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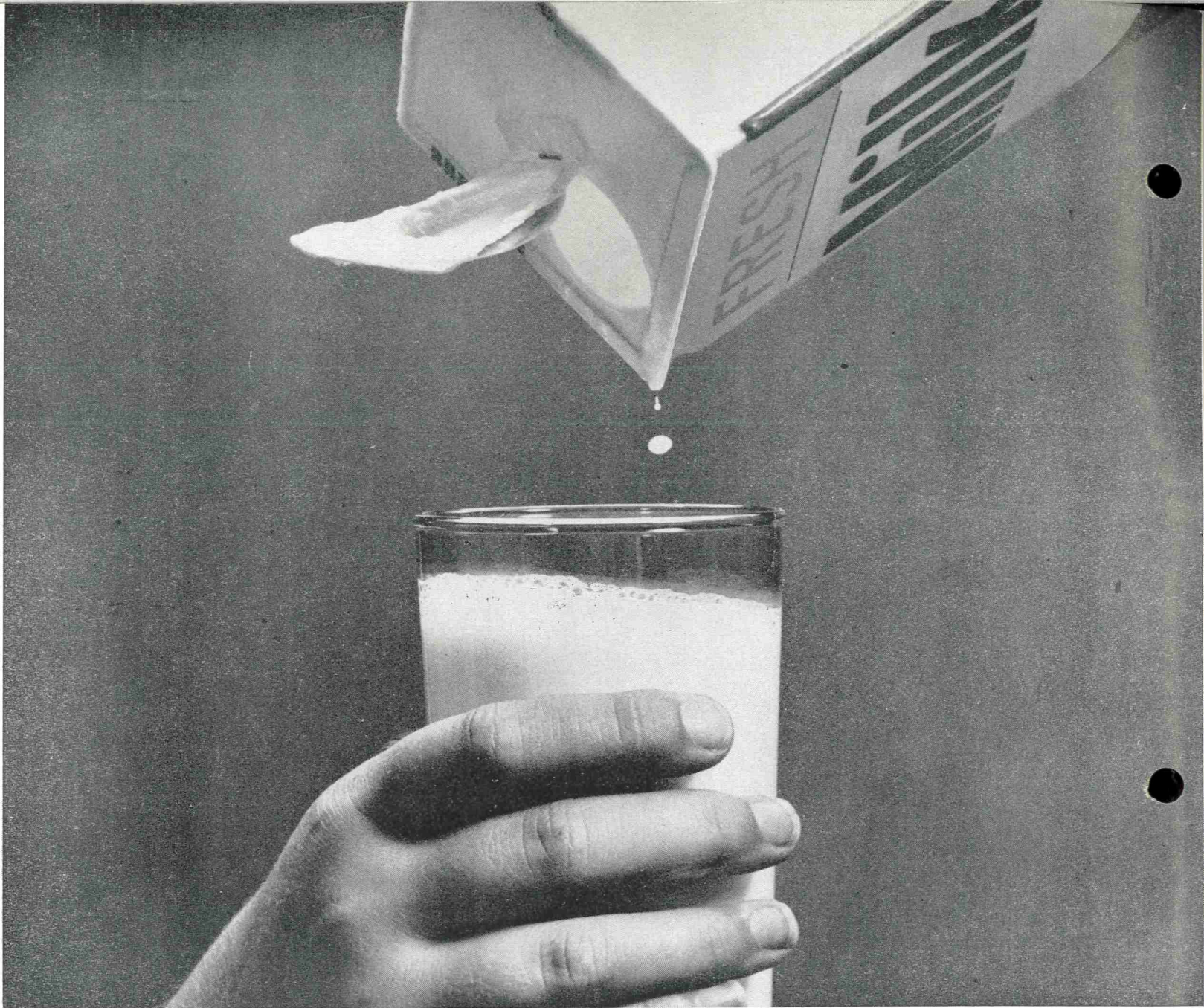
NOVEMBER, 1958

Journal of

MILK and FOOD TECHNOLOGY

Official Publication

International Association of Milk and Food Sanitarians, Inc.



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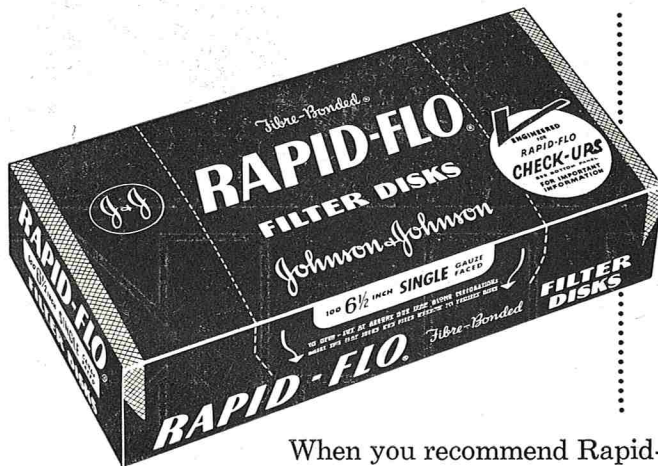
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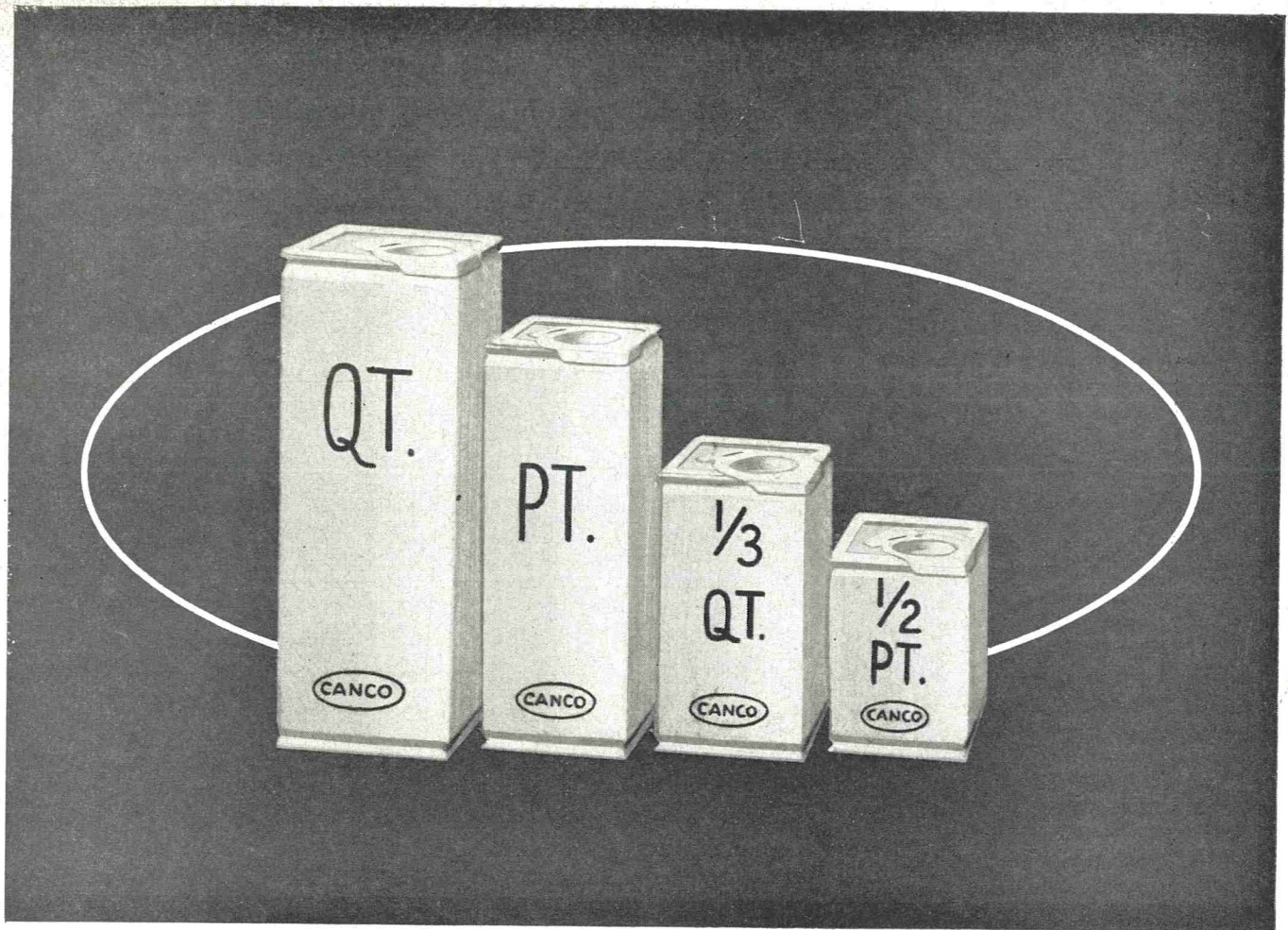
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Official Publication

International Association of Milk and Food Sanitarians, Inc.

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Vol. 21

November

No. 11

Contents

	<i>Page</i>
Presidential Address <i>Harold B. Robinson</i>	303
Meet Our New President	305
The Effect of Germicide Used for Udder Washing on the Number of Micrococci on Teat-Cup Liners <i>F. H. S. Newbould and D. A. Barnum</i>	306
Specifications for Babcock and Certain Other Volumetric Glassware and Methods for Conformance Determinations. <i>A. H. Robertson, C. E. Hynds and H. L. Durham</i>	309
Observations on the Spoilage of Crabmeat <i>Melvin A. Bernarde</i>	318
Amendment to Sanitary Standards for Pumps for Milk and Milk Products Serial 0202	321
Special Service Article	322
Some Public Health Aspects of Food and Beverage Vending	
News and Events	325
Index to Advertisers	332
Affiliates of IAMFS, Inc.	333

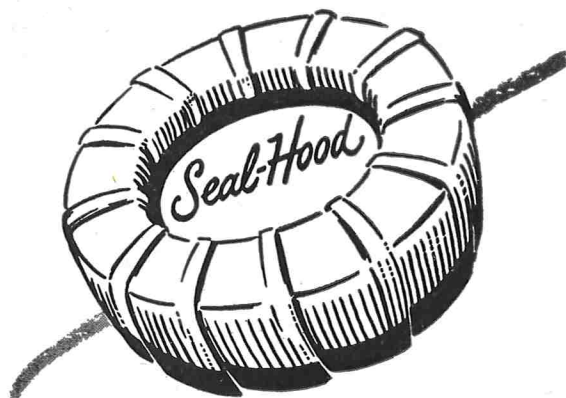
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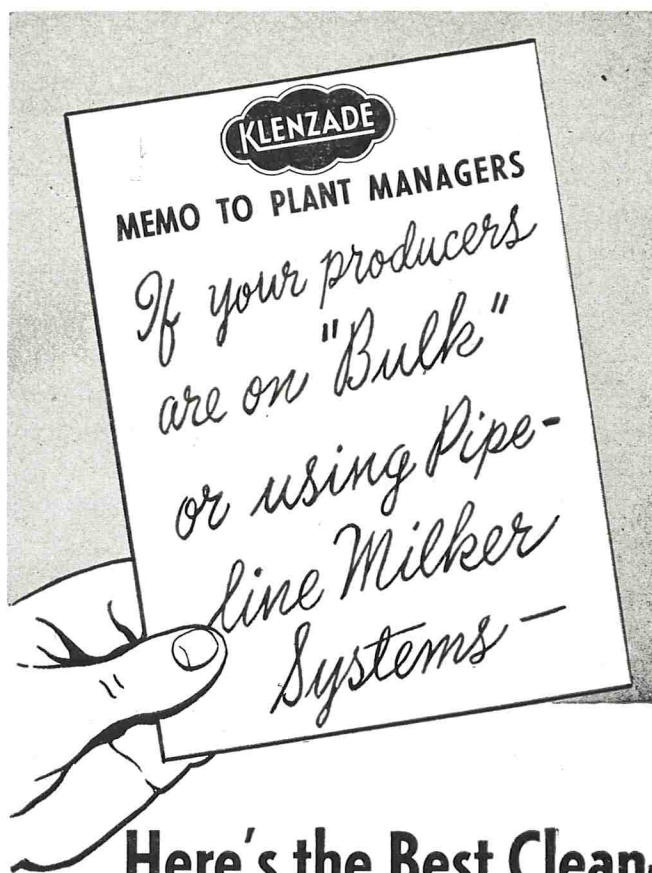
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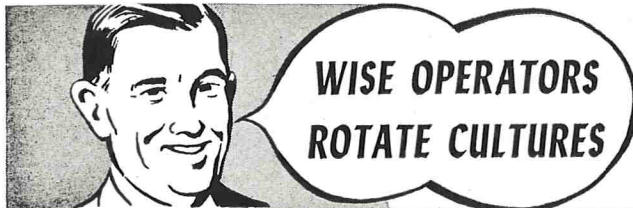
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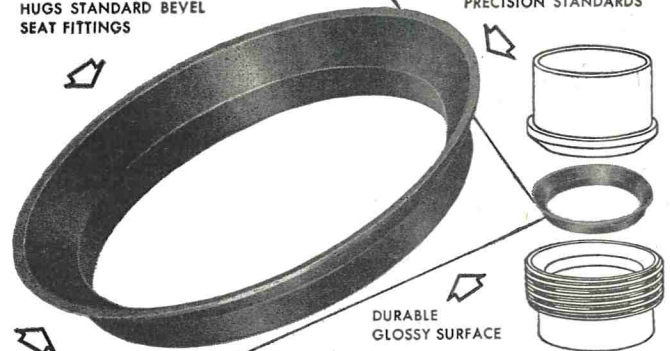
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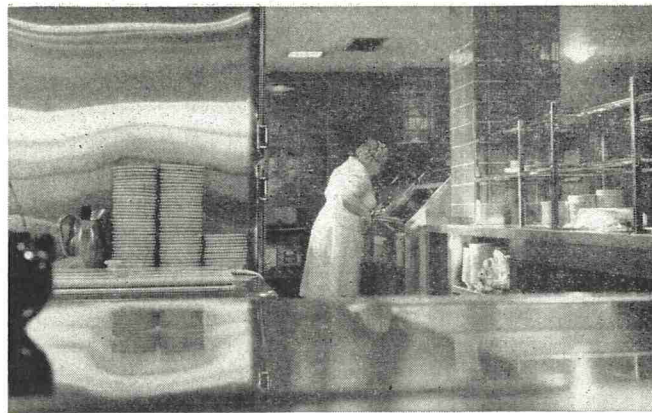
Stainless Steel milk dispenser saves \$30 a day, reports hospital dining room manager

Miss Mary E. Ellis, a professional dietitian, is in charge of the dining facilities at the University of Wisconsin Hospitals. She supervises purchasing, preparation, and serving of food to almost 2000 people.



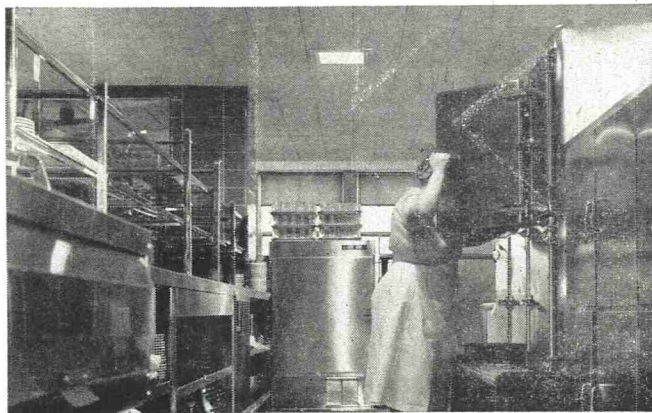
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PRESIDENTIAL ADDRESS¹

HAROLD B. ROBINSON

*Milk and Food Program, Public Health Service,
Department of Health, Education, and Welfare,
Washington, D.C.*

First of all, on behalf of the Executive Board, I would like to welcome you to this the 45th Annual Meeting of the International Association of Milk and Food Sanitarians, Inc. As you know, this year we have a joint meeting with the New York State Association and with the Cornell Dairy Industry Conference. This year's meeting, like others, is an opportunity for you to learn of current research and developments in milk and food sanitation and technology and to make and renew acquaintances with your colleagues throughout the country. The program is a full one. Your cooperation is asked in keeping it on schedule.

In addressing the membership at the annual meeting of his term of office, the President of your Association assumes an obligation to acquaint you with the current status of Association affairs and to bring to your attention problems which merit your consideration and action.

This has been another successful year in the life of the Association. The many committees have been working hard in their respective fields of endeavor and continue to play a most important role in the services the Association affords its membership. In addition, the work of our committees continues to exert a significant influence on sanitary practices throughout the country. In this connection you will be interested to learn that the "Procedure for the Investigation of Food Borne Disease Outbreaks," which was developed by the Committee on Communicable Diseases, has sold over 7,000 copies and has been translated into Spanish by the Pan American Sanitary Bureau for distribution in South and Central America. In addition, the advance sale of reprints of the recently published "3A Accepted Practices for the Sanitary Construction, Installation, Testing and Operation of High Temperature Short Time Pasteurizers" indicates that it, too, will become a standard work in its field.

This year it is not possible to provide time for committee chairmen to present their reports during the general sessions. Instead, during the course of the meeting, presiding officers will call forth individ-



Harold B. Robinson, President, IAMFS, 1957-58.

ual committees for recognition and give you a brief summary of the committee's work for the year. Abstracts of committee reports will be available at the door. The complete report will, as in past years, be published in the *Journal of Milk and Food Technology* where it will be available for your study and reference.

The Journal continues to gain stature as a medium for publication of research results. Last year, the Journal carried, in addition to its service features, some 50 technical articles in the fields of milk and food sanitation and technology. In this regard, your attention is invited to a new service feature initiated in the July issue — the Special Service article. This feature was conceived in the belief that there is a need for summaries of currently available information on various sanitation topics. Your comments and suggestions as to subjects which might be developed in this manner will be welcome.

Your attention is also invited to certain matters of association policy that are being submitted for your consideration at this year's business meeting. First, there are amendments to the Constitution and By-Laws. These were published in the July issue of the Journal and have been developed in accordance with recommendations of the Constitutional Revision Com-

¹Presented at the 45th Annual Meeting of the International Association of Milk and Food Sanitarians, Inc., at New York City, September 8-11, 1958.

mittee. The essence of the changes to be acted upon are: (a) an amendment to the Constitution to expand the objectives of the Association to include the fostering of efforts designed to improve the professional status of the Sanitarian; (b) an amendment to the Constitution to provide greater independence to the Affiliate Council in the selection of its officers; (c) amendments to provide greater clarity in two other sections of the Constitution; (d) amendments to the By-Laws to clarify the distribution of functions between the Secretary-Treasurer and the Executive Secretary; (e) an amendment to provide for the appointment of a nominating committee in advance of the annual meeting; (f) other amendments to the by-laws to clarify the Association's administrative procedures. These amendments will be taken up in the business meeting where you will be asked to vote on whether the constitutional amendments shall be submitted to the membership by mail ballot and whether amendments to the by-laws shall be put in force.

The second matter of Association policy is concerned with the advancement of professional status for the sanitarian. As you know, this matter is, and has been, one of the objectives of this Association for many years. During this time, the Committee on Professional Status, and later the Committee on Education and Professional Development, have studied the situation, defined the sanitarian in terms of qualifications and activities and developed a model registration act for consideration by interested affiliates. In addition, we have participated with the American Public Health Association and the National Association of Sanitarians in the organization of the Sanitarians Joint Council.

These activities have been productive in stimulating professional advancement, and it was the view of the Executive Board at its spring meeting that it was now time for the Association to consider a more definite policy with respect to a coordinated program from professional recognition. To this end, the chairman of the Committee on Education and Professional Development was asked to appoint a sub-committee to develop a proposal for consideration by the membership at this meeting. This sub-committee has developed a proposal that, in the opinion of the Executive Board, merits your consideration and support. It provides that the Association shall, in cooperation with the other participants in the Sanitarians Joint Council, sponsor the organization of a national registry for professional sanitarians. The proposal will be explained in full during the business meeting. You are urged to be present

and express your views.

I would now like to discuss with you in very frank terms two problems that are of concern to the Executive Board. First, is the matter of membership. At present we are a strong Association, with affiliated organizations, and numbering more than 4,000 members. However, after a long period of growth, the total membership is leveling off. Perhaps we have reached a saturation point. On the other hand, we may be failing in our program and services. For this reason, the Executive Board has established a committee under the chairmanship of John Faulkner, with a broad charge to study the policies, programs and procedures of the Association from the standpoint of their adequacy to serve the interests of the membership and the technical fields in which he works.

The second problem is one of finance. The story of the Association's finances for the past 10 years is, I am sure, familiar to you. Under the astute management of our Executive Secretary, we have progressed from insolvency in 1951 to a position of having a contingency reserve. During this period services to the membership have also increased. The Journal is now published monthly rather than bi-monthly. This progress has been achieved without any increase in dues since 1951 despite steadily rising Association costs. There are limits to what even the best management can accomplish. At present the combined Association and Journal operations are not showing a loss, but it is doubtful whether further increase in costs can be absorbed. This matter will receive careful scrutiny during the coming year in order that appropriate measures can be presented to the membership before the financial position of the Association is placed in jeopardy.

These two matters are among the pressing problems that must be faced, studied, and resolved. They are being worked on by the Executive Board and are being brought to your attention because we cannot afford complacency. The field of milk and food sanitation is expanding and opportunities for service are great. The Association must continue to grow both in numbers and in stature if it is to retain its eminence in this field.

In closing, I ask your indulgence to inject a personal note. I would like to express my appreciation to you for honoring me with election to office in the Association. Service through the succession of offices since my election as 2nd Vice President has afforded a rich experience that has given me more than I have given. I would like to pay tribute to the men with whom I have served on the Executive

Board and to express to them my thanks for their ever-present willingness to assume responsibility and to work at the many tasks encountered in the conduct of Association business during the past year. I

would also like to thank chairmen and members of committees for their support and continuing efforts. I am confident of the future of our Association as long as this spirit of cooperation and service prevails.

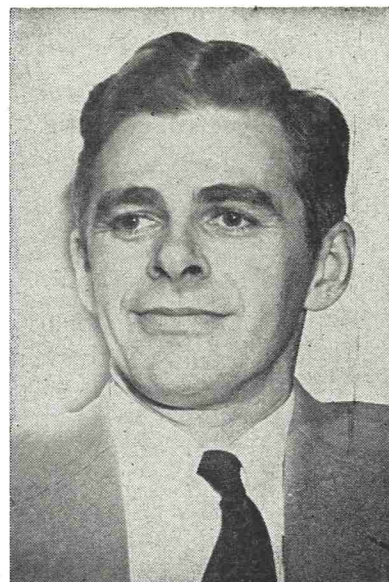
MEET OUR NEW PRESIDENT

Dr. Franklin W. Barber was born in New York City and spent his early youth in Connecticut and Massachusetts. He received a B. S. degree in Biology from Aurora College, Aurora, Illinois, in 1934. He returned to New England, and 1937 began his career in the dairy industry with employment as a laboratory technician in the laboratories of H. P. Hood and Sons to do graduate work in dairy bacteriology at the University of Wisconsin. He received the M. S. degree in 1942 and the Ph.D. degree in dairy bacteriology in 1944.

Upon completing his graduate work, Dr. Barber joined the research staff of Golden State Company, Ltd., San Francisco, California, when he conducted research on the bacteriology of dried whole milk and dried ice cream mix.

In 1945, Dr. Barber joined the research staff of what is now known as the Research and Development Division of National Dairy Products Corporation, which at that time was located at Baltimore, Maryland. The laboratories were moved to their present location in Oakdale, Long Island, New York, in 1948. Shortly afterward, he became Head of the Bacteriological Laboratories and in 1953 was made Chief of the Fundamental Research Laboratory. Following the combination of the Glenview, Illinois and Oakdale, New York Laboratories of National Dairy Products Corporation in 1958, Dr. Barber became Associate Manager of the combined Fundamental Research Laboratories.

During his years with National Dairy, Dr. Barber has actively participated in the programs of many scientific societies, University Short Courses, conferences and technical societies. He is the author of over 40 published papers dealing with a variety of subjects including evaluation of detergent sanitizers and bactericides, the bacteriology of high-temperature, short-time pasteurization of ice cream mix, the coliform problems in fruit ice cream, and psychrophiles in dairy products.



Dr. Franklin W. Barber, President, IAMFS, 1958-59

Dr. Barber is an active member of the American Dairy Science Association, the Institute of Food Technologists, the Society of American Bacteriologists, the Society of Industrial Microbiologists, Sigma Xi and of course the International Association of Milk and Food Sanitarians. He joined IAMFS in 1942 while a graduate student at Wisconsin. He has been a member of the Committee on Applied Laboratory Methods since 1948, Chairman 1955-56, and an Associate Editor since 1951. He was elected to the office of First Vice President of our Association in 1956.

Locally he has been Chairman of the Biology Development Committee of Adelphi College on Long Island for the past two years. He is also in the council of the New York City Branch of the Society of American Bacteriologists.

Dr. Barber's interests and hobbies are pretty much limited to boating, swimming, crabbing and clamming, along with the usual activities of a family man with two growing daughters of 8 and 14.

THE EFFECT OF GERMICIDE USED FOR UDDER WASHING ON THE NUMBER OF MICROCOCCI ON TEAT-CUP LINERS

F. H. S. NEWBOULD AND D. A. BARNUM

Ontario Veterinary College, Guelph, Canada.

(Received for publication June 8, 1958.)

The addition of germicide to the water used for washing the udders of cows prior to milking is a common step in procedures recommended for the sanitary production of milk. It is also frequently advocated for preventing the spread of mastitis infection from cow to cow in a milking line. Some aspects of the use of germicides for this purpose and their relation to mastitis sanitation have been reviewed (2,6).

This work has been undertaken as part of an investigation of methods for controlling the spread of pathogenic staphylococci. It has been shown that there is no significant difference in susceptibility to hypochlorite disinfectants between coagulase-positive and coagulase-negative strains of *Micrococcus pyogenes* (5). In view of the difficulty of differentiating on culture medium between coagulase-positive and coagulase-negative strains, mannitol salt agar (Difco) has been used throughout, and the term "micrococci" as used herein includes all colonies growing on this medium.

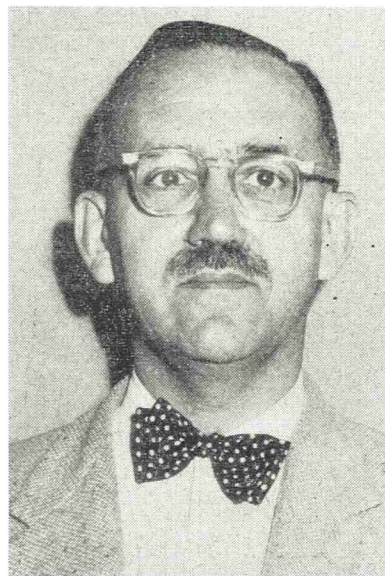
EXPERIMENTAL

The cows used in these experiments were maintained under good sanitary conditions in a small stanchion barn on the College Research Farm. At least two weeks of washing with warm water only separated any two experiments.

Between milkings the teat-cup liners were stored in 1% lye solution. Two sets of liners were used in alternate weeks. The set removed at the end of each week was boiled in 3% lye solution, washed and stored dry until put into use again at the end of the week.

After removal from each cow and before being attached to the next one, the teat cups were rinsed in cold water and then dipped for at least 30 seconds in a disinfectant compatible to the udder washing solution, i.e. sodium hypochlorite 500 p.p.m. during the Hibitane and sodium hypochlorite experiments and Iosan (50 p.p.m. available iodine) during the Iosan experiment. This procedure has been shown to provide adequate reduction in numbers (7).

Each cow's udder was washed at each milking with a separate paper towel dripping wet with germicide solution, which was made up to the proper strength in warm water in a separate pail for each concentration. Where udders were very dirty they were pre-washed with a paper towel and warm water.



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Five cows were used for each experiment. The udder of each cow was washed for one week with one of four concentrations of germicide and one week with warm water. The cows and treatments in each experiment were randomized in a 5 x 5 latin square design, so that each experiment lasted 5 weeks. The solution for each cow was changed each Saturday morning.

At the evening milking on Monday, Wednesday and Friday of each week the teat-cup liners were swabbed and the organisms were enumerated by methods published previously (7,8). All platings were in triplicate.

GERMICIDES

The germicides listed below were used in these experiments. The first two represent newer groups of chemical compounds introduced in recent years, while

the last compound is one of those used in dairy sanitation for a long time.

Iodophor. The product used is sold under the name "Iosan", and provides 1.75% available iodine.

1:6-Di-4-Chlorophenyldiguanidohexane (1). This is a new organic compound marketed in Canada under the trade-name Hibitane. It is also known as Chlorhexidine (9).

Sodium hypochlorite. A liquid Sodium hypochlorite (7% available chlorine) was used.

RESULTS

The mean numbers of micrococci obtained from 60 teat-cup liners for each treatment are shown in Table 1.

TABLE 1 — THE EFFECT OF KIND AND CONCENTRATION OF GERMICIDE USED FOR UDDER WASHING ON THE MEAN NUMBER OF VIABLE MICROCOCCI ON TEAT-CUP LINERS

Iosan		Hibitane		Sodium Hypochlorite	
Conc. p.p.m. Iodine	Mean ^a Liner Count	Conc. p.p.m. Active Ingredient	Mean ^a Liner Count	Conc. p.p.m. Av. chlorine	Mean ^a Liner Count
0	37,600	0	39,900	0	26,400
25	30,600	100	34,900	250	21,500
50	25,600	133	14,600	500	19,800
75	28,800	200	14,800	750	17,300
100	20,600	400	7,600	1000	19,800
F=2.02 ^b		F=3.95 ^b		F=.909 ^b	

^aMean Count from 60 liners.

^bRequired F at 5%=3.26

Although there was no significant overall difference between the counts obtained in the Iosan experiment, inspection of the treatment means did show a significant difference between the counts obtained where udders were washed with water only and those washed with 100 p.p.m. available iodine.

Under the conditions of these experiments washing udders with Hibitane gave the lowest mean liner counts. This is graphically shown in Figure 1, in which are plotted the percentage reductions in the number of micrococci on teat-cup liners from udders washed with the 4 concentrations of each disinfectant.

The smallest reductions were found where sodium hypochlorite was used. Increasing the concentration

to 1000 p.p.m. did not result in any significant decrease in the counts obtained.

In all three experiments there was a marked variation in the mean counts obtained from liners from different cows. Only in the Hibitane experiment was the variance for cow means less than that for treatment means.

No significant differences were found in the mean count obtained each week during the experiment when either Iosan or Hibitane were used, but there was a significant difference between the weeks during which sodium hypochlorite was used.

DISCUSSION

The number of micrococci, as defined, on the teat-cup liners immediately after they are removed from the cows has been used as the criterion for judging the effectiveness of udder washing. This is based on the supposition that the microflora of the teat skin has a marked effect on the numbers and types of organisms on the teat-cup liner, with which it comes in intimate contact during the milking process. The microflora of the teat-cup liner itself is important in the practice of dipping teat-cups between cows in the milking line, which can result at best in a reduction of 90 to 95 per cent of the micrococci present (7).

The most obvious conclusion to be drawn from the results presented is that it is extremely difficult to reduce the numbers of micrococci on teat-cup liners, as they are removed from the teats, by udder washing procedures. This is in agreement with results published by other workers showing that there were no appreciable differences in the microbial count of the milk produced when solutions containing 400 p.p.m. or 200 p.p.m. of available chlorine, 400 p.p.m. or 200 p.p.m. of a quaternary ammonium compound were compared with water alone for washing udders (3). In a subsequent paper it was also shown that both these sanitizers in the above concentrations were ineffective in checking the spread of organisms usually associated with mastitis (4). However, the present work does show that high concentrations of Hibitane used for udder washing do significantly reduce the number of micrococci on the liners. This undoubtedly results from a reduction in the number of the skin microflora since this is the main source of organisms found on teat-cup liners (8).

Sodium hypochlorite, even in concentrations up to 1000 p.p.m. available chlorine had little effect, demonstrating the complete inadequacy of recommending solutions containing 100 or 200 p.p.m. available chlorine, which is a very common practice.

This study demonstrates that there is a need for highly potent germicides which can reduce the number of microorganisms on the teat skin without causing ir-

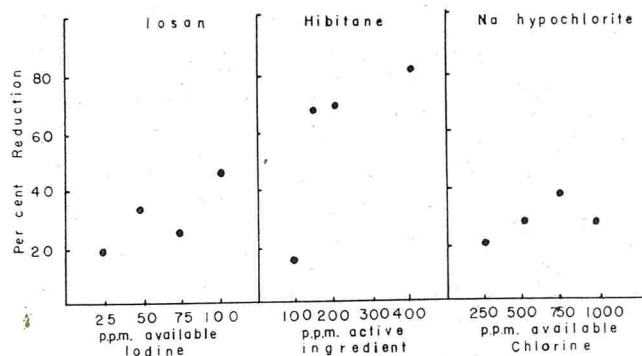


Figure 1. Per cent reductions in the numbers of micrococci on teat-cup liners, resulting from the use of germicides in the udder-wash water.

ritation. On those farms which use a milking parlour, the method outlined by Moore (6) may make possible the use of somewhat lower concentrations of germicide, but in the many dairy barns where milking is still performed in the cow stall the use of water from a hose is likely to result in wet, cold floors which may bring other complications.

SUMMARY

Experiments have been carried out to determine the effect of several germicides in udder washes on the number of "micrococci", defined as all organisms growing on mannitol-salt agar, found on teat-cup liners immediately after removal from individual cows. The need has been shown for highly potent germicides if the number are to be reduced by this procedure.

Lowest numbers were found on liners from cows washed with Hibitane (Chlorhexidine). Iosan (100 p.p.m. available iodine) resulted in a significant reduction in the number as compared to warm water. Sodium hypochlorite, even in concentrations up to 1000 p.p.m. available chlorine had little effect. There was a marked variation in the mean liner-counts from individual cows.

ACKNOWLEDGEMENTS

The authors wish to thank Ayerst, McKenna and Harrison Ltd., for the supply of Hibitane used, and West Disinfecting Co. Ltd., for the Iosan.

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SPECIFICATIONS FOR BABCOCK AND CERTAIN OTHER VOLUMETRIC GLASSWARE AND METHODS FOR CONFORMANCE DETERMINATIONS

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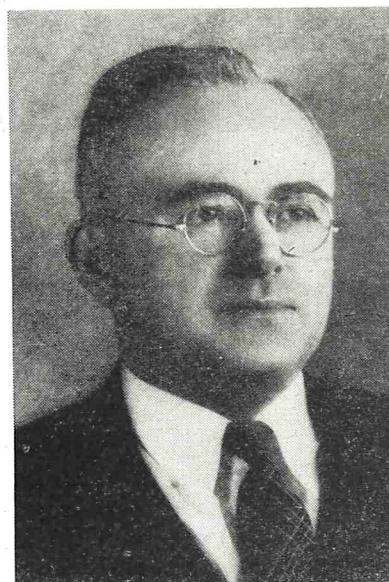
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Methods used currently in New York State for determining conformance with specifications of Babcock and Gerber volumetric glassware (1) and glassware for certain quantitative bacterial determinations (2) for dairy products have been described. The presentation of the procedures herein does not mean that other suitable ones may not be used satisfactorily. Some of the procedures have been used many years, while others, adaptable to Gerber glassware and to bacteriological transfer pipettes, are relatively new. The information herein may be useful to agencies responsible officially or otherwise for glassware conformance testing methods, and particularly to those in areas not yet requiring the use of certain tested and branded volumetric glassware.

The New York State statute (3) provides essentially that whenever determinations of the fat content of milk and/or cream are used for certain specific purposes, the glassware used in the volumetric measurements of the test charge and of the separated fat shall be graduated accurately. It also provides similarly for pipettes and other measuring instruments used when determining for certain purposes the bacterial counts of milk and/or cream as delivered by producers at receiving plants.

When tested for conformance with specifications and found satisfactory, each piece of glassware is indelibly and unmistakably etched by sand blasting or otherwise with a distinctive identifying mark, "N. Y." Any piece which is tested and found not to conform is returned unmarked to the owner. For certain metal syringes (2) with a set screw to fix maximal movement of plunger, a corrosive dye is used to etch the flat surface of a drop of solder securely covering the set screw. The set screw cannot be reset without showing that the solder seal has been broken and the marking partially defaced.

The sand blast equipment consists of an air compressor, motor operated to provide about 40 (30-50) lbs./sq. in. pressure, and a reservoir of sand (No. X-1-PBW/C+H Cover, Ottawa Silica Company, Ottawa, Ill.) with valves suitably located to feed the sand by gravity into the airline near the blast outlet end. By pressing a foot-control valve, air blows sand on to a stencil fitted securely around each piece of glass to be



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marked. Prolonged exposure at unusually high pressures causes excessive etching of exposed areas.

The reader is referred to published records for specifications for Babcock glassware (1,2,3,4,5). Circular 632 by the Department of Agriculture and Markets (1) listed specifications, prepared prior to this date, for Gerber glassware and includes a copy of the New York State statute providing for the identification of tested and approved glassware. The British Standards Institution (in 1935 and in tentative announcement 1951) included specifications (6) for certain pieces of Gerber glassware which differ slightly from those recognized in New York State (1). Recent amendments have been made to the 1951 specifications. Also, the

Netherlands Standards Commission revised their specifications (7) for the Gerber pipette, effective October 1, 1951.

The type of Babcock and Gerber glassware to be considered are:

Babcock Fat Test Method

Pipette to contain 17.6 ml. ± 0.05 ml. of water at 20°C.

Milk Test Bottle, 8%, 18g., grad. in 0.1 percents.

Cream Test Bottle, 50%, 9 g., short (6"), grad. in 0.5 percents.

Cream Test Bottle, 50%, 9 g., long (9"), grad. in 0.5 percents.

Cream Test Bottle, 50%, 18 g., long (9"), grad. in 0.5 percents.

Gerber Fat Test Method

Pipette, to contain 10.77 ml.^a ± 0.03 ml. of water at 20°C.

Milk Test Bottle, 8%, 11.006 g., grad. in 0.1 percents.

Cream Test Bottle, 50%, 5 g., grad. in 0.5 percents.

^aRevised by Netherlands Standards Commission (9), effective October 1, 1951.

GENERAL PROCEDURE

Since specifications for pipettes and other glassware are given in terms of "to contain" or "to deliver" water (H₂O) at 20° C., it seems essential that the exact contents of Master Pipettes, etc., previously checked with H₂O to determine conformance and unmistakably marked for such identification, be used repeatedly for initial transfers for conformance determinations on each lot of from 10 to 20 pieces of untested glassware. Because mercury (Hg) flows freely from surfaces of glass, because it contains no undissolved air, and because air pockets at glass surfaces are readily noticeable and can easily be removed by gently tapping the glassware, Hg, instead of H₂O, is used routinely for volume conformance determinations.

Certain general precautions, mostly related to handling Hg, follow. The room, the Hg and all apparatus to be used is kept at, and the untested glassware stored for sufficient time before use or testing should come to room temperature, usually about 20 - 24° C. The Hg to be used and both certified and untested glassware should be clean, dry and dust free. Trays are used, as needed, to collect accidental Hg losses. (Hg vaporizes very slowly at room temperature and prolonged exposure to vapors may be a distinct health hazard.)

When calibrating, all air trapped while adding each charge of Hg is released from the column by gently tapping the glassware until the top of the column forms a well-rounded meniscus. All instruments and Hg are shielded from temperature changes caused by drafts, manual handling, etc. Use of apparatus or the

wearing of personal adornments potentially amalgamizable is avoided.

Conformance observations in pipettes and in bottle necks may be made at the extreme top of the inverted meniscus of the Hg column or at such other place with reference to the calibration line as the examiner chooses, provided a uniform practice is followed. When examining a water meniscus in the Master Standards, it is always adjusted so that the extreme lowest part of the meniscus coincides with the middle of the graduation line.

BABCOCK AND GERBER MILK PIPETTES

A Babcock pipette to contain 17.6 ml. at 20°C. or a Gerber pipette to contain 10.77 ml. at 20°C. tested for accuracy and bearing certification thereof by the National Bureau of Standards, is used as a Master Pipette for determining the initial charge of Hg for each group of untested pipettes, as hereinafter directed. Since the amount of H₂O retained in the pipette will be determined in part by the shape of the tip and the total interior surface area, and since the volume of the meniscus depends in part on the bore of the suction tube at the graduation line, it is necessary that untested pipettes and the Master Pipette have practically the same dimensions. In the interest of accuracy, it is essential to know the exact content of the Master Pipette and to correct for any error observed either by marking the stem with a narrow paint line or by making an appropriate linear allowance when pipettes being tested do not hold the same amount as the Master Pipette.

To arrange a supply rack of untested pipettes with tip ends extending outward at left of operator is often convenient. With index finger of left hand placed securely over tip end, the Master Pipette (Babcock or Gerber) is filled with Hg exactly to graduation line. With index finger of right hand placed securely over mouth end, the pipette is tilted so that tip end is slightly above horizontal. A pipette to be tested is grasped with the left hand with index finger placed securely over tip end. The Hg charge is then gradually but completely transferred to the pipette in the left hand by inserting the portion below the bulb into the mouth end of the pipette. If the top of the Hg column is level with the graduation line, tolerance ± 0.05 ml. in terms of equivalent length on stem, when pipette being tested is held vertically, the pipette is accepted and identified as described above.

The pipette in the left hand is then transferred to the right hand with the index finger placed securely over the mouth end, and is then tilted as before. Making certain that no Hg has been lost, from 10 to 20 pipettes are tested in succession with the same Hg charge. Before discarding the Hg charge so used, its

volume is redetermined by returning it to a Master Babcock pipette. If loss has occurred, all pipettes in the last batch examined are retested.

A rubber pad over the finger which closes the tip of the receiving pipette protects the finger and reduces the chances for Hg losses. To facilitate speed, pipettes are held nearly horizontal when making transfers.

BABCOCK TEST BOTTLES

Several methods for determining the accuracy of the graduations of Babcock test bottles appear in the Laboratory Manual of the Milk Industry Foundation (8). The Hg calibration method, as described therein, has been used in New York for more than 20 years. Use of the Nafis Tester (Figure 1) a special plunger-

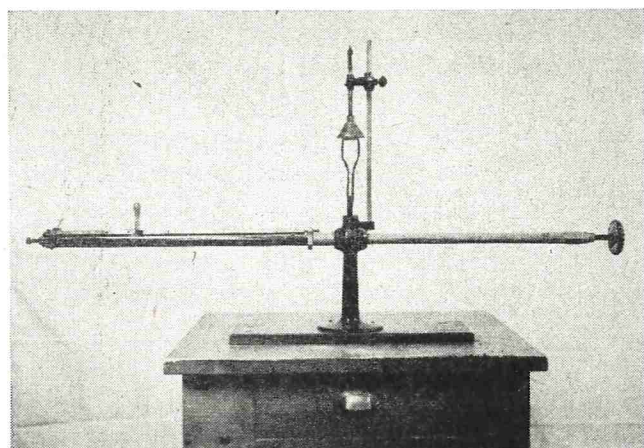


Figure 1. Nafis Tester with Inverted Babcock Milk Test Bottle in Position.

in-cylinder type device, made by Kimble Glass Company simplifies the testing procedure by making possible the repeated delivery of known amounts of Hg without loss into the graduated neck of successive test bottles within only a few seconds.

Before use, and periodically thereafter, the Nafis Tester is checked for plunger displacement of Hg

using a calibrated Master Tube for Babcock milk test bottles (Figure 2). The volume displaced applies to the graduated portion only of the neck of the bottle. The accuracy of the displacement of the left-hand plunger is determined by forcing two successive 0.8-ml. charges of mercury into the Master Tube, each volume equivalent to that occupied by the milk fat from an 18-g charge of milk containing 4% milk fat. Before use, the tube is clamped in position as described below for the milk test bottle.

Master Tubes are required for checking displacements of the plunger when testing Babcock cream test bottles and the 1.0, 1.0 and 1.1, and the 2.2-ml. bacteriological transfer pipettes, described subsequently. The following description of operations is designed in part to enable official agencies to adapt the Nafis Tester to determining conformance of bacteriological transfer pipettes to specifications.

To determine the accuracy of the graduated portion in the neck of a Babcock milk test bottle, the bottle is first inverted over the Hg outlet above the cylinder. The Hg outlet, surrounded immediately below the orifice by a cushion-type fitting, is slightly recessed in the center of a disc, with a rim to prevent Hg loss. The bottle is seated securely over the outlet by clamping it in position from above.

At the right hand end of the metal cylinder, the plunger, with attached actuating rod threaded into the cylinder head, is manually operated to adjust the top of the Hg column level with the first graduation at the 8% line in the neck of the inverted bottle. At the left-hand end, the guide bar, to which an arm is attached for actuating another plunger, is manually operated to force a known amount of Hg in two successive charges into the graduated portion of the neck of the bottle. The guide bar has a check stop corresponding to the correct amount for forcing the Hg first to the 4% graduation, and a second check stop corresponding to the correct amount to continue forcing it to the 0% graduation.

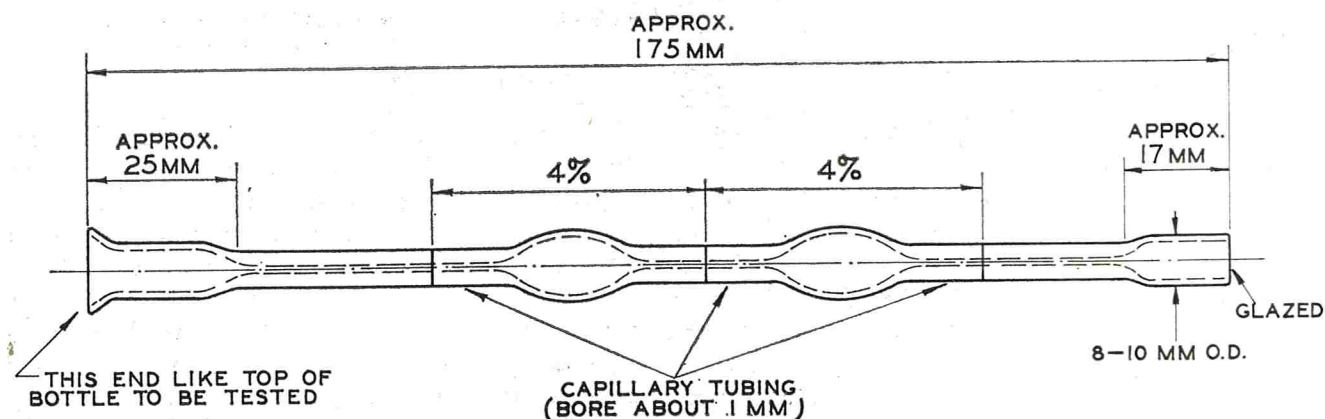


Figure 2. Certified Master Tube for Volume in Babcock Milk Test Bottles to be Used for Calibrating Nafis Tester. (Courtesy Drawing by Kimble Glass Company, Subsidiary Owens, Illinois)

The accuracy of the graduations on Babcock cream test bottles is determined in a similar manner. The chief difference consists of rotating the guide bar so that the stops conform to the desired displacement volumes of Hg. A suitable Master Tube for Babcock cream test bottles is used for conformance determinations for the stops.

The amount of Hg required for each of the two successive charges in the Babcock test bottles, according to their design, is listed below:

Bottle	Successive Charges
Milk test, 8%, 16 gm.	0.8 ml.
Cream test, 50%, 9 gm.	2.5 ml.
Cream test, 50%, 18 gm.	5.0 ml.

The maximum error in the total graduation of any bottle or in any part thereof shall *not exceed* the volume of the smallest unit of the graduation on that type of bottle, as observed by the examiner when viewed at eye level with the graduation line.

GERBER TEST BOTTLES

The closed end of the tube, and in particular the small volume of the bulb above the highest graduation, in the Gerber type of bottles makes it impossible to use the Nafis Tester for determining the accuracy of the neck graduations. To make this determination, it is now customary to invert the 8%, 11.006-g., milk-test bottle and fill the closed bulb with Hg to the first graduation (the 8% line). Formerly a special glass cup with volume confidentially known to the manufacturer of the Gerber test bottles was then filled with Hg. A glass straight-edge was drawn across the top of the cup to remove any excess charge and 2 successive charges transferred to the Gerber bottle. Each charge consists of 0.5 ml. which, if the graduations are correct, should bring the top of the mercury column first to the 4% graduation level and then to the 0% graduation.

Formerly a similar procedure requiring a larger cup was used for determining conformance of the 50%, 5-g, Gerber cream-test bottles. The maximum error in the total graduation of any bottle or in any part thereof shall *not exceed* the volume of the smallest unit of the graduation on that type of bottle. It has been customary to interpret this requirement in the identical manner as described above for Babcock test bottles.

Because of the possible error when straight-edging the Hg in the special cups with previously undisclosed capacity (9), upon request by the senior author a precision calibrated funnel (Sketch XA-1956) was prepared by the Corning Glass Works, Corning, N.Y. (Figure 3). The specifications of 0.5 ml. at 20° C. for calibrating with two successive charges the volume in the neck of the milk test bottle was given the manufacturer first. Use of this apparatus was so satisfactory

that arrangements were made to construct a similar device to deliver a 1.42-ml. charge of Hg for two successive additions to cream test bottles (9).

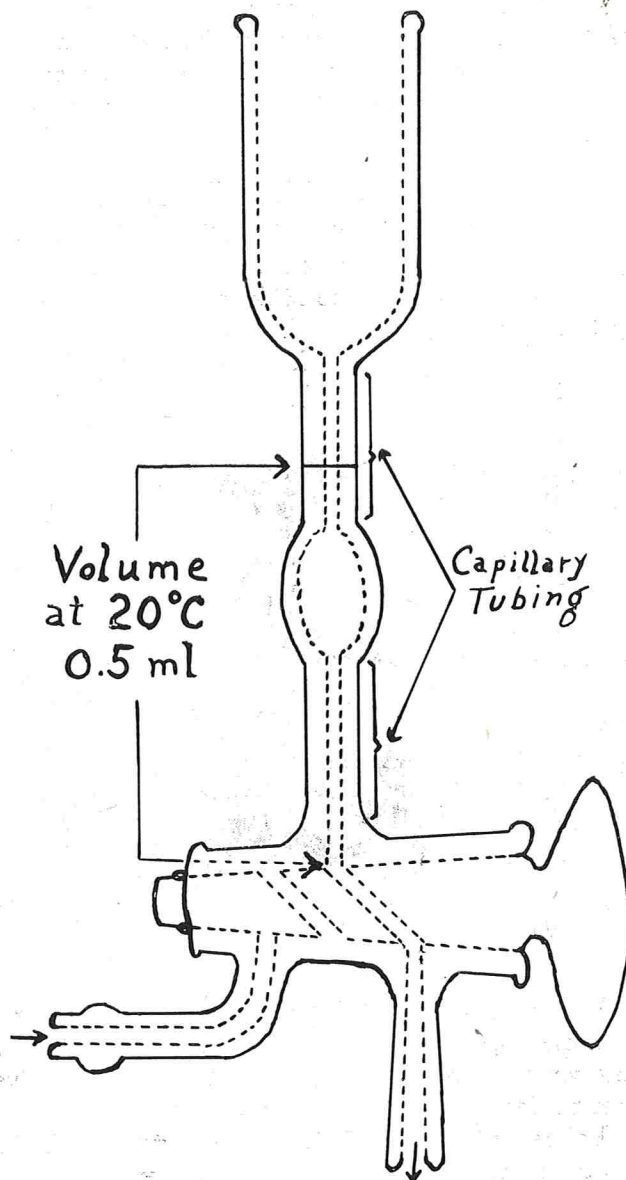


Figure 3. Certified Precision Calibrated Funnel for Measuring Test Portions of Mercury into Gerber Milk Test Bottles.

Originally the intent was to use a leveling bulb for the reserve Hg source, with outlet attached by tubing to intake opening on apparatus and with a screw-threaded column to support the Hg reservoir for close adjustment of the Hg level at the graduation line in the capillary tube. Instead of using this scheme, it was decided to reduce the size of the intake hole in the stopcock by inserting a wood plug through which was made a capillary opening about 1 mm. in diameter. This modification served to control the sudden inward flow of Hg satisfactorily without aid of a

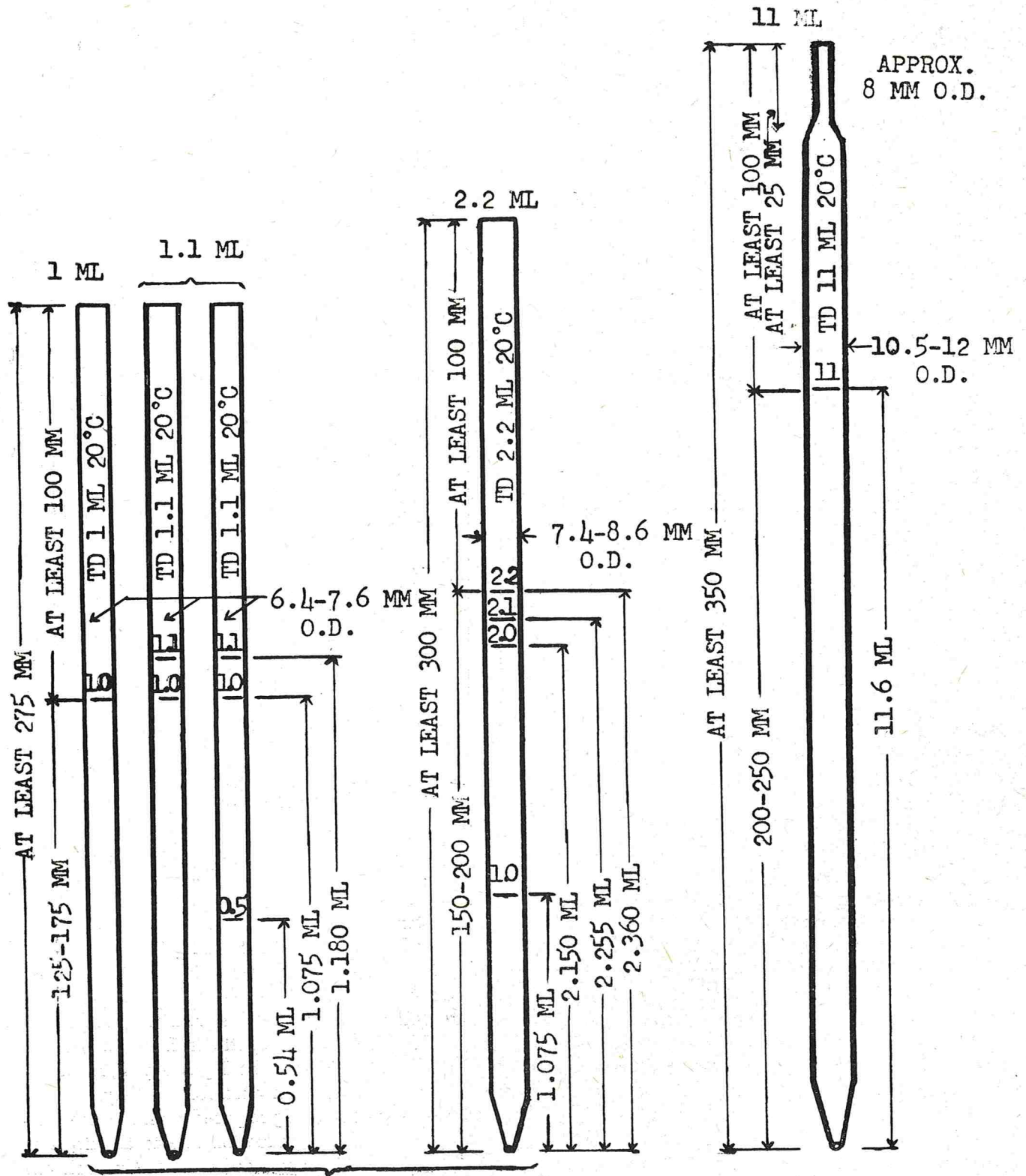


Figure 4. Bacteriological Transfer Pipettes. Delivery 1 ml; Delivery 1.1 ml in 0.1 and 1 ml amounts; Delivery 1.1 ml in 0.1, 0.5, 0.5 ml amounts; Delivery 2.2 ml successively in 0.1, 0.1, 1, and 1 ml. amounts; and Delivery 11 ml.

screw-threaded column. Obviously, before using the charge-measuring apparatus, it is necessary to fill the bulb in each bottle with Hg until it is level with the first graduation line.

In order that the Fibu key-plunger-type stoppers (No. 4285) may be adjusted with minimal chance of leakage, it is essential that the openings in the test bottles be uniformly round, with diameter range from 11.0-11.6 mm. It is also essential to limit necessary adjustment of the column to not over $\pm 0.1\%$ graduation.

BACTERIOLOGICAL TRANSFER PIPETTES

Specifications for the 3 general types of bacteriological transfer pipettes; (a) the 1.0 ml. and 1.1 ml., (b) the 2.2 ml., and (c) the 11.0 ml., are given in Figure 4.

Conformance Determination of Bacteriological Transfer Pipettes

For determining conformance with linear specifications, several pipettes are arranged parallel with the side wall of a tray and the tray tilted so that the tips rest against the base wall (Figure 5). Trays are prepared in 3 different sizes, for use according to the style of pipette to be tested, with floor lines appropriately spaced parallel with the base to indicate tolerance limits as follows:

	Type of Pipette		
	1.0 ml. and 1.1 ml.	2.2 ml.	11.0 ml.
Total length			
at least, mm	275	300	350
Tip to line at ml.	1.0	2.2	11.6
Minimum, mm.	125	150	200
Maximum, mm.	175	200	250
Tip constriction length			
Minimum, mm.	10	10	20
Maximum, mm.	15	15	30

Determination of conformance with the above tolerance limits serves indirectly to assure conformance with bore tolerance measurements also.

For determining conformance to length from top of pipette to the graduations at 1.0 ml., 2.2 ml. and 11.0 ml., the tray is tilted in the opposite direction so that the mouth ends of the pipettes rest against the opposite end of the tray and parallel with the side walls. The line drawn across the floor of the tray 100 mm. from the top guides in determining whether the graduation on the pipette is less than the tolerance.

When the pipettes are in this position, the tip ends are exposed so that a cylindrical taper gauge (Figure 6), tested and marked by the calibrating agency at the appropriate diameter tolerance limits, is inserted in each pipette. The degree of insertion determines

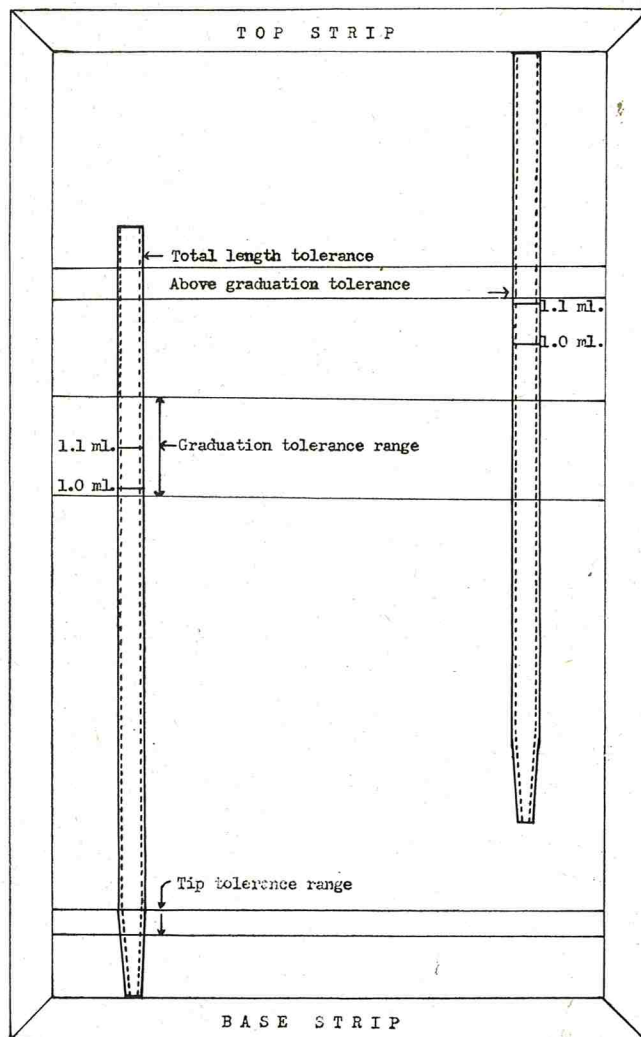


Figure 5. Tray for Linear Conformance Determinations with Specifications for Bacteriological Transfer Pipettes.

whether the tip of the pipette conforms with specifications. Other similar cylindrical taper gauges, as shown in Figure 7, may be improvised.

For determining volume conformance of the 1.0 ml., the 1.0 and 1.1 ml., and the 2.2-ml. pipette, the Nafis Tester is used. A special seat is inserted around the Hg outlet so that the mouth end of the clamped pipette will fit firmly against a cushioned area. Due to variable bores, each pipette is filled to the tip, and then by withdrawing the Hg to a prescribed bar stop, the graduation is checked for accuracy.

Since the volume of Hg required for filling the 11.0-ml. pipette from the graduation line to the tip is so large, the Nafis tester cannot be used. Although one could be designed for this purpose, it is now considered unnecessary because so few pipettes of this type are submitted for testing. The procedure now used is similar to that employed for testing the Babcock and Gerber milk pipettes, except that a small glass

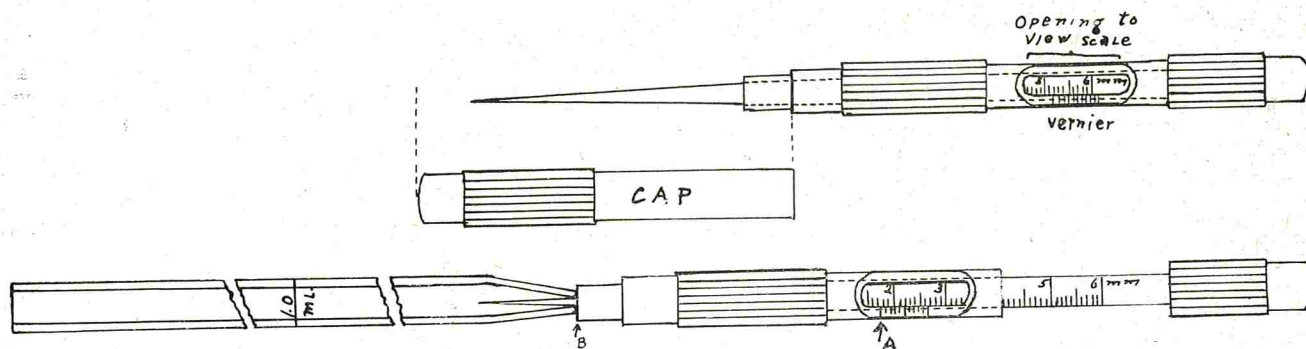


Figure 6. Telescoping Round Taper Gauge for Determining Diameter of Bore of Pipettes at Tip. In Lower section Needle Is Withdrawn to Minimal Tolerance Diameter of 1.75 mm. a: A and 1.0 ml Pipette Tip Held Close to Shield Case at B. (Gauge available as Item 50-733 from E. Machlett & Son, 220 E. 23rd. St., New York 10, N.Y.; now a subsidiary of Fisher Scientific Co., New York.)

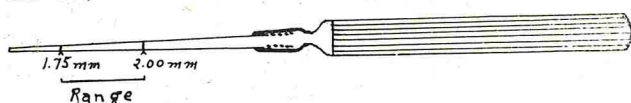


Figure 7. Improved Round Taper Gauge, Marked at Range Limits.

funnel is inserted in the top of the 11.0-ml. pipette when transferring the Hg from one pipette to another.

Tolerances for bacteriological pipette graduations are as follows:

1.0 and 1.1 ml.	± 0.025 ml.	} From tip to any graduation and between successive graduations
2.2 ml.	± 0.040 ml.	
11.0 ml.	± 0.200 ml.	

Testing the 0.01-ml. Capillary Pipette

Because of the small amount of Hg required and the small bore to be filled when testing the 0.01-ml. pipette shown in Figure 8, (for use with the direct microscopic method (2) for determining the bacterial content of milk and cream) special care is essential to avoid Hg losses. The 0.01-ml. pipette is tested for volume conformance by transferring to it from a standard tested pipette 0.1395 g. (approximately 0.1400 g.) of Hg at 20°C. The pipette has an over-capacity of 0.0004 ml. to allow for residual milk adhering within the bore when transferring test portions to slides.

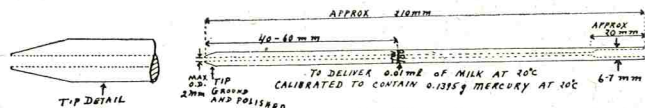


Figure 8. Capillary Pipette, 0.01 ml. Delivery.

Transfer Syringe for 0.01 ml. Bacteriological Test Portions

Because use of the 0.01-ml. pipette to transfer test portions of milk often retarded speed of deck operations at plants and because it could not be used

satisfactorily on creams at low temperatures or those with high fat content, need for a substitute transfer instrument led first to the use of a 0.01-ml. transfer loop (2) and in 1951 to the discovery that for about 3 years the California State Department of Agriculture had been using a metal plunger-in-bore type syringe (2) for transferring 0.01-ml. test portions of milk and cream. The time required for each transfer with the syringe (Figure 9) is about 40% greater than

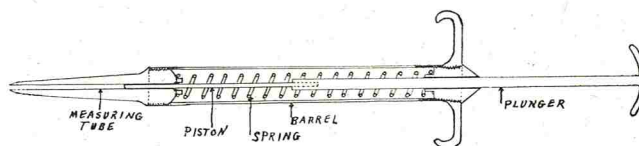


Figure 9. Semi Automatic Syringe, 0.01 ml. Delivery.

that for the transfer loop and about 25% of that required for the pipette. Because of the positive action of the plunger, use of the syringe assures uniform delivery of the charge measured regardless of the temperature and/or the composition of the milk and cream. Furthermore, the error of delivery can be determined by weighing on an analytical balance the charged syringe before depositing the test portion and again weighing it after the deposit has been made. The total error, including the deposited portion, could be controlled with the syringe to 0.0103, ± .0005 g., whereas the error for the initial calibration alone on the pipette, exclusive of operational measuring and depositing errors, was 0.0103, ± .0010 g.

A description of the loop, referred to above, is not included because of actual operational volume transfer errors which vary widely as compared with transfers with the syringe (2) and because after initial calibration there was no positive assurance of maintaining the same loop dimensions after repeated use following sterilizing treatments between samples.

DETERMINING ACCURACY OF GRADUATIONS ON SPECIAL SULFURIC ACID HYDROMETERS

Where Babcock and Gerber methods are used, it is necessary to determine the specific gravity (sp. gr.) of the acid with a small, short-scale Babcock acid hydrometer, sp. gr. range 1.800-1.850 in 0.001 subdivisions.

While it is not generally advisable to use reagents like concentrated sulfuric acid as test solutions, it seems that this is one instance where such use is practical. The sp. gr. of two lots of concentrated acid with strengths approaching the respective range limits of the test hydrometer may be determined with a standard hydrometer, sp. gr. range 1.780-1.850 with 0.0005 subdivisions, which has been tested for accuracy and certified thereto by the National Bureau of Standards. After determining the strength of the two lots of acid, the test hydrometers can be checked for accuracy in the same acids. Since the concentrated acids absorb H_2O readily, it is essential that the sp. gr. of the acid be checked frequently and also before and after each use for testing a batch of instruments. Those instruments which differ from the determinations by the certified hydrometer by more than 0.0005 should not be used.

DETERMINING ACCURACY OF GRADUATIONS ON LACTOMETERS

Before thermo-lactometers are issued for field or for laboratory determinations of the specific gravity (sp. gr.) of milk, checking the accuracy of these instruments at two or more points and their temperature scales at two or more points is desirable. The following procedure has been found satisfactory:

Fill a 500 ml. cylinder with distilled H_2O and submerge it to near its top in an H_2O -bath at 60°F. A constant temperature bath is convenient, but not necessary. When the temperature of the H_2O in the cylinder becomes constant at 60°F., check this constancy with a thermometer of known accuracy, and then carefully observe and record the readings for both the gravity and temperature scales of each untested, clean, dry lactometer. Be sure that the distilled H_2O is at 60°F. when each observation is made. Readings on properly graduated instruments should be 0 on the sp. gr. and 60°F. on the temperature scale.

For conformance with sp. gr. determinations, make a solution containing about 48 g. of sodium chloride per liter. This should have a sp. gr. about equal to that of normal milk *i.e.*, 103 to 105 on the Board of Health scale, and 30.0 on the Quevenne scale. Determine the sp. gr. accurately with a pycnometer, or with a standard lactometer or hydrometer of certified

accuracy. Fill a clean, dry 500-ml. cylinder with this solution and submerge it to near its top in an H_2O -bath at 80°F., or other convenient temperature between 75° and 80°F. When the temperature becomes constant at the point selected, check it for constancy with a standard thermometer of known accuracy and then carefully observe and record the readings on both scales of each clean, dry lactometer, as before. Be sure that the salt solution is at the selected temperature when each observation is made. From the sp. gr. of the salt solution, calculate the lactometer reading at the temperature used, or determine the actual reading with a standard lactometer of known accuracy.

Lactometers with errors exceeding 1°F. on the temperature scale, or with errors exceeding the smallest graduation unit (usually 0.2) on the sp. gr. scale, are rejected. Usually not more than two lactometers are rejected from a gross of well prepared instruments.

If the scale of the lactometer to be tested does not extend to 0, a salt solution of proper strength, instead of distilled water, should be used to make a reading possible near the upper end of the scale. The exact strength of the salt solution will have to be determined in the same manner described for the stronger solution.

SUMMARY

The methods now used in New York State for determining the accuracy of: (a) volumetric glassware required when certain uses are made of determinations of fat in milk and/or cream by the Babcock or Gerber methods, and (b) transfer pipettes required when certain uses are made of bacterial count determinations in milk and/or cream, have been described. In addition, simple laboratory procedures for testing the accuracy of Babcock acid hydrometers and of milk lactometers are included.

Some of the above methods have been described for the first time. Other methods have been used for many years. The aim has been to assemble in one place a statement which may be a useful guide to regulatory agencies and to others charged with making certain analytical determinations on dairy products and with certain conformance tests to be applied to apparatus used when making such determinations.

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OBSERVATIONS ON THE SPOILAGE OF CRABMEAT

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It is well known that fresh crabmeat is extremely perishable. Little has been published concerning its bacterial flora, and the casual agents of spoilage have not been identified. As a consequence, public health standards of bacterial quality are based on little exact data. In addition, information is lacking as to the numbers (ranges) of organisms that may be present in typically fresh meat, "flat" and "off" to foul meat, and its bearing on public health. Previous findings (2) indicated that typical fresh meat prevailed during the first 8 days storage. Crabmeat kept beyond that time lacked the strong "typical" flavor; a flatness became evident about that time though the meat was still quite edible. Patent spoilage occurred shortly after the "flat" stage, from 10 to 15 days after storage at 1-3°C.

Fresh crabmeat is usually sold in three forms; "lump" (the muscles of the back fin or fifth pereopod), "regular" (promotor muscles of the pereopods), and "claw" (muscles of the chelipeds) which appears to be the order of desirability. Although official bacterial standards are the same for each of these types of crabmeat, little information is available about the rate and manner of their deterioration. In fact, crabmeat regulations do not mention types of meat. Tacit assumption considers all meats similar. The few published studies of crabmeat (1, 3, 4,) do not indicate the type of meat tested; one assumes that "regular" type meat, normally the most abundant, was used.

Another unproven but generally accepted notion is that the pH of a crabmeat extract or brei can indicate length of storage and progressive deterioration of the picked meat.

Past investigations in our laboratory indicated a distinguishable and repetitive pattern to crabmeat deterioration; moreover, each type of meat had a distinctly different initial pH, that became markedly irregular with increased storage. Because of this, a definite need for a comprehensive study of the pattern of crabmeat deterioration with each type of meat appeared evident. This would include pH measurements and the ranges of bacterial density in typical, *flat* and *off to foul meat*. The data reported here were obtained over a twelve month period and include only data obtained from a study of these two factors.

EXPERIMENTAL PROCEDURE

The meat for each test was obtained by retort steaming 200 pound-quantities of live Atlantic Blue Crabs



Melvin A. Benarde received the B.S. degree from St. John's University, Brooklyn in 1948. He received the M.S. degree from the University of Missouri in 1950 and the Ph. D. degree from Michigan State University in 1954. Prior to joining the Seafood Processing Laboratory of the University of Maryland, where he now serves as an Assistant Professor, he was with the Naval Food Research Unit in Bayonne, New Jersey, and the Public Health Research Institute of the City of New York, Inc.

(*Callinectes sapidus* Rathbun) for 10 minutes at 250°F (15psi). The crabs were allowed to cool overnight at (1-3°C and then the meat was removed by professional pickers and packed in half-pound snap-lock crab cans.

At intervals, cans were removed from storage (1-3°C) and the bacterial count, pH and organoleptic quality were determined. A 50-gm sample of meat from each can or a total of 50 gm from three cans (composite) was placed into a chilled food blender containing 450 ml of sterile, chilled distilled water. After 3 minutes of blending, additional 10-fold serial dilutions were made. Triplicate 1-ml portions of the appropriate dilutions were plated in nutrient agar (BBL¹) and incubated at 25°C (±5°C) for 72 hours. Bacterial plate counts were made at that time. Hydrogen-ion activity (pH) was determined electrometrically on samples of the original 1:10 dilution. Sensory evaluation was performed by the laboratory personnel.

¹Baltimore Biological Laboratories, Baltimore, Md.

RESULTS AND DISCUSSION

The results of plate counts and pH determinations for "regular", "lump", and claw meat are contained in Tables 1, 2 and 3 respectively.²

In the case of all three meats there was little correlation between plate counts and pH. In January after the seventh day, regular meat showed sharply rising counts which were not accompanied by increases in pH, but rather, slight decreases. Similar patterns were obtained with lump and claw meats. The slowly rising

This appeared to be a significant finding for it indicates the lack of correlation between progressing deterioration and pH.

In August the pattern of little correlation between pH and deterioration was again observed. Although a steady rise in pH was obtained in November, with regular meat, it did not occur with appreciable population increases; similarly with lump meat. Claw meat also showed an erratic pH pattern. The December samples likewise showed poor correlation between pH

TABLE 1 — CHANGES IN BACTERIAL COUNTS AND pH OF REGULAR TYPE CRABMEAT DURING STORAGE AT 1-3°C.

Month	Bacterial count (in millions) and pH after periods of storage indicated															
	Initial		2 days		5 days		7 days		11 days		13 days		15 days		18 days	
	pH	TPC ^a	pH	TPC	pH	TPC	pH	TPC	pH	TPC	pH	TPC	pH	TPC	pH	TPC
January	7.75	.023	7.8	.020	7.9	.086	7.9	.080	7.7	21.8 ^s	7.7	150 ^s			7.5	4620 ^s
April	7.95	.013	7.95	.041	8.25	.10	8.25	1.22			7.9	41 ^s				
June	8.0	.70			7.9	8.1 ^s	7.9									
August	8.0	.012			8.05	.018			8.1	.022	8.2	.93 ^p	8.15	6.2 ^s		
November	7.3	.005			7.9	.010	8.0	0.25	8.15	4.0 ^f						1200 ^s
December	7.85	.004			7.8	.010	8.05	.022	7.95	.06			7.85	1.5 ^f		

^sspoiled; ^fflat; ^poff; ^aTPC=Total Plate Count

TABLE 2 — CHANGES IN BACTERIAL COUNTS AND pH OF LUMP TYPE CRABMEAT DURING STORAGE AT 1-3°C.

Month	Bacterial count (in millions) and pH after periods of storage indicated															
	Initial		2 days		5 days		7 days		11 days		13 days		15 days		18 days	
	pH	TPC ^a	pH	TPC	pH	TPC	pH	TPC	pH	TPC	pH	TPC	pH	TPC	pH	TPC
January	7.45	.01	7.5	.01	7.6	.01	7.61	.04	7.5	6.0 ^p	7.5	60 ^s			7.45	227 ^s
April	7.95	.009	7.7	.027	7.75	.039	7.82	.43			7.9	220 ^s	7.5		7.7	1107 ^s
June	7.6	.142			7.6	1.65 ^s	7.9 ^s									
August	7.8	.008			7.85	.011			7.8	.052 ^f	7.9	2.97 ^p	7.8	12.2 ^s		
November	7.55	.006			7.7	.011	7.8	.036	7.8	1.46 ^f						
December	7.55	.007			7.5	.01	7.7	.019	7.25	.98 ^f			7.5	6.5 ^s		

^sspoiled; ^fflat; ^poff; ^aTPC=Total Plate Count

or stationary counts during the first week of storage are of interest as they portray the growth pattern of psychrophilic-like organisms that grow well at refrigeration temperatures (1-3°C) after a period of adjustment. Unpublished data from our laboratory indicates these organisms to be directly related to spoilage.

The data for April was quite similar in that an erratic pattern of hydrogen-ion activity was obtained with the rising counts. All meat samples examined in June spoiled rapidly. The counts rose sharply in four days and continued upward at so rapid a rate that the samples were all putrid before the eighth day. The pH, on the other hand, either dropped or remained steady

and deterioration.

Irregularity between pH and plate counts was the only constant characteristic indicated by the data obtained during the one year study. No pattern emerged that could be considered as a generalized or a representative version of pH changes with increased storage time. Furthermore, seasonal differences were not evident. During the year, the three types of meat exhibited wide ranges in pH, as seen in the Tables. The over-lapping is far too great to be of value in distinguishing types. In addition, the pH did not drop below 7.4 nor rise above 8.6 at any time. Thus, only 1.2 pH units represented the widest change in hydrogen-ion activity over about 20 days of storage during which time crabmeat progresses from a fresh to a foul, inedible condition. Table 4 indicates that changes in pH units within any type of meat are relatively

²It should be borne in mind that the crabmeat was processed under laboratory conditions which may not prevail in commercial plants.

OBSERVATIONS ON THE SPOILAGE OF CRABMEAT

TABLE 3 - CHANGES IN BACTERIAL COUNTS AND pH OF CLAW TYPE CRABMEAT DURING STORAGE AT 1-3°C.

Month	Bacterial count (in millions) and pH after periods of storage indicated															
	Initial		2 days		5 days		7 days		11 days		13 days		15 days		18 days	
	pH	TPC ^a	pH	TPC	pH	TPC	pH	TPC	pH	TPC	pH	TPC	pH	TPC	pH	TPC
January	8.25	.01	8.3	.035	8.35	.027	8.50	.044	8.5	3.5 ^p	8.45	60. ^s			8.5	76. ^s
April	8.45	.02	8.45	.097	8.5	.12	8.6	.54			8.3	41. ^s				
June	8.55	1.0			7.75	8.2 ^s	7.7 ^s									
August	8.35	.009			8.35	.013			8.35	.02	8.5	.58 ^p	8.35	2.3 ^s		
November	8.2	.008			8.3	.008	8.25	.017	7.8	1.83 ^p					7.8	15. ^s
December	8.2	.01			8.25	.015	8.3	.025	8.2	3.0 ^f			7.85	17. ^s		

^sspoiled; ^fflat; ^poff; ^aTPC=Total Plate Count

slight from the time of typical freshness to the outset of patently spoiled meat.

An interesting point with respect to the individual types was evident from the pH data in Tables 1, 2 and 3. On a yearly basis, lump meat had the lowest pH, averaging 7.65. Regular meat had the middle position with an average pH of 7.8; claw meat was regularly higher than the other two with an average of 8.3

The pH data reported here are contrary to the findings noted in the few published reports on this subject. Harris (3) and Tobin and McCleskey (4) observed that the pH of fresh crabmeat was about 7.2 to 7.4 while spoiled meat had a pH of 8.0 to 8.5. Alford, Tobin and McCleskey (4) agreed with these figures but noted that although there was an increase in pH with an increase in bacterial numbers, "The bacterial count could not be predicted from the pH determination". Recently Dr. Eichii Tanakawa (Japan) stated (5) that he, too, found pH measurements useless as an index of freshness. He used meat from the Kegani or hairy crab, *Erimacrus eisenbeckii*.

Meat with the typical strong crabmeat odor and flavor had counts ranging from approximately 6 thousand to one-million per gm. For the most part, however, the counts are well below one-hundred thousand per gm. Flat meat had counts from about one-hundred thousand to four million per gm. Meat entering the off to foul stage had counts from one-hundred thousand to one billion but more usually one million to ten million per gm. This might be taken into consid-

eration by public health agencies charged with establishing tolerances for intra-state and inter-state shipments. There is little value in establishing a low maximum number in such a highly variable product.

The over-lapping figures with their wide ranges suggest that some special factors may be operative; the type of bacteria rather than absolute numbers may be of greater significance. Certain specific genera may actually be the cause of progressive deterioration while others may be merely ancillary.

Factors other than bacteria may play a role in spoilage; this is a fertile area for study, although the temperature and time used to steam live crabs suggests that enzymes would not be active. Heat protective action exerted by proteins, fats, and other colloids may afford considerable protection to the enzymes present.

Another finding of possible use to agencies charged with routine analysis were the large differences in total counts obtained by the twenty-five degree incubation temperature for 3 days. This procedure rather than the 35-37°C temperature for 48 hours now recommended by most state agencies, results in counts higher by 10 to 1000 times. The "official" methods are probably sufficient for the detection of pathogens but are of considerably less value for obtaining a complete picture of plant sanitation and general bacterial quality of crabmeat.

From the data obtained, it appears that little value can be placed on pH measurements as a guide to length of storage or progressing spoilage. It was also found that the three commercial types of crabmeat lump, regular, and claw have similar spoilage characteristics, and should be considered similar in terms of public health standards.

ACKNOWLEDGEMENT

The author wishes to acknowledge the technical assistance of Mrs. Dorothy Collins in this study.

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TABLE 4 - DIFFERENCE IN pH UNITS BETWEEN INITIALLY FRESH MEAT AND SPOILED MEAT.

Period	TYPE OF MEAT		
	Regular	Lump	Claw
January	+ .05	+ .1	+ .20
April	- .05	0	- .15
June	- .1	0	- 1.0
August	+ .15	0	0
November	+ .85	+ .25	- .4
December	0	0	- .35

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AMENDMENT TO SANITARY STANDARDS FOR PUMPS FOR MILK AND MILK PRODUCTS SERIAL 0202

Formulated by
International Association of Milk and Food Sanitarians
U. S. Public Health Service
The Dairy Industry Committee

The "Sanitary Standards For Pumps For Milk And Milk Products, Amended April 30, 1952", Serial 0201, is further amended by adding paragraph (3) to section "A. MATERIALS", adding paragraphs (8) and (9) to "B. CONSTRUCTION", and adding footnotes 1, 2, and 3.

A. MATERIAL

- (3) Pump impellers or rotors may be made of, or covered with, rubber or rubber-like materials provided such materials are non-toxic,¹ relatively non-absorbent,² relatively resistant to fat, resistant to normal cleaning and bactericidal solutions, and readily cleanable. Rubber or rubber-like materials used for pump impellers or rotors shall be of such composition as to retain their surface and conformation characteristics under conditions encountered in normal use and cleaning operations.

B. CONSTRUCTION

- (8) The rubber or rubber-like coating of pump impellers or rotors shall be bonded in such manner that the bond is continuous and mechanically sound, and so that in normal service the rubber or rubber-like material does not separate from the base metal. The final bond

shall conform in all respects to the criteria established in paragraph A(3).

- (9) The surface of rubber or rubber-like covering of pump impellers or rotors shall be equal in cleanability to stainless steel with 120 grit finish properly applied.³

¹Materials determined to be non-toxic under conditions of use, in accordance with procedures used by the Food and Drug Administration, may be considered as meeting this criteria.

²Moisture and fat absorption shall not exceed one percent absorption by weight as determined by standard ASTM test No. D-471 at 158°F. for seven days.

³Pending development of a standard procedure for measuring the cleanability of surfaces, conformance with this item may be judged by comparing the removal of standard soil from the rubber or rubber-like material and from the stainless steel having a 120 grit finish, when standardized cleaning procedures are used. A technique for such comparisons has been developed by Dr. O. W. Kaufman, Michigan State University.

(Effective date November 1, 1958)

Special Service Article

SOME PUBLIC HEALTH ASPECTS OF FOOD AND BEVERAGE VENDING

Editor's note: Some Public Health Aspects of Food and Beverage Vending will be the next Journal presentation as a Special Service Article. The subject will be presented in three parts, the first appearing in this issue. Health departments commonly understaffed, have to allocate time and personnel to carry on existing programs yet cannot ignore new methods of merchandising which may have public health significance. This article, and the two which are to follow, will present factual information which should help establish the place of food and beverage vending in the environmental health program.

A NEW AND GROWING INDUSTRY

The merchandising of food and beverages through automatic vending machines has shown a remarkable and rapid expansion in recent years. One does not have to look far to find machines which will deliver such products as cold drinks, hot coffee, milk, sandwiches, pastries, and even hot food in cans. In earlier days, vending consisted mainly of candy bars, peanuts, chewing gum, and pop in bottles. But now vending has grown and expanded to the point where the patron can purchase food and beverage varieties on a scale unknown and, perhaps, unthought of ten years ago.

Gross sales of food and beverages through automatic vending devices have reached such proportions that they represent a sizable share of the consumer's food dollar. For 1957, the National Automatic Merchandising Association¹, has estimated that gross dollar sales of vended foods and beverages exceeded one billion dollars, delivered to the consumer through some one million, eight hundred fifteen thousand machines. These estimates arranged in tabular form by number of machines, by categories of products vended and by gross dollar sales are shown in Table 1.

It is readily apparent from the above tabulation that the automatic vending of foods and beverage has become a highly significant segment of our economy. As a merchandising method, it has a number of attributes which can not be ignored. First, it is a quick and convenient means of supplying consumer demand. Whether one wants a cold drink, an ice cream bar, hot coffee, or a beef stew, the machine is there and will deliver your selection by the simple expedient of dropping a coin in the machine. Because it is a mechanical device and delivers a product promptly, there is no waiting to be served; none of the formalities of other types of food dispensing. In public places like bus stations and airports, and in manufacturing plants and

TABLE 1—PRODUCTS VENDED, NUMBER OF VENDING MACHINES AND GROSS DOLLAR SALES OF FOODS AND BEVERAGES, 1957¹

Product	Number of Machines	1957 Gross Dollar Sales (in millions)
Hot Foods	13,500	6.65
Coffee and Hot Beverages	70,000	135.00
Candy	465,000	240.00
Chewing Gum*	260,000	13.00
Milk (machines outdoors)	3,500	10.25
Milk (machines indoors)	40,000	59.00
Ice Cream and Novelties	29,000	28.00
Cookies, crackers, pastries	52,000	10.2
Soft drinks in bottles	800,000	430.00
Soft drinks in paper cups	80,000	120.0
Fruit juices	2,200	2.25
Totals	1,815,200	\$1,054,350,000

*Defined by FDA as a food

at similar busy locations it is on the job twenty-four hours a day. The American public has accepted the vending machine as a convenient service entity. It has taken its place in our society just as has the automobile and the television set.

INDUSTRY TAKES A LEADING ROLE

The vending industry, through both its leaders and its active trade association, has recognized its responsibilities as purveyors of commodities that are subject to public health regulation. In the mid 1940's bacteriologists and sanitarians were engaged to advise with machine manufacturers, supplies of goods and commodities and operators on problems of machine design, product protection and keeping quality. This early advice, was quite generally followed but even the experts, at that time, did not and could not see all of the ramifications of an industry both in transition and rapid expansion. In addition, the types and varieties of foods and beverages vended ten or

¹ National Automatic Merchandising Association, Directory of Automatic Merchandising, 1958. Published by the Association, 7 South Dearborn St., Chicago 3, Illinois.

more years ago were quite limited when compared with those of today.

The expansion of this industry did not go unnoticed by regulatory agencies and a number of our larger cities either enacted special ordinances or applied sections of existing food ordinances to vending machines. However, supervision generally was spotty, and lacked uniformity. Sanitarians too were feeling their way, not knowing just how much or what kind of regulation was necessary.

PLAN OF ACTION CARRIED FORWARD

In 1951, the Armed Forces requested the Committee on Sanitary Engineering and Environment of the National Research Council, through its Subcommittee on Food Sanitation, to study problems attendant upon food and beverage vending. This was done, and in 1952 a recommended set of regulations were promulgated. Their use was, of course, limited largely to the Armed Forces. Some civilian health agencies did use them as a guide, but they were rather incomplete and in certain respects lacked essential or important detail.

At about this same time the industry took active and particular cognizance of the need and desirability for an ordinance that could have national application. Machine manufacturers, especially, were confused by conflicting local requirements. This, prompted representatives of the industry, in 1954, to make formal request of the Public Health Service for assistance in the formulation of a recommended model ordinance and code which would be suitable for adoption by state and local health departments and serve as a uniform guide which industry could follow. To assist in the drafting of such an ordinance the industry appointed task committees, representing all phases of vending, to consult and advise with the Public Health Service.

The Service, in turn, consulted with state and local health authorities in an attempt to draft reasonable practical regulations, acceptable to those who later would adopt and use them. At the completion of deliberations, the present document, *The Vending of Foods and Beverages, A Sanitation Ordinance and Code, 1957 Recommendations of the Public Health Service*, was issued in July of that year.

In the fall of 1956, while the ordinance and code was still undergoing final revision, the National Automatic Merchandising Association realized that one of the first and most fundamental steps to be taken was the implementation of a plan whereby vending machines could be impartially examined and evaluated in terms of sanitary acceptability before they reached the retail market and were in the hands of machine operators. This resulted in the consummation of ne-

gotiations with two universities, both having staff members who had had prior experience in the evaluation of various types of food service equipment. Early in 1957, agreements were made with Michigan State University, East Lansing, Michigan, and with The Indiana Research Foundation*, Bloomington, Indiana, whereby manufacturers wishing their machines examined and evaluated could have this done at either of these two institutions.

While the pending ordinance and code and the evaluation plan were reaching the point of final activation, the industry felt a third step was necessary. This involved the organization of a health-industry advisory group. This would be designed to help guide the industry and health authorities alike in the application and understanding of satisfactory health protective measures at all points involved. This committee, which is known as AMHIC, (Automatic Merchandising Health-Industry Committee), was formerly organized in December, 1956. Public Health is represented by appointees from the following organizations: The Association of State and Territorial Health Officers, The American Public Health Association, The Conference of Municipal Public Health Engineers, The Association of Food and Drug Officials of the U. S., The International Association of Milk and Food Sanitarians, and The National Association of Sanitarians. The Public Health Service and the Armed Forces, while not represented formally as voting members on AMHIC, generally attend all meetings and participate in the deliberations.

PUBLIC HEALTH COUNSEL APPOINTED

To further expedite the close working relationship between industry and public health, the National Automatic Merchandising Association appointed a public health counselor to its staff in August, 1957. The man appointed, David E. Hartley, came to the Association after serving twelve years with the Indiana State Board of Health as a member of the Division of Food and Drugs, and supervisor of the retail foods section. As the title implies, Mr. Hartley serves as liaison between the industry he represents and the official agencies. All matters concerning machine allocations for evaluation, consultations with manufacturers and operators and advisory assistance to both industry and public health, fall within the scope of his responsibilities.

SATISFACTORY PROGRESS BEING MADE

In the light of this relatively new food industry, noteworthy progress has been made. Machines design-

*Testing is done at the Department of Public Health, Indiana University Medical Center, Indianapolis.

ed by major manufacturers within the past twenty months have been built in accordance with specifications contained in the vending ordinance and code. In some instances, it has been possible to provide conversion kits for older models, still in use, so essential

public health safeguards can thus be incorporated.

In the next article of the series, a discussion will be given covering the items of public health importance which need to be considered, especially in machines which vend readily perishable foods.



Officers of Kansas Association of Milk Sanitarians elected at November 5-7, '58 meeting. Left to right, front row: Rowland Noblet, Vice-Pres.; Samuel Hoover, Pres.; Second row: Frank Kelly, Sec.-Treas.; H. L. Thomasson, Executive Secretary, International Association of Milk and Food Sanitarians, Inc.; Lowell Venis, 2nd Vice-Pres.

DAIRY INDUSTRIES EXPOSITION TO UNVEIL MANY ADVANCEMENTS IN TECHNOLOGY, ENGINEERING

Editor's Note: Since many readers of the Journal will visit the Exposition, this summary may be found helpful in planning your visit.

The 21st Dairy Industries Exposition will probably unveil more advances in technology and scientific achievement than any Exposition since 1946. That's the opinion of qualified technicians and dairy industry people who have had a chance to preview what will be some of the nearly 400 displays in the forthcoming great biennial display of dairy industrial equipment, supplies and services.

The Exposition will be held December 8-13 on Navy Pier in Chicago, Ill. All exhibitors are members of Dairy Industries Supply Association, and to DSIA's Washington headquarters in recent weeks have come details of booth displays being planned for December. An experienced dairy industrial technologist who has reviewed some of these details offers these very brief indicators of some of the more interested displays which will undoubtedly make the 1958 Exposition a milestone of dairy progress:

In The Equipment Field

The continuing revolution in cleaned-in-place equipment will be a feature of at least five booths. CIP valves and pumps, CIP washing innovations, brand new concepts in new clamps for CIP clamp-type fittings, circulating units and controls are to be shown. While one or two may have been previously introduced, their 1958 applications promise a continuing swing to labor-saving cleaning methods and sanitation-by-

automation in dairy industrial processing.

New methods of materials handling and moving will be featured in at least seven booths. Completely new machinery for stacking, de-stacking, palletizing and cleaning cases of dairy products will be the major display of at least one. In another, new methods of conveying heavy items by improved mechanical design will be featured. In still another, powder and liquid materials will be moved by pneumatic power through flexible tubing. Another will feature automatic measuring of materials by electric load cells which automatically pre-determine amounts of materials to be measured.

Four and probably more displays will spotlight the latest developments in ultra-high-temperature (UHT), combined with ultra-speed processing. Displays will feature ultra-high-temperature heat exchangers, a new centrifugal pump especially adapted to operate at ultra-high-temperatures, air eliminators, vacuum deodorizers (not new in principal, but new in current applications) wherein there is no milk burn-on to plates or vacuum chamber, and new frame designs to house the revolutionary new components.

Brand new freezers, ice makers, compressors, and advanced refrigeration equipment will be the center of at least eight exhibits. In one, a new multi-cylinder ammonia compressor will hold the spotlight. In another an aluminum-clad air agitated ice builder will be featured, and in still others, special applications which will fit one—or hundreds—of special uses.

Equipment designed for particular products will be featured in several dozen booths. One will feature a redesigned cheese vat and automatic agitator with a special water treating system for the manufacture of cottage cheese; another will show special equipment for cottage cheese curd handling. Another, where dry milk is the product, will feature a pneumatic system for conveying the dried milk in which air is used as the cooling as well as the conveying medium, while maintaining cooling and moisture limits under varying ambient temperatures. An entirely new continuous buttermaking machine is promised in another booth. While similar machines have been features of past Expositions, the manufacturer of this year's new machine claims that it is a revolutionary adaptation of a European machine which makes butter to the highest American standards.

A European machine for manufacturing unusually large quantities of novelties, which was introduced at Dairy Industries Exposition four years ago, has now been adapted for a new method of manufacturing ice cream stick novelties and will be featured in another booth.

Numerous specialty items of heavy equipment of

many uses will be featured in scores of other booths. Among these is a new machine which, within seconds, is able to dissolve such dry materials as stabilizers, sugars, cocoa and milk powder in cold liquids. Another is an homogenizer with capacities much greater than any offered previously and the widest of capacity (reportedly from 75 gallons per hour to 7500 gallons per hour).

In The Containers Field

A European-born tetrahedral paper milk container will appear at the Exposition. Manufacturers of glass containers will feature strengthened containers with special coatings for longer life; and paper milk container manufacturers are readying new waxes and coatings for their product.

Innovations in high-speed filling, not only of milk containers, but of ice cream and cottage cheese cartons, will be spotlighted in more than a half-dozen booths. Once the latter have been filled and sealed, a new machine in another booth will be able automatically to accumulate and bundle-wrap pints and half gallon sizes.

In The Transportation Field

Mobile refrigeration has occupied the majority of manufacturers of transportation equipment in the dairy industries, and probably a baker's dozen of them will unveil new units which have been undergoing rigid tests for the past several years.

Over-the-road bulk transport of milk, which is corollary to the "revolution" brought about by the use of the bulk farm tanks which have been featured at recent Expositions, and which will be conspicuous also in this year's, will be given special attention. New safety features, easier cleanability, and—in at least one case—an outside support of extruded aluminum rings are among the promised developments.

Among the innovations promised in insulated truck bodies are a new walk-in type of ice cream truck body which reportedly allows easier access to products; a new forward control milk body and a drop frame ice cream body; and new types of insulations and other barriers for retaining low temperatures.

In The Ingredients Field

New emulsifier-stabilizers, which are instantly soluble in hot or cold liquids, some of them pre-measured in polyethylene bags, will be the feature of possible half-a-dozen ingredients manufacturers. Other stabilizers to be featured include some which are fortified with milk proteins which thus not only perform a function but also enrich the dairy product.

New and improved flavor, scheduled to be introduced, include a solid pack stabilized strawberry product, banana ice cream flavor product, cranberry sherbet flavor, ingredients for Italian spumoni, fudges and chocolates, cherries and nuts, and the most popular

flavor, vanilla, will be displayed by a dozen or more manufacturers, in both liquid and dry forms.

One specialty promised by a chocolate supplier is a retail package of a chocolate flavored milk fortified with an attached home fountain. And another supplier of chocolate flavorings has developed ultra-tiny marshmallows to be floated on hot chocolate.

Liquid sugars will be displayed by several suppliers, at least one of whom will feature a display of a model ice cream plant showing how a corn syrup storage and handling system operates.

In The Point-of-Sale Field

A wide range of vending machines for dairy products, many of which have been exhibited previously but which now have embodied new principles of refrigeration or dispensing or mixing of product, will be the center of attention in eight or more booths.

Four—and probably double or triple that number—manufacturers of refrigerated display cases report that major advances in design of cases and refrigeration units for them have been made in the past two years. In one, a single open case maintains two different temperatures in two adjacent areas, so milk and other dairy products may be displayed next to ice cream and sherbet which require much lower temperatures.

A half dozen or more manufacturers of counter freezers for ice cream and other soft-serve dairy foods, many of which have been exhibited previously, promise new models which will reduce labor costs on upkeep while improving sanitation maintenance.

Soda fountain manufacturers, on the whole conservative in their estimates of their exhibits' newness, admit that 1958's latest fountains will be designed so it will be possible to prepare and serve food faster and more efficiently than at any time in the past. New applications of fountains—outdoors, in supermarkets, in homes—are also to be demonstrated.

In The General Commodities and Services Field

This year will even see improvements in milk filters. Reports from one manufacturer tell of the great strength of a new non-gauze face filter made possible by use of resins. Others report technical progress in making non-woven fabrics serve as efficiently as other filters, with increased resistance to rupture.

A brush manufacturer, reporting development within the past six months of a revolutionary new floor scrub brush with all white dairy brushes, which reduces bacterial soak-up, will premiere it at the Exposition.

For large home consumers of milk, there will be two, and possibly more, exhibits by firms which have developed practical home bulk milk dispensers.

One firm reports it has developed a fire-quenching foamed plastic insulation for low temperature equip-

ment and various building applications; in a model dairy processing plant it will demonstrate applications of the new material.

EXTENSION OF EDUCATION NEEDED IN MASTITIS CONTROL

Future progress in the control of mastitis in dairy cattle will depend upon the application of known disease control measures with treatment used only as an adjunct of control. This recommendation was made to veterinarians attending the 95th convention of the American Veterinary Medical Association held recently at Philadelphia.

Mastitis continues to exact a toll of over \$227 million annually from dairy farmers. This figure represents the economic loss from lowered milk production and condemned milk, expenditures for drugs and treatment, the Association said.

The solution to the problem, according to the subcommittee report, lies in education programs directed toward the dairyman and all groups interested in milk production, and toward the veterinarian to increase his awareness of veterinary medical responsibility for a total control program.

Present veterinary medical knowledge indicates that the control of mastitis in dairy herds depends on:

1. Good herd management,
2. Proper milking procedure,
3. Veterinary diagnosis when mastitis appears, and
4. Veterinary treatment of infected animals.

When these four principles are utilized with close cooperation between the herd owner and his veterinarian, the huge annual expenditure for drugs and the net loss due to this condition will be drastically reduced, according to the report.

MINUTES OF THE AFFILIATE COUNCIL IAMFS

1. Paul Corash, Chairman, called the council meeting to order Monday, September 8, 1958 at 3:30 P.M.
2. The members present identified themselves and the affiliates they represented.
3. The minutes of the 1957 council meeting were read by the Secretary-Treasurer. Mr. Riley (Illinois) moved that the minutes be approved as read. The motion carried.
4. Mr. Thomasson, Executive Secretary, read the proposed budget for 1958-59, and gave a brief summary of the Association's financial condition. The full financial report will be given at the business meeting. Mr. Goslee (Connecticut) moved that the proposed budget be approved. The motion carried.
5. Mr. Corash reported on the proposed constitutional amendments. The proposed amendments were published in the July 1958 Journal and will be read at the business meeting.
6. Mr. Wainess (Illinois), chairman of the Membership Committee, reported on availability of brochures, at cost, to be sent to prospective members. These brochures can be obtained from the Association. Where the Association has no affiliate, mail will be sent directly to prospective members.
7. Discussion was held concerning whether the Committee on Committees should be continued as such. Mr. Riley (Illinois) suggested that the committee be continued. The council favored this suggestion.
8. The problem of obtaining active participation by committee members was discussed. It was pointed out that the committee chairman must be a spark plug, able to fire the committee and keep it active.
9. Mr. Goslee (Connecticut) suggested that there should be closer liaison between committees of our affiliates and that the Executive Secretary office could be a clearing house for these reports. Affiliate committee reports could be forwarded to the concerned committee of the Association.
10. Dr. J. Olson, Associate Editor of the Journal, suggested that committee reports of the affiliates could be mimeographed and distributed to Secretaries of the other affiliates.
11. Dr. J. Olson reported on the Journal's problems and a discussion was held concerning ways of improving the Journal. (Note - The complete report will be filed with the minutes.)
12. Mr. Karl Jones (Indiana) reported that after Indiana's program was published in the Journal they had had numerous requests for papers on the various topics and that often the speakers had not prepared papers.
13. Mr. Jones (Indiana) suggested that serious thought should be given to changing the name of the Association to include all sanitarians. Mr. Adams, Executive Board, spoke in favor of the change, pointing out that the trend was away from specialization and that we were losing members by our restrictive name. The Executive Secretary spoke in favor of the change. Wilbur Parkinson (Utah) also spoke in favor of changing the name. Mr. Riley (Illinois) opposed any change, stating we were specialists and should remain so. Mr. Goslee (Connecticut) suggested that this was an important step and it should be carefully studied. Mr. William Hickey (Executive Board) spoke in favor of a change in name. Mr. Parkinson (Utah) made a motion that this matter be referred to the Committee on Committees for action. Mr. Adams seconded the motion. The motion carried.
14. Mr. Adams (Executive Board) initiated a discussion concerning ways in which the International could assist our affiliates. More active help in securing registration of sanitarians will be forth-coming from the International to our affiliates.
15. Mr. Adams reported on the Sanitarian's Award, pointing out there was more interest this year and more nominees (10) than in former years. The sponsors of this award prefer to keep this award for a local sanitarian rather than broaden this to include State and Federal men.
16. Mr. Goslee (Connecticut) spoke against the International Association getting involved in any national uniform labeling laws pertaining to milk and milk products. No action was taken on this matter.
17. Mr. Riley (Illinois) made a motion that the chairman of

the future councils send a letter to the Secretary of each affiliate prior to the annual meeting, giving the time of the council meeting, date, location and agenda. Such notice to be sent out at least thirty (30) days prior to the annual meeting. The motion was seconded and the motion carried.

The meeting adjourned at 5:15 p.m.

VINCENT T. FOLEY, *Secretary-Treasurer*

18. The following were present at the Council meeting:

L. E. Smith, Kentucky
 C. C. Prouty, Washington
 F. W. Barber, Ex. Board
 I. E. Parkin, Pennsylvania
 W. P. Boylston, S. Carolina
 H. L. Thomasson, Ex. Secy.
 H. Wainess, Illinois
 J. C. Olson, Jr., Minnesota
 P. E. Riley, Illinois
 K. K. Jones, Indiana
 W. V. Hickey, Ex. Board
 S. Shepard, Rhode Island
 H. C. Goslee, Connecticut
 J. J. Sheuring, Georgia
 H. S. Adams, Indiana
 V. T. Foley, Ex. Board
 P. Corash, Ex. Board
 W. Parkinson, Utah

VINCENT T. FOLEY, *Secretary-Treasurer*

**MINUTES OF THE IAMFS INTERIM
 EXECUTIVE BOARD MEETING,
 NEW YORKER HOTEL, NEW YORK CITY
 APRIL 25, 26, 1958**

1. President Harold Robinson called the meeting to order Friday evening, April 25, 1958. Those present were President Harold Robinson, President-Elect Frank Barber, First Vice-president William Hickey, Second Vice-president John Sheuring, Immediate Past-president Paul Corash, Senior Past-president Harold Adams and Secretary-Treasurer Vincent Foley. Also present was Executive Secretary H. L. Thomasson, ex-officio member of the Board. The Board was in session until 11:15 p.m., April 25, and re-convened the next morning Saturday, April 26, for an all day session.
2. Mr. Robert E. Mytinger appeared before the Board and extended an invitation for our Association to join the National Health Council. Mr. Mytinger is a member of the Executive Board of N.H.C. The N.H.C. is supported by grants from members, however, all contributions are entirely voluntary and members are not obligated to donate. The Board went on record to submit this to the membership for discussion at the 45th Annual Meeting to be held in New York City, September 8-11, 1958.
3. Dr. Frank Barber gave a detailed review of the program for the 45th Annual Meeting and he reported that confirmation has been received from practically all the speakers and that the program is nearing completion.
4. Mr. Thomasson reported that he and Dick March had worked out the operational responsibilities for both associations.
5. Mr. Thomasson presented comparative financial statements for the quarters ending December 31, 1957 and March 31, 1958 which showed the Association to be in sound financial condition and considerably ahead of the same period last year.
6. Mr. Thomasson reported the demand for the "Suggested Procedure For The Investigation of Food Borne Disease Outbreaks" pamphlet continued strong and that it has now been translated into Spanish. The "High Temperature Short Time Pasteurizing" pamphlet will be published soon and will not appear in the Journal.
7. The matter of travel expenses for Dr. J. Olson, Associate Editor of the Journal, for attendance at two technical meetings was discussed and Dr. Barber moved that the Association assume Dr. Olson's expenses. The motion carried.
8. Dr. John Sheuring moved that the Associate Editor submit a budget estimate for travel expenses for attendance at two technical meetings in addition to the Interim and Annual Meetings, to be included in the next annual budget for the Journal. The motion carried.
9. Discussion of the Executive-Secretary contract was deferred until the Fall meeting since it doesn't expire until July 15, 1959.
10. Mr. Paul Corash reviewed the proposed Constitution and By-Laws changes and these will be handled through the procedure outlined in the Constitution and By-Laws for Amendments.
11. The president will appoint a nominating committee at an earlier date in keeping with the wishes of the membership, as expressed at the last meeting.
12. Lengthy discussion was held concerning possible ways the Association could help and assist our affiliates. The registration of sanitarians was discussed and it was decided to expand our services to our affiliates in every possible way. The Association's Model Registration Law is available to all affiliates, plus much valuable information and experience gained throughout the United States. The president was directed to write Dr. John Sheuring, Chairman of the Committee on Education and Professional Development and charge him with the responsibility of actively pursuing this endeavor. Dr. Sheuring recently played an active part in securing the registration of sanitarians in Georgia.
13. The problem of future services, sustaining membership, and improving the Association was discussed and the president will appoint a committee to explore this field.
14. The president read a letter from John H. Fritz of the Washington D. C. Health Department, who is our representative on the Joint Committee on Food Equipment Standards of the National Sanitation Foundation, who asked for advice as to whether his committee is to work on protocols for special devices. The Board was not in favor of working on protocols for special devices at this time.
15. The Board accepted an offer to have representation on the Automatic Merchandizing Health Industry Committee. Our designated representative will be Mr. John H. Fritz.
16. The president read two letters from Harold Wainess which will be sent to prospective members. In states

where we have an affiliate the Association will work in close co-operation and through the local affiliate in securing new members. Where we have no affiliate the letters will go directly to the individual from the Association office.

17. Mr. Harold Adams, Chairman of the Committee on Recognition and Awards presented pictures of plaques to be given the recipient of the Sanitarian's Award at the annual meeting. He was authorized to secure this plaque. Potential candidates for the Annual Citation Award were also discussed.
18. The president asked the Board's opinion on a matter involving correspondence between Mr. C. A. Abele and Mr. Glenn Fulkerson, Tennessee Department of Health, concerning a policy matter and an interpretation of certain 3-A Sanitary Standards, particularly bulk holding tanks. The Board instructed the president to discuss the matter in question with Mr. C. A. Abele, as early as convenient and report the results of his discussion to the Board.
19. The Executive Board adjourned at 5:00 p.m., April 26, 1958.

VINCENT T. FOLEY, *Secretary-Treasurer*

NEW COLOMBIAN MILK PROMOTION LAUNCHED BY DSI

A new phase of milk utilization promotion was launched in Colombia with the signing, early in July, of an Agreement between Dairy Society International, acting as cooperator with the Foreign Agricultural Service of the U. S. Department of Agriculture and Procesadora de Leches S. A., a producer-processor cooperative in Medellin.

The Agreement for joint promotional activities was signed for DSI by George W. Weigold, Executive Assistant, who is in South America to check on possibilities of market development for dairy products. Administering the program in Medellin will be Antonio Diaz, who for the past year has been director of the Society's market development work in Colombia.

The Medellin phase of the Colombia effort comes as the culmination of nearly two years of concentrated work on the part of the DSI mission to raise the general level of milk consumption in Colombia. Part of this work has entailed raising standards of quality of local milk supplies in order to insure a product worth extensive promotion. This has been done through general technical advice and, with conspicuous success, through a series of Short Courses in Dairy Technology held at the University of Medellin, with the Faculty of the School of Agronomy, Dr. Earl Weaver of the Michigan State University mission (under ICA) at the University, the ICA and FSA missions in Colombia, the United Nation's Food and Agriculture Organization, local health officials and dairy in-

dustry executives, all acting as cooperators. Some 150 Short Course graduates have gone back to jobs on dairy farms and in processing plants, as public health officials and as food specialists keenly aware of the necessity for improved sanitation and quality control in the handling of milk products.

The Medellin program will be directed at testing, in a single market area, the possibilities of greatly increasing the level of milk and dairy products consumption through all types of promotional media. It will be financed jointly by "Proleche" and the DSI-administered Dairy Products Program for Colombia—which uses Colombian peso market development funds from the sale of surplus agricultural products to Colombia. Each will contribute 3,500 pesos monthly to the joint promotional campaign.

LACTOSE AFFECTS FREEZING POINT OF MILK

Milk from individual cows and from groups of cows were examined for its freezing point and for factors affecting the freezing point. Based on results obtained with 100 raw milk samples from individual cows, lactose was found to be the most important factor governing the freezing point of milk. Of the 62 samples with over 4.5% lactose, 23 (37%) had freezing points of -0.550°C . and below, and 6 (10%) had freezing points above the 3% water-tolerance level, namely, -0.5335°C .

Of the 38 samples with 4.5% lactose or less, none had a freezing point of -0.550°C . or below, but 22 (58%) had freezing points of above -0.5335°C .

The specific conductivity of milk varied inversely with the percent lactose. Although in low-lactose mastitic milk equally low in lactose showed freezing point above the legal minimum. Both prolonged storage of raw milk and pasteurization decreased the specific conductivity of milk and raised its freezing point.

The facts reported here were abstracted from an article entitled "Conductivity, Per Cent Lactose, and Freezing Point of Milk," by F. Pinkerton, and I. I. Peters, Department of Dairy Science, A & M College of Texas, College Station, Texas, and reported in the March, 1958 issue of the Journal of Dairy Science.

NUTRITION FOUNDATION ASSIGNS 12 NEW GRANTS-IN-AID

Accelerating its already extensive international research activities, which seek to shed further light on the relationship between nutrition and human health, the Nutrition Foundation this week assigned an additional \$128,000 for grants-in-aid and educational

projects to twelve Universities and Medical Schools in the United States, Canada and Central America, it was announced by Dr. C. G. King, Executive Director of the non-profit Nutrition Foundation.

Dr. King further revealed that the Foundation, since its founding 17 years ago, has already allocated 302 grants-in-aid totaling over \$5,200,000 to support research by the nation's foremost medical and nutritional scientists. The new grants will permit these noted research scientists to extend present investigations or launch new studies in the area of nutritional science. In addition, Dr. King reported that almost \$1 million in supplementary funds have been donated by member and non-member companies to support the Foundation's intensified program to determine the relationship of edible oils and fats to overweight and to possible changes in blood cholesterol that may furnish a valuable index in the protection of public health.

One of the more significant new grants, according to Dr. King, is the one made to Dr. N. S. Scrimshaw of the Institute of Nutrition of Central America and Panama for intensive research into the significance of diets low in animal protein, fats and other nutrients. Dr. King explained that Dr. Scrimshaw is doing outstanding research on human protein requirements and problems of education in areas where protein deficiency is regarded as the most serious handicap to human health. In addition to developing improved techniques of evaluating protein, vitamin, mineral and related types of malnutrition, he is guiding an intensive study of the use of cereal type mixtures to protect infant and adult health more adequately, while resources are being developed to furnish greater quantities of milk, meat, fish, eggs and other sources of high quality proteins, Dr. King said.

The largest of the current group of grants-in-aid (\$23,000 over a two-year period) was assigned to the University of Notre Dame where the noted Dr. B. S. J. Wostmann will be able to continue his pioneering work in determining the nutrient requirements of germ-free animals. Dr. Wostmann's work will permit new approaches for studying such factors as defense against infections and intestinal synthesis or destruction of vitamins and amino acids.

The educational projects included in the current assignment of funds by the Nutrition Foundation include: The publication of numerous general and technical reports and pamphlets; the publication of NUTRITION REVIEWS, a monthly synopsis and report on research accomplishments in the field of nutrition; research and technical conferences; and annual awards given by the Nutrition Foundation to the American Dietetic Association (the Mary Swartz Rose Fellowship), the American Institute of Nutrition

(the Osborne and Mendel Award), the American Medical Association (the Joseph Goldberger Award and the Medical Student Research Fellowship in Clinical Nutrition), and to the Institute of Food Technologists (the Babcock-Hart Award).

The new grants-in-aid assigned by the Foundation are:

University of Wisconsin — A. E. Harper to study amino acid balances in nutrition; \$3,500., one year.

Institute of Nutrition of Central America and Panama — N. S. Scrimshaw to determine significance of diets low in animal protein and other nutrients; \$5,000 annually, 2 years.

University of California — H. O. L. Fischer to seek identification of sugar derivatives formed biologically; \$5,000 annually, 2 years.

Johns Hopkins University — A. L. Lehninger for studies on biological utilization of fats and sugars; \$6,400 annually, 3 years.

Harvard University — C. S. Davidson to determine dietary factors in the prevention and treatment of fatty livers; \$4,800., one year.

Columbia University — D. H. Anderson and P. A. di Sant'Agnes for investigations on celiac disease and cystic fibrosis of the pancreas; \$5,000 annually, 2 years.

Harvard University — G. W. Thorn and A. E. Renold for a comparative study of glucose and fructose metabolism in man; \$5,000., one year.

PREVENTS MILKSTONE



IOSAN removes and prevents milkstone buildup. Moreover, it simplifies sanitation. Lowers bacteria counts. Replaces two or more products because it is both a powerful cleaner and sanitizer.

IOSAN is the original "Tamed Iodine" Detergent-Germicide. The U. S. Patent Number on its label is your protection against imitators. Available from your regular supplier or from Lazarus Laboratories Inc., Division of West Chemical Products Inc., 42-16 West St., Long Island City 1, N. Y.



Media for MYCOLOGY

DIAGNOSTIC for the isolation, identification and cultivation of pathogenic fungi. These media are also widely used in phytopathological studies. Several are neutral in reaction, giving optimum conditions for growth of a variety of fungi. The following may be prepared as selective media by the adjustment of reaction, addition of antibiotics or other agents:

Bacto-Brain Heart Infusion Agar	Bacto-Mycological Agar
Bacto-Sabourand Dextrose Agar	Bacto-Mycological Broth
Bacto-Sabouraud Maltose Agar	Bacto-Corn Meal Agar
Bacto-Littman Oxgall Agar	Bacto-Corn Meal Agar with Dextrose
Bacto-Bean Pod Agar	Bacto-Prune Agar
	Bacto-Lima Bean Agar

CONTROL for sanitary and sterility procedures as well as for general use in mycological procedures:

Bacto-Sabourand Maltose Broth	Bacto-Neurospora Culture Agar
Bacto-Sabouraud Liquid Medium	Bacto-Potato Dextrose Agar
Bacto-Malt Extract	Bacto-Mildew Test Medium
Bacto-Malt Agar	Bacto-W.L. Nutrient Medium
	Bacto-W.L. Differential Medium

CLASSIFICATION . . . and nutritional studies of fungi:

Bacto-Yeast Morphology Agar	Bacto-Czapek Dox Broth
Bacto-Yeast Carbon Base	Bacto-Czapek Solution Agar
Bacto-Yeast Nitrogen Base	Bacto-Vitamin Free Yeast Base

THE DIFCO MANUAL, NINTH EDITION,
including descriptions of these media and their use, is available on request.

DIFCO LABORATORIES
DETROIT 1, MICHIGAN

Massachusetts Institute of Technology — R. S. Harris to study metabolism of C_{14} labeled fatty acids; \$4,300., one year.

Teachers College of Columbia University — R. R. Fields for research on nutrition education in elementary schools; \$5,700., one year.

University of Notre Dame — B. S. J. Wostmann to determine nutrient requirements of germ-free animals; \$8,000. (1959) — \$15,000. (1960).

American Institute of Nutrition — for support of the Fifth International Congress on Nutrition; \$2,500. annually, 2 years.

University of Wisconsin — H. J. Sallach to study biological utilization of amino acids; \$1,800., one year.

The Nutrition Foundation is a non-profit research organization, industry-financed, and operated in the public interest. Supporting basic research and education in the science of nutrition, the Foundation during the past year has distributed more than a million dollars in grants to medical and graduate schools in the United States, Canada and Central America.

FOR SALE

Single service milk sampling tubes. For further information and a catalogue, please write: Bacti-Kit Co., P. O. Box 101, Eugene, Oregon.

CHEMICAL WATER TESTING SERVICE

Now, dairymen can match the detergent they use to the water on their farm and do a better job of cleaning equipment.

They can find out quickly which detergent will work best as determined by a chemical water-testing service — offered free of charge by Surge Dealers in the interests of dairy sanitation.

After an on-the-farm test has been made, a formula card is tacked on the milk house wall. This card recommends the type and amount of detergent a dairyman should use based on hardness and iron content of his water.

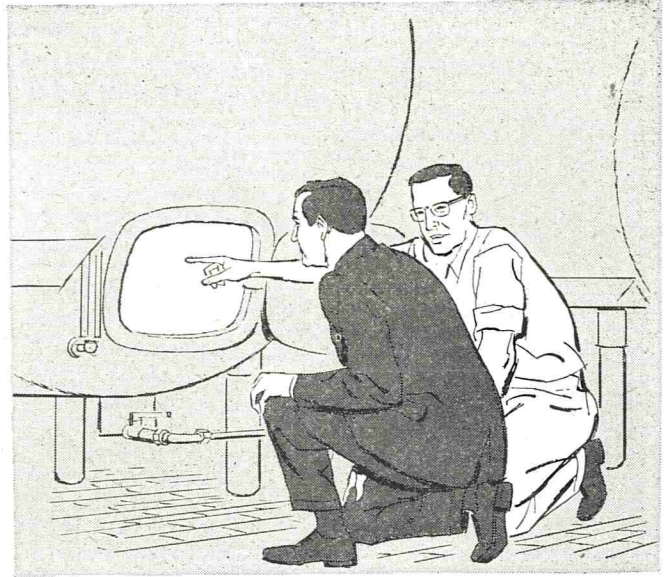
Matching the detergent to the water for better cleaning has great appeal to bacteria-conscious dairymen — particularly those who use pipe line systems which must be cleaned in place.

Good pipe line cleaning must not only assure a low

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bacteria count, but must also prevent a buildup of milk deposits (milkstone) in the system.

Efficient pipe line cleaning depends on temperature, water velocity, kind and quantity of water, kind of detergent and other factors.

Having the detergent which best suits the water will further simplify cleaning for dairymen who use the new "push-button" pipe line washer. With a fully automatic timing device, the "push-button" washer will rinse, wash, rinse again and sanitize the pipe line — while the operator turns to other chores. Successful "cleaning in place" of pipe line milkers calls for following a cleaning pattern or cycle. By automatically doing each operation in sequence and for the recommended time, the "push-button" washer makes sure a complete washing cycle is carried out.

Use of the proper detergent can be expected to make the "push-button" washer even more efficient.

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American Can Co.	II
American Seal-Kap Corp.	IV
Babson Bros., Co.	Back Cover
Baltimore Biological Laboratory, Inc. Division of Becton, Dickinson & Co.	Inside Back Cover
Bacti-Kit Co.	V
Cherry-Burrell Corp.	Inside Front Cover
Chr. Hansen's Laboratories	V
Difco Laboratories	Page 331
Diversey Corp.	Page 332
Johnson & Johnson	I
IAMFS, Inc.	VII, VIII
Klenzade Products, Inc.	IV
Lazarus Laboratories Inc. — Division West Chemical Products Corp.	Page 330
The Haynes Mfg. Co.	V
United States Steel Corp.	VI

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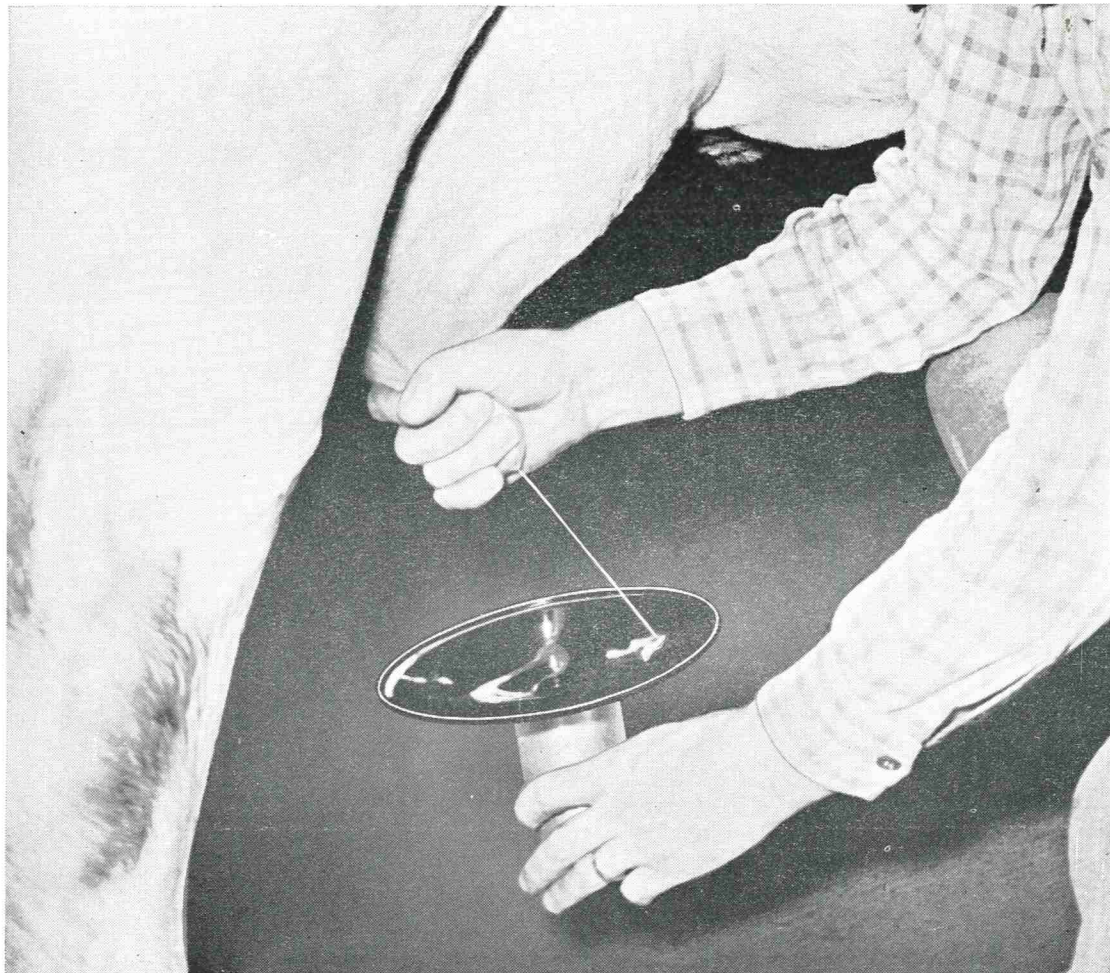
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