VOLUME 15 NO. 3
May – June 1952

Journal of

MILK and FOOD TECHNOLOGY

Official Publication

International Association of Milk and Food Sanitarians, Inc.

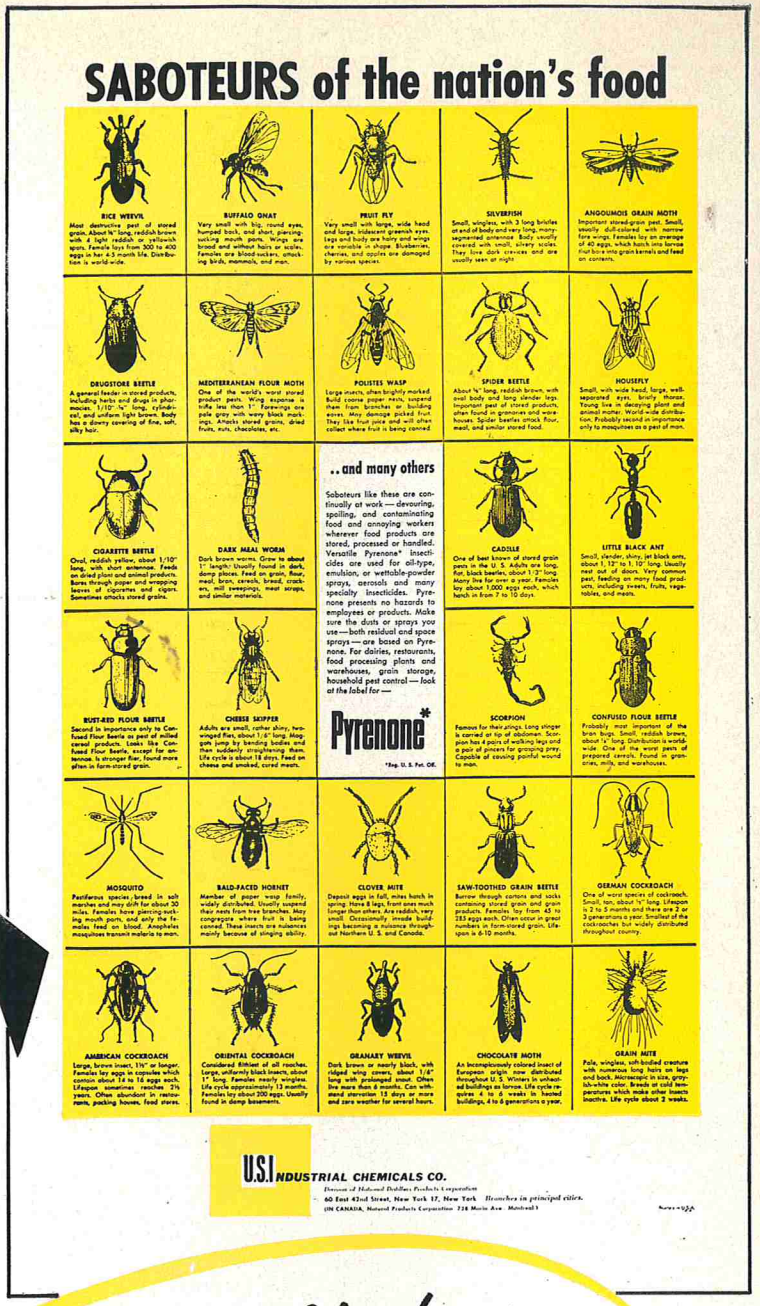
See the bugs you can kill with Pyrenone*

*Reg. U. S. Pat. Off.

These and many more pests that destroy food and annoy workers can be controlled by a program of sanitation and effective spraying with Pyrenone based insecticides. There are all kinds of sprays made with Pyrenone — aerosols, oil-base sprays, emulsifiable sprays and insecticide dusts.

Know the enemy — learn how to identify the pests that cause trouble, then institute a planned program to fight them. You'll be pleased to find that Pyrenone type insecticides give effective results — economically — without hazards to employees or animals or products in processing or storage.

Make sure Pyrenone is on the label of the insecticides you make — or sell — or use!



Free Wall Chart available at your request

Write on your business letterhead for your free copy of this attractive wall chart which illustrates and describes the 28 leading pests you can control with Pyrenone.

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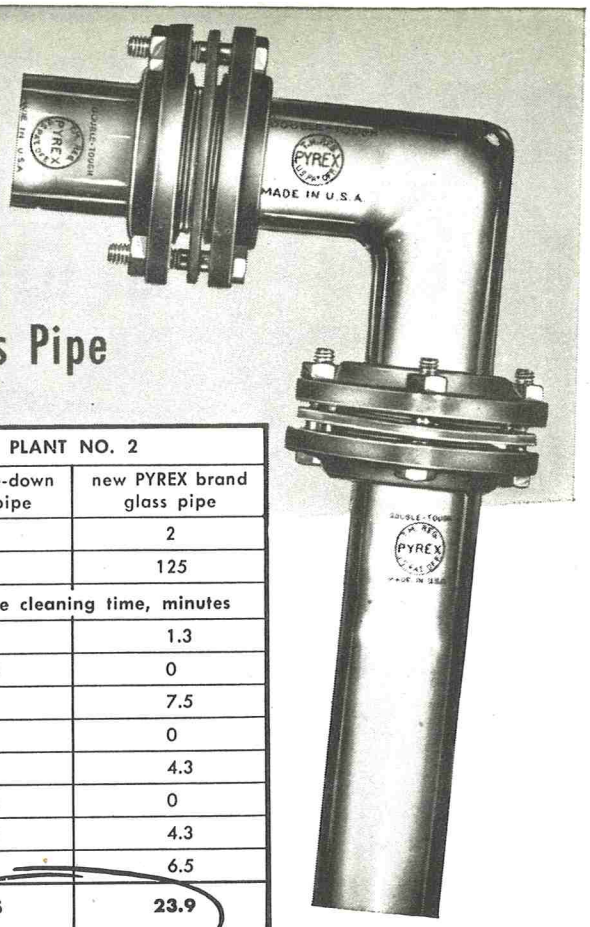
TESTS PROVE:

How two Milk Plants Reduced Clean-up Time by Switching to Glass Pipe



	PLANT NO. 1		PLANT NO. 2	
	former take-down type of pipe	new PYREX brand glass pipe	former take-down type of pipe	new PYREX brand glass pipe
size of line, in.	1½	1½	2	2
line length, ft.	64	80	125	125
	productive cleaning time, minutes		productive cleaning time, minutes	
rinse	0	2.0	0	1.3
disassemble	10.3	0	23.0	0
wash	0	4.5	0	7.5
wash, rinse	6.1	0	8.1	0
rinse	0	5.8	0	4.3
reassemble	14.6	0	34.0	0
sanitize	1.7	4.0	2.4	4.3
miscellaneous	0	8.8	0	6.5
total productive cleaning time	**32.7**	**25.1**	**67.5**	**23.9**

The *MORE* Pyrex brand glass pipe you use the *MORE* you *SAVE* in cleaning costs!

The table above is based on comparative studies in two milk plants which have replaced their old take-down type of pipe with permanent PYREX brand glass pipelines. Note the important fact that—while it takes about twice as long to clean twice as much take-down type of pipe—the cleaning time for glass pipe remains almost constant.

As you get into longer lines, the cleaning time for both types increases—*but the increase is much slower for glass pipe.* This is accurately reflected in Table II at right which gives the ratio of cleaning time for both types of pipe at various line lengths. Note that the more glass pipe you use, the greater the difference in cleaning time . . . *and the more money you save.*

To get the complete story on how you can save with PYREX brand glass pipe, send to Corning Glass Works for the reprint entitled, PERMANENT PIPELINES CUT CLEANING COSTS, written by F. F. Fleischman, Jr., and R. F. Holland of the Dairy Industry Department at Cornell University.

LINE LENGTH, FT.	RELATIVE CLEANING TIME	
	Take-down Pipe	Glass Pipe
40	1	1
100	2	1
200	3	1
500	4	1
1000	5	1

These figures are valid only when glass line is connected in one complete circuit for cleaning.

PYREX BRAND GLASS PIPE IS DISTRIBUTED BY CREAMERY PACKAGE MFG. COMPANY AND CHERRY-BURRELL CORPORATION

PYREX

CORNING GLASS WORKS, CORNING, N.Y.

Corning means research in Glass

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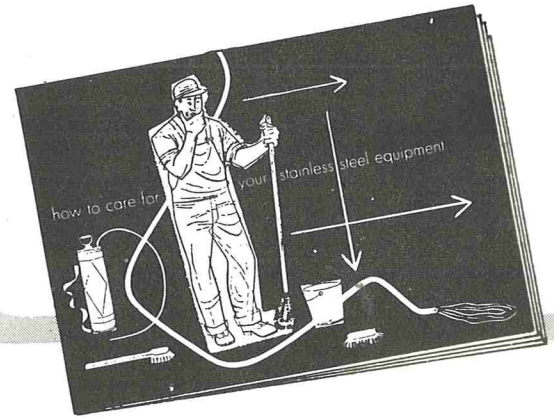

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What type of brushes to use on stainless steel? Should parts and fittings be soaked or brushed? How can milkstone be prevented where hard water is used? Which cleaner should be used on high temperature heat exchange equipment —alkaline, neutral or acid? You'll find the answer to these and many other every-day questions on the care and cleaning of stainless steel in Cherry-Burrell's new booklet, "How to Care for your Stainless Steel Equipment," yours free for the asking.

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trendmaker in a great industry

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.

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Journal of

MILK and FOOD TECHNOLOGY

INCLUDING MILK AND FOOD SANITATION

Official Publication

International Association of Milk and Food Sanitarians, Inc.

VOL. 15 — MAY-JUNE — NO. 3

Editorials — CONTENTS — *Page*

For this ...

recommend

J & J

RAPID-FLO

Trade Mark of Johnson & Johnson

Fibre-Bonded

FILTER DISK

in the ***proper size***

for the strainer

NOT THIS

Strainer Showing By-Pass

Strainer with Perfect Filtration

BY-PASS OF UNFILTERED MILK MAY EVEN BE CAUSE FOR REJECTION

With today's urgent need for every drop of Quality Milk produced, the right *size* filter disk is just as important as the right *type*. Many farmers trying to cut costs may mistakenly use a filter disk too small for their strainers. By-pass of unfiltered milk will result and can cause loss to plant, producer and hauler.

That's why all three types of J & J Rapid-Flo FIBRE-BONDED Filter Disks (no gauze facing, single gauze-faced, double gauze-faced) are made in sizes to fit all strainers now in general use.

What's more, the exclusive J & J Fibre-Bonding Process makes Rapid-Flo Filter Disks safer, more retentive and stronger, avoiding fibre-separation and assuring a more reliable Rapid-Flo Farm Sediment Check-Up.

Dairy technicians, sanitarians, fieldmen, and leading health authorities know that everybody benefits from proper filtration. They urge the Rapid-Flo Strainer Check-Up for correct disk-size as well as right type.

ROUTE No. _____ PATRON No. _____

FILTER-STRAINER CHECK-UP

More milk of top quality is needed this year than ever before because of increasing populations all over the country. So it's more important than ever before to avoid loss of milk frequently caused by using the wrong size and type of milk filter disk. We want to make sure you are using the right size and type for your strainer. To be sure, just follow these few simple steps.

1. Place your strainer on the opposite side of this card and with a pencil trace the outside (bottom) of your strainer. (Follow pictures for directions.)

2. Indicate a few of the slots or holes in the bottom baffle or support plate of your strainer by tracing your pencil around the edges. This will assist us in identifying the type of strainer you are using. If your strainer has no support or bottom baffle, indicate this fact on this card.

3. PLEASE ANSWER THE FOLLOWING IMPORTANT QUESTIONS.

What size filter disks are you now using? _____

Plain (no gauze) _____

Single face (Gauze on one side) _____

Double face (Gauze or cloth on both sides) _____

What make or brand of filter disk are you now using?

(TURN OVER)

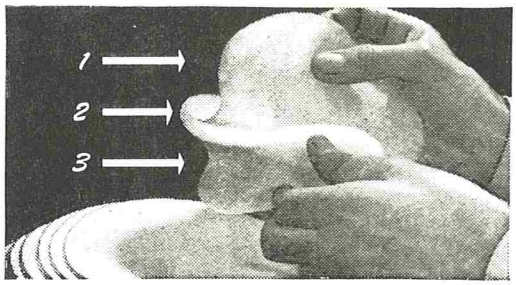
Your J & J Filter Products Field Service Representative will cooperate with you fully in providing a sufficient number of check-up cards like this for all your producers. Contact him, or write the factory for details.

FILTER PRODUCTS DIVISION Johnson & Johnson 4949 WEST 65th STREET CHICAGO 38, ILLINOIS

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

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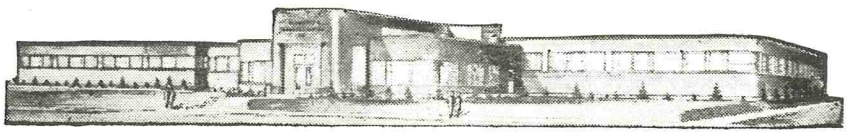
Manufacturers of Perfection, Blue Streak, Elgrade, and DUBL-CHEM-FACED Filter Discs, Rolls, Bags and Tubes . . . Fray-Seal Cheese Bandages and Circles . . . and a complete line of cotton goods for the Dairy Industry.



Roccal BRAND SANITIZING AGENT

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.

In recommended dilutions Roccal is:

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

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

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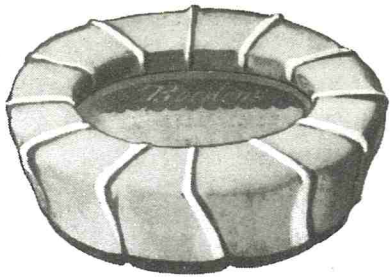
Distributed in the Dairy Field by Cherry-Burrell Corp. and other leading dairy supply houses.

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

We can take milk's goodness for granted

...because he didn't



You might have passed him by... this old man whose eyes shone with a young man's purpose. He was fifty-six, and his hair and beard were white. His clothes were threadbare. He was penniless and being sued for debt besides. He had tried many things and had known failure. But he had three assets left: Integrity, the will to win, and a good name. This was Gail Borden...

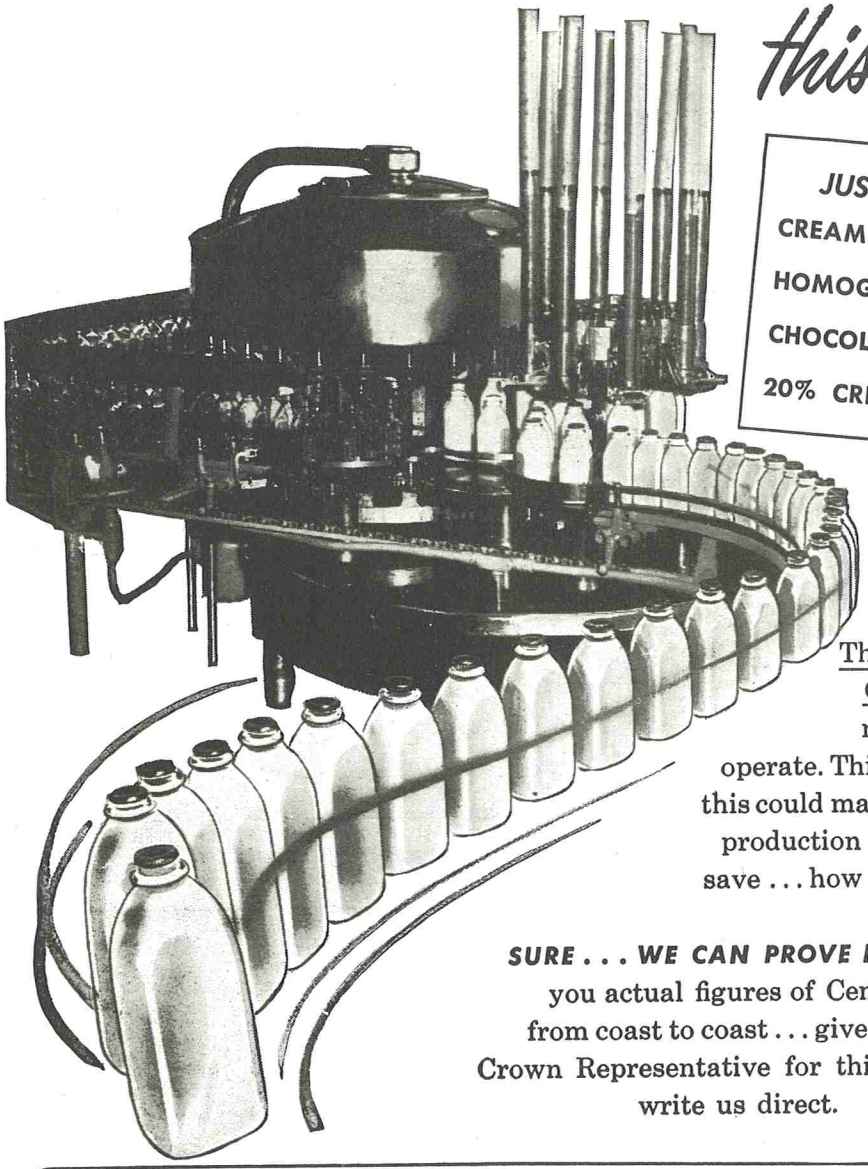
Many adults and thousands of infants were dying yearly in New York from infected milk...when Gail Borden finally achieved his dream...the manufacture of condensed milk that stayed pure, fresh and wholesome. He made milk *safe* for you. * He established the first code of sanitation in dairy practice, and fought ceaselessly for cleanliness. He paid his dairymen to destroy infected milk. * The quality in the bottle of milk we take for granted today is only part of the Borden story. The Borden Company in 1857 began the manufacture and distribution of Gail Borden's newly invented condensed milk, the first milk food for infant feeding. * Borden's "firsts" have been many. First to manufacture a dried milk specialty for infant feeding—Dryco. * First to provide a specially prepared food for infants, children, and adults allergic to milk—Mull-Soy. * First to provide a complete infant food carrying the fatty acid pattern and amino acid pattern of human milk—Bremil. * The lists of Borden contributions to the development of milk in all its forms as a safe, dependable source of nutrition are too many to list here in their entirety. * But if it's Borden's—it's got to be good.

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

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

Talk about *speed*...

this filler has it!



JUST LOOK AT THESE FIGURES:

CREAM LINE MILK	135 BPM
HOMOGENIZED MILK	130 BPM
CHOCOLATE MILK	125 BPM
20% CREAM	120 BPM

These are only rated capacities for Cemac 28. They are exceeded in many dairies . . . every day they operate. Think what a difference speeds like this could make in your plant . . . the balanced production you'd have . . . the time you'd save . . . how you could increase your profits.

SURE . . . WE CAN PROVE IT . . . we will be glad to show you actual figures of Cemac operating speeds in dairies from coast to coast . . . give you names of owners. Call your Crown Representative for this information, or if you prefer, write us direct.

Dependability, too! Look at Cemac from any angle . . . construction . . . dependability . . . efficiency . . . economy . . . you'll find this filler head and shoulders above the rest. Compare Cemac with any other filler . . . at any price. See it in actual operation . . . then make your own decisions.

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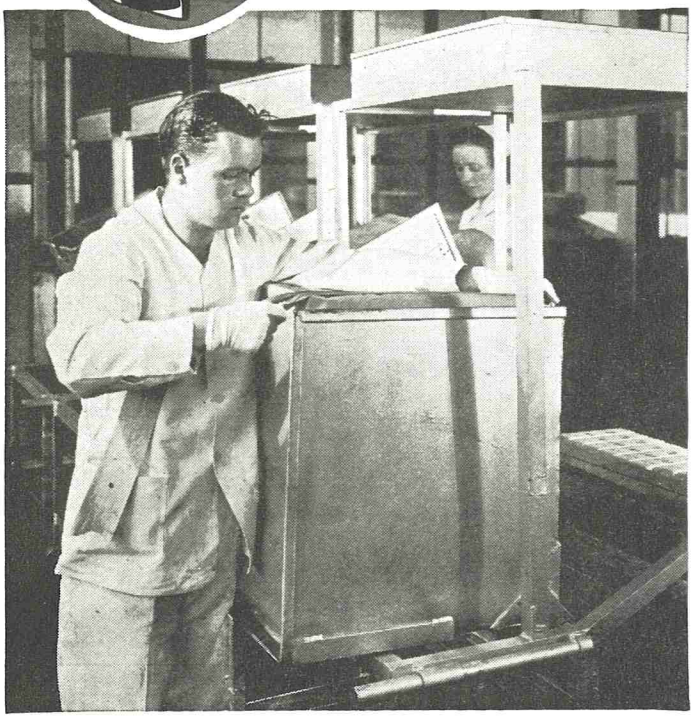
VACUUM MILK FILLER

The Greatest Performer of them all

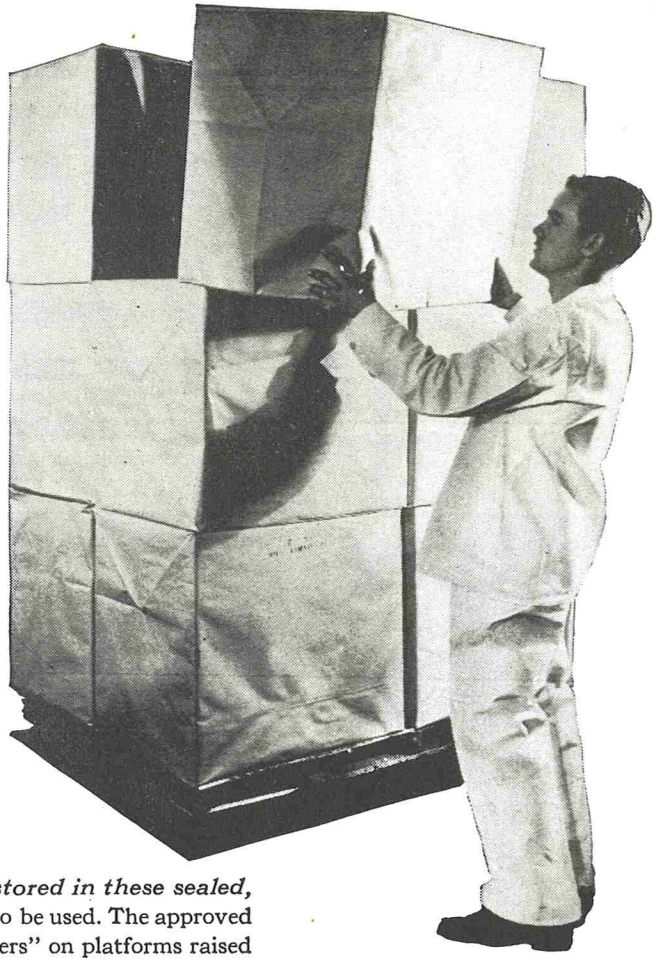
. . . AND REMEMBER, THE GREATEST COMBINATION OF THEM ALL IS CEMAC AND THE DACRO P-38 CAP!

THROUGH THE EYEPIECE

(Crucial Points in Bacterial Control of Canco Milk Containers)



1. This picture shows the dustproof, heavy paper "carriers" in which Canco milk containers are shipped to the dairy. In strictly sanitary surroundings, the "carriers" are carefully sealed before shipment.



2. At the dairy, Canco containers *are stored in these sealed, dustproof "carriers"* until they are to be used. The approved dairy procedure is to stack the "carriers" on platforms raised off the dairy floor.

3. Shows man removing sealed containers from opened carrier and placing them on the filling line. This operation usually takes place in a separate room from the filling operation.

HELPFUL SUGGESTIONS by Public Health Authorities have been instrumental in improving the technique of handling Canco paper milk containers. The technique is so perfected that finished Canco containers reveal no bacteria at all in 80% of the cases.[1] The remaining 20% show an average of .007 organisms per cc. Good evidence shows that laboratory contamination is responsible for a large proportion of positive findings in rinse technique.

(1) The Journal of the Texas Public Health Association, 2-50

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CANCO

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HOW MUCH CAN **Permanent Lines** SAVE YOU?

Stainless Steel TUBING or PYREX Glass Pipe

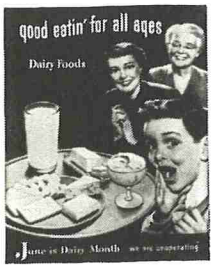
can engineer either to meet your needs and advise which is better for you

Many dairies have reported savings in cleaning costs up to 50% since installing permanent milk lines with in-place cleaning. Whether *you* can realize similar savings depends upon your plant layout, length of lines and other factors. *Let CP advise you.*

CP is thoroughly experienced in engineering complete permanent milk line systems. Using either stainless steel or PYREX "Double Tough" Glass Pipe, whichever is better for *you*, CP can provide a system designed to give you the most in economy and efficiency. And you can count upon getting an impartial recommendation—because CP is a leading supplier of *both* stainless steel tubing and glass pipe for permanent lines.

Find out now what permanent lines can do for you. For practical advice call in your CP Representative.

is a National Distributor for PYREX "Double-Tough" GLASS PIPE and is Headquarters for Stainless Steel Tubing through 21 Branch Sales Offices, Coast to Coast



PYREX "Double-Tough" Glass Pipe, part of a complete permanent milk line system engineered by CP. These lines are cleaned in place, eliminating disassembly and reassembly time and costs.

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Surrey, England

Editorial Notes

PUBLIC HEALTH SERVICE DISEASE REPORTS, 1950

Here, again, is our familiar "home-made" tabulation, with 1950 figures added.

NUMBER OF OUTBREAKS

	1944	'45	'46	'47	'48	'49	'50
Milk and milk products	36	24	12	17	13	11	8
Ditto suspected	5	5	6	5	4	4	2
Other foods	288	272	287	292	304	331	341
Ditto suspected	10	3	12	24	22	34	6
Water		20	25	20	16	24	15
Ditto suspected		6	7	4	5	1	1
Undetermined vehicles		12	6	27	10	9	7

For two reasons, only very general comments on the 1950 reports are warranted or desirable. The first is that, due to lack of necessary personnel in the Public Health Service office now handling the reports, the usual explanatory notes (concerning some outbreaks) were omitted. The more than ordinarily meager information and the long recognized variability in adequacy and quality of the local reports received by the Service leave little on which to base detailed or constructively critical comments.

The other and much more important reason is that, a year ago or thereabouts, the handling of these reports was turned over to the National Office of Vital Statistics. This is now a part of the Public Health Service. Changes in methods of handling the data are under active consideration. It is no reflection on those who, in the past, have been struggling with an almost impossible job to regard this as encouraging. By the time the data available to the service has been "processed" by a group of statistical experts it may well be that we, in the field, will get less of it. But it is reasonable to expect that what finally comes through will be dependable.

It is no violation of confidence to say that the writer was recently accorded the courtesy and privilege of being invited to submit comments and suggestions concerning the handling of the reports. This was done. The spirit in which the comments were made and received is evidenced by the fact that this editorial was not undertaken without the prior approval of the Office of Vital Statistics.

GENERAL COMMENT

Of the 8 outbreaks attributed to milk and milk products, the largest was 5 cases, the smallest 2. Five were food poisoning, 3 undulant fever. A person would have to be optimistic in the extreme to believe that these few very small outbreaks were all for which milk and milk products had been responsible, in a year, in the United States.

Of the 14 waterborne outbreaks, 8 were charged to wells and other private supplies. There was an outbreak of 117 cases of "acute dysentery"; one, 8 cases, infectious hepatitis one typhoid fever, 7 cases; the rest were gastroenteritis. The largest proportion reported from any state was 5 gastroenteritis from New York.

As for foods other than milk etc., the information was too limited to warrant many conclusions. The first of the three largest outbreaks was one of 615 cases of food infection in a Los Angeles hospital. The responsible organism and vehicle were not identified. Staphylococcus food poisoning was responsible for 600 cases in Omaha, Nebraska; vehicle, cream pie. An outbreak of 677 cases of gastroenteritis was reported as occurring in Orange County, N. Y.;

vehicle and source of contamination not identified. This outbreak occurred in a large State mental hospital located at Orangeburg, Rockland County, N. Y. From information available to the writer, the cause may have been *Staphylococcus aureus* toxin.

SOME JUSTIFIABLE CONCLUSIONS

So far as these outbreaks reported are concerned the outlook is encouraging and promising. The most difficult part of the Public Health Service's job is to get adequate, understandable and dependable reports from the states and other reporting agencies. Only a high degree of local interest and cooperation will make this possible. The honest efforts of the Public Health Service to provide important and needed information should be — and are — appreciated. It is to be commended for its latest move in this direction.

Paul B. Brooks

THIRTY-NINTH ANNUAL MEETING
NICOLETT HOTEL - MINNEAPOLIS, MINN., SEPT. 18-20, 1952

New Books & Other Publications

ICE CREAMS AND OTHER FROZEN DESSERTS, by J. H. Frandsen and D. H. Nelson. Published by the author, Amherst, Mass. 1950. 318 pages. 48 illustrations. Price $5.25.

This book is a concise handbook for the dairy student, plant operator, and ice cream salesman. A large amount of practical information is assembled in a form easy to understand and apply. The 24 chapters start off with the history of the industry, then the food value of ice cream, classes of these frozen products, composition, ingredients, stabilizers, flavors, calculation of mixes and costs, processing the mix, packaging, hardening, specialties, formula defects, tests, sales outlets, formulas for fountain use, and a total of 42 tables of useful information.

Federal Food Drug and Cosmetic Act — Judicial and Administrative Record 1949 - 1950. By Vincent A. Kleinfeld and Charles Wesley Dunn. Published by the Commerce Clearing House, Inc., Chicago 1, Ill. 1951. 543 pages. $10.25.

This is the second research book in the "Food Law Institute Series." (The first was reviewed in this Journal, **13**, 309 (1950)). The first portion (pages 21 - 282) contains all opinions and collateral interpretations as published in the law reporters and notices of judgment. Then follows (pages 283 - 290) statements of general policy and interpretation under the Act. The third section (pages 291 - 394) carries in full text the definitions and standards for food. Pages 407 to 525 carries copies of several of the Acts, various forms, a cumulative table of cases, supplementary to the authors' previous compilations, and an index of 17 pages.

ADVANCES IN FOOD RESEARCH, Vol. III, edited by E. M. Mrak and G. F. Stewart. Published by Academic Press, Inc., New York, N. Y., 1951. 518 pages. Price $9.50

This volume continues the practice of covering a wide variety of important subjects in the advance of food research.

Enzyme - Catalyzed Oxidative Browning of Fruit Products. M. A. Joslyn and J. D. Ponting, pages 1 - 47, review the literature of browning (about 200 references), discuss the enzymic reactions, and the industrial control practice based on the assumption that this browning is due to the reaction of polyphenobase with oxygen; selection of fruit of proper refining, removal of oxygen, adjustment to optimum pH, addition of antioxidants and saline inhibitors, and heat inactivation of phenolase.

Physical and Chemical Aspects of the Production, Storage, and Utility of Dry Milk Products, by S. T. Boulter, Robert Jenness, and W. F. Geddes, pages 47-118, with about 300 references. The subject is reviewed under the captions: properties and quality requirements, manufacture, and chemical changes. The great expansion in the preparation of dry milk products has not resulted in sufficient basic research to overcome some loss of palatability and redispersibility.

Electromagnetic Radiation Fundamentals and Their Applications in Food Technology, by B. E. Proctor and S. A. Goldblith, pages 120-196. About 175 references. Infrared radiation, radio waves, and radio-frequency treatment have no bactericidal effects other than heating. Sonic vibrations are unable to sterilize packaged foods because of technical limitations of the materials. Radioactive isotopes have not sterilized effectively, and moreover, create a food hazard by their residual radioactivity. Cathode rays (beta particles) do effect sterilization but flavor defects have not been overcome. X-rays are bactericidal but too weak to be practical for the food industry. Ultra-violet light has been successfully used for surface and air sanitization.

(continued on page 109)

THE SMITH 0.01-ML SYRINGE IN THE MICROSCOPIC GRADING OF MILK

By R. W. Newman, *Dairy Bacteriologist,*

Dairy Service Laboratory
California Department of Agriculture, Sacramento 14, California

The 0.01 ml Smith syringe was developed to overcome the serious errors in measurement which occur when a 0.01 ml glass pipette is used in high-speed, large-volume microscopic grading of milk. This syringe has been used exclusively by the California Department of Agriculture since January, 1949, and has brought about a revolutionary improvement in accuracy. Measurement of the 0.01 ml volume is automatically accurate.

A recent contribution of importance to the Breed method has been the development of a new mechanical device for measuring the 0.01-ml volume of milk. In view of the possibility that it may be recognized in the forthcoming edition of *Standard Methods for the Examination of Dairy Products,* a description of its nature and operation may be of considerable interest.

The Breed direct microscopic count method[1,2] has been used since 1924 in California and has been an indispensable means for the rapid field grading of milk used for manufacturing purposes. Adoption of the Breed method was followed, in 1926, by the introduction of a combined defatting-fixing-staining solution[3] which considerably increased the speed and efficiency of platform grading. Our second improvement in terms of speed and accuracy has been the adoption of the Smith syringe for measuring the 0.01-ml portion of milk.

In 1945, while the writer was making a survey of the microscopic count technique used by our field inspectors one of them, Mr. Ralph Smith, showed me his first crude model of what he called a mechanical pipette. The fundamental advantages and possibilities of this device were so apparent that every encouragement was given Mr. Smith to develop the idea into a practical working model. Lacking necessary lathes and tools, he enlisted the aid of a local jeweler, Mr. George S. Riggs.* He turned over the patent rights to Mr. Riggs who finally perfected the device and placed it on the market about two years ago.

In the accompanying photographs, Plate I shows the exterior appearance of the syringe assembled ready for use, while Plate II shows the syringe taken apart to indicate details of its working parts.

Basically, the device operates on the principle of the hypodermic syringe except that the conventional plunger has been replaced with a wire about 0.5 mm in diameter. Pressure on this wire plunger forces it down to the tip through which it protrudes slightly to facilitate spreading of the milk over the 1-sq. cm. area. After spreading is completed, the plunger is released and a spiral spring causes the wire to return instantly to its original position.

Prior to each sample, the syringe is rinsed in clean, cold water containing an approved quaternary ammonium compound (2 drops to 6 ounces of tap water). The quaernary ammonium compound is used to prevent growth of bacteria with danger of subsequent contamination from this source during hot weather. Rising is accomplished by drawing in and expelling the water three times. This is followed by a similar rinse in the sample of milk or cream to be examined.

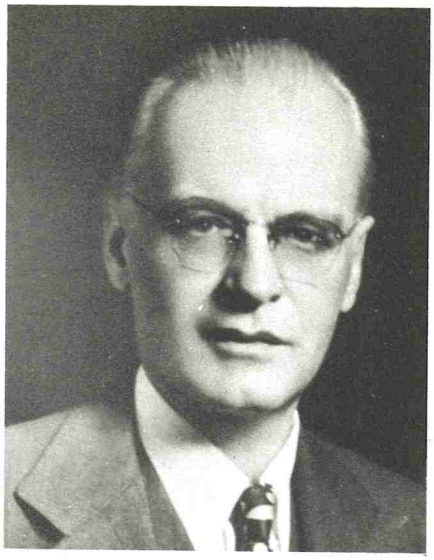
Then, with the tip of the syringe beneath the surface of the milk (or cream), the plunger is released. After wiping the excess milk or cream from the tip with a clean, dry flannel cloth, the 0.01-ml charge is expelled in the center of the 1-sq cm area. The syringe is held *vertically* during expulsion and spreading of the milk.

Spreading is done with the tip of the syringe, beginning at the periphery of the round 1-sq cm area and working in toward the center, using care to spread the milk or cream evenly. In order to prevent any milk being withdrawn into the syringe from the film, the plunger must not be released until the tip of the syringe has been removed from the film. Rising with water and milk are repeated between each successive sample of milk or cream.

At the end of each day's work, the syringe immediately is taken apart and the wire plunger and the inside of the barrel are wiped dry with clean, dry flannel, care being taken not to loosen the locknut screw on the plunger assembly.

These syringes are easily calibrated by expelling and spreading milk (at 20° C) onto a glass slide. The slide is counterbalanced on the pan of a chainomatic balance and then counterbalanced again with the exact weight of 0.01 ml of milk

*Mr. George S. Riggs of Riggs & Nisson, 913½ "Eye" Street, Modesto, California. Patent granted 1950.



Mr. Newman graduated from George Washington University with B.S. in bacteriology. He served 19 months in World War I, U.S. Department of Agriculture, U. S. Hygenic Laboratory (U.S.P.H.S.) both in Washington. He returned to California in 1921 as Dairy Bacteriologist, Bureau of Dairy Service Laboratory, California Department of Agriculture. He has studied particularly the simplification of staining and other procedures of Breed direct count method, first routine procedure for the bacteriological examination of frozen desserts and ingredients, procedures for isolating and identifying food poisoning and other organisms in dairy products, etc.

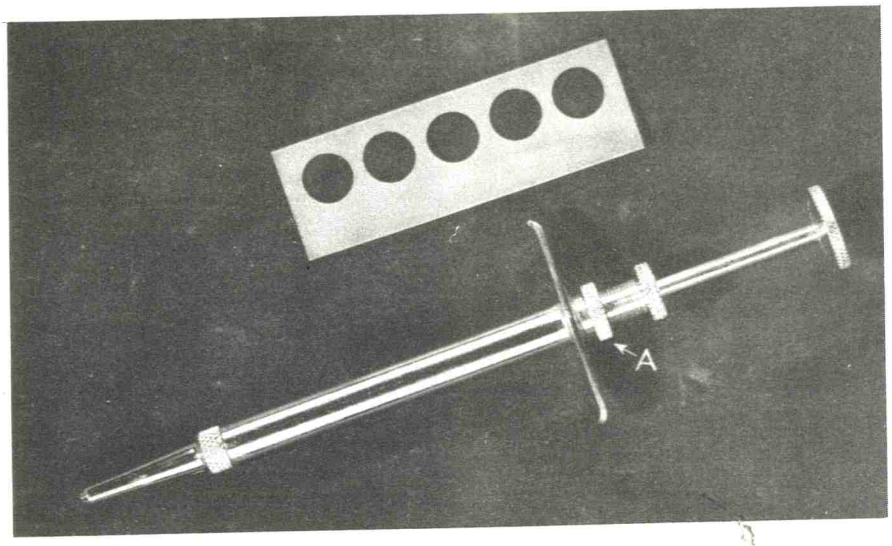


PLATE I. Smith 0.01 ml. syringe ready for use together with round area slide for milk films.

(0.0103 gm) *before* the milk is added to the slide.

After drawing up the charge, the syringe tip is wiped free of adhering milk, then held vertically on the slide while expelling the milk, using a rotary motion beginning at the periphery and ending at the center of the round 1-sq cm area. The syringe is held vertically until spreading is completed and plunger is not released until after the syringe is raised from the milk film. Spreading and re-weighing must be done very rapidly in order to prevent evaporation of milk. The syringes are adjusted until four to six consecutive weighings agree at 0.010 gm (as close to 0.0103 gm as possible). As these syringes are used in the same manner in field work (vertical expulsion, spreading, release of plunger after removal from milk film), any error resulting from milk adhering to the tip upon removal from the film should be reduced to a minimum.

Adjustments are made by tightening or loosening locknut "A" until the syringe consistently delivers exactly 0.010 gm of milk. The nut then is locked at that position by means of a small set screw. Thereafter, except when necessary to readjust the plunger stroke in order to assure 0.01-ml deliveries, this locknut screw must not be loosened.

It might be considered desirable to check the calibration of these syringes at twelve-month intervals in order to correct any errors possibly due to wear or other causes.

It will be noted that reference has been made to the use of round 1-sq cm areas. Conventional 1"x3" glass slides has been sandblasted to provide five circular areas (diameter 1.1285 cm) together with marginal space for identification purposes (Plate I). This type of slide was developed by us* in order to facilitate rotary spreading. When one is working at high speed, the natural tendency is to use a quick rotary motion which is not feasible with square areas. With the latter, the square has to be carefully, painstakingly outlined and then the center portion filled in. The tendency is to skip the corners of the area and all too often, in outlining the square, the line may waver and the result may be an approximation rather than a true square. On the contrary, when using the natural rotary spreading there are no troublesome corners to contend with and the saving in time and nervous tension may be devoted to greater care in making the films. An additional saving in time occurs when the tip of the syringe is used for spreading.

*The technique of sand-blasting these round area slides was devised in this laboratory by Mr. Loyd Stout, Laboratory Technician.

PRACTICAL VALUE

While these factors are of little importance to those working in a laboratory and under laboratory conditions where the time element is not a pressing problem, they are of major importance in high-speed field grading where often there is no time even to drop the syringe or pipette and take up a spreading needle.

Twenty-seven inspectors of this department devote their full time to the field grading of manufacturing milk. All of them have used these syringes exclusively since January, 1949, when, after some 25 years, the use of glass pipettes finally was discontinued. After using

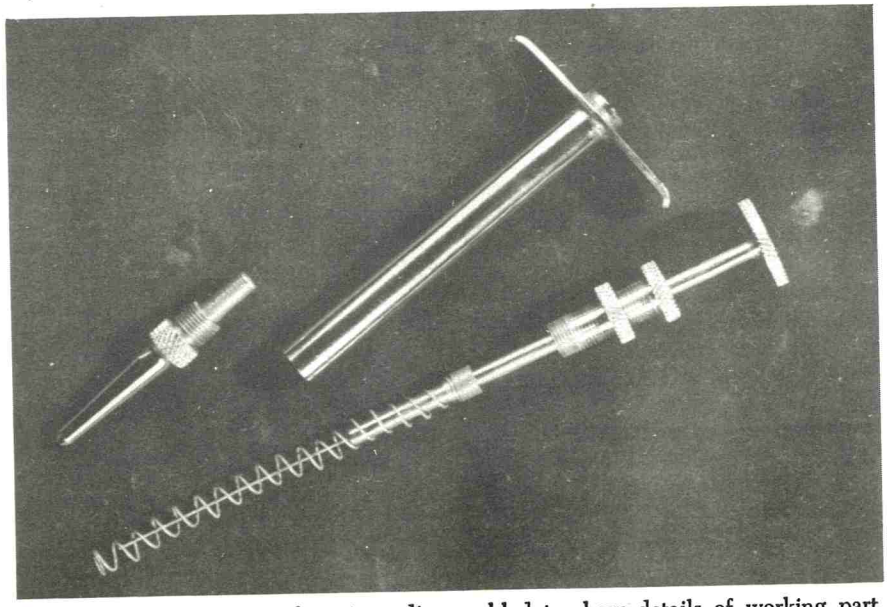


PLATE II. Smith 0.01 ml. syringe disassembled to show details of working part.

this syringe in high-speed field grading of manufacturing milk for over two years under the most adverse conditions which exist on delivery trucks and on receiving platforms, we have found it to be one of the most important and useful single contributions to the direct count procedure. In this work it has eliminated the fundamental errors encountered in practical high-speed, large-volume field work which had occurred with the glass pipette such as: (1) errors in measurement, (2) presence of split columns of milk, (3) presence of air or water bubbles in the milk column, (4) presence of water or milk "foam" in the capillary above the milk column, (5) plugging of the capillary with curd particles, (6) removal of milk from the film itself when the glass pipette is lifted from the slide (milk redrawn into the capillary), (7) broken glass pipettes at awkward moments, (8) broken or chipped tips to impair accuracy, and (9) overcoming of objection raised by some dairymen who, occasionally observing field men at work, believe that the use of a glass pipette is an insanitary procedure because of the danger of saliva running through the capillary of the pipette and thus contaminating their milk samples, saliva being associated by them with bacteria.

The syringe also has saved considerable operational time in that the tip of the syringe is used for spreading the milk over the 1-sq cm area on the slide. Each syringe is calibrated to compensate for the milk which adheres to the tip. This amount of adhering milk is quite uniform because calibration and spreading always are done with the syringe held in the same position, i. e., vertically. By using this syringe it is possible to obtain automatically accurate measuring of the 0.01-ml volume regardless of the speed with which it is used.

Its use has resulted in a revolutionary improvement in accuracy and speed which has been reflected consistently in the periodic check reports on direct count technique. Because of the ease and convenience of operation, none of our men willingly would return to the use of the old glass pipettes.

THE BACTERIAL COUNTS ON PASTEURIZED MILK HELD IN REFRIGERATED STORAGE

C. W. Chaffee

Senior Inspector, Department of Farms and Markets, Hartford, Connecticut

The Department of Farms and Markets has the responsibility of the quality of milk sold in Connecticut. The Bureau of Laboratories of the State Department of Health is the official laboratory used by the Department of Farms and Markets for official analysis of samples of milk and dairy products.

In order to obtain information as to what happens to pasteurized milk in refrigerated storage, the following procedure was used on samples submitted to the Bureau of Laboratories by the Department of Farms and Markets from Dealers A and B. Six quarts of freshly pasteurized milk, that were consecutive bottles from the filler near the middle of the run of the grade of milk being processed, were well iced, and delivered to the laboratory within ½ hour for analysis.

Bottle No. 1 was tested for bacteria and put in refrigerated storage. Bottle No. 2 was also tested for bacteria to provide a check on the duplication, and was then tested for fat, solids, flavor and odor, and discarded. Bottles Nos. 3, 4, 5, and 6 were placed in refrigerated storage until used. The next day, Bottle No. 1 was again tested for bacteria. Bottle No. 3 was tested for bacteria, fat, solids, flavor, and odor, and then discarded.

The following day, Bottle No. 1 was again tested for bacteria, and the same procedure used on Bottle No. 4 as had been used on No. 3. The next day, Bottles Nos. 1 and 5 were tested, and Nos. 1 and 6 on the next day. The purpose in running the bacteria counts for six days on the same sample was to see if the repeated agitation had any apparent effect on the bacteria count.

The above procedure was also used by laboratories C, D, and E in their own approved laboratory, such laboratories operating under the approval of the Bureau of Laboratories of the State Department of Health.

Grade A Milk — Tested By Bureau of Laboratories

Freshly past. -3000-3000

Dealer A

Sample No.	1	2	3	4	5	6
Freshly past-3000-3000						
Stored 1 day-3000	-3000					
Stored 2 days-3000		-3000				
Stored 3 days-3000			-3000			
Stored 4 days-3000				-3000		

Dealer B

Freshly Past -3000-3000						
Stored 1 day -3000	-3000					
Stored 2 days-3000		-3000				
Stored 3 days-3000			-3000			
Stored 4 days-3000				-3000		

Approved Milk — Tested By Bureau of Laboratories

Dealer A

Sample Nos.	1	2	3	4	5	6
Freshly Past 15,000 18,000						
Stored 1 day 32,000	28,000					
Stored 2 days 18,000		18,000				
Stored 3 days 19,000			17,000			
Stored 4 days 16,000				19,000		

(continued on page 114)

1. Breed, R. S., The Determination of the Number of Bacteria in Milk by Direct. Microscopic Examination. *Centralbl. f. Bakt.*, II Abt., **30**:337 (1911).

2. *Standard Methods of Milk Analysis*, 4th ed., American Public Health Association, New York, pp. 11 - 16, (1923).

3. Newman, R. W. A One-Solution Technique for the Direct Microscopic Method of Counting Bacteria in Milk. *Monthly Bull.*, Calif. Dept. Agri., **16** 1 - 7, (1927).

OBSERVATIONS ON THE COLONY PRODUCTIVITY OF SIX MILK PLATING MEDIA

VIVIAN PESSIN

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AND

A. H. ROBERTSON*

Director, State Food Laboratory, Department of Agriculture and Markets, Albany, N. Y.

Colony productivities of 5 media (2 containing skim milk, 2 milk-free, and 1 synthetic) have been compared with that of the official (TGEM) medium, authorized by the American Public Health Association. The chief objective was to discover a suitable milk-free medium to replace the TGEM medium. Work on improving the milk-free media is being continued. The synthetic medium (selected amino acids, vitamins, purines, pyrimidines, mineral salts, glucose and agar) gave about 95 percent productivity of the TGEM medium. A synthetic medium has potential use as a reference productivity standard.

EVER since the American Public Health Association (APHA) accepted the present Tryptone Glucose Beef Extract (Skim Milk) Agar (TGEM) plating medium,[1] effective on July 1, 1939, repeated complaints have been made about the particulate separation (some undissolved portions from skim milk powders, when reconstituted and used, but more often of the progressively precipitating masses of flocculent skim milk solids in the melted medium) and the resulting mistaken colony identification of the particulate matter. Even when fresh skim milk is uniformly distributed, the medium has a slightly cloudy appearance. In addition, one cannot ignore the inconvenience of locating a suitable source of fluid skim milk or of rehydrating skim milk powders and the nuisance of weighing or measuring the quantities needed.

The APHA Committee was responsible for authorizing the addition of skim milk to the plating medium, for reasons which at that time seemed justifiable, the aim being to get with maximal uniformity the highest Standard Plate Counts obtainable by using an improved plating medium and by incubating the poured plates for 48 hours ±3 hours at a preferred temperature of 32°C. Because the Standard Plate Count may not be appreciably reduced in some instances by the failure to include 1 percent of skim milk (average reduction from about 5 to 8 percent), some laboratories have deliberately omitted skim milk from the plating medium. (Although the Eighth Edition of Standard Methods authorized the optional use of 32°C and 37°C for the incubation of plates, it was disclosed before the Ninth Edition of Standard Methods was printed that most laboratories would prefer to incubate their plates at 35°C, if the use of this temperature were authorized. Since some laboratories had unqualifiedly accepted 32°C incubation as official for their jurisdictions, the optional use of either 35° or 32°C incubation temperature is authorized in the Ninth Edition.)

Buchbinder *et al.*[2] directed attention at the 1948 Annual Meeting of the APHA: (1) to the possibilities of one or more milk-free plating media with colony productivities nearly equal to those obtained on the official TGEM medium, and (2) to a realization that a magnitude of colony counts could be adjusted slightly by making small changes in the proportion of the ingredients in the medium.

In 1949, the Laboratory Methods Committee[3] of the *International Association of Milk and Food Sanitarians* (IAMFS) undertook to compare the colony productivity of five candidate plating media with that of the officially recognized

Vivian Pessin; B.A., Hunter College; M.A., Columbia University. Statistician Division of Milk Sanitation, New York State Department of Health. 1937–1941. Senior Statistican, New York City of Health, 1941 —. Referee (Statistical Consultant), Subcommittee on *Standard Methods for the Examination of Dairy Products*, A. P. H. A. Coordinating Committee on Laboratory Methods, 1951.

*The Chairman of the Subcommittee on *Standard Methods for the Examination of Dairy Products* of the American Public Health Association herewith acknowledges the valuable help of C. A. Abele, Luther A. Black, Leon Buchbinder, and Samuel R. Damon in organizing and executing this study, and of both Miss Vivian Pessin, Statistical Consultant to the Subcommittee and formerly Senior Statistician, and Louis Pincus, Senior Statistician, Bureau of Records and Statistics of New York City Department of Health, for guiding the execution and for making the multiple computations needed to establish the relative conformance of the determinations by the candidate media with those on the official APHA medium.

The Subcommittee gratefully acknowledges the unselfish help of each of seventeen participating laboratories: Oak Farms Corporation Laboratories, Dallas Texas; Division of Laboratories, Ministry of Health, Montreal, Canada; Division of Bacteriology and Dairy Research, Department of Agriculture, Ottawa, Canada; H. P. Hood & Sons Laboratory, Boston, Massachusetts; Environmental Health Center Laboratories, Federal Security Agency, Cincinnati, Ohio; City Health Department Laboratories, Denver, Colorado; Division of Laboratories, Department of Health, New Orleans, Louisiana; Caddo Branch Laboratory, Division of Laboratories, State Department of Health, Shreveport, Louisiana; Division of Laboratories, State Department of Public Health, Chicago, Illinois; State Department of Health Laboratories, Austin, Texas; City Department of Health Laboratories, Steubenville, Ohio; Hygienic Laboratory Division, State Department of Health, Charleston, West Virginia; Dairy and Food Control Laboratory, State Department of Agriculture, Madison, Wisconsin; Dean Milk Company Laboratory, Rockford, Illinois; The Borden Company Laboratory, Chicago, Illinois; City Board of Health Laboratory, Chicago, Illinois; and State Board of Health Laboratories, Topeka, Kansas.

Tryptone Glucose Beef Extract (Skim Milk) Agar, Difco (Bacto) dehydrated, Medium No. B2 (TG EM), for plating milk samples using the Agar Plate Method.[1] Directions for their use provided that skim milk was to be added to only one of these candidate media. Among the four skim milk-free media, two had relatively complex formulas.

Based upon the average count obtained on each medium and comparable calculated range distribution about each mean, the data by Pessin and Black[3] disclosed that the colony productivities of the two skim milk-containing media were practically indistinguishable. Two of the skim milk-free media of relatively simple composition possessed many of the desired characteristics of a suitable plating medium, but the colony productivities of each of these exceed the range limits recognized for conformance with the productivity of the official TGEM medium. For obvious reasons, further consideration of the more complex skim milk free media was discontinued.

Following a preliminary report of the results obtained in the IAM FS studies, the Subcommittee on Standard Methods for the Examination of Dairy Products of the AP HA, through the cooperation of two manufacturers of dehydrated plating media, initiated similar tests to determine colony productivities. Their studies included observations on six media, identified as follows:

A. A single batch of Difco agar prepared from the ingredients (an officially recognized procedure), subdivisions of which were shipped to each participating laboratory with directions for adding the necessary amount of rehydrated skim milk prepared from subdivisions of the same lot of powder. In the interests of assuring maximal uniformity, directions, were furnished for rehydration and sterilization and for the addition of the reconstituted milk to known quantities of sterile media in the containers after receipt at each of seventeen laboratories.

B. A candidate TGEM dehydrated medium, prepared according to Formula No. 183-B, by the Baltimore Biological Laboratories, Inc., Baltimore, Md.

C. The officially recognized Difco (Bacto) TGEM dehydrated medium, prepared according to Formula No. B2, by Difco Laboratories, Inc., Detroit, Mich.

D. A candidate dehydrated milk-free medium, by Difco, composed of 0.35% yeast extract, 0.5% tryptone, 0.1% dextrose, and 1.5% agar.

E. A candidate dehydrated milk-free medium, by BBL, composed of 0.9% milk-protein peptone, 0.1% dextrose, and 1.5% agar.

F. A synthetic medium, prepared according to Formula No. S4 by BBL, under the direction of Pelczar and Brown,[4] consisting of 18 amino acids, 8 vitamins, 3 purine bases, 2 pyrimidine bases, potassium acid phosphate, magnesium sulphate, glucose, and agar. (Recent information discloses that a small amount of sodium ethyl oxalacetate added to the original formula for Medium F practically eliminates interfering precipitates and permits reducing the incubation period from 96 hours to 72 hours.)

PROCEDURE

Except for Medium A, all of which was prepared from the identical batch of ingredients in one laboratory for distribution in rehydrated form to each of the seventeen participating laboratories, the remaining five media were furnished by the manufacturer in dehydrated form. Each batch was received in individually-sealed packages without manufacturers identification on the bottle. Each bottle contained about 160 grams, an amount sufficient for at least five liters of prepared medium. The unopened packages were codes with an identifying number for each medium before shipment to each participating laboratory. When each batch of the medium was prepared, each laboratory was directed to determine its pH, using the method normally employed, and to answer a few pertinent questions relating thereto. In the interests of establishing a uniform and reliable electrometric procedure for pH determinations, a separate report[5] on these records will be made at the 1951 annual meeting of the Association.

Directions provided for plating so that from each laboratory 12 usable counts per sample (range limits extended to 20-400 colonies per plate in order to keep the additional work within practical limits) would be available on not less than 25 raw and 25 pasteurized milks. Because of the need for balanced records among the 6 media, no results could be included on any sample with less than 12 usable counts, 2 by each of the 6 different plating media. If any plate among the 12 per sample had spreader growth, an obvious contamination, or a colony count outside of the range, it was necessary to omit from the tabulations the results on the otherwise satisfactory plates on that sample. Regardless of whether the counts per plate conformed to the above 20-400 colony limits, the laboratories were directed to include the counts on all plates poured with the synthetic medium, provided they had no spreaders or obvious contamination. Directions for diluting each type of milk follow.

Dilute each raw milk sample 1:10 by transferring 11 ml of milk to a dilution bottle containing 99 ml of sterile dilution water. From this dilution measure 1 ml to a second dilution bottle containing 99 ml of sterile dilution water. After mixing thoroughly transfer exact 1 ml portions only into each of 12 plates.

Dilute each pasteurized milk sample 1:100 by transferring 1 ml to a dilution bottle containing 99 ml of sterile dilution water. After mixing thoroughly, transfer exact 1 ml portions only into each of 12 plates.

A special order of arranging the plates for each sample, prior to pouring, and also of selecting for successive samples the first pair in the sequence of plates to be poured, appreciably reduced the possibility for high or low count tendencies caused by unequalized sedimentation in and the progressive drying of the 1 ml portions deposited in the plates. Plates for each sample were arranged according to the 6 pairs, as listed below. Test portions were transferred to the

plates in increasing numerical order of plate identity, always starting with Plate 1. Each pair of plates were poured with the respective medium indicated below the plate identities.

Plate Identity	1	2	3	4	5	6
	12	11	10	9	8	7
Medium Used	A	B	C	D	E	F

The order of selecting the pairs of plates first to be poured provided for the pairs of plates for Sample 1 to be poured progressively with Media A, B, C, D, E, and F; for Sample 2, with Media B, C, D, E, F, and A; for Sample 3, with Media C, D, E, F, A, and B; for Sample 4, with Media D, E, F, A, B, and C; for Sample 5, with Media E, F, A, B, C, and D; for Sample 6, with Media F, A, B, C, D, and E; for Sample 7, with Media A, B, C, D, E, and F; for Sample 8, with Media B, C, D, E, F, and A, etc. Despite the need to discard the results on occasional samples because of unsatisfactory plates, the above order was repeated for the pairs of plates to be poured first with the respective media, beginning with each successive seventh sample to be plated. Appropriate sterility controls were used on dilution waters, plates, media, etc.

Because of the slower colony growth response on the synthetic medium, plates poured with it were incubated at 35°C for 96 hours± 3 hours. Plates poured with the other five media were incubated as usual at 35°C for 48 hours ±3 hours. Because of the need for additional incubation of Plates 6 and 7 and the expected smaller size colonies thereon, the analysts were cautioned not to be less diligent than otherwise when counting the colonies on these plates.

ANALYZING THE DATA

Usable counts were reported on 337 raw and 349 pasteurized milks. Data on raw and pasteurized samples were treated separately. International Business Machine equipment, available in the New York City Department of Health, was used for sorting and tabulating the data and for most of the computations. Before sorting the cards, the punch record on each was checked for accuracy.

Two indices were computed to measure the variability among counts on duplicate plates in each laboratory. The counts were converted to logarithms, and the logarithm of the lower count subtracted from that of the higher count. The antilogarithm of the average of these differences is the geometric mean of the ratios of the counts, herein regarded as the first index.

The second index of variability of duplicates was the point below which 95 percent of the ratios are expected to fall. Since the logarithms of bacterial counts have an approximately normal distribution, the distribution of the differences of logarithms of paired counts will also be normally distributed (around zero), provided the order of counts within each pair is random. Fixing the order of counts so that each difference is positive has no effect on the magnitudes of the differences. The effect on the distribution is the removal of the negative half thereof and the addition of its mirror image to the positive half. Thus, the distribution of the absolute values of the differences of logarithms of paired counts is half of a normal distribution. The standard error of the whole normal distribution is computed from the absolute differences, and the interval $(0 + 1.96s)$ contains 95 percent of the area of the distribution of the absolute differences. The antilogarithm of $1.96s$, hereinafter referred to as the "95 percent point," is therefore the level below which 95 percent of the ratios are expected to fall.

Bartlett's test for homogeneity of variances was negative; that is, the laboratories were found to differ very significantly with respect to the variation between the counts of duplicate plates.

Each medium was compared with Medium C, with Medium A, and with Medium F. For the media comparisons, the duplicate counts were added mechanically before conversion of the sum to logarithms. Each logarithm of a sum for the base medium was then subtracted from the corresponding logarithm for the test medium, and the square of the differences determined. For each pair of media, a tabulation was run similar to the tabulations for the laboratories, except that in the case of the media, the directions of the differences were indicated. After correcting for the use of sums instead of averages (by the subtraction of the logarithm of 2), the mean differences and their variances were computed for the various pairs of media.

DIFFERENCES AMONG LABORATORIES

The magnitude of the differences between duplicate counts were studied for each laboratory which reported counts for at least 100 pairs of duplicate plates of the same type of milk. Table 1 lists the geometric means of the ratios of the higher to lower counts, and the levels below which 95 percent of such ratios are expected to fall. Chart I shows the same data graphically, with the laboratories ordered according to their variability.

The geometric means of the ratios ranged from 1.14 to 1.17 for raw milk, and from 1.14 to 1.16 for pasteurized milk. The 95 percent of the ratios ranged from 1.13 to 1.56, and from 1.09 to 1.45 for the raw and pasteurized milk, respectively. From these figures, it appears that duplicates of raw milk vary somewhat more than duplicates of pasteurized milk.

Although there were some exceptions, the magnitude of the differences in the same laboratory generally were similar for raw and pasteurized milk. Laboratories 4 and 16 varied somewhat less for raw milk than for pasteurized milk, while the reverse was true for Laboratory 5.

DIFFERENCES AMONG MEDIA

The productivities of the six media are compared in Table 2. The geometric means of the counts of each medium are listed and are also expressed as a percentage of the geometric means of Medium C, A and F. Asterisks are used to indicate whether the latter percentages differ significantly from 100;

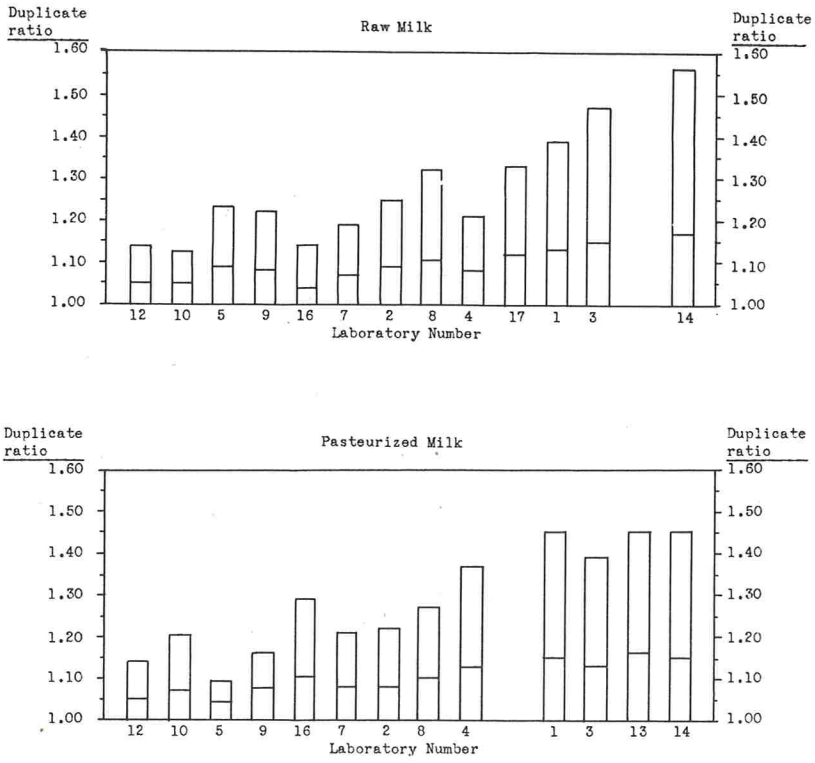


Chart I — Variability of counts as measured by duplicate ratios* by laboratory and type of milk samples.

* A duplicate ratio is defined to be the ratio of the higher to the lower counts on duplicate plates.

The upper limit of each bar is the level below 95% of the duplicate ratios are estimated to fall.

The horizontal line within each bar is the geometric mean of the duplicate ratios.

that is, whether the difference in the productivity of a given medium and the base medium has statistical significance. Chart II gives the relative percentages of the means (the base mean being 100 for Medium C), and the range within which the true precentages are expected to fall 95 percent of the time. When the range does not include 100 percent, the given mean is said to be significantly different from the base mean.

The geometric means of the counts ranged from 101 to 112 for raw milk, and from 93 to 121 for pasteurized milk. The mean counts for raw and pasteurized milk were very close for all except Media A and D. The geometric mean for pasteurized milk on Medium A was much lower than the geometric mean for raw milk, while the reverse was true for counts on Medium D.

Medium A generally had the lowest productivity among the six compared. Its geometric mean on pasteurized samples was significantly lower than that on all other media. Its geometric mean on raw milk was significantly lower than that on Media B, C and D, about the same as on Medium E, and somewhat higher than on Medium F.

The productivity of Medium B approximated that of Medium C and was significantly higher than the productivities on Media A and F.

The productivity of Medium C was significantly higher than that on Media A, E and F, about the same as on Medium B, and significantly lower than that on Medium D.

Medium D had the greatest colony productivity, particularly for pasteurized milk. Its geometric means were 4 and 14 percent higher than the geometric means for Medium C for raw and pasteurized milk, respectively. It was also significantly more productive than Media A and F.

TABLE 1. NUMBER OF DUPLICATE PLATE PAIRS, AND VARIABILITY OF COUNTS AS MEASURED BY DUPLICATE RATIOS*, BY LABORATORY AND TYPE OF MILK SAMPLES

Laboratory	RAW MILK			PASTEURIZED MILK		
	No. of duplicate plate pairs	Geom. mean of duplicate ratios*	95%-point** of duplicate ratios*	No. of duplicate plate pairs	Geom. mean of duplicate ratios*	95%-point** of duplicate ratios*
1	126	1.13	1.39	150	1.15	1.45
2	150	1.09	1.25	150	1.08	1.22
3	150	1.15	1.47	156	1.13	1.39
4	150	1.08	1.21	150	1.13	1.37
5	114	1.09	1.23	114	1.04	1.09
6	....	....	....	84	....	....
7	150	1.07	1.19	180	1.08	1.21
8	132	1.11	1.32	114	1.10	1.27
9	150	1.08	1.21	150	1.07	1.16
10	144	1.05	1.13	144	1.07	1.20
11	42	....	....	54	....	....
12	144	1.05	1.14	156	1.05	1.14
13	84	....	....	150	1.16	1.45
14	168	1.17	1.56	156	1.15	1.45
15	....	....	....	30	....	....
16	150	1.04	1.14	150	1.10	1.29
17	168	1.12	1.33	6	....	....

* A duplicate ratio is defined as the ratio of the higher to the lower count of a duplicate pair of plates.

** The level below which 95% of the duplicate ratios are estimated to fall.

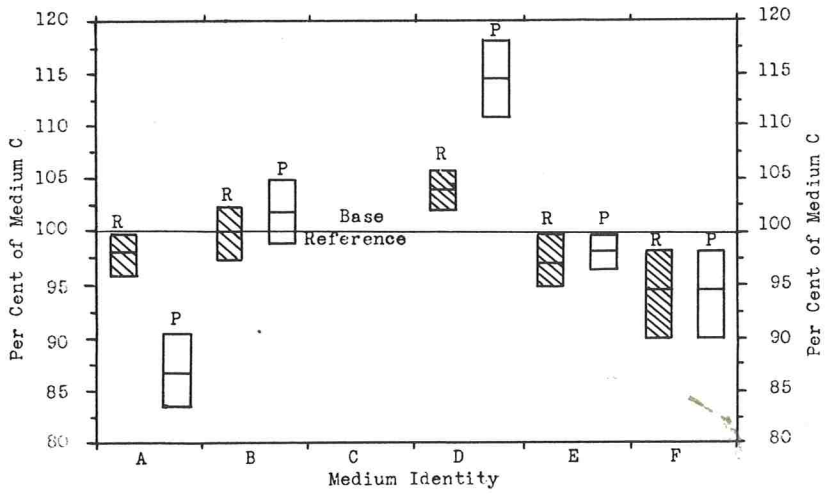


CHART II — COMPARISON OF GEOMETRIC MEAN COUNTS OF SIX PLATING MEDIA, USING MEDIUM C, THE OFFICIAL TGEM MEDIUM, AS A BASE OF REFERENCE

R = Raw milk. P = Pasteurized milk.

The center line of each bar is the geometric mean of Medium X expressed as a percentage of the geometric mean of the medium used as a base of comparison.

The length of each bar represents the range within which the true value of the percentage lies 95% of the time. If this range does not include 100%, Medium X is significantly different from the base medium.

DISCUSSION

Based upon the confirming observations reported herein, namely that the colony productivities on the two dehydrated Media B and C, to which 1 percent of skim milk was to be added after rehydration and before use, the Subcommittee on Standard Methods for the Examination of Dairy Products recommended to the APHA Coordinating Committee on Laboratory Methods, on November 1, 1950, that authorization be granted for the optional use of either Difco's Tryptone Glucose Extract Agar, dehydrated, No. B 2 or BBL's Trypticase Glucose Extract Agar, dehydrated, No. 183-B as official plating media for determining the Standard Plate Count on milk and cream by the Agar Plate Method. The Coordinating Committee on Laboratory Methods acted favorably on the recommendation and referred it to the Committee on Research and Standards. On February 20, 1951, the Committee on Research and Standards voted favorably on the action of the Coordinating Committee on Laboratory Methods.

Thus far, comparative determinations have been made on raw and pasteurized milk only. There is no reason to believe that optional use should not be extended to raw and pasteurized cream. Before use for plating milk and cream, one percent of skim milk (fresh or freshly reconstituted, or sterilized stock thereof) should be added to the prepared medium. No determinations have been made by the Subcommittee to establish independently the equivalent productive value of each BBL ingredient for possible interchangeable use with each Difco ingredient. In the interests of uniformity, it is recommended that a dehydrated form of medium be used.

Formal announcement of the acceptance of the optional use of either of these two dehydrated media for making Standard Plate Counts on milk and cream by the Agar Plate Method was made by Reginald M. Atwater, M. D., Executive Secretary of the American Public Health Association, effective February 20, 1951.[6]

Table 2. COMPARISON OF GEOMETRIC MEAN COUNTS USING SIX DIFFERENT PLATING MEDIA, BY TYPE OF MILK SAMPLE

	MEDIA					
	A	B	C	D	E	F
Geometric mean						
Raw milk	105.5	108.0	108.0	112.3	105.2	101.4
Pasteurized milk	92.5	108.3	106.1	121.1	103.9	99.8
Geometric means as percentages of Medium C						
Raw Milk	98**	100	(100)	104**	97*	94**
Pasteurized milk	87**	102	(100)	114**	98*	94**
Geometric means as percentages of Medium A						
Raw Milk	(100)	102*.	102**	106**	100	96
Pasteurized milk	(100)	117**	115**	131**	112**	108**
Geometric means as percentages of Medium F						
Raw milk	104	107**	107**	111**	104	(100)
Pasteurized milk	93**	109**	106**	121**	104	(100)

** P <.01 Significant

* .01 <P <.05 Borderline significance.

Because of the general tendency for increased colony productivity on Medium D and for decreased colony productivity on Medium E than was obtained on Medium C, the Subcommittee, although recognizing the need to replace as soon as possible the milk-containing media with milk-free media for official work, suggests that observations be made on media of similar composition, slightly modified only with respect to the percentages of ingredients used, so as to yield counts essentially in agreement with those obtained on Medium C.

The colony productivity on the original S4 synthetic media yielded an average colony count of essentially 95 percent of that obtained on the official TGEM medium. For nearly a half-century, scientists have talked about a synthetic plating medium, but credit for so nearly a complete achievement, as herein reported, goes to Pelczar and Brown.[4] Although the cost of ingredients for the synthetic medium is much greater than the cost for digest and/or extract type media, there is good reason to believe that the modified S4 medium can be used even now, with due care, as a reference medium for the productivity determination of commercial lots of media.

It is recognized that considerable additional work should be done, first, to confirm the productivities herein reported, and later, to improve the composition of a synthetic medium, the use of which may at the proper time receive official APHA approval for reference productivity determinations. Fortified by the rapidly expanding knowledge on nutrition, including that on single cell type organisms, Earle K. Borman, Connecticut State Department of Health Laboratories, Hartford, Connecticut, as Vice-Chairman of the APHA Subcommittee on Approval of Culture Media, is now organizing studies to improve the synthetic medium.

SUMMARY

The colony productivities of six plating media for the Agar Plate Method, including one of synthetic composition, have been compared.

The comparison confirms an earlier observation that the colony productivity obtained on the officially recognized Difco's Tryptone Glucose Extract Agar, dehydrated, No. B 2 and BBL's Trypticase Glucose Extract Agar, dehydrated, No. 183-B, are essentially identical. Formal authorization for the optional use of either of these media was made by the American Public Health Association on February 20, 1951.

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.

A synthetic plating medium consisting of 18 amino acids, 8 vitamins, 3 purine bases, 2 pyrimidine bases, potassium acid phosphate, magnesium sulphate glucose, and agar has yielded an average colony count of essentially 95 percent of that obtained on the officially recognized Difco's Tryptone Glucose Extract Agar, dehydrated, No. B 2. Steps have been taken to confirm this observation, hoping thereby to establish a basis for recognition at the proper time by the American Public Health Association of a reproducible reference medium for determining the colony productivity of commercial lots of media.

REFERENCE

1. *Standard Methods for the Examination of Dairy Products*, Ninth Ed., American Public Health Association, New York 19, New York.

2. Buchbinder, Leon, Baris, Y., Alff, E., Reynolds, E., Dillon, E., Pessin, V., Pincus, L., and Strauss, A. Studies to Formulate New Media for the Standard Plate Count of Dairy Products, *U. S. Public Health Reports*, **66**, 327 (1951).

3. Pessin, Vivian and Black, L. A. A Comparative Study of Six Agars Proposed for Bacterial Plate Counts of Milk. *J. Milk and Food Technol.*, **14**, 98 (1951).

4. Pelczar, M. J. and Brown, J. H. Synthetic Culture Media for Reference Use in Dairy Bacteriology. *Ibid*, **14**, 90 (1951).

5. Black, L. A. Determining the pH of Culture Media. Unpublished.

6. Atwater, R. M. Official Acceptance of Plating Media for the Agar Plate Method. *Amer. J. Public Health*, **41**, 609 (1951).

NEW BOOKS & OTHER PUBLICATIONS

The Pharmacological Evaluation of Antioxidants, by A. J. Lehman, O. G. Fitzhugh, A. A. Nelson, and G. Woodward, pages 197-208. Nonpoisonous antioxidants are propylgallate, thiodipropionic acid and its dilauryl and distearyl esters, and gum guaiac. 12 references.

Salmonella Infection as a Food Industry Problem, by W. R. Hinshaw and Ethel McNeil, pages 209 to 240. 103 references. Most of the 150 serological types affect man and animals, with birds and swine the most important animal reservoirs. Eggs have yielded 52 types of *Salmonella*. Infections have come through meat, vegetables, and fruits, (contaminated from animals), milk and cheese (through insects, rodents, etc).

Reactions between Sugars and Nitrogenous Compounds and Relationship to Certain Food Problems, by J. P. Danehy and W. W. Pigman, pages 241 to 290. 199 references. The importance of this subject is in changes caused during processing and handling of various foods, important among which are browning discolorations. The survey deals with experimental and speculative work on the character of the reactions.

Chemical and Microbial Studies on Sliced Canned Bacon, by J. A. Ulrich and H. O. Halvorson, pages 291 to 325. About 100 references. The most desirable cure leaves 2 - 3 percent salt in the product. Smoking is more effective without removing the skin. There is some measurable deterioration during storage but less at 21° – 24°C (70° – 75°F) than at 38°C (100° F).

Certain Aspects of Internal Corrosion in Tin Plate Containers, by R. R. Hartwell, pages 327 to 383. 142 references. Tinned cans now require about 4 percent of the nation's finished steel output. This is a well illustrated discussion of the manufacture of tin plate, corrosion, packaging and storage, variables in canning operations (e.g. oxygen,

(continued to page 129)

REPORT OF THE APPLIED LABORATORY METHODS COMMITTEE

This year your committee has reviewed progress made or studies under way in several phases of laboratory methods currently of interest to milk and food sanitarians. These include bacteriological and chemical laboratory tests, studies of alternative times and temperatures for HTST pasteurization of milk products, recent work on germicides, and certain administrative practices.

Bacterial Plate Counts

The report of the committee on Applied Laboratory Methods presented last year at the 37th Annual Meeting on "A Comparative Study of Six Agars Proposed for Bacterial Plate Counts of Milk" was published in the May-June 1951 *Journal of Milk and Food Technology.*[1] Following a preliminary report of these results, the APHA Subcommittee on Standard Methods for the Examination of Dairy Products undertook independent comparative tests of six media, and in a manuscript recently prepared for publication[2] confirmed our earlier observations.

Based upon these observations and recommendations, and subsequent approval by appropriate AP HA committees, that Association on February 20, 1951[3] authorized optional use of Difco's Tryptone Glucose Extract Agar, or BBL's Trypticase Glucose Extract Agar as official plating media. The APHA Subcommittee plans additional studies to adjust the compositions of two milk-free plating media, which it hopes to complete successfully within the next year so that one or more may be recognized in the next edition of Standard Methods as a substitute for the present milk-containing media.

In their comparative studies a synthetic plating medium included yielded an average colony count in 96 hours almost equal to that obtained in 48 hours on the present standard milk-containing agar. A report on this synthetic medium by Pelczar and Brown appeared in the May-June 1951 *Journal of Milk and Food Technology.*[4] Steps are being taken by a recently appointed AP HA Subcommittee on Approval of Culture Media to study further synthetic media with a view to its future recognition as a reproducible Reference Medium for determining productivity of commercial lots of media.

Direct Microscopic Examination

The report this committee presented at the 1950 annual meeting on "A Comparative Study of Stains Proposed for the Direct Microscopic Examination of Milk" was published in the March-April 1951 *Journal of Milk and Food Technology.*[5] The APHA Subcommittee on Standard Methods for the Examination of Dairy Products has organized a further comparative study now under way of six staining procedures. From the results obtained in their study of 12,000 slides it should be possible to select one or more of the better stains for inclusion in the next edition of their Standards Methods.

Reduction Tests

One member of the Committee (C.K.J.) presented a paper at this annual meeting on "The Effect of Refrigeration Storage on the Reduction of Resazurin and Methylene Blue in Milk." His results showed that refrigeration for 2 hours tended to slow down Methylene Blue reduction slightly, for 23 hours somewhat more. With resazurin a similar picture was obtained, except that there was a better agreement following overnight refrigeration when the dye was incorporated *before* storage; with methylene blue, best results came when the was added *after* overnight storage.

Antibiotics

Several members of the Committee have participated in the development and testing of a more rapid and practical procedure for the detection of antibiotics in milk than the agar cup plate method heretofore used for this purpose. This was made possible by the cooperation of Difco Laboratories, who prepared small paper disks containing known measured amounts of penicillin and other antibiotics, and who have supplied this material as well as standardized spore suspension and media to a number of laboratories for testing purposes. Concentrations of 0.05 to 5 units of penicillin per ml may be determined by this method. An ampule of standardized bacterial culture is mixed well with melted and cooled standardized medium, and a thin layer poured into a flat bottom petri dish and allowed to solidfy.

The test is made by saturating a plain sterile paper disk with the unknown milk and placing it on the surface of the medium. At the same time several concentration disks containing known amounts of penicillin per ml similarly are placed on the medium, and the plate incubated 6 hours or so. A zone of inhibition of growth around the plain disk indicates the presence of antibiotic in the unknown milk. The diameter of the zone is then compared with the concentration disks containing known amounts of penicillin in per ml to determine how much antibiotic was present in the unknown milk, expressed in terms of penicillin units.

This test was designed as a screening test to determine whether or not some inhibiting agent is present in a given sample of milk. If it is desired to determine whether penicillin is actually present, this can be done when making the test by saturating another paper disk containing sufficient penicillinase to inactivate up to 10 units of penicillin. Then a zone of inhibition around the plain disk but not around the penicillinase disk, would indicate that the milk contained penicillin. A zone of inhibition around each disk would indicate an inhibiting agent that was not penicillin.

At the 1951 Annual Conference of New York State Association of Milk Sanitarians, Dr. Kosikowsky of Cornell University reported on their study of "Antibiotics in the Fluid Milk Supply of New York State." This was confined to samples of nearly 1000 bottled pasteurized milks from various places at two seasons of the year. Total inhibition was measured by determining any reduction in acidity following inoculation with an active starter, and about 11 percent of the milks were inhibitory. By use of the paper disc method, antibiotics, chiefly penicillin, were demonstrated in about 8 percent of the milks. Tests for sulfa drugs were negative. Tests for the presence of quaternaries made by the Miller and Elliker procedure disclosed that about 4 percent of the milks were positive.

PHOSPHATE TESTS

Members of the committee have participated in comparative tests arranged by the APHA and AOAC referees on Phosphatase Tests for Cheese. A comparative study of field and laboratory procedures for phosphatase in fluid milk is being arranged by the APHA and AOAC. The results obtained will be utilized in determining what tests will be included by the APHA Subcommittee in the next edition of *Standard Methods for the Examination of Dairy Products.*

A number of laboratories have reported difficulties in applying the phosphatase test to ice cream, dessert toppings, and chocolate milk. One member of the committee (H. S.) suggests that apparent false positive results may be corrected by more adequate controls. If fruits or nuts are present in ice cream, they should be filtered before testing and since no appreciable amount of enzyme leaches into the mix from the fruit or nuts, the remaining material can be tested.

Vanillin and other flavoring or coloring materials added to milk products during manufacture may result in apparent positive phosphatase test results due to the presence of phenolic substances which can react with the "BQC" solution to yield an indophenol or indamine blue. On the other hand, the coloring material may be extractable by the butyl alcohol and obscure or magnify the extracted indophenol blue.

Where a positive result is obtained by a routine test, the procedure should be repeated and also a control test made using the same amount of sample but substituting for the buffered substrate an equal amount of buffered water prepared in the same manner except that the disodium phenyl phosphate is omitted. No substrate being present, the enzyme cannot liberate any phenol by hydrolysis; consequently, any blue color adduced in this control test is caused by an interfering substance and the amount of this blue color must be subtracted from the color obtained in the regular procedure. Conversely, the absence of blue color in the control test when color is obtained with the substrate indicates the presence of the phosphatase enzyme, and therefore improper pasteurization.

Another procedure which can be employed to resolve the false positive is to allow the mixture of sample and substrate to incubate for an hour (or even two hours) and compare the resulting extracted indophenol blue with similar treatment of a sample which has incubated only 20 minutes. If the phosphatase enzyme be present, the longer incubation period will yield more blue color than the shorter period. If the enzyme be absent and an interfering substance be present, the extracted color will be constant regardless of the length of incubation.

Where both the phosphatase enzyme and an interfering substance be present, the longer the incubation period employed for both the control and the actual test, the more readily can the color value of the control be compared with or subtracted from the color value of the actual test.

HEATED OR RECONSTITUTED MILK

As a result of observing false positive phosphatase tests in samples of ice cream products from a manufacturer, Edwards (now AOAC referee on tests for reconstituted milk) found that upon heating a mix containing vanillin and unheated milk or cream, a blue color developed under conditions of the phosphatase tests. However this color did not develop until vanillin was added to milk products previously heated to 80°C. Based on these findings, Edwards presented "A New Method For the Detection of Heated or Reconstituted Milk" at the 1949 Annual Meeting of the Association of Official Agricultural Chemists.[6] Members of your committee interested in this problem had planned to evaluate this procedure which requires a spectrophotometer and earlier procedures suggested to detect reconstituted milk, but were unable to do so.

However one member of the committee (H.S.) did develop a procedure for detecting the admixture of raw milk with heated milk. Lacking information as to the degree or manner of heating, and the percentages of raw or heated milk, procedures were developed to identify completely raw milk. The proposed assay conditions were adjusted to the average enzyme encountered in herd raw milk, and the laboratory procedure simplified so it may be performed in the field without the use of laboratory facilities. Only a limited number of samples have been assayed by two members of the committee, but when sufficient tests have been made the procedure and results will be published.

TIME AND TEMPERATURE EQUIVALENTS FOR HTST PASTEURIZATION OF DAIRY PRODUCTS

Numerous investigators the past few years have been concerned with the determination of time and temperature equivalents for HTST pasteurization. Progress is being made in these studies and a number of papers on the subject have been published since the last meeting of this association in Atlantic City a year ago.

Ice cream mix pasteurization has probably received the most attention with studies being conducted at North Carolina, University of Illinois, and University of Minnesota among others.

Grosche, Speck, and Lucas[7] reported combinations of time and

temperature equivalent to 155°F for 30 minutes, based on destruction of normal flora, based on destruction of a *Microbacterium* species, and based on destruction of a *Micrococcus* species.

They concluded that the tentative standard of 175°F for 25 seconds would be equivalent to the present standard of 155°F for 30 minutes.

Tracy, Tobias, and Herreid[8] reported at the International Association of Ice Cream Manufacturers that 194°F for less than 1 second using the Vacreator and 185°F for 6.1 seconds using a Mallorizer, resulted in satisfactory destruction of normal flora and for test cultures of *Micrococcus freudenreichii,* two cultures of *Streptococcus faecalis,* and an unidentified spore-former. Work reported by a member of the committee (F.W.B.)[9,10,11] has shown that temperatures above 190°F for 1.4 seconds and 175°F for 25 seconds gave destruction of a heat resistant micrococcus comparable to that obtained at 155° F for 30 minutes, and similar results have been reported by other investigators.

Although the time and temperature combinations reported in the literature are not conflicting, the vast amount of information that is being compiled is made confusing by the many variations in the experimental studies. One phase of HTST pasteurization studies that was considered by this Committee was the determination of the thermal death time of a specific organism that might be made available to other investigators in studying the bacterial destruction obtained by HTST methods. Some preliminary studies have been made, but before a report can be presented more investigations are needed. It is felt that the use of one particular test culture by all investigators will do much to improve the acceptance of data concerning the bacterial destruction obtained by HTST heat treatment of various dairy products.

Speck and Lucas[12] reported recently on HTST pasteurization of chocolate milk. They used a culture of *Micrococcus freudenreichii* in their studies and showed that although 161°F for 19 seconds resulted in destruction of the organism comparable to that obtained at 145°F for 30 minutes, a better stabilized product would be obtained at 175°F for 19 seconds, or 168°F for 40 seconds. This work also showed that with chocolate milk it may be necessary to use a longer time or higher temperature when pasteurizing by the Vat process. More investigations are needed on this type of product.

Although data are not available at the present time, the advent of concentrated milk presents the problem of time and temperature standards for HTST pasteurization of this product. This problem is being investigated by a number of workers, but it is too early to present any conclusions as to the combinations of time and temperature needed for satisfactory pasteurization of the product.

Shahani, Herreid, and Ordal[13] reported on studies using a small tube heat exchanger, commercially known as the Mallorizer, to pasteurize milk and cream inoculated with *Micrococcus freudenreichii* and a spore-forming organism. Satisfactory destruction equivalent to laboratory pasteurization was obtained between 168°F and 174°F for *Micrococcus freudenreichii,* and 280°F for the spore-former. Total heating time was about 8.4 seconds. Naturally-infected high-count milk was submitted to similar heat treatments and nearly complete sterility was obtained between 220°-240°F.

It is suggested that the committee continue to follow the information being presented on time and temperature equivalents for HTST pasteurization.

GERMICIDES

Last year Dr. P. R. Elliker of this committee reported at your annual meeting on "A New Method for Measuring Quaternary in Milk and in Detergent Sanitizers." This method was published by Miller and Elliker[14] in the March 1951 *Journal of Dairy Science.* The method can be applied for detection of any of the well known quaternary preparations on the market. It will detect as little as 3 ppm of alkyl dimethyl benzyl ammonium chloride in unhomogenized raw or pasteurized milk. If suitable standards consisting of known quantities of quaternary added to milk are also run simultaneously, the method can be employed to estimate concentration ranging from 5 to 100 ppm quaternary in milk samples. The type of quaternary molecule present in the milk must be known for accurate determinations. A modification of the method has been applied to determination of quaternary compounds in detergent sanitizers. Preliminary observations indicate that the method may be applied for detection of quaternary in some foods other than milk.

Since publication of this article some sources of difficulty in the hands of other workers who have tried the method appear due to: (1) Use of old reagents. Preparation of reagents from fresh supplies of chemicals has greatly improved results for some workers. (2) Incomplete centrifuging. The directions for centrifuging for complete separation of fractions must be followed closely. (3) Contamination from glassware or stoppers. Traces of quaternary yield false positive tests and traces of acid or anionic surface active agents from cleaners result in false negative tests. (4) Impure batches of eosin yellowish dye. A large standard tested batch of eosin dye is available and samples of eosin from this batch may be obtained from the authors where the eosin is considered a source of difficulty in running the test.

Collins *et al.*[15] have reported the certified acidic dye, congo red, to show possibilities for application as a neutralizing agent for quaternary ammonium compounds. In comparisons with lecithin and Tween 20 a ratio of congo red to quaternary of 10:1 appeared to provide satisfactory neutralization for cultures of *Escherichia coli* 198 and *Micrococcus pyogenes* var. *aureus* 209 with several quaternary compounds. The results obtained suggest the advisability of comparative studies of congo red and the lecithin-Tween 80 neutralizer using a procedure such as the Weber and Black method under various experimental conditions that would include a wider variety of bacterial test species, representative commercial quaternary compounds, adjustment to different pH levels, and presence of buffer salts. Considera-

tion also should be given to advantages of congo red in imparting a red coloration to colonies or to disadvantages of a residual deposit of dye that might accumulate on test materials.

A modification of the Weber and Black method for determining effectiveness of germicides against bacteria has been applied by Parker and Elliker[16] for determining rate of destruction of bacterial viruses (bacteriophage) by hypochlorite and quaternary ammonium compounds. Viruses employed consisted of various bacteriophage strains for *Streptococcus lactis* and *Streptococcus cremoris*. A representative commercial hypochlorite showed more rapid destruction than any of the quaternary preparations. A detergent sanitizer containing quaternary, polyphosphate, and nonionic surface active agent was more viricidal than the quaternary alone. Results also demonstrated that rate of destruction of suspensions of virus could be determined by the modified Weber and Black procedure.

At the 1950 meeting of the American Public Health Association, Buchbinder and Zaretsky[17] reported on "Cessation of Bacterial Motility as a Rapid Test for Germicidal Action," since published in the May 1951 *American Journal of Public Health*. Their test is based on the addition of the diluted germicide to a motile bacterial culture, and observing the preparation under a microscope to determine whether motility ceases. They reported that results obtained by their microscopic procedure closely paralleled commonly used bacteriological culture techniques for determining percent of bacteria killed.

The development of strains of bacteria with enhanced resistance to quaternary ammonium compounds has recently been reported by two different workers. Crocker[18] was able to increase the resistance of *Serratia marcescens* quite appreciably. Most of his work, however, was with strains of *Escherichia coli*, where he was able to induce a considerable increase in the resistance of several strains studied. Even more interesting was the fact that the resistant strains lost the ability to produce gas in liquid media and to produce typical colonies on desoxycholate agar. Chaplin[19] has also reported that a strain of *S. marcescens* could be induced to grow in broth with a concentration of quaternary 400 times as great as that initially endured. He also showed that the typical sigmoid survivor curve obtained with quaternaries was due to the wide variations in resistance within the culture. By selecting the most resistant members of the strain, a straight line logarithmic survival curve was obtained. However, such strains rapidly reverted to the original type.

Superior germidical activity has been claimed for a new organic type of chlorine germicide Antibac-25. This was not substantiated in tests reported by Johns[20] wherein this product was compared with three hypochlorites, including a new powdered type of hypochlorite containing a wetting agent. This latter hypochlorite failed to show any superiority over the other two hypochlorites tested.

NATIONAL RESEARCH COUNCIL PROJECT

At the 37th annual convention last year, A. C. Dahlberg and H. S. Adams reported on the study being made by the National Research Council on "Milk Quality and Milk Regulations." A report of their findings on milk regulations was issued recently by the National Research Council, but nothing has been published on the laboratory examinations being made as a part of the project. However, Dr. Dahlberg has supplied the committee with the following paragraph:

"The National Research Council, under contract with the Production and Marketing Administration of the United States Department of Agriculture, is conducting a study of milk ordinances and milk quality. Eight cities have been selected and studied. In each city the raw and pasteurized milk of six or eight plants have been sampled. The raw milk samples were tested in a local laboratory by our laboratory technician for standard plate and coliform counts, and direct microscopic bacterial clump and cell counts. All pasteurized milk was sent to the University of Minnesota in St. Paul. In the Quality Control Laboratory tests were made for butterfat, phosphatase, standard plate, coliform, and psychrophilic counts on milk and cream. Also these same bacterial counts were made on the milk after storage at 43-45°F for 4 and 7 days and after storage at 32-34°F for 7 days. In the biochemical laboratories tests were made for specific gravity, freezing point, pH, titratable acidity, total solids, protein, minerals, calcium, phosphorus, iron, carotenoids, vitamin A, ascorbic acid, riboflavin, and thiamine. All analyses were made by standard methods of the American Public Health Association or the A.O.A.C. wherever such methods existed. The data are now being compiled and no report is available on the number of analyses. However, the number of lots of pasteurized milk samples sent to St. Paul was 18 to 24 per city which for nine cities (one city was repeated at a different season) would give a total of about 200 lots of milk. As each lot contained 4 samples for bacteriological tests, the number of individual samples was approximately 800."

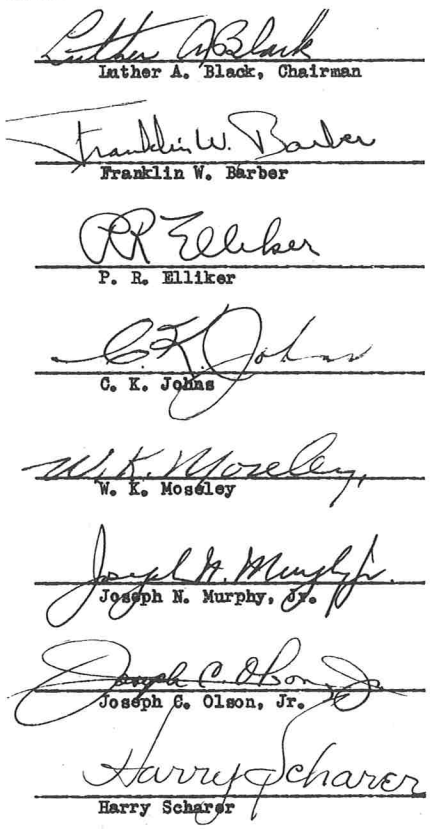
INTERSTATE MILK SHIPMENTS AND LABORATORY APPROVAL

Last year at your 37th annual convention, J. L. Rowland gave "A Synopsis of the National Conference on Interstate Milk Shipments" and Dr. J. C. Olson, Jr. of this committee reported on "Problems of Midwest Producers in Interstate Shipment of Milk." Since then a Second National Conference has been held and a report of their actions was issued recently.* The conference approved recommendations of the laboratory task force that milk intended for interstate shipment should be examined by plate or direct microscopic counts, including the examination of routine sample from each producer; that the state may accept the results from a private laboratory authorized to do official work by the supervising agency, or a milk industry laboratory similarly officially designated for the examination of Grade A raw milk for pasteurization; and that the requirements approved at the First Conference

*See this Journal, January-February, (1952).

as to adherence to standard methods, frequency of sampling, state approval of local laboratories, and Public Health Service certification of laboratories of state agencies should apply to both raw and pasteurized milk and milk products.

Those interested in approval of laboratories should note that at this meeting J. C. McCaffrey, Chief, Bureau of Sanitary Bacteriology, Illinois Department of Public Health is scheduled to report on "State Approval Program for Laboratories."



Luther A. Black, Chairman
Franklin W. Barber
P. R. Elliker
C. K. Johns
W. K. Moseley
Joseph N. Murphy, Jr.
Joseph C. Olson, Jr.
Harry Scharer

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BACTERIAL COUNTS ON MILK IN REFRIGERATED STORAGE

(continued from page 103)

Dealer B

Freshly past.	32,000	22,000				
Stored 1 day	31,000	28,000				
Stored 2 days	22,000	21,000				
Stored 3 days	19,000	20,000				
Stored 4 days	13,000	16,000				

GRADE A MILK — TESTED BY DEALER'S LABORATORY

Sample No.	1	2	3	4	5	6

Dealer C

Freshly past.	260	270				
Stored 1 days	250	270				
Stored 2 days	220	280				
Stored 3 days	230	260				
Stored 4 days	210	310				

Dealer D

Freshly past.						
Stored 1 day	1,300					
Stored 2 days	1,400	900				
Stored 3 days	1,500	600				
Stored 4 days	1,300	2,100				

APPROVED MILK — TESTED BY DEALER'S LABORATORY

Dealer C

Sample No.	1	2	3	4	5	6
Freshly past.	2,500	2,600				
Stored 1 day	2,600	2,500				
Stored 2 days	2,200	2,500				
Stored 3 days	2,200	2,100				
Stored 4 days	2,500	2,400				

Dealer D

Freshly past.						
Stored 1 day	2,800					
Stored 2 days	2,900	3,800				
Stored 3 days	3,800	3,900				
Stored 4 days	2,900	4,300				

Dealer E

Freshly past.	16,000					
Stored 1 day	22,000	18,000				
Stored 2 days	26,000	30,000				
Stored 3 days	28,000	37,000				
Stored 4 days	52,000	60,000				

CONCLUSION

Good quality pasteurized milk will not increase appreciably in bacterial content, even after 120 hours of storage, under proper refrigeration, sometimes even showing a decrease in count.

Poor quality pasteurized milk on the other hand, will not stand up for any appreciable period, even under ideal storage conditions.

SANITARY STANDARDS FOR PUMPS FOR MILK AND MILK PRODUCTS

Formulated by

INTERNATIONAL ASSOCIATION OF MILK SANITARIANS
UNITED STATES PUBLIC HEALTH SERVICE,
THE DAIRY INDUSTRY COMMITTEE

Amended April 30, 1952

Original Publication in JOURNAL OF MILK AND FOOD TECHNOLOGY, Vol. 10, No. 5, Sept-Oct., 1947

IT is the purpose of the IAMS, 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. Milk pump 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 are equivalent or better, may be submitted at any time for the consideration of IAMS, USPHS, and DIC.

3A STANDARDS FOR CENTRIFUGAL AND POSITIVE ROTARY TYPE PUMPS

A. *Material*:

1. All metal pump parts having any surface in contact with the product shall be constructed of dairy metal consisting of stainless steel, nickel alloy, or equally corrosion resistant material that is nontoxic and nonabsorbent.

a. All milk contact surfaces shall be finished to a 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 constructed as to be easily cleanable.

B. *Construction*:

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

2. The parts forming the space between the motor and the pump body shall be constructed in such a way that they are easily accessible for cleaning, and drain freely.

3. If legs are used, they shall be smooth with rounded ends and no exposed threads. Legs made of hollow stock shall be sealed. On pumps with legs designed to be fixed to the floor the minimum clearance between the lowest part of the base and the floor shall be four inches.

a. Readily portable pumps not permanently attached may have leg heights of 2 inches. (Readily portable pumps are defined as those having a base area of not more than one square foot, or, in the case of motor mounted pumps, an area encompassed by the legs that does not exceed one square foot.)

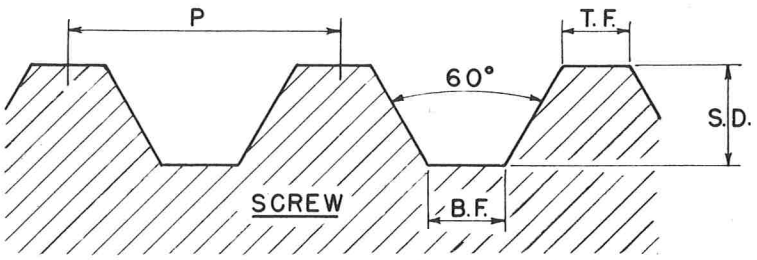
b. Bases when used shall be constructed without ribs or flanges and shall have a smooth top and bottom surface.

4. Pumps which because of their size and type cannot be mounted on legs, shall be mounted on a base designed for grouting and sealing.

5. The driving means between the impeller or rotor and the pump shaft shall be so arranged as not to form a pocket or crevice that is not readily cleanable.

6. There shall be no threads in the milk zone, except where necessary for attaching the impeller to the shaft. In such case(s) the thread shall conform to the following drawing known as the "brass valve stem" thread. The threaded angles shall be not less than sixty degrees and with not more than eight threads to the inch, nor less than five-eighths inch major basic diameter. The length of the nut

BRASS VALVE STEM THREAD



P = PITCH	$P = \frac{1}{T.P.I.}$
S.D. = SINGLE DEPTH	S.D. = .381 x P
T.F. = TOP FLAT	T.F. = .280 x P
B.F. = BOTTOM FLAT	B.F. = .280 x P
T.P.I. = TH'DS PER INCH	

shall not exceed three-quarters of the thread basic major diameter and the nut shall be of the open type.

7. All surfaces in contact with the product shall have smooth, rounded corners and shall be readily accessible for cleaning.

C. *Openings*:

1. Inlets and outlets shall conform with the 3A Sanitary Standards for Fittings.

D. *Shaft Seal*:

1. Seal shaft be of the sanitary type easily removable for inspection and cleaning, and shall be constructed of material not injurious to milk.

E. *Gaskets*:

1. Single service gaskets of the sanitary type, or removable rubber type gaskets that can be easily cleaned, shall be used.

F. *Mountings.*

1. Mountings of motor, pump, and drive shall be of sanitary construction and shall be either sealed to the base or mounted to permit easy cleaning with minimum clearance of not less than one inch.

G. *Sealing*:

1. Timing pumps used in connection with high temperature short time pasteurizing equipment shall be provided with an easily accessible or externally visible seal or seals to limit the maximum capacity of the pump. The seal or seals shall prevent the changing of the maximum speed of the pump, either by adjustment of the drive or replacement of pulleys or belt. (This shall be effective not later than January 1, 1949.)

C. A. Abele, Chairman - CSP of IAMFS — 4/30/52 Date

J. D. Faulkner, In Charge - MF-USPHS — 4/25/52 Date

E. H. Parfitt, Chairman - SSS-DIC — 4/30/52 Date

H. S. Fielder, Chairman - Tech. Committee — 4/30/52 Date

ILLINOIS HTST PASTEURIZATION CONFERENCE

The high-temperature short-time pasteurization conference at the University of Illinois on May 6th and 7th was attended by 143 persons from dairy plants and public health departments in Illinois, the Middle Western states and Winnepeg Department of Health.

The program consisted of a demonstration of control instruments on high-temperature pasteurizer by J. Barber and L. L. Forward of the Taylor Instrument Company and by H. Wainess of the U.S. Public Health Service. The Taylor Instrument Company supplied a number of cut-away instruments, including thermometers, flow diversion valves, pressure valves, magnetic switches, etc., while the U.S. Public Health Service had its mobile HTST pasteurizer on exhibition. Messrs. Barber, Forward, and Wainess did an excellent job of explaining details of the operation of the instruments on pasteurizers. The interest was great.

In addition to the demonstration on pasteurizing instruments, representatives were present from the manufacturers of HTST equipment to explain the operation of this equipment in the University Creamery. These representatives included Frank Board and H. E. Behlmer of the Cherry-Burrell Corporation, R. R. Crist of the Illinois Creamery Supply Company, L. T. Gustafson of the Creamery Package Mfg. Company, C. E. McIntire of the Meyer-Blanke Company, all assisted by V. L. Swearingen, the creamery manager. The University is fortunate in having equipment which represents all methods of pasteurizing fluid dairy products, including a pasteurizer in which temperature can be attained that will sterilize products.

One of the highlights of this conference was the luncheon address by Dr. K. G. Weckel of the University of Wisconsin on Technological Advances in the Dairy Industry. He was preceded on this program by Dr. G. W. Salisbury, Head of the Department of Dairy Science, who briefly discussed the progressive teaching, research, and public service program in his department.

The afternoon program consisted of the latest information on pump systems in HTST pasteurizers by H. Wainess; pasteurizing ice cream mixes by J. Tobias; pasteurizing milk for cheese by S. L. Tuckey; and timing HTST pasteurizers by E. O. Herreid.

The program for this conference was developed by a committee which consisted of a representative from the University, two from industry and one from the U.S. Public Health Service. The personnel of this committee was J. H. Hetrick of the Dean Milk Company, Rockford, Illinois, H. D. McAuliffee of the Bowman Dairy Company, Chicago, Illinois, H. Wainess of the U.S. Public Health Service, Chicago, Illinois, and E. O. Herreid of the University of Illinois.

Conference on School Lunch Sanitation Held in Roanoke

Education and public health officials are agreed that the sanitation problems of the school lunch programs require considerable more study before standards can be set up comparable to those established for commercial eating places. This was one of the findings of a conference on school lunch sanitation held March 7-9, 1952 at Roanoke, Va., sponsored by *Modern Sanitation,* and attended by local, state, and federal officials in the fields of public health, school administration and industry.

Delegates prepared a report which recognized that responsibility for defining the sanitation problems of school lunches and formulating recommendations for their solution should be shared jointly by public health and education officials.

The report pointed out that with 10,000,000 children eating lunch at school five days a week, an activity affecting the health of so large a segment of the school population should have adequate sanitary safeguards. These should relate not only to the purity of the foods that are served but also to the methods of food-handling and food service.

The school lunch is part of the total school program; it should serve not only to give children a wholesome sanitary meal at lunchtime but also to provide good experience in sanitation, social behavior, and nutrition.

Reprints of the complete report are available from Modern Sanitation, 855 Avenue of the Americas, New York 1, New York.

Standing (left to right) John Powell, Charles L. Senn, Frank O. Washam, C. H. Atkins, Dr. Mayhew Derryberry, G. S. Shields, J. Lloyd Barron, Eleanor Pryor, Hester Webb, Hulda Kloenne, Kathryne F. Sheehan, J. V. Cawley, Homer N. Calver. Seated (left to right) Dr. E. H. Ellinwood, Ruth Powell, Herbert J. Dunsmore, Grace Harrell, Mildred Reynolds, Marjorie Heseltine, Fred Wygal and Dr. Helen Mackintosh.

3A Sanitary Standards Meeting

A joint meeting of representatives of the 3-A Sanitary Standards Committees will be held at Davis, California, on Thursday, June 26th 1 P. M., the last day of the Annual Meeting of the American Dairy Science Association.

The primary object of this joint meeting is to provide Pacific Coast sanitarians and users of dairy equipment with an opportunity to express their views concerning standards now in tentative form, and to encourage greater interest in that section in 3-A Sanitary Standards.

REPORT OF COMMITTEE ON MILK REGULATIONS AND ORDINANCES — 1951*

The committee report on milk regulations and ordinances is of necessity again in the form of a progress report. The committee was composed of seven members, but Dr. A. C. Fay of H. P. Hood and Sons, Boston, Massachusetts, and Mr. Delozier of Louisville, Kentucky were unable to give their time to the work of the committee. This report, therefore, represents the work of the remaining five members. The chairman greatly appreciated the excellent cooperation he received from these members.

The work outlined in the 1950 report was undertaken. The comments on the 1947 and 1949 reports dealing with those sections on "definitions," "permits," "inspection" and "production requirements for milk to be pasteurized" were abstracted and sent to the members of the committee for their information and for their comment. This was an arduous and time-consuming job for the committee members. A majority of us, however, believed that this was the best method of acquainting ourselves with the general feeling regarding the proposed ordinances. Furthermore, the committee that prepared the 1949 report was severely criticized for not publishing the criticisms received regarding the 1947 report. Therefore, in order to recognize that 59 members commented on the 1947 report and 37 on the 1949 report, or a total of 96 members did have something to say regarding these reports and asked for an audience, we considered it necessary to give consideration to every comment, suggestion, or criticism that was made.

The 1947 report was similar to the ordinance recommended by the U. S. Public Health Service. Some changes have been made in that ordinance since the report was written. We, therefore, compared the comments regarding the 1947 report with the revision rather than with the original report.

Time has not permitted us to interchange our views on the individual comments and obtain a unified opinion. This report, will, therefore, cover only a few of the points on which a majority of us appear to agree, and a few points on which we have decided differences of opinion.

Regarding "definitions," time will not permit a discussion of suggested minor changes in their wording. We have not agreed that there are too many definitions of cream. We favor retaining "half-and-half" but have not agreed to its required fat content. However, Federal Specification C-C-67lb, 1 June 1951 Cream and Half-and-Half, Fresh; which requires 11.5 percent fat for Half-and-Half has recently become available. To promote uniformity, we would probably recommend that this fat content be required. We consider that "definitions" should be included for concentrated skim milk, high solids skim milk, concentrated milk beverage or concentrated skim milk beverage, and vitamin D concentrated milk. It appears that with minor changes and the above additions, we would recommend the section on "definitions" of the ordinance recommended by the U. S. Public Health Service.

Regarding "permits," and "inspections", we will apparently agree that the adopting state or community should have a choice between a "permit revocation" type and a "degrading"type of ordinance. We would, therefore, likely recommend that both types be included in an ordinance recommended to the Association. We are, however, not in agreement as to the frequency of farm inspection after the initial inspection and the issuing of a permit. We have three suggestions to consider: (1) Frequency should be based on necessity as shown by platform tests; (2) at least once every 2 months; and (3) at least once every 6 months. No agreement has been reached regarding the number or frequency with which platform samples should be taken.

Regarding the "production" section, we have not sufficiently coordinated our opinions to make any general conclusions. The most frequent criticism of this section in both the 1947 and 1949 reports was that many items were not sufficiently specific. The critics, however, failed to state what the specific requirements should be and we have not attempted to write specific requirements to replace such terms as "adequate" in either of the reports.

Most of the viewpoints expressed by members of the Association regarding the 1947 and 1949 committee reports were somewhat general in character. Many of them favor either routine dairy farm inspection or platform tests. A large number, however, recognize the need for both approaches. It, therefore, appears that an ordinance satisfactory to the majority will have to recognize both aspects of control as a compromise.

We could undoubtedly agree that the ordinance should be brief and contain a separate code or explanatory section. We could also probably agree that it should contain provisions for using either permit, revocation, degrading, or both as means of enforcement. We have, however, no way of knowing that such an agreement would be satisfactory to a majority of the Association members. Furthermore, there are many points on which we would probably not fully agree. We, therefore, request that the adoption of this report authorize the next chairman to obtain instructions from the Association members by the Secretary sending a questionnaire requesting their views on certain points. The next chairman and his committee should formulate the questionnaire. Some of the questions that we would recommend are:

Should the proposed ordinance be brief and contain an interpretive code or should all requirements be included in the ordinance?

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*Delivered at the 38th Annual Meeting of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., Glenwood Springs, Col., Sept. 26-29, 1951.

Should the proposed ordinance follow the general form and arrangements of sections and items of the 1947 report, the 1949 report, or some other form and arrangement?

Should mandatory pasteurization be required, with a footnote explaining the changes to be made if the adopting community is not in a position to ban the sale of all raw milk? Or should mandatory pasteurization not be required, with a footnote explaining the changes to be made by the adopting community if it desires to require the pasteurization of all milk?

Association members should be given an opportunity to decide whether they wish to make a logical distinction between the control of the quality of the milk and the control of the quality of its production environments. In other words, should official reliance upon control methods be centered in routine farm inspection, or platform inspection, or a suitable combination? Instructions should also be obtained from the association regarding the number of grades of milk that should be recognized in the ordinance.

Without the aid of a majority of the members of the Association regarding these and other points, we feel that the committee cannot formulate an ordinance satisfactory to a majority. However, with the material available and with their help, we believe that a satisfactory ordinance can be formulated. We, therefore, recommend that the committee on milk regulations and ordinances be continued.

C. J. Babcock, *Chairman*

H. S. Adams

A. W. Fuchs

O. A. Ghiggoile

N. O. Gunderson

NATIONAL CONFERENCE ON INTERSTATE MILK SHIPMENTS

The National Conference on Interstate Milk Shipments wishes to announce their Annual Conference for June 10, 11, and 12, 1952, Statler Hotel, St. Louis, Missouri.

Interest in this Conference has been continually growing and at the present time there are some thirty-three states that have participated or shown interest in the national movement. This is primarily a meeting of States. It is a meeting in which all official control agencies of the various states are welcome and urged to attend, as well as industrial trade organization and the Armed Services.

Reservations should be secured as early as possible. This can be done by writing Mr. McLeod, Reservation Manager, Statler Hotel, St. Louis, Missouri.

Robert Akeson has joined the U. S. Industrial Chemicals Co. Division of National Distillers Products Corporation as assistant advertising manager. Prior to his appointment, Mr. Akeson was for four years associated with the G. M. Basford Company, advertising and marketing agency, with time out for service in the Army Occupation Forces in Germany.

CURRENT U. S. PUBLIC HEALTH SERVICE REPORTS

For the two week period ended April 26

Anthrax: continuing to appear among swine in Ohio, 327 animals scattered through 50 counties, having been affected. Eight cases in cattle reported. In 7 infection believed to have been traced to "accidental mixing of contaminated hog feed into the cattle ration." Disease also appeared, since late March, for the first time, in Michigan. Eleven cases in cattle and 9 in swine reported. Eleven counties involved, all in the Lower Peninsula.

Botulism: three cases, with two deaths occurred in Los Angeles County, California. Home-canned mushrooms. Oregon reported two cases, with one death. Home-canned beets.

Streptococcal sore throat: Massachusetts reported an outbreak of 82 cases (no deaths) in a hospital housing 884 persons. Believed to have been food-borne but the item of food not determined.

Gastroenteritis: the New York City Department of Health reported an outbreak of 33 cases, traced to "gefullte fish" cakes. Four families, totaling 35 persons, exposed. All had diarrhea and cramps, except two who did not eat the cakes. Average incubation period 10 hours. Reports on bacteriological examination of fish and stool specimens not received at the time of reporting.

California reported two outbreaks. Five persons, among a a group dining at a San Francisco club, affected. Illness occurred 3 to 4 hours after eating. *Staphylococcus aureus* found in Spanish tongue and turkey. These foods had been left at room temperature 4 hours after cooking. The other outbreak of 100 cases, occurred in a school. Illness followed, by 6 to 13 hours, a meal which included potato salad. An organism of the paracolon group was found in the salad. Stool cultures of persons who prepared the food negative.

Five cases, in an Ohio family group, occurred 2 hours after eating ham. The pre-cooked ham, before purchase, had been unwrapped and exposed on a counter. In the home, after cooking, it was unrefrigerated for 13 hours. "Staphylococcus" recovered from a specimen of the ham.

P. B. Brooks

SYSTEMATIC TESTING OF INHIBITORY SUBSTANCES IN MILK*

G. J. Silverman and F. V. Kosikowsky

Department of Dairy Industry
Cornell University, Ithaca, New York

A portion of a 30 ml sample of milk is tested for general inhibition by a starter activity test and if positive results are obtained the remainder of the sample is subjected to a disc assay test for antibiotics and specific chemical test for quaternary ammonium compounds and sulfonamides. All of these tests are readily adaptable to a systematic laboratory procedure. Their significance and limitations are discussed.

During the past few years there has been a great deal of discussion concerning current practices in the dairy field whereby milk might become contaminated with starter inhibitory substances. These practices include the treatment of dairy cattle for mastitis with antibiotics, such as penicillin, and with sulfa drugs and also the sanitization of dairy equipment with quaternary ammonium compounds. It has been pointed out by a number of investigators that these compounds may carry over into the milk and if the concentrations are large enough these milks cannot be properly made into such fermented dairy products as cheese, buttermilk, and sour cream. Inhibition of lactic starter organisms by milk containing these compounds has been conclusively shown in the laboratory. [7,8,9]

There is at the present time no evidence to indicate the importance of this problem in the field. Over the past year a survey has been undertaken to define the extent of the problem in the New York State area by this laboratory. During this study a definite need was shown to exist for a schematic procedure whereby it would be relatively simple to establish the presence, nature, and concentration of inhibitory substances on a large number of milks.

This paper is concerned with such a suggested procedure, and lists a tested flowsheet of methods for total inhibitory substances, antibiotics, sulfa drugs, and quaternary ammonium compounds along with observations on the characteristics and effectiveness of the individual tests. A number of the methods outlined are well established either in the dairy or medical field and needed only slight changes to fit into the systematic pattern of testing. The procedures which were used in the following order for the survey are presented in this report.

Preparation of Milk Samples

The total quantity of milk required for all the tests concerned with the systematic analysis for inhibitory substances is 13 ml. It is preferable, however, to have at least a 30 ml milk sample for duplicates. In analyzing total inhibitory substances and antibiotics, the milk, raw or pasteurized, is heated to 180°F for 5 minutes, cooled to 92°F if it is to be tested immediately or otherwise cooled to 40°F. For sulfa drugs and quaternary ammonium compounds the test is applied directly to raw or pasteurized milk.

Total Inhibitory Substances in Milk

Principle: This method measures the acid increase by starter organisms in an unknown milk compared to the acid increase of a known control milk or milk powder under comparable incubation and testing conditions. It is commonly referred to in the fermented milk products field as the 'starter activity test' and in this study it was similar in principle to the methods suggested by Horral and Elliker[5] and by Krienke[10].

Procedure: Ten ml of milk are heated to 180°F for 5 minutes in sterile test tubes and cooled to 92° F. Then 1 ml of active commercial starter which was first diluted 1:1 with cold highly heated milk for easier pipetting (180°F 30 min) is added. The tube of inoculated milk is shaken well, and 5 ml is withdrawn for the initial alkali titration. The tube with the remaining 6 ml is placed in a water bath at 92°F for 4 hours after which all of its contents are titrated directly in the tube, using N/20 NaOH with 4 drops of phenolphthalein as the indicator. In testing a large number of tubes, time intervals must be so set between each tube that the incubation period is always 4 hours. The first titration of the 5 ml portion is recorded as *Initial value*. Four hours later the titration of the 6 ml or the second titration is recorded as *Final value*.

Mr. G. J. Silverman is a graduate assistant at Cornell University. He was born in New York City and after serving in the United States Armed Forces, was accepted at Cornell University, receiving a B.S. and M.S. in Dairy Industry and hopes to eventually obtain a Ph.D. from this institution.

*The authors wish to express their appreciation to A. H. Robertson, Department of Agriculture & Markets, New York, for his interest and advice in regard to this problem and to C. W. Christensen, Difco Co., Detroit, Mich., for his technical assistance relative to the disc assay method.

Along with the samples of milk of unknown history, samples of skimmilk (10 percent T.S.) from reconstituted spray powder known to be free of inhibitory substances, are heated to 180°F for 5 min. and tested in identical fashion. These controls always were incubated as the first and last samples of the group being tested. A composite milk sample from a mixed herd known not to have been treated with antibiotics or other drugs may be used as a supplementary control.

Calculations and Interpretation:

$$\text{Final value} - \text{Initial value} = \text{Acidity increase}$$

$$\frac{\text{Acidity increase of test milk}}{\text{Acidity increase of control milk}} \times 100 = \text{Total activity value expressed as percent}$$

Total activity values of 100 percent or higher are not inhibitory. If value is below 80 percent, then definite inhibitory characteristics are predicted and the milk was submitted to more specific tests for inhibitory substances listed in the following pages.

Disc Assay Method for Penicillin and other Antibiotics in Milk

Principle: The disc assay method for penicillin determination is an evolution of the cup assay methods as developed by Vincent and Vincent[14], Foster and Woodruff[2,3], Schmidt and Moyer[13] and by Loo *et al.*[11] This type of method is much simpler in operation and in some respects is considered more accurate than cup assay methods. Application of the penicillin disc assay to milk on a practical basis has been under development at Difco Laboratories, and much of the detail of their method is presented in this paper.

The method is based upon the observation that if a paper disc containing penicillin is placed on a hardened agar layer previously seeded with bacteria sensitive to pencillin or other antibiotics, the antibiotics will diffuse from the disc radially and where inhibition occurs a circular clear zone is formed, indicating no bacterial growth, whereas the rest of the agar layer in the petri dish is of turbid nature. The size of the diameter of the clear zone is directly related to the concentration of antibiotics up to a certain level.

Procedure: Six drops of standardized *B. subtilis*** spore suspension are added to 12 ml of sterile melted whey agar at 50°C. After shaking, the seeded agar is poured into a standard sterile petri dish and allowed to solidify as a level layer.

A small quantity of milk, 0.017 ml, is placed on ¼" diameter filter paper discs** by means of a micro pipette, and the disc, held by tweezers, is saturated with milk but without any excess. Good results have also been obtained in this laboratory by saturating ½" diameter paper discs simply by dipping an edge in the milk until the the entire disc is impregnated by capillary action thus eliminating the need of pipetting. The smaller ¼" disc also may be used with this latter technique but more care is needed to prevent surplus milk from being retained on the disc. After the disc absorbs all of the liquid it is quickly and firmly placed on the surface of the solid agar, and as more discs are placed on the plate they are arranged in a circle on the petri dish. About 8 to 12 discs depending upon their size may be placed on a standard petri dish. The petri dish is inverted and incubated at 37°C for 4 to 6 hours after which observations are made on the plate. All results in this paper pertaining to disc assay methods were obtained using ¼" discs.

A standard disc containing known concentration of penicillin should always be placed on each plate to serve as a check on the sensitivity of the method. Larger sterile dishes can be substituted for the standard petri dish if large numbers of milk samples are to be analyzed.

Calculations: As shown in figure 1, clear circular zones around the discs indicate inhibition of the test organism and the presence of antibiotics in milk. If a small ruler and a set of calipers are used to measure the diameter of zones obtained by standard discs of varying concentration this can be translated into a standard penicillin curve. Prepared standard penicillin discs purchased from commercial sources or disc impregnated with milk containing known amounts of penicillin are satisfactory for producing such a curve.

Specificity of Disc Assay Method for Penicillin.

Penicillin can be specifically identified in this method by using penicillinase disc** where positive results are obtained. When a zone occurs, the milk which produced it is placed (0.017 ml) on a disc impregnated with penicillinase. This disc is placed on seeded whey agar and the analyses repeated as for penicillin. If a zone is not reproduced penicillin was present in the milk, and it is assumed that the penicillinase inactivated the penicillin. If a zone still persists it indicates that other antibiotics or inhibitory substances are present.

Free Sulfa Drugs in Milk.

Principle: The presence and concentration of free sulfa drugs in milk were obtained by modifying the chemical method of Bratton and Marshall[1] which is an accepted method for blood and urine. According to these investigators the following principles govern this test. Trichloracetic acid precipitates the protein in blood. Nitrous acid produced as a result of the addition of sodium nitrite diazotizes the free sulfonamide or any other free sulfa drugs which are derivatives of the parent compound, sulfanilamide. Excess nitrous acid is destroyed by ammonium sulfamate and the diazotized sulfonamide combined with added N-(1-Naphthyl-ethylenediamine) to form a stable vivid red color.

Procedure: To 1 ml of raw or pasteurized milk is added 10 ml of fresh 1.5 percent trichloracetic acid. The resulting precipitate is filtered off with Whatman No. 42 paper. One ml of the clear filtrate is added to a clean test tube followed by the addition of 10 ml of 0.01 percent fresh sodium nitrite solution.

**Whey agar, *B. subtilis* spores, plain and standard ¼" discs can be obtained from Difco Co., Detroit, Mich. Preparation of *B. subtilis* spores in the laboratory is also discussed by Loo *et al.*[11] Plain ½" disc No. 740-E may be obtained from Schleichter and Schuell Co., Keene, N. H.

The solution is allowed to remain at room temperature for 3 minutes. Then 1 ml of 0.1 percent ammonium sulfamate solution is added and the solution is allowed to stand for 2 minutes. Finally 1 ml of fresh 0.5 percent N-(1-Napthyl)-ethylenediamine is added. A clear red color results almost immediately if sulfa drugs are present in the milk.

Calculations: A standard color curve indicating concentrations of sulfa drugs can be developed from the red color using a photocolorimeter. Though there is some difference in standard curves for the individual free sulfa drugs the differences are not extremely great.

Quaternary Ammonium Compounds.

A method for these compounds in milk was presented recently by Miller and Elliker[12]. This method involved the use of eosin yellowish dye and citric acid buffer. As the method was used exactly as suggested by these authors reference to the details of the principle and procedure should be made to the original article[12]. One ml of milk is used for this test.

RESULTS

Detection of Penicillin and Other Antibiotics in Milk.

Methods outlined in this study were applied to milk from mastitis-free cows of the college herd. Varying concentrations of penicillin G, aureomycin, and dihydrostreptomycin were added to separate lots of raw milk. These milks were then heated to 180°F for 5 minutes, cooled to 40°F and held for 24 hours before analyses were made. This treatment was considered to approach the treatment of milks for some commercial fermented dairy products.

In table 1 are shown data obtained by the total inhibitory substances method and by the disc assay method on milks which contained these three antibiotics. Although three commercial lactic acid starters from different sources were run, table 1 lists results from only one of these starters. Milks containing penicillin in concentrations of 0.1 unit of penicillin per ml exhibited a slight inhibitory effect upon this multi strain starter of about 10 percent. Between 0.1 and 0.3 unit of penicillin per ml, however, the effect was very pronounced. With this starter, slight activity persisted even at the highest concentration of penicillin. Most of the other commercial starters studied were affected to about the same degree as starter L1 but one starter (data not shown) was somewhat more sensitive being inhibited 20 percent at 0.1 unit per ml penicillin concentration and showing zero activity at 5 units per ml and higher.

Aureomycin and dihydrostreptomycin are not nearly as effective inhibitors of lactic acid starter bacteria, table 1, as is penicillin at levels below 3.0 units per ml. Above this concentration differences in potency between the various antibiotics were not too pronounced.

Results in the laboratory on the disc assay method, table 1, indicate it is capable of a great deal of sensitivity when specifically applied to penicillin in milk. Under optimum test conditions, concentrations of penicillin in milk as low as 0.05 unit per ml were detected. For the average laboratory analyses sensitivities of 0.1 unit per ml could be expected, fig. 1. A good indirect relationship was shown to exist between milk activity and zone diameter when the total inhibitory method and the disc assay method were compared on milk containing only penicillin as the inhibitory agent, table 1. Experience in the field on a large number of raw and pasteurized milk samples have not indicated as good a correlation. In particular blended pasteurized samples from commercial dairies did not show such correlation. This may have been due to the fact that most positive cases contained low concentrations of penicillin and that such factors as natural inhibitors for the test organism may have entered into the picture.

Aureomycin and dihydrostreptomycin, on the other hand, both exhibited lower sensitivities to the disc assay method when *B. subtilis* was used as the test organism. This in effect increases the specificity of the disc assay method for penicillin when this organism is used with this agar.

Detection of Sulfa drugs in Milk.

Five sulfa drugs were added to different lots of the same milk in the various concentrations listed in table 2. Acid activity, zone diameters, chemical readings and taste reactions were noted. Though sulfapyridine had the greatest effect upon the activity of the starter organisms used it is apparent that as a group the sulfa drugs are not highly effective against normal starter organisms in the concentrations that might be expected in a milk which has been obtained from a cow treated with this drug.

Except for sulfathiazole, very little sensitivity to *B. subtilis* was exhibited in the disc assay method by sulfa drugs. Even in the case of sulfathiazole zoning was apparent only at the highest concentration

TABLE 1. The Detection of Antibiotics in Whole Milk as Shown by the Starter Activity Test and the Disc Assay Method Using a Starter Culture of High Activity. (L1)

Type & Concentration of inhititory Substances	Activity*	Zone diameter of inhibition** by disc assay
units	percent	CM (includes disc diameter)
Penicillin		
0.00	100	0.0
0.10	92	1.1
0.30	56	1.5
0.70	27	1.8
1.00	20	2.0
3.00	17	2.4
5.00	16	2.5
10.00	15	2.6
Aureomycin		
0.00	100	0.0
0.05	92	0.0
0.10	95	0.0
0.30	79	0.0
0.70	53	0.0
1.00	41	0.0
3.00	23	1.15
5.00	20	1.45
10.00	18	1.60
Dihydrostreptomycin		
0.00	100	0.0
0.05	103	0.0
0.10	96	0.0
0.30	82	0.0
0.70	62	0.0
1.00	45	0.0
3.00	21	0.0
5.00	17	1.4
10.00	15	1.8

* Increase in acidity of control milk in 4 hours at 35°C using 5% (L1) starter was 0.21% to 0.73% = 0.52% increase. Contols in this table were of same lot of milk containing no antibiotic.

** *B. subtilis* test organism used on whey agar.

TABLE 2. The Detection of Sulfa Drugs in While Milk as Shown by the Starter Activity Test, Disc Assay Method, Chemical Test, and Taste.

Type and concentration of sulfa drug in milk	Activity*	Diameter zone of inhibition** by disc assay	Chemical Test	Taste
percent	percent	CM		
0.000	100	0.0	no color	O. K. (sl. cooked)
Sulfanilamide				
0.001	104	0.0	no color	sl. puckery
0.005	98	0.0	pink	sl. puckery
0.010	94	0.0	sl. red	puckery
0.025	88	0.0	red	sl. bitter
0.050	82	0.0	red	bitter
Sulfamerizine				
0.001	101	0.0	no color	O.K.
0.005	101	0.0	pink	sl. puckery
0.010	98	0.0	red	sl. puckery
0.025	91	0.8	red	bitter
0.050	85	0.8	red	strong bitter
Sulfathiazole				
0.001	97	0.0	no color	sl. puckery
0.005	97	0.0	pink	sl. puckery
0.010	95	0.0	red	sl. bitter
0.025	82	1.8	red	sl. bitter
0.050	80	2.2	red	sl. bitter
Sulfamethezine				
0.001	94	0.0	no color	sl. puckery
0.005	89	0.0	pink	sl. puckery
0.010	83	0.0	red	sl. puckery
0.025	87	0.0	red	bitter
0.050	96	0.0	red	strong bitter
Sulfapyridine				
0.001	98	0.0	no color	sl. puckery
0.005	92	0.0	pink	sl. puckery
0.010	90	0.0	red	puckery
0.025	81	0.0	red	sl. bitter
0.050	70	0.8	red	sl. bitter

* Controls in this table were milk of same lot containing no sulfa drugs or antibiotics.

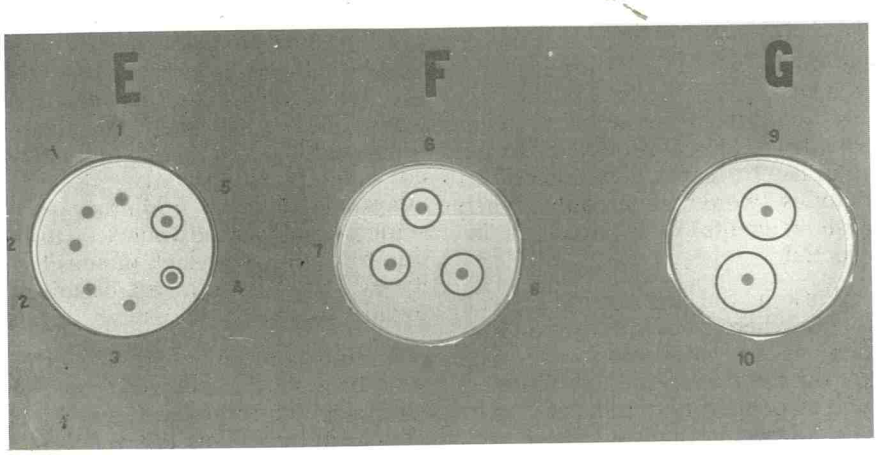

FIGURE 1. Results of Disc Assay Method on Milks Containing Known Quantities of Penicillin and Expressed as Units/ml Milk. 1. 0.00, 2. 0.01, 3. 0.05, 4. 0.10, 5. 0.30, 6. 0.70, 7. 1.0, 8. 3.0, 9. 5.0, 10. 10.0.

TABLE 3. The Detection of a Quaternary Ammonium Compound (Roccal) in Whole Milk as Shown by the Starter Activity Test, Disc Assay Method, and Chemical Test.

Quaternary ammonium	Activity*	Zone of inhibition by
compound	percent	disc assay CM
0.0	100	0.0
3.0	95	0.0
5.0	89	0.0
10.0	70	0.0
50.0	15	0.0

*Controls in this table were milk of same lot containing no quaternary ammonium compounds.

used. When discs dipped in solutions containing p-amino-benzoic acid were dried and then treated with milk containing sulfathiazole, no zone appeared. This application of p-amino-benzoic acid might serve as a specificity test for sulfa drugs if the latter were suspected on a disc assay check plate.

The chemical test of Bratton and Marshall for adaptation to milk provides a high degree of sensitivity. Milks containing as low as 0.005 percent sulfa drugs could be detected by a pink coloration. Very small amounts of sulfa drugs also were indicated by the off-flavor in milk ranging from slight puckery to extremely bitter.

Detection of Quaternary Ammonium Compounds in Milk

Relatively small concentrations of these quaternaries affected the activity of the starter organism, table 3. However, amounts greater than 10 ppm were required before any serious problem with commercial starter inhibition was encountered. The disc assay method using *B. subtilis* was without sensitivity of quaternary ammonium compounds employed herein.

DISCUSSION

This study was undertaken to evaluate and coordinate methods for the systematic analysis of inhibiting substances in milk. It does not touch on methods for bacteriophage because at the present time no practical method exists which can test for bacteriophage in large numbers of milks obtained over wide areas. Therefore, the impor-

tance of this problem to the dairy industry cannot be fully evaluated until such time when the incidence of such cases can be measured.

All the methods finally adopted in this systematic approach showed some promise for their particular function. The starter activity test showed good sensitivity. If this test is carried out with an active starter in a thermostatically controlled water bath it should provide in five hours an answer as to whether the milk contains inhibitory substances. To achieve reproducibility the choice of a proper control is imperative, and the manner of adding starter and titrating the milks should be standardized. Extreme heating of the milks for the starter activity test is necessary as in its raw or even pasteurized state such factors as contaminants or natural inhibitors might come into the picture.

The disc assay method in the laboratory produced sensitive and reproducible results which supports to a great extent the findings of Gilcreas and Stewart[4] on a related type of method, the cup assay method, but any statements as to its ultimate success in the field must be qualified. Heating the raw or pasteurized milk to 180°F for 5 minutes and then cooling to 70° F or lower before use is a precautionary measure for this test. At certain times of the year natural inhibitory substances against *B. subtilis* appeared in the milk. The false positive zones which were created by these natural inhibitors were never over 1.0 cm in diameter and disappeared upon heating of the milk to a high temperature. If for the sake of convenience raw milks are tested directly, all values below 1.0 cm should be considered as possibly being caused by natural inhibitors.

When testing blended pasteurized fluid milk it is doubtful that the level of penicillin which one might expect to find is anywhere near the optimum working sensitivity scale of the disc assay method. Nevertheless, if blended pasteurized milk from commercial dairy plants contains penicillin between 0.1 and 1.0 unit/ml, this method should pick it out. For individual producer's raw milk the disc assay method may prove to be of greater usefulness as one might reasonably expect relatively higher concentrations of penicillin, if there is any present, than for the blended pasteurized type of milk sample.

Bacteria other than *B. subtilis* as a test organism may be employed. For example, *Staphylococcus aureus* which may be used instead does not seem as sensitive to natural inhibitors as is *Bacillus subtilis*. However, *B. subtilis* has the advantage in that it can be used as a spore suspension. This spore suspension can be held in a cold room for many months without need of further transfer, thus saving labor and at the same time introducing a test organism of uniform growth and viability characteristics. The latter organism also gives sharper edges to its zones.

Unless more sensitive test organisms for other antibiotics are found using whey agar it appears that this disc assay method is restricted largely to the detection of penicillin. A number of factors, however, are likely to change the sensitivity of the method for penicillin. The thinner the agar layer the greater the sensitivity. Irregularities in agar depth cause irregularities in results. Excess moisture in plates, uneven incubation temperatures, and varying amounts of inoculum also cause variation in final results.

Aseptic technic should be used throughout and includes such practices as flaming the tweezers for holding discs.

The sulfa drug test was sensitive enough to detect 0.005 precent sulfa drugs in milk whereas the test for quaternary ammonium compounds could readily detect 3 ppm in milk. In both tests successful analyses were made only when fresh reagents were used as instructed.

Work in our laboratory as well as elsewhere, has indicated that there is no satisfactory one-hour test for the detection of antibiotics, such as penicillin, in milk. It should be no deterrent, however, that several of the methods listed here require about 5 hours or more before an answer can be obtained. If a group of producers transport their milk to a plant and if after testing several of their milks are positive, it may be too late to prevent that milk from entering the supply. Yet on the following day those same producers with suspected milk can have their milk held up until completion of another test. The realization by the producer that the dairy management is aware of the presence of drugs or antibiotics in his milk then serves as an effective educational method to combat whatever problem exists in this field.

SUMMARY

A schematic procedure was compiled from a number of individual methods used for the detection of such inhibitory substances as antibiotics, sulfa drugs, and quaternary ammonium compounds in biological fluids. This systematic procedure was formulated for the large scale testing of fluid milks. Because of its simplicity and cohesiveness it should prove to be of importance in a large scale undertaking if all qualifications are considered.

A disc assay method for milk using *B. subtilis* as the test organism procedure showed promise in the laboratory for the detection of amounts of penicillin in milk as low as 0.1 unit/ml. Results from the field on mixed pasteurized milk samples did not indicate as good a correlation relative to antibiotics as results obtained in the laboratory on control milks. This was undoubtedly due to other variable factors inherent in some milks obtained at random. More work should be undertaken in the field to confirm the usefulness of the disc assay method as a standard test for milk. Penicillinase discs enabled this method to attain a specificity for penicillin. This disc assay method using *B. subtilis* was not very adaptable to other inhibitory substances likely to be found in milk due to the relative lack of sensitivity exhibited by the test organism toward these substances.

A four-hour incubation starter activity test also showed promise for detecting total inhibitory substances in milk. This test was highly sensitive but accurate reliable results are largely dependent upon standardization of technic.

(continued on page 139)

Report of Committee on Frozen Food Sanitation*

During the past year your committee selected two projects for study. The first deals with regulations, effective in the various states dealing with the control of frozen foods. Questions which prompted this study were: (1) The extent to which our national population is covered by regulations governing frozen foods; (2) The quality of these regulations; (3) agencies concerned with frozen food sanitation; and (4) the logical place of frozen food sanitation in government. The growth of the frozen food industry and the increasing types of food processed by this industry undoubtedly warrant such questions, as well as additional ones, which the committee should ponder and, if possible, try to answer. It can readily be seen that this is no small project, but results of the past year's survey should provide valuable basic information from which future work may proceed.

The second project initiated dealt with the processing treatments of fruit for use in ice cream. Several reasons suggested this study among which were: (1) The use of a processed product by the ice cream manufacturer, over which he has no control and which receives from him no further bactericidal treatment, and (2) ice cream containing these products more frequently contains numbers or types of bacteria not encountered in other flavors of ice cream — although it is not presumed that this situation solely is the responsibility of the fruit processor. In view of the sanitary regulations controlling the sanitary conditions requisite for the manufacture of quality ice cream, the above reasons were considered sufficient to warrant this study.

Detailed reports on each of these subjects are hereby submitted to the Association for its consideration.

State Regulations Affecting Frozen Foods

James A. King

The Frozen Food Sanitation Committee has had as its principal activity the investigation and analysis of state laws, rules and regulations which apply to frozen foods. A questionnaire was sent to all states along with a request for copies of rules and regulations which apply. Results, based on 47 replies, were as follows:

1. 45 of the 47 states regulate to some degree the processing, storage and distribution of frozen foods.

2. Of the 45 states with controls, 20 have laws only; 25 have laws and regulations.

3. Responsibility is placed as follows in the 45 states:

Agriculture	— 21
Food & Drug	— 1
Health	— 22
Laboratories	— 1

4. Thirty states believe present laws and/or regulations to be adequate; fifteen states qualify their reply or state no.

5. Responsibility for administration of laws or regulations is at the state level in 28 states; shared by state and local government in 16 states; and is entirely a local responsibility in one state.

Upon examination of laws and regulations supplied by the various states there appear to be four general types of requirements which apply to sanitation of frozen foods|

1. Broad food laws which are usually based upon the uniform food and drug act and apply to all foods. A majority of these acts were written long before the advent of frozen food on a commercial scale.

2. Cold storage acts which apply to establishments offering storage space in refrigerated warehouses and which deal principally with labeling, age of food, records, etc.

3. Frozen desserts laws which deal principally with dairy products.

4. Frozen food locker plant laws dating from 1940 to 1951.

Of the 41 states submitting copies of laws or regulations:

17 have general laws only with no specific reference to frozen foods.

24 have specific frozen food locker plant laws which generally do not apply to frozen foods which move in commercial channels.

A single comphrensive law or regulation dealing with the broad subject of frozen food sanitation was not noted in the 41 sets of material received. Instead, control measures are contained in an average of three publications from each state. One official stated the situation as follows: "No law or regulation in effect in this state specifically refers to 'frozen foods' except the state Frozen Food Locker Plant Law which contains no provisions that would apply to the sale of frozen foods. Therefore, all state laws and regulations governing the processing, preparation, manufacture, or sale of foods in general would apply to 'frozen foods'."

Since there was no general pattern of requirements except in the field of frozen food locker plants, an analysis was undertaken of 24 laws or regulations dealing with this phase of the frozen food industry. Of the 24 laws and regulations analyzed, common requirements were as follows:

22 covered all food products

1 covered meat and poultry only

24 became effective since 1940

21 require license or permit

23 require inspection

18 regulate or forbid storage of food not intended or suitable for human consumption.

12 specify the type of construction for walls, floors and ceilings

18 require that the plant be kept clean

10 require that the plant be adequately lighted

10 require that the plant be adequately ventilated

14 require lavatory facilites

13 require an adequate supply of safe water

15 require toilet facilities for employees

7 specify that equipment must be constructed so as to be easily cleaned

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

14 require equipment to be cleaned and sanitized

1 specifies the method or methods for cleaning and sanitization

10 require storage of equipment so as to prevent contamination

14 specify clean outer garments for employees

18 require healthy employees or health certificates

5 require gas masks where toxic refrigerant is used

5 require submission of plans for new plants

15 specify one or more specific temperature for chill room, sharp freeze room or locker rooms, as follows:

a. Chill room: + 34°F to + 38°F ± 2°. Most frequent temperature required is 34°F ± 2°.

b. Sharp freeze room: −20°F to 0°F. 10 states require −10°F. Most states permit a 10° higher temperature when forced air circulation is used.

c. Locker rooms: 0°F to 10°F. 12 states require 0°F; 2 require 5° F or less and one requires 10° or less.

15 require inspection of all food entering the locker by operator

17 specify proper wrapping of food

13 require that food packets be identified

12 require recording thermometers in the locker room

8 require records of entries into plant

Among the additional requirements appearing with some frequency were:

1. Locker rooms for employee clothing.
2. Regulating storage of fish
3. Prohibition of toxic ink for marking food
4. Forbidding the use of tobacco in the plant
5. Specifying methods of waste disposal
6. No handling of food in living quarters
7. Details for handling fruit and vegetables
8. Requiring various rooms as a prerequisite to plant approval
9. Forbidding domestic animals in plants
10. Screening of doors and windows
11. Protection of food from contamination
12. Thermometer specifications

The above information is based upon the laws or regulations received from the various states with full recognition that some states with seemingly inadequate requirements may be able to apply other laws or regulations not available to the committee.

The committee was unable to find references to commercial frozen food which would insure the consumer against thawing and refreezing; no reference is made to commercial frozen food, temperature, ages, or transportation requirements. Even if we could assume that all necessary sanitation measures are carried out prior to freezing, it appears that there remains a broad area requiring study and investigation as prerequisite to any adequate performance standard.

By implication administrators, in their replies, indicate divided opinion regarding the need for specific laws or regulations governing frozen food sanitation.

A Preliminary Survey of the Processing Treatments of Fruit for Use in Ice Cream

Raymond N. Doetsch

In order to determine what treatments are given to fruits before they are sold to manufacturers of ice cream, 62 companies which process fruit were asked the following question: "What processing treatments do you give fruits before they are offered for sale to ice cream manufacturers?"

The following table will show how this question was answered by the 62 manufacturers polled.

No address, cannot be found, etc.	5	8%
Do not sell to ice cream manufacturers	2	3%
Considered process trade secret	1	1%
Referred elsewhere	1	1%
Bankrupt	1	1%
No reply	36	58%
Detailed reply	16	24%

The reason for the great number of manufacturers who chose not to reply perhaps may be because they considered an answer to be in the nature of giving away trade secrets, competitive processing, not for publication, etc.

Of those manufacturers who submitted a detailed reply to the question, the treatments mentioned were being used on strawberries, raspberries, peaches, dates and maraschino cherries. The following table shows the number of manufacturers who used each of the tabulated methods of treating and/or preserving these fruits before sale to ice cream manufacturers.

Sugar preservation	8
Sulfur dioxide treatment	4
.1% Sodium benzoate treatment	3
Boiling in sugar solutions	5
Pasteurization	1
Can sterilization	8
Citric acid preservation	2
Fumigation with methyl bromide	1

At the present time there are not very many useful conclusions that can be drawn from this survey. However, it should be pointed out (1) that the processors were not too cooperative with us in this particular venture, and (2) in most instances fruits are not sterilized, but reliance is placed mainly on high sugar concentration and obtaining good fruit. A number mentioned preservation in sugar using boiling solutions. Surprisingly enough, however, sterilization of the can before filling was mentioned as a distinct processing treatment by one-half of those who answered.

The Committee hopes that before the next report is due we may perhaps be able to obtain replies from additional processors and that more information may be available for the evaluation of the effectiveness of the various treatments.

Comments on this report and suggestions for future work will be welcomed by your Committee.

Marvin L. Speck, *Chairman*
H. D. McAuliff
Raymond N. Doetsch
O. A. Ghiggoile
S. R. Howe
James A. King
David Levowitz

MILK and FOOD SANITATION

THE SANITARIAN, AND YOU

K. G. WECKEL
Department of Dairy and Food Industries
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It has been reported that the longevity of man is constantly increasing. In the time of the Roman Legionnaire about 500 B.C. life expectancy was about 23 years. In this country, life expectancy in 1850 was 40; by 1900, 47; by 1940, 63; and 1950, 67. Life expectancy has been increased as much within the past 50 years, as in the previous 2000 years. In 1900, 17 percent of the population was 45 or older; by 1940, this percentage had increased to 27. In 1945, 11 percent of the population was over 60; it is estimated that by 1960, 15 percent, or one of every six, will be over sixty years of age.

Interestingly, while longevity has increased in certain countries, it has not, in others. Students in our laboratories from India, for example, report a life expectancy of 24.

The increase of life expectancy is due to three major fields of endeavor: 1) advances in the science and practice of medicine, 2) an increased knowledge of nutritional needs and in food utilization habits, and 3) the development and practice of public health and sanitation techniques by which transmissible affliction is avoided.

The significance of these fields of endeavor on man's wellbeing is to be noted in the areas within this country where they are either unavailable, or not practiced.

You, as sanitarians, are important parts in the processes by which the life span, and the convenience thereto, has been increased nearly threefold, and, within twofold in the time of yourselves, and of your parents. This has taken, and is taking place even with increase in, and an aggregation of our population, both of which add to the burden of achievement.

It is necessary that you as a sanitarian, stand aside, and apart, periodically, the better to survey and evaluate the work that has been, and is being done, and to ask yourself, "how am I doing?" — and, more, "what am I doing?"

This is because the science and techniques of practice of sanitation are developing constantly. It is not a static, fixed, quiescent profession. Like other fields of endeavor, it involves use of knowledge in many fields within science, in each of which there is constant search for knowledge that is of use to man, and his well being. He who does not recognize this is, in fact, not a full fledged sanitarian, but a cog, in a plan, that in itself may be outmoded. The sanitarian must reach for, acquire, evaluate, and use the newer facts of value as they become available if he is to fulfill his part in being of service to the well being of man, and which, as a sanitarian, he has chosen to do.

Students who survey sanitation work soon learn that the knowledge of the sanitarian must parallel and encompass some of the knowledge of:

the animal and dairy husbandman	
veterinarian	chemist
bacteriologist	physicist
engineer	lawyer
public health officer	teacher
dairy and food technologist	
nutritionist	farmer
psychologist	entomologist
salesman	

The supervision of the procurement, transfer, processing, and distribution of food supplies under conditions that foster good health involves a broad, technical background. A sanitarian must recognize then, that his profession is an honorable one, and no less worthy of identification than that of the butcher or baker, doctor or dentist, producer or processor. Each should make identification of the profession easy, whether it be by doing so on the letterhead, office, door pane, framed certificate on the wall, or by signature. Be proud of your chosen service.

The professional sanitarian is no less faced with the problem of maintaining a progressive attitude, and ability, than are others in differing or related professions. The sum total, and the availability of knowledge, has always been so vast, that each of us must learn to winnow and sift it to gain that which we can use. There are a number of avenues by which the progressive and responsible sanitarian can keep himself alert, and play the role he should in the profession.

Believe in, and identify yourself and your profession

Each of us needs the moral encouragement of being recognized for the work we do, and the contributions we make to the welfare of others. I point this out because it appears that in the classifications of the U. S. Department of Labor the sanitarian, as such, is a lost, or black sheep, and at least, not professionally acknowledged. This is probably because the practicing sanitarian must needs be familiar, and very much conversant with many fields of endeavor, in themselves, separately recognized.

Keep up with the "literature"

America and Canada are blessed with literally hundreds of technical Journals, trade papers, and farm periodicals. In the dairy and food industry alone is a large number of trade publications. There are several publications of direct and immediate interest to the sanitarian which he should definitely have as subscriptions, and others to which he should have access for related material. My experience in visiting offices from which sanitarians work is that far too many have made no studied effort whatever to have on hand, or access to 1) basic sanitarians technical journals, 2) trade journals of related material, or 3) of newer texts in the general field of work. The overall cost to a sanitarian, or his employer of keeping a modest well organized library is trivial in the light of the benefits that can be derived. Mental stimulation and modernization require the use of journals and texts. It is a choice of: read, or become ragged. Every journal and trade publication carries diverse types of information: original articles, abstracts or reference to other articles, announcements of descriptive material by manufacturers, and of books from publisher, bulletins and circulars from federal and state governments, colleges and universities. The worth of the publication often depends on how successfully the reader can, or is willing to, squeeze

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the content for his use. Every sanitarian must set aside a work period for use of the publication. It should be a designated, uninterrupted, regular period for the job. The sharp and precise employment and use of the mind in this work is no less exhausting, when properly done, than is other usual physical work.

Many sanitarians work within organizations where many publications are available, but who have not had the opportunity to participate in office publication routing systems. This certainly should be done.

Keeping alert

One of the means of fixing knowledge in the mind is by repetition, and by association of facts. Many sanitarians do not have as frequent opportunity to converse, repeat and associate facts professionally as do men engaged in other professions, and this is especially so of milk and food sanitarians in smaller communities and organizations. Sanitarians can and should conduct regular periodic local area seminar group discussions on either: recently published articles, or on specific developments of mutual interest. There is no reason why sanitarians in communities, or even within organizations, cannot conduct seminar reviews of current material. It is necessary for us to comment that as among dairy group meetings, the professional sanitarian is often very conspicuous by his absence. The sanitarian should participate in and become a part of industry activities. The most successful food product organizations have the most alert and active sanitarians.

Be a "specialist"

Keeping the mind alert, and interested in the vocation, can be met in part by developing a special fund of knowledge about certain things. Basically, trying to know all about everything is impossible. But you can know a lot about something and this can stimulate you in your work. Every sanitarian should have some special project or subject about which he desires some specific information within a given year. It may be on the temperature of milk on delivery wagons, or in stores, or of how old it does become in institutions, or of a more complex matter involving antibiotics in milk or so on. The pursuance of the project will necessitate your thinking, and reading about what is known on the subject, and force you to evaluate the better what you thought you may have known about other things.

Work with others

The work of the sanitarian involves contact with large numbers of people. It may or must be done on an individual basis, or in small and large groups. Much of the work must be done on an educator basis, and in doing this, there exists a variety of tools that are of great help. There are governmental college and industrial services by which knowledge can be transferred in a manner to be effective. These have teaching aids, whether as speakers, counselors, movies, demonstrations, bulletins, and so forth. The effective planned use of these facilities can do much to accomplish and help the work of the sanitarian. But it must be utilized in a planned and well managed project basis. Haphazard utilization of facilities of others leads eventually to frustration.

Look at the record

One of the greatest problems of all organizations is to have personnel show what was done and what was accomplished by doing it. One of the most interesting developments in the planning of work is the system used by fieldmen in vegetable canning plants in projecting planting of crops so that the cannery can have the crops at peak of maturity in scheduled amounts. It involves heat unit measurement. The point is that the work is planned in advance, and the status of the crops at any time can be evaluated. Sanitarians should plan their work on a project basis, and at the end of a stipulated period make an evaluation, and report. Work cannot properly be planned without evaluation. The availability of positive information is one of the best selling tools there is in furthering a program.

Educate rather than police

A major portion of the world's accomplishments is done on a basis of understanding. You have only to converse with any skilled workman to learn that he usually understands why things are done in certain ways. The doing is through the understanding. The need for understanding in the process of teaching sanitation techniques to others in very great. Policing a method is necessary for the limited few; teaching a method is basically more successful for the majority. It is the experience of many who have thought of the problem that there is a great gap in the understanding of many who are doing jobs that involve sanitation practices. You as a sanitarian ought to examine your ability as a teacher.

Practice and preach

Unfortunately there are professed sanitarians who fail to practice their preaching. The failure may lie in personal habits, or in procedures in their work. Sometimes it is exemplified in the absence of clean teeth, dirty finger nails, or poorly kept clothing, car, or office. At other times, it is a failure to provide on one hand a philosophy of living that is taught in another part of an operation, such as clean toilets, rest rooms and halls, or stairs in a building housing elsewhere food handling operations in which personnel are expected to be sanitation conscious. Again it is exemplified by the man who urinates in the barn and makes light of his teaching, or the one who paws over utensils without first having cleaned and sanitized his hands. As a sanitarian, you are under constant scrutiny, and folks seldom tell *you* what *they* see.

Take the bushel off the light

Sanitarians, by and large, are a shy and conservative lot. You seldom see their pictures on the front, or inside pages of the newspaper or in trade papers, newspaper articles about their activities, of the meetings they conduct or attend, are too few. In communities, annual reports of their work frequently involve negative rather than positive accomplishments. Every sanitarian should interest every person

possible in the work, and should take every opportunity to do so.

Sanitarians should improve their reading practices; they can extend their speaking abilities and participations and make known the kind of work they do, and the objectives they seek. The effort should not be confined only to those with whom you must work, but to others who may seemingly be remote, whether Service Clubs, Parent Teacher Groups, School and College Groups, and so on. In so doing — you learn of avenues of opportunity, and gain enthusiasm for your work. Take every opportunity to do such work, for it is an honorable profession and is contributing greatly to the welfare of man.

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NEW BOOKS & OTHER PUBLICATIONS

(continued from page 109)

vacuum, headspace, heat treatment), added materials, trace elements (S, Cu) tin coating, tin plate testing, enameled cans, and electrolytic tin plate.

Rationale for Studies of Consumer Food Preferences, by R. L. D. Morse, pages 385 to 427. 76 references. Consumer preference studies started in 1926, and have shown continuing interest. Preferences are relative and vary from time to time. Methods of significant measurement need more research. The factors involved in both consumer and market surveys are analyzed in detail.

Control of Microorganisms Causing Spoilage in Fruit and Vegetable Products, by Mathilde van Schelhorn, pages 429 to 482. About 225 references. Preservation is discussed under heat treatments, exclusion of oxygen, inhibitory effects of CO_2 sterilization by filtration, electronics, ultrasonics, etc., low temperatures, dehydration, acid fermentation, chemical treatment, dips, controlled atmospheric conditions, and sanitation. Progress in chemical preservation has not been as great during the past 15 years as in physical methods. Preservation of fresh, untreated fruit and vegetables has not been solved by storage in special atmospheres and by various dips. Combinations of low initial infection, low temperature storage, and gas atmospheres indicate present trends.

ROLE OF THE PLANT FIELD MAN IN MILK SANITATION*

VINCENT V. KISER .

Field Supervisor, Hoosier Condensed Milk Company

The work of field men is more effective when it is done in collaboration with the sanitarians. Mutual confidence among sanitarians is in order to preclude multiple inspection. Educational methods are more successful than coersion, and cases are given in illustration.

I want to take this opportunity, as a field man and a representative of industry, to express my regrets at the loss of a great sanitarian to our Indiana State Board of Health, who was untiring in his efforts as a sanitarian. We, as field men in industry, could call upon him at any time for help and get it immediately. He was a wonderful sanitarian. The man of whom I am speaking is H. L. Thomasson, known to most of us as "Red". Although the State Board of Health of Indiana has suffered a great loss, this organization has also gained by obtaining his services as an Executive Secretary. We, of Indiana, want to wish him all the luck in the world in his new position.

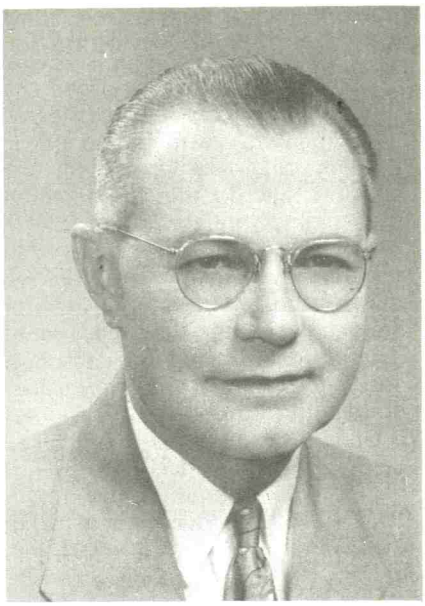
SANITATION PROGRAM

In the years past, a field man was considered good if he could go out and buy milk for his company and still keep that patron after sour milk had been returned to him. Times change; a field man of today is a lot different than a field man of yesterday. I would like to read to you what I consider to be a good definition for a field man. "A field man must be a man's man, a lady's man, a plutocrat, a democrat, a republican, a New Dealer, an old dealer, a fast dealer, a technician, a mathematician, a mechanic, and last but not least a sanitarian."

The State of Indiana is doing a great job in helping to make good sanitarians out of field men. Once a year, for three days, a Field Men's Conference is held at Purdue University, the state Agricultural College. Some very good talks at this conference help a lot in our work. The Quality Program in our state is also very valuable. The state is divided up into four sections, and a meeting is held for each section, each month. This program provides contact for the field men with each other monthly. These quality Meettings and Field Men's Conferences at Purdue are put on jointly by the State Board of Health, Purdue University, and the Indiana Dairy Manufacturing Association.

I like to compare the work of sanitarians to a football game, with the sanitarians and field men playing on the same team. The sanitarians should play the part of Quarterback and Coach, and the field men should be the ball carriers. On a football team all players must know the rules and code. The field men must know the rules and code the same as the quarterback or they can't help play the game properly. Field men as ball carriers must have faith in the quarterback and coach; unless we do have such confidence we cannot hope to win. In the game of football, whether it is played in California, Indiana, or in New York, it is played under the same rules and regulations. Sometimes such is not the case in this game of sanitation. We do have faith in the sanitarians and believe in them, but, I wonder if the sanitarians have faith and confidence in each other.

A good way to prove a point is by illustration. To prove this point I want to tell you of a little personal experience. I have a pilots' license. A few years ago in order to get this pilot's license I had to take an examination in civil air regulations. I studied the book on regulations for about a week, took the examination, and flunked. A few days later, my son brought a book home; I think it was put out by the Standard Oil Company, and was nothing more than a comic book. A crow was acting out illustrations of all the Civil Air Regulations just as they were in the large book I had studied. I read this book through a few times, took the examination over again, and passed with a grade of 95 per cent. As you can see, this illustrated comic book was a great help to me.



Mr. Vincent V. Kiser has been associated with the Hoosier Condensed Milk company for the past several years and has been active in dairy educational work in Northern Indiana, having served as general chairman of the Wells County Dairy programs for the past three years, in cooperation with the agricultural extension service.

MUTUAL CONFIDENCE AMONG SANITARIANS

As an illustration of why I do not think some of the sanitarians have faith and confidence in each other, I want to tell you of another per-

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sonal experience. Last week when I went to the office on Monday morning, my boss said, "Don't go to the country, there are two sanitarians here from Florida; they want to look over some of our farms and our plant." I spent two days working with them. Wednesday morning when I came to the office there was a note on my desk to see Mr. Neuhauser in his office. He said, "Don't go to the country today, there are two sanitarians here from Georgia. They want to see some farms, and go over the plant." I spent two days working with them too. Then on Friday when I got to the office there was still another note on my desk to see Mr. Neuhauser, and he said; "Don't go to the country today, there is a Captain here from the Quartermaster's Corps of the Army who wants to see some of our farms and go through our plant." The only way I got to come to this Convention was to leave on Saturday morning, when there were no sanitarians there; the only reason there were none there was because most of them do not work on Saturday. I'm glad I left Saturday because I understand that this week a sanitarian is there from Pittsburgh. If this keeps up, I wonder when a field man is going to get any field work done. Doesn't this illustrate what I mean when I say sanitarians haven't any faith in each other?

Our plant, the Hoosier Condensed Milk Company, handles fluid milk. The farms and our plant are inspected by our city Grade "A" milk inspector, several times a year, besides all of the platform tests which are run on our products. The State Health Department sanitarians survey our plant and farms once a year. These reports are all filed at the State Board of Health office. Although our state does this work, and our city inspector does his work, when Georgia, Florida, and Pennsylvania dairies want milk, the sanitarians from these states must come out and look for themselves. Is there any wonder why I say, I don't think that the sanitarians have faith or believe in each other. But we really do have faith in you, believe in you, look to you for guidance in our work, and want you to call the play so that we can carry the ball.

SANITATION SHOULD BEGIN AT FARM

Sanitation, definitely, must start on the farm. It's up to the field men to see that the farms are kept in proper order, at all times, both in construction and sanitation. When the sanitarians inspect our farms or our plant, then it is up to us to get our plant and our farms in the condition that is required by them. Sanitarians haven't the time to do the field work for us; that is our job. Last year in Indiana there was $500,000 worth of milk sent back to the farmers from the plants reporting on our Quality Program in Indiana. Now I don't blame these farmers for this loss of milk; I think the responsibility lies on our shoulders. If we had done our job and helped these farmers the way we should, they would not have lost this milk.

I want to give you another illustration. A couple of years ago, I was inspecting farms and maybe I was in too big a hurry. I looked over a farmer's barn and it was in very good condition, the milk house was nice, too, and everything seemed to be clean and orderly. I checked the pails, the milker, and the milker inflations; they were all very good. In our work, we are using a small pocket flash light so that we can see down into these inflations in order to determine whether there is any deposit left in them. If we see anything in the inflation, we turn them inside out and show the farmer what is on the inside. Usually if he learns that there is a deposit in the inflations he will clean them. On this particular farm, I checked everything, or thought I had, and gave it a very good grade. In about three days there was a note on my desk that four cans of sour milk had been sent back to a producer. I looked at the record and it was the producer that I had thought was very good. I went back out to the farm to see what was the matter. The farmer's wife came out, and said, "I wonder what's the matter, we had four cans of sour milk? You looked over everything just two days ago and said everything was in good shape." I said, "Well let's look again." I checked all the pails, checked the inflations, and they were all right. There was a long hose on the machine and I asked her for the cleaning rod. She said, "I have no cleaning rod, I just have a brush." So I went out and got my cleaning rod out of my car, and had her hold the hose while I pushed the cleaning rod through. Quite a deposit came out the other end. My mistake was that I hadn't used the cleaning rod in this hose when I was out there before. I felt it *my* responsibility that these folks had lost those four cans of milk. I showed her how to use the rod; she ordered one, and it was sent out to her the next day. They are using it very faithfully, and are keeping a good quality milk coming into our plant. That's why I say, that if these farmers lose milk, it is the field men's fault, and not the farmers in most cases.

The sanitarians haven't the contact with the farmers that we have. We are out there from three to four times a year, and can usually call them by their first names, and normally can get more done with the farmer in keeping his place the way it should be than you fellows can. We know him better and have better contacts with him. When an inspection is made on any particular farm, that inspection sheet is a picture of that farm on that particular day. If that picture doesn't look right, it is up to us to contact the farmer and get the picture the way it should be; also, try to get him to keep it that way. Most of them will, if approached in the right way. The quality in a bottle of milk set on a doorstep definitely can't be any better than the milk received at the plant from the farm. Sanitation must start at the farm and be carried on until it is set on the doorstep of the consumer. If a plant has a producer who just can't be kept in line, I think the plant is much better off to get rid of him. If the producer can't be replaced with a better one at least the quality of the milk will be improved.

EDUCATION IS SUPERIOR TO LAW

Sanitation definitely can not be accomplished just by legislation. Sanitation is best obtained by an educational program, and this must be carried out by us for the reason that we have a good contact with

the farmer. Legislation alone is definitely not enough. We used to have prohibition, but people still drank. We have gambling laws, but gambling still goes on. We have speed laws, and they are broken. So it is the same in sanitation. The only way to get results is through education.

Here again, I think we and the sanitarians can use illustrations that will bring home to the farmer what we are trying to teach him. I want to give an illustration of this. A few months ago a farmer called the plant and wanted one of the field men to come out. I went out to his farm, and he said. "I would like to sell milk to your Company." I looked over his farm, he had a very nice barn, and was keeping it clean, and orderly. His milk house was well constructed, he had good equipment, and it was clean. I said, " Do you use chlorine to disinfect these utensils before using them?" "No, I never used any," he said. "Do you wash the udders of the cows before milking?" He said "No." I said, "Well, this is one of our requirements—that you disinfect your utensils and wash the udders of the cows with chlorine." He said, "You can just go to the Devil, because if I have to give a cow a bath before I milk, I'll never sell milk to your company or anyone else. I'll just quit milking." I said, "Well, George, that is your privilege, but before you do that, I would like to ask just one thing. Let me come back out to your farm tonight before you milk and let me wash the cow's udders before you milk." He said, "If you want to work that bad, come on out. You can sure do it." I said, "I will be right here, but when I do come, there is one request that I would like to ask of you. After I wash the cow's udders, I would like to have you drink the water that I use to wash them." He said, "Why, my gosh, I absolutely wouldn't do that." I said, "All right, I'll still come out to the farm tonight, and watch you milk; when you get through milking I want to see you drink the milk." He said, "I'll do that. My family have drunk this milk for a long time, and we are still living." I said "That is possible, but I still want to see you do it." He said, "Why?" I said "Well, now when you put that milker on that cow, and those udders of that cow are not washed, how are they going to be when you take off the milkers. That milk is going to be half way up on that teat when the inflation cup is on, and there is twelve inches of vacuum on it. When you take the milker off the cow, how is that teat going to be?" He said, "Clean." "That's right," I said. "Now you would not drink the water that I was going to wash those teats with, but you put the milker on the cow, then you are going to wash the teats with the milk, and then drink the milk. Now, what is the difference, whether you drink the milk that you wash the teats with, or drink the water that you wash them with?" "Well," he said, "I don't know what I'll do. I'll see you in about a week." I saw his wife on the street a few days later, and she said, "What did you tell George, when you were out there on the farm?" I said, "Why?" She said, "I had to tear up a whole bed sheet into little squares and he has them all down at the barn and he washes the cows' udders every time before he milks." I think a lot of little illustrations like that will bring the story home to the farmer better than to say that it is one of the requirements.

I was out to see another farmer recently. He had a very nice farm, but his well-top was in very bad shape. I recommended that he make his well-top water-tight. He told me that they had drunk that water for ten years, and it hadn't killed them yet. He wanted to know why it would make any difference if they washed the utensils in it. I told him that we were more particular with the water that they washed their utensils with than the water that they drank. He wanted to know why. These figures that I am going to give you may not be exactly right, but they sure got results. I told him that if that water was contaminated with typhoid, maybe there were only about 20 or 25 typhoid germs in that water. The water being cold, and having no food value, the germs would not grow, consequently, they would get a very little dose of this bacteria by drinking the water, and probably would be able to throw off the germs and not get the disease. If they used that same water to wash utensils and just three or four of those germs got on their utensils, then got into a can of milk through the utensils, by the next morning there would be about 40,000 or 50,000 typhoid germs in that milk. Then if his family drank that milk, they probably would get typhoid. He said, "I guess I need a new well-top and I am going to do some other cementing day after tomorrow, so I'll just put a new top on that well." This may be a crude way of putting out education, but boy it sure gets results.

We feel that we have a good supply of milk coming into our plant, we have a good plant, and we sure intend to keep it that way. I think we must give credit where credit is due. We have been under eastern inspection for the past twenty years, and I feel sure that the sanitarians in the eastern markets have given us a lot of help. It is through their efforts that our plant and our patrons are in the condition that they are today. Once in a while I will argue with an inspector or sanitarian, but there is one sanitarian that I never have argued with, and I think he is in this audience today. I have never argued with him, and I don't think that anyone else has ever argued with him, because they knew they couldn't win if they did. I want to finish by saying that if you, as quarterback, and as coach, will call the signals, we will carry the ball.

TANK TRUCK PICK-UP FOR BULK MILK COOLING TANKS AT FARMS*

H. Clifford Goslee

Chief, Dairy Division, Department of Farms and Markets

The two tank truck pick-up routes which have been operating in Connecticut during the last three years can attribute much success from very frequent fieldmen's visits to the farms, much sampling of the milk, and many improvements in methods and equipment.

Four new routes have been started and three more will be operating in a few weeks. The present interest by both dealers and producers is so ravenous that rigid control is imperative. Fortunately, the 1951 Connecticut legislature gave the Commissioner of Farms & Markets authority to establish rules and regulations to control all phases of the project.

Already, methods have been established for the sampling and testing of the farm milk for butterfat, utilizing "standard methods" with a few supplementary requirements.

The Department is now working on methods and standards to ensure high quality milk. In addition to our present code requirements, consideration will be given to all of the newer methods of milk production not now specifically covered in existing codes (state or U.S. P.H.S.)

Tank-truck pick-up is so closely related to new methods of milk production that it is almost impossible to disassociate TTPU from bulk cooling of milk at the farm, and even straining and pouring of freshly drawn milk in stables, pipe line milking (within or without milking parlors), in-place cleaning of milk handling equipment, mixing warm and cooled milk, and all the other factors among which should be recognized in the control of the health of the producing animals, including as it does today, the use of antibiotics and not overlooking the inclusion, for shipment, of milk from animals immediately after freshening as well as late in lactation. There are many other factors which must be considered in their environmental position.

During the last four years the TTPU project of collecting milk from New York State farms for delivery into central Connecticut has furnished evidence of the need for basic regulations which can be accepted and enforced by any and all of the interested control agencies. The need for regulations has also been rather vividly displayed by the manner in which equipment manufacturers preferred to use the producing farms as proving grounds rather than carry on sufficient experimental work in laboratories. Unless otherwise indicated, succeeding comments will refer to the TTPU project just mentioned.

The tank truck used is a conventional type, 300-can, single compartment tank with a positive pump and tygon hose assembly for drafting milk. The pump is enclosed and affixed to the truck and used from that position. The hose is approximately nine feet long and carried in a straight cylindrical tube. The tanker, pump, and hose are washed and sterilized at the receiving plant; the hose is filled with lye solution which is not withdrawn until time for drafting at the first pick-up point on the route, at which time it is rinsed with clean, cool water, and a chlorine solution.

Upon arrival at a pick-up farm, the truck operator measures the milk in the bulk cooling tank, then starts the agitator; makes the necessary hose connection; takes samples of the milk as soon as suffiicient agitation has been obtained, then starts the drafting operation. The truck tank hose is capped between farms and carried in a protective tube. The only washing operation enroute is a cold water rinse which the truck operator applies to the farm cooling tank. The samples for butterfat testing are built up in accordance with standard methods. The truck operator must hold a license for this phase of the project.

Recently, Connecticut has set up the following rules:

"Methods of sampling and testing of producers' milks in farm cooling tanks when such milks are transported to plants in tank trucks."

(a) The milk sampling to be done by a person holding a sampling license from the Department of Farms and Markets.

(b) Building up of daily samples for ten-day composite samples.

(c) Providing for a duplicate sample (producer and dealer).

(d) Permission for transportation of dealer samples.

(e Samples to be taken according to Standard Methods, after sufficient agitation, and the milk so sampled shall be free from churning, excessive foaming, and visible fat globules.

(f) All samples shall be held under suitable refrigeration.

(g) All samples shall at all times be protected from tampering.

(h) All samples not taken, built up, handled, and stored in compliance with these regulations, shall be deemed unsatisfactory for official testing.

(i) Any licensee employed in this project failing to comply with these regulations shall be subject to suspension or revocation of license after hearing before the Commissioner.

At the farms, various types of equipment are utilized. The cooling tanks are all stainless steel inside, and for the most part, have their special refrigerated units serving the bottom area of the tank and further equipped with slow-speed agitators. Sanitary lines and fittings are stainless steel. Hot water is supplied from water heaters located in, or near, the milk rooms.

* Presented at New York Dairy Technology Society, Feb. 19, 1952.

Mr. H. Clifford Goslee is Division Chief, Clerk of Milk Regulation Board, and Secretary of the Connecticut Association of Dairy and Food Sanitarians.

In 1927 he joined the State Dairy and Food Commission. For several years he was in charge of the field laboratory. Then in 1937 he became supervising inspector, and in 1951, Executive Assistant.

In 1948 he was honored by the University of Connecticut for "outstanding service in the field of Dairy Manufacturing and to collegiate training."

Electricity is obtained from public utility lines and only a very few farms have any auxiliary generating equipment, and this is chiefly limited to tractor power take-off being applied to the compressor motor. This very briefly sketches the project.

BASIS OF REGULATIONS

In some states, regulations have included, in addition to the sanitary control, several economic factors dealing with cooling tank calibration and installation, method of measuring milk volumes, sampling procedure, and various methods of recording and reporting. Consideration here will be limited to basic factors of sanitary control. Obviously, this should extend from the cow to the receiving plant, both inclusive.

Established requirements for milk production should be supplemented, wherever necessary, to insure a daily flow of milk from clean, healthy cows through clean equipment into bulk milk cooling tanks which will adequately cool and store all the production on hand at any particular farm. While equipment must be clean as measured by physical inspection, it may be necessary to require it be clean as indicated by bacteriological examination. A special bacterial standard may be necessary for milk handled in such a project. Only limited permission should be granted for the use of new types of equipment which have not been approved by recognized authorities. The quality of the water supply becomes vastly more important because of the possibility of greater volumes of residual water getting into the milk. By the same token, the use of certain chemicals in washing operation and germicidal treatments becomes more important.

PROBLEMS IN CONTROL ROUTINE

Will control agencies be given additional staff sufficient to make the time consuming inspections of a selected group of producers while the producers operating in the conventional manner are not inspected with the same frequency?

Is the value of deck inspection completely lost?

Will the science of bacteriology and chemistry bring forth tests which will have far greater sensitivity in identifying the presence of cells, coli, anti-biotics, toxins, and various other deleterious materials?

Will the truck operator be expected to qualify as a milk sanitarian?

Will the truck operator or the field man reject a tank of milk at the farm?

When would the sanitarian be justified in rejecting milk in such a project.

Can a control agency prescribe that a truck tank have several compartments; that the farm cooling tanks have recording thermometers that producers subsidize the agency for the additional inspection expense incurred?

COMMENTS AND CONCLUSIONS

Casual observors have received the impression that if one company can operate a TTPU project without losing a single tank of milk, in fact, they have received a very high quality milk, that anyone else can do the same thing with equal success. Such an impression is dangeriously erroneous. Company field men visited the farms in this project more freqeuntly than once each week. Frequent equipment service was maintained. Very high type truck operators were employed. Leading company officials took personal interest and pride in the project. The project was sufficiently successful so that the company publicized the project extensively. Unfortunately the "economic values" received the greatest publicity.

RECOMMENDATIONS

Control agencies should take a positive position and hasten to establish basic regulations. Only by such action will the milk industry, at large, realize the necessity of extensive quality control. For your information, during the last fiscal period four more TTPU projects have been put in operation in Connecticut.

Mr. J. H. Shrader, Editor
Journal of Milk and Food Technology
23 East Elm Avenue
Wollaston 70, Massachusetts

Dear Mr. Shrader:

I have read with interest your editorial in the last issue of the journal regarding "Affiliation of our organization with the food law institute". I know nothing of this relatively new organization other than the information given in your editorial. However, it would appear that the milk and food sanitarians would stand to gain from such a relationship. Certainly I can not see how we could lose. Personally, I am in favor of such an affiliation and hope that you may have other such expressions from the members of our organization.

Yours very truly,

Theo. R. Freeman

Associate Dairy Manufacturer
University of Kentucky

Theo. R. Freeman:db

CITATION FROM THE UNIVERSITY OF CONNECTICUT DAIRY CLUB

April 26, 1952

To Friend Lee Mickle

In recognition of outstanding Service in the Field of Dairy Manufacturing and to Collegiate Training in the State of Connecticut.

This year's Honor Guest from the field of Dairy Manufacturing is Doctor Friend Lee Mickle. Doctor Mickle is the Director of the State Department of Health Laboratories, State of Connecticut, Hartford, Connecticut . . . . ..

He first worked for the State of Connecticut from 1911 until 1913 under Professor Herbert W. Conn at Wesleyan University and again from 1917 until 1920 under Doctor Charles J. Bartlett of the Yale School of Medicine. He was Director of the Atlantic City Municipal Laboratory from 1920 until 1922 and then worked under Doctor Robert S. Breed, New York Agricultural Experiment Station, Geneva, New York, until 1924. Twenty-eight years ago he returned to this state as Director of the Bureau of Laboratories of the Connecticut State Department of Health. He is also an Assistant Professor of Public Health in the Yale University School of Medicine with the title of Lecturer.

He is an able organizer and administrator. The State Department of Health Laboratories have steadily grown under his direction. The services performed by his department which affect the dairy industry include all the chemical and bacteriological tests commonly used to determine whether milk or milk products are safe for human consumption.

He has assembled an able and loyal staff who work for the health of the people of Connecticut.

Doctor Friend Lee Mickle is a Fellow, and former member of the Govenring Council and of the Executive Board, of the American Public Health Association, and he has been chairman of the laboratory section of that association. He has been chairman of many committees of the American Public Health Association which have dealt with the chemistry and bacteriology of milk. In particular he has been very active in the committees which were responsible for the bacterial staining and counting procedures in the direct microscopic examination of milk and bacterial plate counting procedures of milk.

Doctor Mickle has been active in the International Association of Milk and Food Sanitarians; The Society of American Bacteriologists; The American Chemical Society; Sigma Xi, scientific honorary society; Alpha Chi Sigma, chemical fraternity; The Connecticut Association of Dairy and Food Sanitarians; and is the president-elect of the Connecticut Public Health Association.

He has been a leader in: 1. simplifying laboratory work for determining the bacterial colony counts of milk. 2. introducing chemical and organoleptic tests for determining the quality of table cream and 3. improving staining methods for the direct microscopic count.

Doctor Mickle is author of numerous bulletins in the public health laboratory field including publications of original research on several aspects of milk and milk products. He has cooperated in class and research programs and has been guest lecturer on the University campus on numerous ocasions.

Dr. Mickle accepted the citation and closed his response as follows: " . . . . In the hope that my experience can be of benefit to some of your members of the Dairy Club who before very long are to go out to take your places in the world — whether in your own business, in industry or in the public service — I will rephase what I have already

said by making these several recommendations to you:

"Get plenty of good background and training for the tasks ahead — the kind of instruction that the able faculty of the Department of Dairy Industry here at Storrs is giving you — and then never be afraid of hard work.

Endeavor to become expert in at least one chosen sphere of activity so that you bow to no one in that field.

Constantly throughout your life continue to seek advice from those best qualified to give it and in turn strive to enthuse and stimulate those with whom you work.

Associate yourself with other well-trained men and women in your field, rely on team work with them and do not try to be a lone wolf.

Make and keep friends whom you can respect.

Keep your sights high even when the going gets rough or the financial return is small.

And, if by chance I can enthuse you to wish to follow in my footsteps in just one respect, marry the person who will be a loyal helpmate, and advisor and a stimulus to you constantly to do the best job of which you are capable."

Association News

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Secretary-Treasurer, R. L. Van Buren, P. O. Box 184, San Diego 12, Calif.
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Secretary-Treasurer, J. F. Tinker, State Dept. of Health, Pierre, South Dakota
Executive Board:
Past President, Don Wilson, City Health Dept., Mitchell, South Dakota
Elected Member, Charles Halloran, State Dept. of Health, Pierre, South Dakota

NEW AFFILIATES

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Vice-President, Galen Furry, Martinsburg, Pa.
Treasurer, Earl F. Hack, Mexico, Pa.
Secretary, C. D. Herbster, 325 Orange St., Selinsgrove, Pa.
Executive Committee: Dr. S. M. Ross, V. M. D., 1828 E. Third St., Williamsport, Pa.
I. E. Parkin, 213 Dairy Bldg., State College, Pa.
G. C. Kern, Milton, Pa.
Harry T. Daddario, New Berlin, Pa.

DR. S. B. FISCHER

It was with a feeling of sincere regret that the friends and fellow-workers of Dr. S. B. Fischer heard of his death.

Dr. Fischer was graduated from Cornell University in 1931. His work as veterinarian continued until he was appointed Associate Sanitarian by the State Health Department. He served on several committees of the New York State. At the time of his death he held a position as Associate Director of Sanitation with the Suffolk County Health Department.

One of his greatest contributions to the County was his tireless effort toward obtaining pasteurization of the milk supply.

ADDITIONAL MEMBERS OF COMMITTEE ON COMMUNICABLE DISEASES

Dr. R. J. Helvig, Chairman, U.S.P.H.S., Washington 25, D. C.

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

Dr. Raymond Fagan, Kansas City Field Station, Epidemiology Branch, CDC, 3900 East St., Kansas City 3, Kansas

Dr. L. E. Burney, State Health-Commissioner, Indiana State Board of Health, Indianapolis, Indiana

John H. Fritz, Chief, Food Section, Kansas City Health Dept., 21st Floor, City Hall, Kansas City, Missouri

INHIBITORY SUBSTANCES IN MILK

(continued from page 124)

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CALENDAR

June 4-7—New York State Health Conference, Lake Placid.
June 7-8—Colorado Public Health Association, Estes Park, Colorado.
June 8-12—Institute of Food Technologists, Twelfth Annual Meeting, Grand Rapids, Mich.
June 10-12—National Conference on Interstate Milk Shipments, Statler Hotel, St. Louis, Mo.
June 16-19 — Canadian Public Health Association, Winnipeg.
June 18-19—Massachusetts Public Health Association, Amherst.
June 24-26—American Dairy Science Association, Davis, California.
June 23-27—Annual Meeting and Short Course of the South Dakota Association of Sanitarians, at Sylvan Lake, South Dakota.
Sept. 18-20—Annual Meeting, International Association of Milk and Food Sanitarians, Inc., Nicolett Hotel, Minneapolis, Minn.
Oct. 20-24—Annual Meeting of the American Public Health Association in Cleveland, Ohio.
Oct. 22-23—Annual Conference for Vermont Dairy Operators, University of Vermont, Dairy Department, Burlington, Vermont.

3A SANITARY STANDARDS COMMITTEE ADVANCES PROJECTS

A joint meeting of 3-A Sanitary Standards Committees was held at the Georgian Hotel, Evanston, Illinois, on April 29 and 30.

Final action was taken on an amendment to the 3-A Sanitary Standards for Pumps, on Sanitary Standards for Return Tubular Heat Exchangers, and an amendment to the Sanitary Standards for Piping and Fittings.

The formulation of sanitary standards for milking machines and for can washers, which have been under consideration for a number of years, was considerably advanced. Closer agreement was reached on the details of sanitary standards for the permanent installation of pipelines to be cleaned in-place. And the formulation of sanitary standards for farm storage and for cooling tanks was so far advanced that it may be anticipated that these standards will be ready for publication at an early date.

FLORIDA ASSOCIATION OF MILK SANITARIANS EIGHTH ANNUAL CONFERENCE REPORT

H. H. WILKOWSKE, *Secretary-Treasurer*

University of Florida, Gainesville, Fla.

The Florida Association of Milk Sanitarians met at Gainesville April 2-4, 1952, with a record-breaking attendance of 130. Mr. E. L. Shortlidge, Jacksonville, was unanimously elected an honorary member. A newly revised constitution was adopted. A committee was appointed to study and suggest a 10-year award program to be started in 1954 Membership has thus far far been increased 50% over last year.

The following Officers and Board of Directors were elected:

President, R. R. Hood, State Dairy Supervisor, East Pensacola Heights

Vice President, L. L. Chaffee, Pinellas County Milk Sanitarian, St. Petersburg

Secretary-Treasurer, H. H. Wilkowske, Assistant Dairy Technologist, Department of Dairy Science, University of Florida, Gainesville

Past President, L. T. Smith, State Dairy Supervisor, Jacksonville

Directors:

H. F. Cameron, Clay County Sanitation Officer, Green Cove Springs

S. T. Chalker, Jackonsville Dairy Sanitarian, Jacksonville

J. D. Robinson, State Dairy Supervisor, Plant City

H. H. Rothe, State Dairy Supervisor, Gainesville

C. O. Stoy, Dade County Dairy Supervisor, Miami

A very comprehensive program was presented, highlighted by five out-of-state speakers. Mr. C. A. Abele, The Diversey Corporation, presented interesting material on bottle washer operations and dairy plant sanitation. Dr. J. J. Sheuring, University of Georgia, and Mr. H. P. Hodes, Tri-Clover Machine Company, discussed the timely subject of glass piping, stainless steel piping, cleaning by recirculation, and related problems concerned with this popular topic.

Dr. G. H. Hopson, DeLaval Separator Company, presented interesting information on milk inspection and milking machines.

Dr. J. G. Terrill, Radiological Health Branch, U.S.P.H.S., presented a thought provoking talk on the relation between radiation and milk.

Other timely topics which were discussed included bulk milk dispensers, home pasteurizers, dairy cattle diseases and control, law enforcement, laboratory analysis of ice cream, milk-borne diseases, salesmanship, and milk sanitation and public health.

Door prizes for attendance included four copies of the book *Dairy Manufacturing Processes* by Fouts and Freeman and ten copies of the Dairy Plant Operators Manual donated by the Florida Dairy Industry Association, E. T. Lay, Executive Secretary.

JOURNEYS OF YOUR PRESIDENT

H. L. THOMASSON
President, International Association of Milk and Food Sanitarians
Shelbyville, Indiana

March 18th.

On the train at 12:46 headed for the Klenzade Seminar at Excelsior Springs, Mo. Arrived at the Elms Hotel 4:45 P.M. and who would be getting out of their car but Bill Mosely, Indianapolis, Fred Babel, Purdue University and Bob Haas, Wayne Cooperative Dairy, Richmond, Indiana. Had the pleasure of rooming with my old friend Bob Haas.

The Klenzade Seminar was bigger and better than ever. One wonders every year how they can possibly surpass the last one, but they always do.

While looking for something different I stumbled into the Institutions section and had so much fun and it was so interesting that I stayed through two sessions.

Wish I could name all the old acquaintenances I saw and the new ones I made. Ken Weckel, Harold Barnum and Milt Fisher were there so we held an Impromtu Board of Directors meeting one evening after other affairs were over.

March 22nd.

Back to Kansas City Saturday afternoon with "Mac" McLean, U. S.P.H.S. Region VII. Fred Flieschman, Corning Glass, and Phil Hodes, Tri-Clover. Stayed overnight with my brother-in-law and family.

March 23rd.

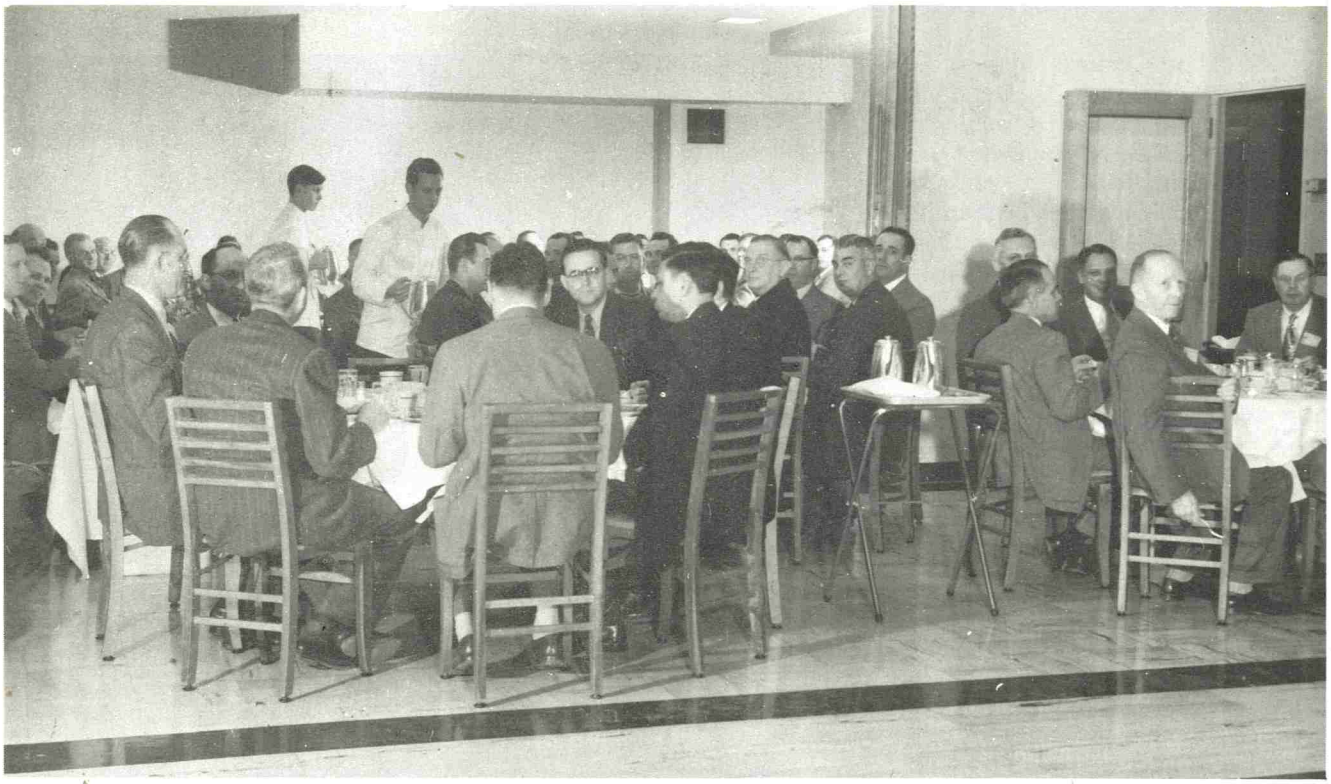
5 P.M. "Mac" McLean and Hugh Eagan picked me up and we were on our way to Ames, Iowa for the Iowa State Short Course and Iowa Milk Sanitarians Association meeting.

March 24th.

Warmly welcomed by Dr. Merle Baker, Dr. Goss, Dr. Iverson of Iowa State College and Dr. Getz, Ray Belknap, Ed. Armil, Pete Kreamer and the rest of the Iowa Association fellows. The short course was very good and so was the Iowa Association meeting. Dr. Goss arranged for me to make a recording at the Radio station. I'm still wondering how it sounded as I didn't get to hear it. "Mac" McLean made one, too, and it sounded swell.

March 25th.

4 P.M. off to the airport at Des Moines with my old friend Larry Woodman, Schlueter Tank Co.,



Michigan Association of Sanitarians banquet held Wed. evening April 9th. Canada, Minnesota and Indiana were represented. The handsome profile in the center of the picture belongs to Dick Adams, Minnesota State Dept. of Health, and the nice looking back on his left belongs to Sam Hopper, Indiana U. Dept of Public Health.

who so graciously volunteered to take me.

11 P.M. Back home again.

March 31st.

8:35 A.M. on the plane to Columbus, Ohio, to attend Ohio State University Short course sponsored jointly by Ohio State U. Dept. of Dairying, the State Agriculture Dept., and the State Dept. of Health. Their first joint venture but I'll wager it was the beginning of many more. It was very gratifying to me to see these three departments of government working together. Dr. Gould, Dr. Burgwald and the other members of the Ohio U. Staff working with M. J. Dotter, Ray Watts, Nick Carter, of the State Dept. of Health. G. W. Van Schoik, and Orville Honeycutt of the State Dept. of Agriculture are to be congratulated on an excellent start towards better uniformity, and direction of purpose which most certainly will be obtained from their combined efforts.

Dr. W. H. Haskell, Klenzade Products, was on the program too, so we had dinner together and took in the movie "African Queen".

I enjoyed the trip, made more pleasant of course by that good old Ohio hospitality which rivals the Hoosier brand. Jim Smith, Ohio U. Extension Service, met me at the plane and M. J. Dotter delivered me back to the airport.

April 1st.

6 P.M. back home again.

This is a typical session at the Michigan Dairy and Food Sanitarians School at the Kellogg Center.

April 7th 4 P.M.

Off to Michigan State College, Lansing, Mich. by train via Chicago. It sure is a nice place but hard to get to from here. On the sleeper in Chicago at 9:30 P.M. sitting in the lounge reading and who should walk in but Ken Weckel. I call him the "human dynamo" he has more projects going at one time than sixteen men, makes them all tick too, and can he ever write letters. I should know. One guess what we talked about, "Yeah", that's right, International Association affairs.

April 8th.

Off the train at 7 A.M., snow all around. Ken and I were hungry but picked a bum place, compromised on a cup of coffee, left and went to a cleaner looking place. Out to Kellog Center, then, where the Michigan Association of Sanitarians and Dr. Mallmann and his boys cooperate in putting on a jim dandy short course. Ken Weckel

Although you may not believe it Dr. Mitchell, Hyacinth, Quebec, Canada, is not telling Mallmann and Thomasson about the big one that got away. It's strictly shop talk in lobby of Kellogg Center.

made the opening talk and he did himself proud.

I was scheduled for two lectures on a new subject for me, "Balanced Inspection Services in the Dairy Industry". The subject has many interesting angles.

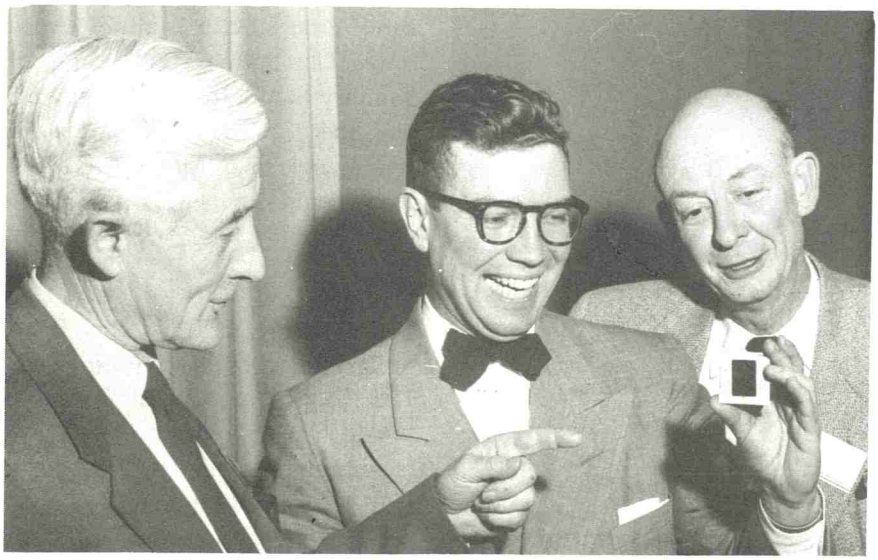
The Michigan Association banquet was a big success. Milo Wilson, Jim Axelson, Lyle Littlefield, Dr. Mallmann and all the rest provided for excellent entertainment and a good speaker. Incidently a resolution was adopted to sponsor International Association meeting for 1953 at the Kellog Center. It is a nice place with grand facilities.

The whole program was well planned, and very informative.

April 9th.

10:30 A.M. took off with Sam Hopper, Indiana U. Dept. of Public Health who showed up on the scene, collecting pointers on how to conduct a short course.

Jack Lammy, Pontiac Michigan Department of Health, Vernon Wait, Pontiac Dept. of Health, LaRue Miller, Michigan Department of Health, Lansing, Ralph Florio, Pontiac Dept. of Health and seated, David Kronick, Pontiac Dept. of Health glancing over early notes taken during the recent Dairy and Food Sanitarians School at the Kellogg Center.



Getting a sneak preview of the slides used by H. L. Mitten, Jr., Research Engineer, The Creamery Package Manufacturing Company, Fort Atkinson, Wisc., is Dr. W. L. Mallmann, Professor of Bacteriology Michigan State College and Chairman of the Michigan Association of Sanitarians, Mitten holding slide and H. L. Thomasson, Executive Secretary and President International Association of Milk and Food Sanitarians. Dr. Mallmann, Mitten and Thomasson presented materials dealing with immediate topics of interest to the members in attendance. The annual dinner meeting of the Michigan Association of Sanitarians was held Wednesday, April 9. The concluding session was held Friday, April 11.

3:30 P.M.

Out of Sam's car in Indianapolis and on the bus for home with only two minutes to spare.

April 20th 10:27 A.M.

Off again to Columbia, Mo., to attend the annual joint meeting of the Missouri Association of Milk and Food Sanitarians, and the Missouri U. Dept of Dairy and Food Industry. Stayed over night in St. Louis.

April 21st. 9 A.M.

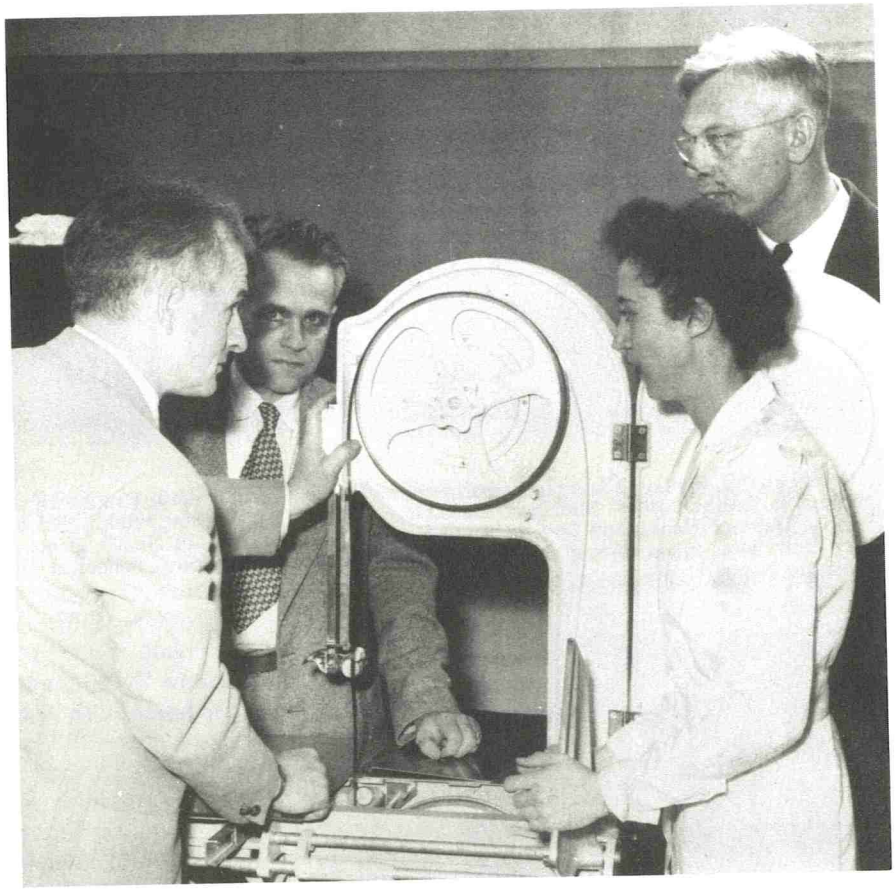
Dr. Frank, Drumgold and Agee, Milt Fisher's boys, picked me up at the hotel. We stopped at some cross-roads place, close to Milt's farm, to get him. Got to see Milt's son, Bob, he and Grandpa "Milt" were strutting a little. Bob was the proud father of a son born Sunday morning.

Arriving at noon, lunched at the

Daniel Boone Hotel and out to the college for the start of the meeting. Sure was great seeing Dr. Reid, Dr. Ragsdale, Prof. Edmondson, Jack Fritz, J. L. Rowland, Eddie Simpson, Geo. Bauers, Evan Wright (on the same program from Kansas) Wilbur Fagin, Jesse Barlowe and and all the others, sorry I can't name them all.

"Why Did They Build the Ocean so Close to the Shore." See what you can do with it sometime.

The next morning some fellow sitting next to me leaned over and whispered, pointing to my talk as listed on the program, "Did you hear this talk?" "Yes" I said, "Did you" "No, I wanted to but couldn't make it, how was it?" "Well, you didn't miss anything," I said. "Well, Gee, I'm surprised I thought it would be good," he said.



R. T. Coleman, Royal Oak, Michigan, of the Oakland County Department of Health with Edward Wykes and John Veenstra of Grand Rapids going over the meat cutting situation with Gertrude Blaker, Asst. Prof., of the Department of Restaurant Management during the recent Dairy and Food Sanitarians School held at the Kellogg Center for Continuing Education.

The program was arranged in general sessions, milk sections and food sections. Wonderful attendance, prizes were given and all fishing equipment, too. Oh! Well. I never was lucky, didn't win a thing.

At 3:30 Friday I was scheduled for a talk on the screwiest subject.

A beautiful walnut gavel was given me at the Banquet. I certainly was very pleased and grateful.

The meeting came to a close Wednesday at noon, so away with the St. Louis fellows and stayed over night with the Fishers.

April 24

9:30 A.M. on the train and back home again at 2:35 P.M.

April 28th.

3:51 P.M. caught 406 (I'm getting so I know number of the trains) to Chicago. 3A Standards meeting at the Georgian Hotel, Evanston, Illinois. All the Sanitary Procedures Committee members there but one and he lives in California so we couldn't expect him to be there. Talk about a working outfit, this is really it. Farm tanks, can washers, milking machines and cleaned-in-place pipes lines all day and evenings for two days. The sincere, gentlemanly give and take, the rendering of honest opinions, the respect for these opinions displayed by the individuals in these three groups, our Sanitary Procedures Committee, Dairy Industry Sanitary Standards sub-Committee, and the U.S.P.H.S. never fails to renew my love for and faith in Democracy.

April 30th.

Jim Meany, Chicago City Board of Health, dropped me off at the 12th St. Station, caught the James Whitcomb Riley at 5:30 D.S.T. Met friends on the train, from home who had transportation from Indianapolis, Shelbyville too small for James Whitcomb Riley to stop, have to find your own transportation or take the bus from Indianapolis, so was lucky to catch the ride. Home again 10 P. M. See you around.

"Red"

PART OF THE CLASS OF 115 "students" who attended the Institute of American Poultry Industries' first Sanitation School, held in Chicago April 19th and 20th, 1952.

SANITATION SCHOOL OF THE INSTITUTE OF AMERICAN POULTRY INDUSTRIES

A Sanitation School, sponsored by the Institute of American Poultry Industries, was held in the auditorium of The Beatrice Foods Company, Chicago, on April 19 and 20. The attendance of more than a hundred included poultry dressing and processing plant management and sanitation personnel, regulatory agency representatives, and representatives of manufacturers of processing equipment and sanitizing chemicals.

The papers cover many of the aspects of poultry plant sanitation, as is demonstrated by the following program:

Food Sanitation — yesterday, today and tomorrow . . . Shelbey T. Grey. Explained how changes and improvements in food processing enter into interpretations and rulings made by Food and Drug officials.

Built-in Sanitation . . . R. W. Hart and C. W. Gordon. Showed how to keep sanitation costs down and sanitation standards up — by using the right materials, proper lay-outs, and good maintenance.

Make Your Rodent Control Program Work . . . Donald A. Spencer and A. J. Steffen. Showed that baiting and trapping programs are not always as successful as they appear to be, and presented the best prevention and control measures to use in fighting the daily battle against rodents.

Plan and Organize Your Plant Sanitation . . . Dr. G. W. Shadwick. Told how his company carries out a profitable clean-plant, clean-equipment, clean-product program.

Make Your Insect Control Program Work . . . Dr. E. L. Holmes. Showed how to protect food supplies and equipment against insect contamination.

Use the Right Equipment — Keep It Clean — Make It Last . . . Dr. G. F. Stewart and Dr. J. L. Cherry. Offered practical pointers on making sanitation dollars go as far as possible.

The Clean-up Crew — Its Job, Tools, and Techniques . . . Ray W. Schultz and H. B. Richie. Told what it takes to do a good job of cleaning up for tomorrow's operation.

Good Housekeeping Pointers for Egg Breaking Plants . . . W. W. Mass. Told how to hold down bacteria counts and solve tough cleaning problems of minimum cost.

Good Housekeeping Pointers for Poultry Processing Plants . . . Dr. C. H. Koonz. Told how to make sanitation pay off through improved keeping quality and higher operating efficiency.

You and the Law . . . Dr. W. H. Haskell. Told where your legal responsibilities begin and end.

The Veterinary Corps Looks at Sanitation . . . Lt. Colonel George D. Batcheldor. Listed Sanitation factors that receive the most emphasis in Army supervisory work.

Clean Hands . . . M. H. Taras. Discussed management's responsibility in this field and how it can best be carried out.

Homework Assignment — Putting Sanitation Facts to Work. Dr. Hugh. Outlined what it takes to get the job done right.

Stump the Experts — Questions and Answers . . . Informal discussion.

SIXTEENTH KLENZADE SEMINAR LARGELY ATTENDED

The 16th annual Klenzade Educational Seminar recently held at Excelsior Springs, Missouri, was attended by more than four hundred leaders in the dairy and food industries, nationally known scientists, bacteriologists, public health officials, and sanitarians from virtually every state in the union and Canada.

The roster of guest speakers included over eighty prominent authorities, each a specialist in a particular field of sanitation.

Morning assembly sessions, beginning promptly at 8:15, were devoted to sanitation topics of general interest until noon. Afternoon sessions were divided into many different panel meetings covering specific problems. A special feature of the Seminar were the Consulting Sessions held for two consecutive evenings from 7:30 to 9:00. This provided a rare opportunity for plant personnel to personally meet and discuss their problems with some of the country's outstanding scientists, bacteriologists, and technicians.

FREEBURN SUGGESTS THAT PHS SET TOLERANCES

Stanley B. Freeborn, Acting Dean of the University of California College of Agriculture (state wide) spoke at the National Agricultural Chemicals Association Meeting in San Francisco, presenting the role of research in keeping agriculture solvent, and outlining the importance of chemicals in agriculture in meeting the heavy and increasing demand for food and fiber.

Replying to critics who discredit the use of chemical tools in agriculture on the theory that harmful residues of toxic materials are reaching the dining tables of the nation, Freeborn suggested that the federal government should 'establish tolerances' and 'police interstate shipments.' The latter is the duty of the Food and Drug Administration. The tolerances which are the key to our whole solution of this problem of uncertainty and unrest should be entrusted to a separate agency of government primarily charged with research and fact finding instead of the Food and Drug Administration. This might well be the United States Public Health Service whose service for over 160 years has always been characterized by devotion to the goal of man's health and well-being without the slightest hint of bureaucracy or 'empire building.'

"The progress that we may make in American agriculture through the use of chemicals is threatened today by a fanaticism that is being fanned into flame by minor demagogues bolstered by power—hungry governmental bureaucrats. Fanaticism thrives on ignorance and half-truths. Its antidote is truth."

IOWA ASSOCIATION OF MILK SANITARIANS

The Iowa Association of Milk Sanitarians held its annual meeting March 24 and 25 at Ames, Iowa. The meeting this year was held in conjunction with the Dairy Short Course at Iowa State College and was devoted entirely to the State Grade A Milk Law. Mr. R. W. McLean and Mr. H. E. Eagan of the U. S. Public Health Service conducted the meeting for both days.

The program for the day included all phases of dairy farm inspection under the Standard Ordinance and Code and the H. T.S.T. pasteurized and dairy plant inspection.

Approximately 250 people attended the meetings, a good many of whom were dairy plant operators. There has been very much interest in Grade A milk all over the state this past year and a number of the meetings have been joint meetings with the plant operators. The cooperation that is being developed between the industry and various health enforcing agencies is very gratifying. The meetings with the industry have aided the milk programs materially.

"Red" Thomasson was able to attend the annual meeting. He spoke briefly of the functions and relationship of the International and affiliate organizations.

R. A. Belknap
Secretary-Treasurer

OPENING FOR SUPERVISOR OF MILK SANITATION

New York State announces nationwide competition for Supervisor of Milk Sanitation, $8,350 - $10,138, in the Department of Health. This position directs the statewide program of milk and restaurant sanitation. Qualifications include: degree in dairy science, sanitation, sanitary engineering, veterinary medicine, or public health, and 9 years of experience in public health dairy science or sanitation including 2 years of major administrative experience in the direction of a large program of milk sanitation or experience as a professor of sanitation or dairy science. For additional information, write Mr. Carl Tremer, Examinations Division, 39 Columbia Street, Albany, New York or Mr. R. H. Mattox, New York State Department of Health, State Office Building, Albany, New York. Formal applications should be received by June 27.

Classified Ads

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A national trade association noted for its high professional standing in the public health field has an opening for a young man soundly trained and with an experience in sanitation or health education or both. A unique opportunity with an attractive future. Box 286, Shelbyville, Indiana.

Yuma County Health Department, Yuma, Arizona Sanitarian II, generalized environmental sanitation program, county-wide. State training, experience and references. Arizona State Merit System. Starting salary $286 to $311 depending on qualifications up to $366 plus $.07 per mile travel allowance.

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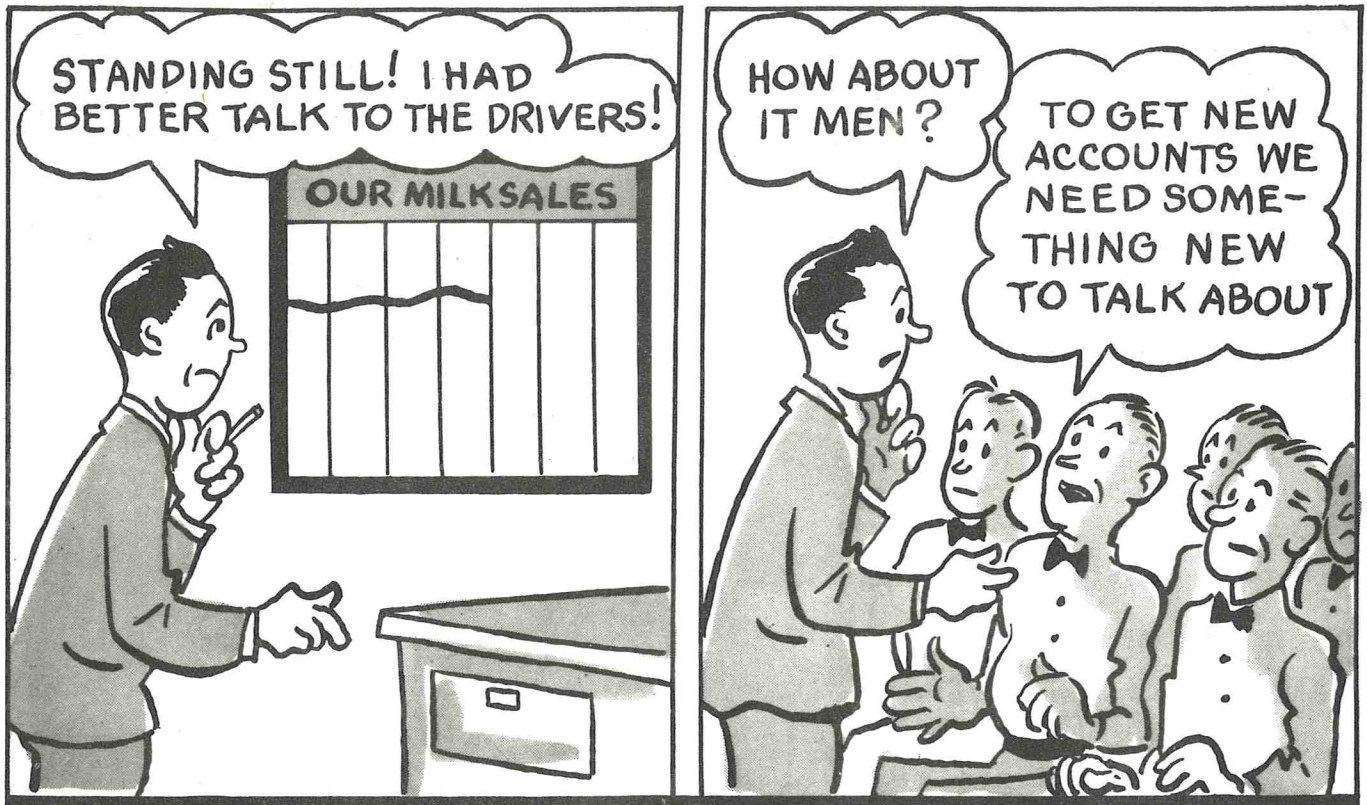

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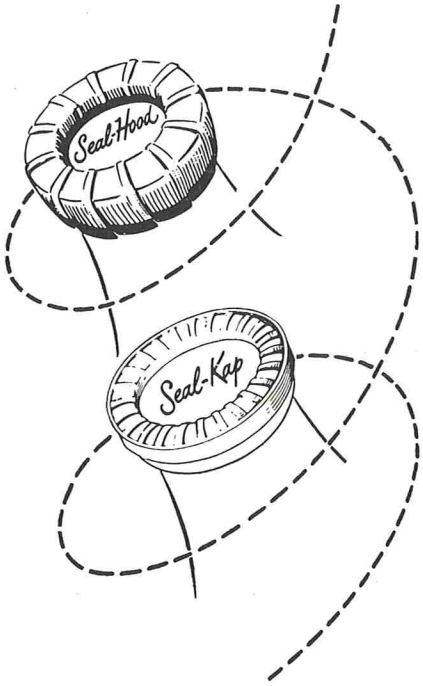

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