

Journal of

MILK and FOOD TECHNOLOGY

53rd ANNUAL MEETING
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Minneapolis, Minnesota

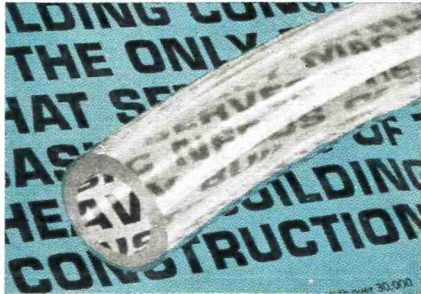
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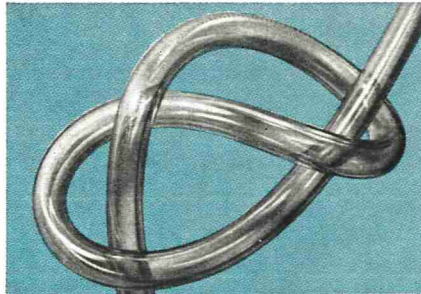
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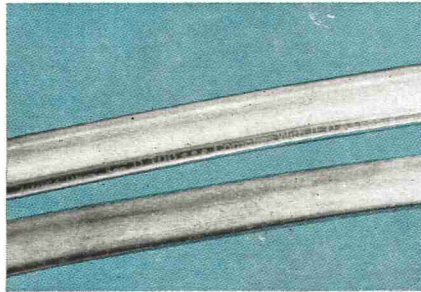
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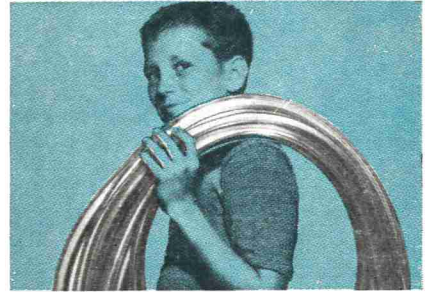
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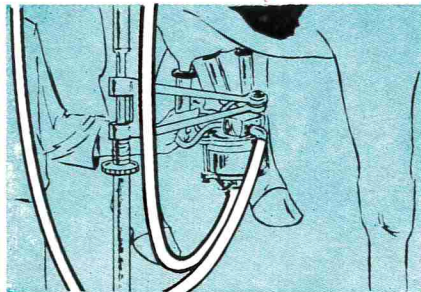
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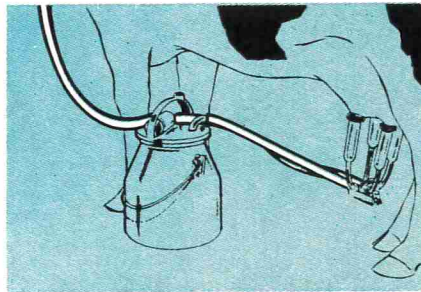
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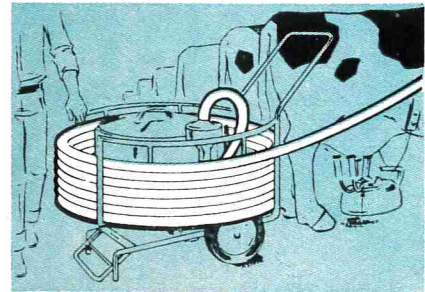
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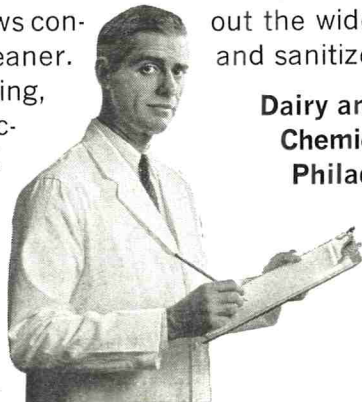


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Journal of

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INCLUDING MILK AND FOOD SANITATION

Official Publication

International Association of Milk, Food and Environmental Sanitarians, Inc.

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Vol. 29 June, 1966 No. 6

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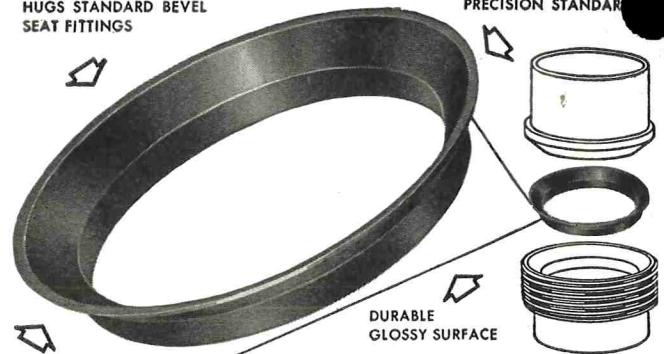
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WE NEED AN INCREASE IN IAMFES DUES

The time has come to face the issue and to consider the financial status of our organization. We cannot continue to carry out our organizational responsibilities in this era of higher costs without a needed adjustment in our income.

The programs and participating activities of International are well known to the membership and all of us can take great pride in what is being accomplished. The work of the Standing Committees has been outstanding and has received world-wide recognition. Reports on the current programs of a number of these Committees have appeared in recent issues of the *Journal of Milk and Food Technology*.

Space will not permit more than passing mention of the accomplishments and current activities of these Committees, such as the most valuable work of our Sanitary Procedures Committee through the years in its contribution to the development of the well-known 3-A Standards for dairy industry equipment. Similar recognition must be given to our Committees in the establishment of criteria for food service vending equipment, baking industry equipment standards and in participation in nation-wide programs with NSF, NAMA, FDA, APHA, FDA, APMA, USPHS and many other organizations. The Farm Methods Committee has been particularly active in the interstate milk shipment program and the mastitis control program. Other Committees are credited for their major contributions in the fields of frozen foods, food-borne illness and communicable disease control, applied laboratory methodology, national labeling, and in various educational and professional programs.

A major activity of IAMFES, of course, is the publication of the *Journal*. Since its inception in 1937, the *Journal* has grown in world acceptance and is now highly respected and recognized as the most authoritative and outstanding publication in its field. Articles published cover a very wide area of interests and many of the basic research and technical articles are abstracted for other journals and cited as reference material.

The *Journal* is intended to provide a diversity of information and material of a non-technical and practical nature for the various needs of its readers. With the expansion of the *Journal* staff by the addition of an Associate Editor, more articles and papers of general interest are being utilized without sacrificing in any degree the highly technical reputation and standing of the *Journal*. In addition there has been greater use of information from industry on new products, equipment and processes, new techniques and practices and other items of value to the professional sanitarian.

An organization such as IAMFES, however, is useful almost in direct proportion to the support given it by its membership. Active support, of course, begins at the affiliate level and strong, well organized active affiliates are the foundation stones of the International organization. At all levels, whether local, state or national, every individual member is in a position to receive direct benefits and should not hesitate to contribute his time, talents, efforts and particularly his financial support toward the overall success of the Association. Especially, no organization can be successful in carrying out its responsibilities to the profession or business it serves unless it has financial support to provide adequate funds for its operations.

SEARCH FOR ADDITIONAL INCOME

Compared with other organizations serving professional people, International has the unique but unfortunate position of operating on a very low budget. This is certainly not news to the membership since this problem has been constant over a period of years. In spite of two increases in dues in the past fifteen years (1950 and 1960) and the almost continual search for outside sources for funds, the situation has now reached a very critical stage. Frankly, additional income must be provided from some source or the activities of the Association and its services to its members may have to be seriously limited.

The problem of securing adequate income has been under constant study. In our letter to Affiliate Secretaries on October 20, 1964, H. L. "Red" Thomasson reviewed some of the possible steps screened from a number of ideas and suggestions as follows: (1) Sustaining membership; there is much opposition by industrial organizations which would be candidates for such membership and it is questionable whether substantial income could be realized from such a source. (2) Publication of handbook; this is desirable but would probably produce only small and certainly not immediate revenue. (3) Voluntary contributions from affiliate associations from their reserve funds; contributions were solicited last year but the total contributed was less than \$150.

The *Journal* is a major source of income but is also a major expense and there is little prospect for the organization to realize any profit from its operations. The Association's portion of current dues collected through affiliates is \$5.00. The cost of printing and distributing 12 issues of the *Journal* is \$4.20; hence each member actually gets back all but 80c in the *Journal* alone. Other Association expense

for salaries, travel, meetings, office maintenance and normal organization functions must be financed out of income sources in addition to the 80c remaining from present dues. Sale of reprints, manuals and other publications and funds such as the \$2500 allotment from the National Labeling Committee for services rendered are utilized. The NLC fund, of course, is no longer available to International.

In substance, it appears that the only practical means of obtaining the vitally needed increase in revenue to meet current minimum requirements, to make up the deficit from the loss of the National Labeling Committee funds, and to finance the highly desirable and increasingly important expanded programs, functions and services of the Association is a definite increase in the annual dues.

HOW WE COMPARE WITH OTHER ORGANIZATIONS

A review of other professional associations in our field which perform similar organization functions reveal that current fees range from \$10 to \$15. For the most part these organizations have substantially greater memberships and publish larger and more extensive journals. However, there can be no question that our own Journal of Milk and Food Technology compares most favorably in its authoritative material, its wide acceptance and its coverage.

In consideration of our minimum needs for current Association and Journal operations and in order to enable International to expand its activities and services to an even more worth-while degree, it is the opinion of the Executive Board that our annual membership fees should be increased to \$8.00 on an affiliate basis and \$10.00 on a direct basis.

In support of this proposal—and again it may be emphasized that the new fee schedule will be substantially under that of associations of comparable character—a review of current finances and an enumeration of needs for relatively immediate expansion is in order.

Income for the fiscal year ending June 30, 1965 from Association dues, Journal advertising, reprint sales and the National Labeling Committee contribution amounted to \$50,290. Expenses for the Association operations and the Journal publication totaled \$48,674. Hence, there was a net balance of \$1,617.00 for the past fiscal year operations. However, at present income and without the National Labeling Committee fund the operations for the current fiscal year of 1965-66 will end up with a deficit.

OPERATING COSTS INCREASED

There can be no doubt that the cost of doing Association business has steadily increased in recent years. Even though "Red" has instituted every

possible measure to reduce office and association business expense, it is obvious that some adjustment in current salaries and particularly in providing additional office help is not only logical but long overdue.

As "Red" pointed out in his letter to the Affiliates, he has continued to operate as Executive Secretary and Managing Editor with only one full time clerk in spite of the fact that the Association has doubled in number of members with a resulting definite and steady increase in office detail and general costs of doing business. Furthermore, his salary rates have remained substantially the same.

"Red" has the responsibility of running the affairs of the Association not only at our Shelbyville office but also in the manifold contacts and relationships with Affiliates and outside organizations. He also has the task of publishing the monthly Journal, including procurement of advertising, make-up and printing and distribution.

Lack of adequate office personnel has required "Red's" presence at Shelbyville for greater periods of time and has reduced his opportunities for affiliate and outside contacts. An additional full time girl was authorized last year but for budget reasons has not been employed. It cannot be questioned that more office personnel is needed to allow "Red" to extend his operations in the field to serve the Association more effectively.

The expansion and extension of the Journal has been outlined. Since the Journal is not self supporting, some of the expansion to provide a publication to meet the broad interests of our members will have to be financed out of additional funds.

Many Standing Committee functions have had to be curtailed because of lack of finances. Since these activities give substance to the fundamental purpose of our organization, it is essential that the work of these committees, present and future, be adequately supported.

NEED FOR EXPANDED ACTIVITIES

There is much to be done and many avenues in which the work can be usefully expanded. Efforts of the 3-A Committee should not be limited to the dairy field but, in keeping with other industry developments, must be extended to other aspects of food processing. A number of food service equipment standards are in various stages of development and many tasks remain yet to be completed. The current report of the Applied Laboratory Methods Committee recognizes the need for more collaborative studies in food microbiology methods and for developing further standards in the examination of food products, water, air and other environmental samples. Other Committees face similar challenges in this

rapidly changing world of sanitation and public health.

With an expanded association program some adjustment in travel reimbursement is warranted. Most organizations provide for necessary travel of officers, executive boards and certain committee activities. For the most part International has had to rely on the willingness of its leaders to finance their own travel, or to attempt to schedule meetings in conjunction with other programs where travel financed for other purposes can be utilized. This obviously curtails the activities of our officers and committee men, all of whom volunteer their time as well, and reduces to a minimum the potential benefit of these organization functions. Other associations have found it expedient to support these essential activities by at least partial reimbursement of expenses incurred.

There is also a problem of securing speakers for our Annual Meeting and the Program Chairman is largely limited in his selection of speakers to persons able to travel on their company expense or public agency budgets. While we are indeed fortunate to have had outstanding speakers at our meetings, it has been the experience of other organizations that programs can be definitely expanded in scope and calibre if some speaker expense funds are available.

PROPOSED INCREASE MODEST

Many other reasons for increasing Association operating funds can be cited. It may also be ques-

tioned that a fee increase of \$3.00 is warranted. In his letter to the Affiliates "Red" stated that in order to finance the costs of the part time Journal editor already employed and the full time girl authorized for his office, a minimum of \$7,000 would be needed. Other essential activities and expanded functions of your Association will necessitate the additional funds expected to be realized from the increase.

On the basis of a present membership approximating 4000, an increment of \$12,000 from the \$3 fee increased might be anticipated. However, it has been the unfortunate experience of most organizations that there is a loss in membership when dues were raised. Our loss in 1960 was less than 10% which fortunately has been offset by subsequent new memberships. A similar temporary loss may also be experienced this time but it is hoped that it can be kept to a minimum by this full explanation of the needs of your Association, its plans for the future which will directly benefit the individual member, and a frank comparison of the situation of IAMFES in comparison with other professional organizations.

A sum of \$3 per year is not significant in today's living, (less than 6c per week) and as a contribution to the welfare of your Association it can bring you manifold professional and personal benefits. Moreover, you will be a continuing part of an organization in which you can take great pride and which will be able to further its major contributions in the field of sanitation and public health.

U.S. TRADE CENTER IN FRANKFURT SETS ENVIRONMENTAL TEST EQUIPMENT SHOW

The U. S. Department of Commerce today announced a unique overseas show-and-sell exhibition of equipment to create any environment affecting man and his products.

The show will be staged October 5-12, 1966 at the U. S. Trade Center in Frankfurt, Germany. It will be devoted to advanced U. S. equipment to test product performance under such simulated conditions as vibration shock, extreme temperature and pressure, humidity, solar and nuclear radiation, and products reaction to sea salt, sand, dust, mold and fungus corrosion.

Planned by the Department's Bureau of International Commerce (BIC) with assistance and cooperation of the Institute of Environmental Sciences of Mt. Prospect, Illinois, the Frankfurt show is expected to attract buyers, agents, distributors, technicians and end users from throughout West Germany and neighboring countries. The show's sales target

is the European producer of electronic components and systems, space vehicles and satellites, weather rockets, pharmaceuticals, paper, textiles and lumber, and the food and transportation industries.

A BIC survey, conducted by Mr. A. Billet, Past President of the Institute of Environmental Sciences, shows that these industries are in the market for laboratory and plant simulation devices to aid in designing and producing better equipment and consumer goods. Sales opportunities for U. S. products are promising.

U. S. firms interested in taking part in the Frankfurt Trade Center show may obtain additional information from the Bureau of International Commerce (code 8193), U. S. Department of Commerce, Washington, D. C. 20230 (Phone: area code 202 WO 7-5791), or from any of the Department's 42 Field Offices.

A SUGGESTED SANITARY STANDARD FOR FREEZER-DISPENSED ICE MILK, MALTED MILK, AND SHAKES

K. G. WECKEL¹

*Department of Dairy and Food Industries,
University of Wisconsin*

(Received for publication December 17, 1965)

The Executive Board of the Wisconsin Intrastate Milk Shippers Conference directed the appointment of a Committee to review standards and problems in the production and dispensing of soft-serve freezer-dispensed products, including beverages made with dairy products, such as soft-serve dispensed goods, malts, and shakes. The Committee was requested to propose standards for consideration for adoption by the Conference.

The Committee, in a survey of a number of state and city ordinances and regulations, was unable to locate sanitary standards for freezer-dispensed products suitable for Conference action. The survey indicated frequent use of a standard plate count standard of 50,000/ml, and a coliform count standard of 10/g of product. Unpublished data from Committee members, and others, indicated some 25% of samples tested exceeded these standards. Foltz and Mickelson (1) reported 81 of 100 samples of vanilla flavored malted milk shakes contained coliform organisms; 10 contained coagulase positive phage typable strains of staphylococci. Only 39% had 10 or fewer coliforms per gram. The Committee concluded there definitely was need of improved regulatory supervision of these types of freezer-dispensed products. It was deduced that about 60% of the cities within the State make some evaluation of these products, some regularly, others irregularly.

There are a number of conditions in freezer-dispensing operations that can affect adversely the sanitary quality of these products. There often exists inadequate training of personnel in essential sanitary procedures. There is a high turnover rate in personnel, and frequently, particularly in peak seasonal periods, young people are employed. Frequently, utensils are neither properly washed nor sanitized. The conditions of withdrawal of mix from hoppers and freezers, and accumulation of mix

drips and leaks is believed to be a major problem. Failure to maintain constantly low temperature of the mix (such as at time of delivery) is believed frequent. Delivery of mix in bulk quantity is a recent development and requires assessment.

The Committee on Ice Milk and Frozen Desserts submitted a proposed standard for supervision of freezer-dispensed desserts which was adopted by the Wisconsin Conference on Intrastate shipments (2). In the light of apparent need for such standards, it is suggested for application elsewhere.

SUGGESTED SANITARY STANDARDS FOR FREEZER-DISPENSED FROZEN DESSERTS

Freezer-dispensed frozen desserts, including soft-serve goods made with dairy products, ice milks, malts, and shakes.

Bacteriological Standards. Sanitary procedures in the processing, handling and storing of freezer-dispensed desserts, including soft-serve goods, ice milks, malts and shakes, and ices and other similar desserts shall be such that the finished product shall have a bacterial plate count not to exceed 50,000/g, and a coliform count not to exceed 10/g. Samples of such products used to determine compliance with bacteriological requirements shall be obtained from supplies owned by or in possession of the operator of the dispenser whether stationary or mobile.

Temperature Standards. Dairy product mix shall be delivered to the dispenser operation and therein held continuously at 45 F or less until the mix enters the freezer-dispenser. Bulk mix shall be delivered only to the operation properly equipped to handle such product. These standards shall also apply to open containers of fluid sterile mix and reconstituted dry mix.

Equipment Standards. New equipment used for preparation and dispensing of semi-frozen soft-serve goods, malts, shakes, ices or similar products shall conform to all applicable standards of construction for such equipment established by the National Sanitation Foundation and the 3-A Sanitary Standards Committees.

Sanitation Procedures. All equipment used in freezer-dispenser operations shall be dismantled, washed, rinsed, and properly left to air dry after each day's use. Related facilities such as malted milk mixers, cups, paddles, spatulas, etc., shall be similarly washed, rinsed, and properly set to drain and dry. All equipment shall be sanitized by solutions containing not less than 100 ppm available chlorine or its equivalent before subsequent use.

When in the opinion of the sanitarian the dispensing equipment, containers, or utensils are unclean, or insanitary, or their use is such that the resulting dispensed product is

¹The following members of the Committee participated in the survey and development of the Standard during 1964 and 1965: Dr. Robert Bradley, Roy Clary, Sylvester Danen, William Ebert, Ed Galloway, Stanley Goldschmidt, Howard Householder, William Hansen, John McClelland, Dr. R. M. Parker, Albert Paulson, A. E. Rost, Albert Schroeder, George Stewart, W. L. Schultz, A. Trinrud, Arnold Van Thullenar, Wesley Wise, Duane York and K. G. Weckel.

contaminated, the sanitarian may attach a quarantine tag to this equipment. Any equipment or container so tagged shall not be used until made acceptable and released from quarantine by the sanitarian.

The following instructions are recommended for guidance of sanitarians and dispenser operators:

1. *Each day*—disassemble all freezer-dispenser machine parts in contact with the mix or product, and properly wash them with detergent solution, rinse, and store to dry. Similarly wash related utensils such as malted mixers, cups, paddles, piping, and so forth.

2. *Each day*—thoroughly rinse the assembled machine, piping, mixer, and the utensils immediately before use with a solution containing not less than 160 ppm chlorine, or an equally effective sanitizer.

3. All mix shall be held at 45 F or less at all times.

4. Mix retained in the hopper, and mix retained in the freezer may be withdrawn at the end of the day into a clean, sanitized, and covered container of approved type and stored at 45 F or less for subsequent use. Mix separately collected from leaks or drips should be discarded.

5. A typed or printed description of the exact washing and sanitizing procedures to be used for the equipment, including

the method of preparing detergent solution and the sanitizing solution (strength and name of sanitizer) and the procedure to be used in salvaging mix and frozen product from the freezer shall be posted conveniently near the freezer.

Posting of Instructions for Personnel.

Typed or printed instructions for personnel shall be posted near the freezer. The instructions shall include:

1. Method of preparing detergent wash solution, (name and amount of detergent, and amount of water).
2. List of all items to be washed with detergent solution.
3. Procedure to be used in salvaging mix and frozen product from freezer hopper, and freezer barrel.
4. Procedure to be used in preparing sanitizing solution, (name and amount of sanitizer, and amount of water).
5. List of all items to be treated with sanitizing solution.

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2. Wisconsin Conference on Intrastate Milk Shipments. Proceedings of Conference. October 7, 1965.

PUBLICATIONS OF INTEREST

Editorial Note: Listed below are books, pamphlets and reprints on a variety of subjects considered to be of interest. Request for material should be addressed to the source indicated. Note cost of books and certain items.

Information, Influence and Communication. A collection of 25 papers by social scientists and public relations practitioners. Edited by O. Lerbinger and A. J. Sullivan. Basic Books, Inc., New York, N. Y. \$8.50

Proceedings National Conference on Salmonellosis, March 1964, Atlanta, Ga. Supt. of Doc., Govt. Printing Office, Washington, D. C. 20402 \$1.50

Food Quality: Effects of Production Practices and Processing. G. W. Irving, Jr. and S. R. Hoover, American Soc. for Advancement of Science, Washington, D. C. \$8.50

Explorations in Future Food-Processing Techniques. Review of freeze dehydration and food irradiation. Edited by S. A. Goldblith. The M. I. T. Press, Cambridge, Mass. 02142 \$5.00

Publications of U. S. Dept. of Commerce Clearinghouse for Federal Scientific and Technical Information. (Order from Clearinghouse, Dept. of Commerce, Springfield, Va. 22151 Report No. IDO-10042. Suitability of Potato Products Prepared from Irradiated and Chemically Inhibited Potatoes. \$2.00

Report No. AD-613-950. Induced Radioactivity in Foods and Electron Sterilization. \$3.00

Report No. AD-621-921. Resistance of Microorganisms to Ionizing Radiation Applied to Foods. \$1.00

Milk and Milk Products Equipment. A Guideline for Evaluating Sanitary Construction. Supt. of Doc., Govt. Printing Office, Washington, D. C. 20402. 20c.

Screening Tests for the Detection of Abnormal Milk. Supt. of Doc., Govt. Printing Office, Washington D. C. 20402

Plastics Pipe Standards and Use in Water Systems. Edward H. Look, President, Plastics Pipe Institute. (Order from Portco Corp., Paper and Plastics Div., Vancouver, Wash.)

Automation in Deep-Fat Frying. Gifford-Wood, Inc. Hudson, N. Y.

Measurement and Removal of Soil from the Surface of Canning Tomatoes. Agricultural Extension Service. Univ. of California, Davis

Selected U. S. Government Publications. (Order by Catalogue No. from Supt. of Documents, Govt. Printing Office, Washington D. C. 20402)

Cat. No. FS 2.302:F-10/2. Packaged Disaster Hospital, Custodian Handbook 25c

Cat. No. A 1.76:290. Suggested Guide for the Use of Insecticides to Control Insects Affecting Crops, Livestock and Households. 200 pp. \$1.00

Cat. No. C 41.2:R 11/2. Current Status and Commercial Prospects for Radiation Preservation of Food. 55c

Cat. No. D 212-6/3:F 73. Food Operations Reference Manual. (U. S. Navy on-the-job training manual to consist ultimately of 8 sections in looseleaf form. This first increment contains Sec. A, Introduction and Sec. D, Food Production.) 568 pp. \$4.50.

Cat. No. A 93.27:25. Increasing World Food Output, Problems and Prospects. 45c

Cat. No. FS 2.2:P 96/7/964. The Public Health Service Today. 30c

Cat. No. PrEx 8.9:966. Federal Water Resources Research Program for Fiscal Year 1966. 15c

Cat. No. C 41.2:W 29/11. Size and Regional Trends for Pressure Pipe in Water and Sewage Systems. 10c

Cat. No. FS 2.94:964 Pollution-Caused Fish Kills in 1964. 25c

EFFECT OF THE TYPE OF BACTERIOLOGICAL PEPTONE IN THE PLATING MEDIUM UPON THE ENUMERATION OF PASTEURIZATION-RESISTANT BACTERIA IN MILK¹

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(Received for publication January 13, 1966)

SUMMARY

Various bacteriological peptones were studied as to effects on enumeration of pasteurization-resistant bacteria in milk. No appreciable differences were observed in colony counts of unheated cultures of thermophilic *Micrococcus varians* and *Arthrobacter* and *Streptococcus* sp. when plated with media containing different peptones. After laboratory pasteurization, colony counts differed substantially. Usually, media producing the highest counts yielded the largest and most easily discernible colonies. Bacto-Tryptone was deficient for colony development of thermophilic streptococci. Results indicate that, although seemingly adequate for enumeration in raw milk, the bacteriological peptone currently recommended for the standard plate count may not be satisfactory for the determination of the maximum viable bacteria population of pasteurized milk.

Before publication of the seventh edition of *Standard Methods for the Examination of Dairy Products* (2) in 1939, Nutrient agar, containing beef extract and peptone as nutrient sources, was recommended as a plating medium. Previously, little regard had been given to the particular type of peptone used. Bowers and Hucker (5) suggested the use of an improved plating medium containing 0.5% tryptone (a casein-digest peptone), 0.1% glucose, 0.5% skim milk and agar. Comparing this medium with Nutrient agar, plate counts were 36% higher on 134 samples of raw milk and 350% higher on 77 samples of pasteurized milk. Similar results were reported by other investigators (6, 7, 20) when plate counts on the two media were compared. Abele (1) suggested further refinement of the proposed medium by the inclusion of beef extract. Consequently, a plating medium containing tryptone, glucose, beef extract, skim milk and agar replaced Nutrient agar as the official plating medium in 1939 (2). Several investigations (9, 10, 11, 12, 13) demonstrated that the newly adopted medium, TGEM agar, was superior to Nutrient agar for the enumeration of bacteria in milk, especially

for pasteurized milk and heat-treated bacteria. Nelson (14) also reported that variations in the tryptone content of the plating medium and the time of addition of the bacteriological peptone in the preparation of the medium influenced colony development by heat-treated bacteria.

Because of difficulties with precipitation of the skim milk in the TGEM medium, studies (15, 16) were undertaken to find a suitable milk-free medium to replace TGEM agar. As a result, Plate Count agar, containing tryptone (a pancreatic digest of casein), yeast extract, dextrose and agar, was officially recommended in 1953 (3) and currently is recognized (4) for the standard plate count of milk.

The role of bacteriological peptones in bacterial growth has been investigated by many workers. Bowers and Hucker (5) stated that hydrolyzed casein was an excellent source of nitrogen for bacterial growth, particularly for those microorganisms associated with milk. They assumed that the efficiency of hydrolyzed casein depended upon the large amount of tryptophan in casein which became available when the casein was hydrolyzed either with trypsin or pepsin. Shrader (17) compared 10 milk plating media prepared with various peptones. Peptones varied in their cultural effects, and media of different nitrogen composition were said to affect the cultural characteristics of various bacteria. He further stated that bacterial culture media must possess lower nitrogen compounds for proper growth and that amino acids in proper concentration were generally the most important nitrogen compounds for culture media.

This study was undertaken to explore the effect of various bacteriological peptones in the plating medium upon the enumeration of pasteurization-resistant bacteria in milk. It is appreciated, however, that bacteriological peptones constitute only a portion of the nutrient complex of a medium.

EXPERIMENTAL METHODS

Except for certain indicated modifications, the methods employed were those outlined in Standard Methods (4). To reduce the time required for preparing replicate plates, 1.0 ml and 10.0 ml pipettes graduated in tenths of a milliliter were used for delivery of 0.1 ml and 1.0 ml quantities.

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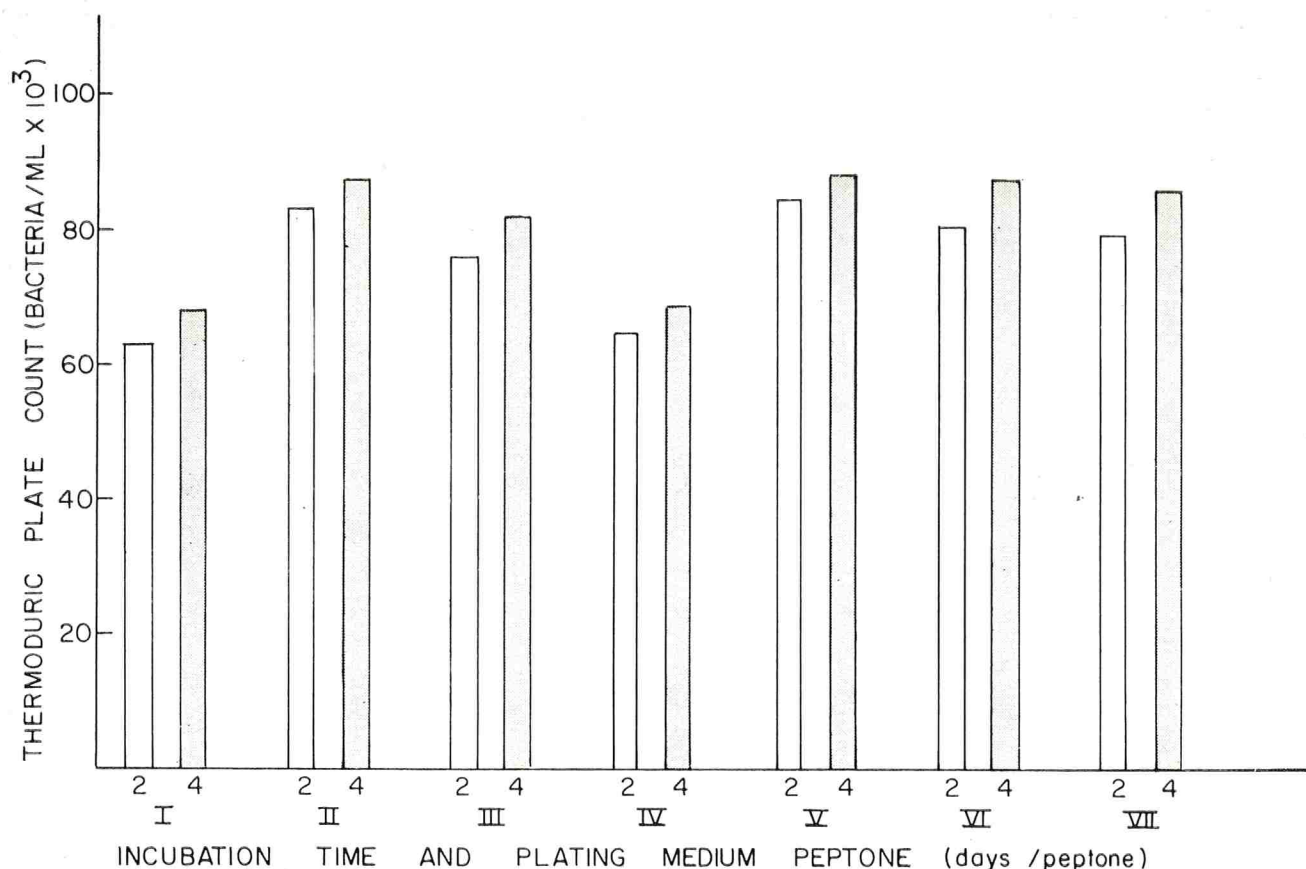


Figure 1. Mean thermoduric plate counts (32 C) of 26 milk samples obtained with media containing various bacteriological peptones: I, Bacto-Tryptone; II, N-Z-Amine Type AS; III, N-Z-Amine Type YT; IV, Edamin; V, Soy Peptone Powder; VI, N-Z-Case; VII, HY-Case SF.

Ten samples of bulk-cooled grade A milk, 10 samples of can-cooled manufacturing grade milk and six samples of blended bulk and can-cooled manufacturing grade milk were examined. A "complete immersion" laboratory pasteurization technique as described by Thomas et al. (19) was employed. Samples were pasteurized at 62.5 ± 0.1 C for 30 min. Less than 5 min. were required for samples to reach pasteurization temperature, and they were cooled in ice water immediately following pasteurization.

Duplicate plates for each dilution were poured with each of seven media prepared with various bacteriological peptones. With the exception of the type of bacteriological peptones used in formulation, the composition of all media was identical to that of Plate Count agar as outlined in Standard Methods (3). The bacteriological peptones were:

- I. Bacto-Tryptone, B-123 (pancreatic digest of casein)
- II. N-Z-Amine Type AS (pancreatic digest of casein)
- III. N-Z-Amine Type YT (enzymatic digest of casein)
- IV. Edamin (lactalbumin hydrolysate)
- V. Soy Peptone Powder (enzymatic digest of soybean meal)
- VI. N-Z-Case (tryptic digest of casein)
- VII. HY-Case SF (acid hydrolysate of casein)

Bacto-Tryptone, B-123, a recommended and commonly used peptone for Plate Count agar, was obtained from Difco Laboratories (8). The other bacteriological peptones were obtained from Sheffield Chemical*. Analyses of these materials were supplied by Sheffield Chemical. Plates were incubated at 32 C, and colonies counted after 2, 3 and 4

days of incubation. Counting and marking of colonies were conducted in the manner outlined by Thomas et al. (19).

Milk samples showing wide variations as well as no variation in thermoduric count, among the various media, were selected for study of the bacterial types encountered. Isolation, classification and study of the growth of pure cultures on the various media before and after laboratory pasteurization were conducted as described in an earlier study (19).

RESULTS

Arithmetic mean thermoduric colony counts obtained by plating 26 milk samples with media containing various bacteriological peptones are summarized in Figure 1. Although variation among mean counts obtained with the various media was not great, the data indicate that media prepared from Bacto-Tryptone and Edamin produced the lowest mean colony counts. Mean colony counts obtained with the other media were similar, especially after 4 days of incubation.

Table 1 summarizes the distribution of thermoduric bacteria, obtained with media prepared with the various peptones, in eight samples of milk. The data indicate that bacteria of the *Arthrobacter* genus preferred media prepared with Bacto-Tryptone, N-Z-

TABLE 1. AVERAGE DISTRIBUTION OF THERMODURIC BACTERIA IN EIGHT SAMPLES OF MILK^a OBTAINED WITH MEDIA CONTAINING VARIOUS BACTERIOLOGICAL PEPTONES

Bacteriological peptone	Average thermoduric count ^b /ml	Distribution of bacteria (% of total)			
		Arthrobacters	Microbacteria	Micrococci	Streptococci
Bacto-Tryptone	95,000	13.6	1.7	77.9	6.8
N-Z-Amine Type AS	150,000	1.8	5.3	70.1	22.8
N-Z-Amine Type YT	130,000	13.1	4.9	55.7	26.3
Edamin	100,000	7.3	5.4	87.3	00.0
HY-Case SF	140,000	12.3	7.0	49.1	31.6

^aPasteurized at 62.5 ± 0.1 C for 30 min.

^bPlates incubated at 32 C for 48 hr.

Amine Type YT and HY-Case SF. The medium prepared with N-Z-Amine Type AS did not substantially support colony productivity by these bacteria according to the 2-day colony count. Table 1 illustrates the apparent inadequacies of the Bacto-Tryptone and Edamin media for supporting growth of thermoduric streptococci. However, these organisms accounted for a substantial portion of the colony counts obtained with media prepared with N-Z-Amine Type AS, N-Z-Amine Type YT and HY-Case SF.

A study of the effect of various peptones used in the plating medium upon colony counts of pure cultures of thermoduric bacteria revealed that only in rare instances were differences in colony count of the unheated cultures possibly attributable to differences in the composition of the media. In contrast, however, differences in colony counts of the pasteurized cultures were commonly attributable to differences in bacteriological peptones used in the plating media. This was especially true for cultures of *Arthrobacter* sp. and *Micrococcus varians* (Figures 2 and 3).

A pasteurized culture of *Microbacterium lacticum* demonstrated no differences in colony counts attributable to variation in medium composition. Pasteurization conditions employed did not result in any killing effect upon this organism. As noted in an earlier study (19) for refrigerated cultures of this organism, the laboratory pasteurized count was appreciably higher than the count for the unheated cultures.

Although unheated cultures of *Streptococcus* sp. showed no appreciable variation in count among the different media, pasteurized cultures showed noticeable variation in colony count. Colony counts of pasteurized cultures were substantially lower with a medium containing Edamin than with other media. There was some indication that the colony count also was inhibited with Bacto-Tryptone medium.

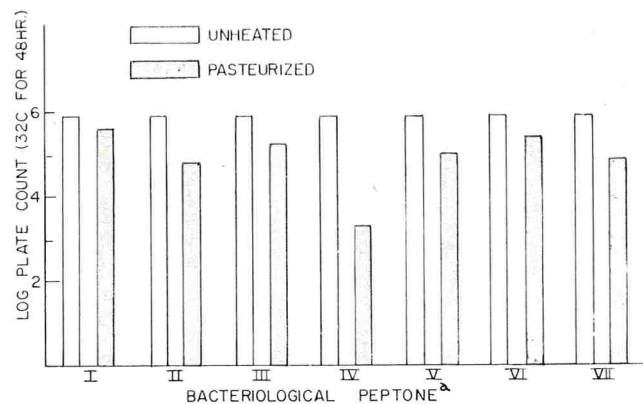


Figure 2. Effect of Plate Count agar bacteriological peptone upon the plate count of a culture of *Arthrobacter* sp. before and after laboratory pasteurization. I, Bacto-Tryptone; II, N-Z-Amine Type AS; III, N-Z-Amine Type YT; IV, Edamin; V, Soy Peptone Powder; VI, N-Z-Case; VII, HY-Case SF.

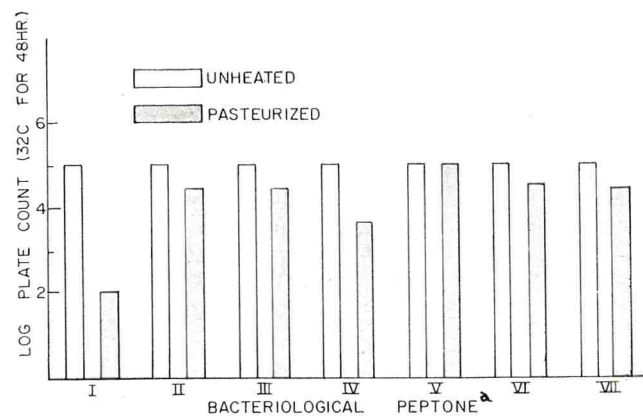


Figure 3. Effect of Plate Count agar bacteriological peptone upon the plate count of a culture of *Micrococcus varians* before and after laboratory pasteurization. I, Bacto-Tryptone; II, N-Z-Amine Type AS; III, N-Z-Amine Type YT; IV, Edamin; V, Soy Peptone Powder; VI, N-Z-Case; VII, HY-Case SF.

DISCUSSION

Standard Methods (4) recommends a pancreatic digest of casein conforming to the specifications outlined in the *Manual of Microbiological Methods* (18) for the preparation of milk plating medium. Bacto-Tryptone, supplied by Difco Laboratories, Inc. (8), is perhaps one of the most commonly employed bacteriological peptones. This bacteriological peptone and six others of varying types were used in the preparation of plating media to determine their effect upon the thermoduric plate count.

Because of their extremely complex nature, it would be difficult to evaluate the suitability of bacteriological peptones for bacterial growth on the basis of chemical analysis alone. However, it has been suggested (17) that the nutritive value of various peptones for microorganisms in milk is directly related to their amino nitrogen content. The amino nitrogen content of the bacteriological peptones included in this study ranged from 1.8% for Soy Peptone Powder to 6.9% for Edamin. Results for 26 milk samples showed that the highest average thermoduric count was obtained with medium prepared with Soy Peptone Powder, which contained the least amino nitrogen. In contrast, the average thermoduric count obtained with medium prepared with Edamin was appreciably less than that obtained with all other media except for the one containing Bacto-Tryptone. Because the only variation among the media was the type of peptone used in preparation, these results indicate that the value of bacteriological peptones for growth of thermoduric bacteria cannot be established on the basis of amino nitrogen content alone.

Of the seven media, the one prepared with the standard Bacto-Tryptone gave the lowest average thermoduric colony count. However, the average counts obtained with the various media showed a rather narrow range of variation of from 63,000 to 88,000 per ml. Nevertheless, for certain samples of milk, the thermoduric counts obtained with media prepared with Bacto-Tryptone and Edamin were substantially lower than counts obtained with other media. These differences seemingly resulted from the inability of some of the thermoduric streptococci to produce colonies after heat treatment on the Bacto-Tryptone and Edamin media.

The bacteriological peptones included in this study represent but a small portion of the possible number of peptones that could be utilized in the preparation of plating media. However, the results obtained with this limited number of peptones illustrate their important role in milk plating media. Perhaps of greatest significance is the observation that some peptones commonly employed in plating media may fail entirely to support growth of certain types of

thermoduric bacteria after heat treatment. If certain thermoduric bacteria, such as streptococci, go undetected in pasteurized milk, then the thermoduric plate count has lost much of its meaning.

One of the important objectives of a plating medium is the production of discernible and easily countable colonies. Colonies of minute size might be inadvertently overlooked in the counting process. Generally, the media producing the highest counts in this study also produced the largest sized colonies. Colonies produced on media containing Bacto-Tryptone and Edamin were, usually, noticeably smaller than those produced on the other media.

The results with pure cultures indicate that thermoduric bacteria are generally more exacting in the type of bacteriological peptone required for growth after being subjected to laboratory pasteurization than before pasteurization. This was true especially for cultures of *Arthrobacter* sp., *Micrococcus varians* and *Streptococcus* sp. Prior to pasteurization, cultures of these bacteria grew equally well on all media prepared with the seven peptones examined in this study. Following pasteurization, however, the organisms grew much better on certain of the media than on others.

The relative suitability of the different media for determining viable numbers after laboratory pasteurization varied according to the particular organism employed. For example, laboratory pasteurized cultures of *Arthrobacter* sp. exhibited maximum colony productivity on the medium which contained Bacto-Tryptone. In contrast, laboratory pasteurized cultures of *M. varians* exhibited minimum colony production on this medium. These results indicate that, if the maximum viable bacterial population of pasteurized milk is to be determined, the plating medium currently recommended may not be adequate.

The results also indicate that the relative heat resistance of a given organism cannot always be accurately determined by plating on a single medium. The common definition of thermoduric bacteria, "bacteria that survive pasteurization in considerable numbers," becomes meaningless if the plating medium employed in determining degree of survival is not adequate for supporting growth of heat-treated bacteria. To illustrate this point, a pasteurized culture of *M. varians* showed survival of less than 1% when plated with medium prepared with the recommended Bacto-Tryptone. When plated with medium prepared with Soy Peptone Powder, however, this same culture showed a pasteurization survival of 80%. Additional examples of similar results obtained with pure cultures of other thermoduric bacteria could be cited.

The observation that heat-treated bacteria are

more exacting in their requirements for initiation of growth than are bacteria in their normal state cannot be overlooked. Few investigators seem to have taken cognizance of this in studying the pasteurization-resistant flora of milk or in formulating media for making plate counts on pasteurized dairy products. Usually, the same medium has been employed for determining the viable numbers of bacteria in both raw and pasteurized milk.

The observations made in this study are in accord with those of Nelson (13). Although not restricting his studies to thermophilic bacteria, he noted that bacteria which had been subjected to heat at partially lethal levels were more demanding in their requirements of media for growth than were unheated control organisms. He concluded that this should be considered in the formulation of media for the enumeration of bacteria in heated food products and in experiments concerned with the effect of heat upon microorganisms.

ADDENDUM

Attention of the reader is directed to the "Erratum," contained in this (June) issue of the Journal, to the paper "Effect of pH of plating medium on enumeration of pasteurization resistant bacteria in milk," by Thomas, Reinbold, and Nelson, which appeared in the May 1966 issue of this Journal.

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SPEEDING LITTERBUG A RARITY, SAYS KAB

Speed has a direct bearing on the accumulation of litter on the country's roadways, according to Keep America Beautiful, Inc.

Professional and voluntary litter fighters from all 50 states overwhelmingly agreed in a KAB survey that the slower-traveled secondary highways, country roads and city streets are suffering most at the hands of the litterbug.

Heavy accumulation of litter on the faster-traveled limited access thruways and turnpikes was reported by only three

per cent of those responding to the survey, said KAB.

Allen H. Seed, Jr., executive vice president of KAB, noted that refuse thrown from a car is a safety hazard in addition to being unsightly and the fact that motorists appear to be more conscious of the safety element when traveling at higher speeds accounts for the lower incidence of "toss-out" on the high-speed routes.

"But even the slow-driving litterbug can be eliminated by installation and use of an auto litterbag," said Mr. Seed.

ERRATUM

EFFECT OF pH OF PLATING MEDIUM ON ENUMERATION OF PASTEURIZATION-RESISTANT BACTERIA IN MILK.

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Volume 29, no. 5, pages 157 and 158, Table 1 and Figure 1: the data in Table 1 and Figure 1 should read as follows:

TABLE 1. AVERAGE DISTRIBUTION OF THERMODURIC BACTERIA IN NINE SAMPLES OF MILK^a OBTAINED WITH PLATE COUNT AGAR AT VARIOUS pH LEVELS

Plating medium pH	Average thermoduric count ^b /ml	Distribution of bacteria (% of total)			
		Arthrobacters	Microbacteria	Micrococci	Streptococci
6.5	100,000	26.8	0.0	63.4	9.8
7.0	170,000	27.6	1.7	58.7	12.0
7.5	190,000	25.8	0.0	37.1	37.1
8.6	130,000	15.4	7.7	35.9	41.0
9.1	78,000	00.0	4.7	41.9	53.5

^aPasteurized at 62.5 ± 0.1 C for 30 min.

^bPlates incubated at 32 C for 48 hr.

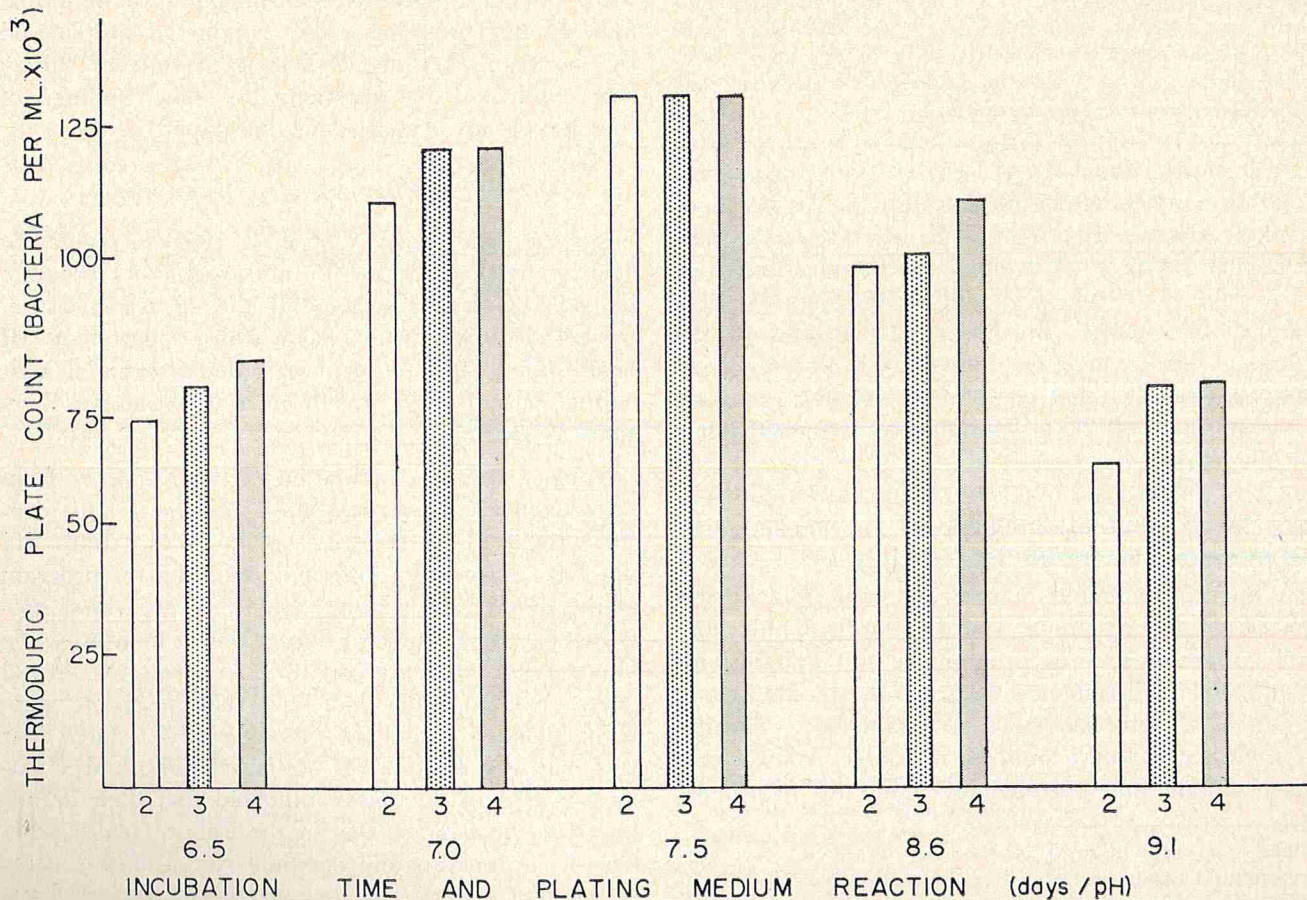


Figure 1. Arithmetic mean of thermoduric plate counts (32 C) of 18 milk samples obtained with Plate Count agar at various pH levels. (Pasteurization was at 62.5 ± 0.1 C for 30 min).

SURVEY OF ABNORMAL MILK PROGRAMS ADMINISTERED BY STATE REGULATORY AGENCIES^{1, 2}

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SUMMARY

Through survey questionnaires, information was obtained about the abnormal milk control programs administered by state regulatory agencies. Responses were received from dairy regulatory officials in 49 states. A majority (67%) of the states did not have a designated abnormal milk regulatory program at the time of this survey, but many were in the process of developing such programs. More concern was evident for the control of abnormal milk in the Grade A supply than for the manufacturing supply.

The tests most widely reported for detecting abnormal milk (in order of prominence) were: microscopic leucocyte count, California mastitis test, modified Whiteside test, catalase test, and Wisconsin mastitis test. Standards based on leucocyte counts of 500,000 or 1,000,000/ml were reported by 13 states. Approximately 70% of the responding states indicated that their programs followed the recommendations of the National Mastitis Council; however, others (30%) indicated further studies would be made before abnormal milk regulations could be promulgated.

The new Grade A pasteurized milk ordinance, 1965 Recommendations of the USPHS (3), is scheduled to become effective for all interstate milk shippers July 1967 (1). It is significant that a portion of this ordinance deals specifically with abnormal milk or mastitis control. Furthermore, delegates to the National Conference on Interstate Milk Shipments (1) recommended that laboratory screening programs for abnormal milk be in operation by July 1966. They recommended, however, that such a program should not be used as a prerequisite of interstate milk shippers listing until the adoption of recommendations (3) of the Public Health Service (July 1967).

While the National Mastitis Council (2) has suggested procedures for a flexible abnormal milk control program, such a program is not suitable for regulatory enforcement. Reasonable standards and methods of detection must be established. The desirability of having a uniform regulatory control program among states is obvious. Programs mentioned

by the Public Health Service (3) and the Interstate Milk Shippers Conference (1) are not specific enough to meet this need. For example, the Public Health Service (4) has published information on the use of five different screening tests for the detection of abnormal milk, but recommend these be an adjunct only to the regulatory process (3). There is concern that some agencies will likely overlook this warning and use one or more of the screening tests as basic criteria of abnormal milk. Since none of these tests provides conclusive evidence of abnormal (mastitic) milk, confusion between states could produce chaotic conditions.

To obtain information on the types of abnormal milk control programs being conducted or planned by the regulatory agencies in each state, a survey was conducted by questionnaire. The findings of this survey are presented in this paper.

SURVEY FINDINGS AND DISCUSSION

Questionnaires were sent (Fall, 1965) to regulatory agencies responsible for the milk regulatory program in each of the 50 states. Of the 49 responses received, 27 (55%) were from state departments of health, 21 (43%) were from state departments of agriculture, and 1 (2%) was from a state sanitary livestock board.

Table 1 shows a tabulation of the responses from state agencies concerning their abnormal milk control programs. A majority (67%) of the states did not have a specific abnormal milk control program at the time of the survey. Some indicated their programs had been initiated during recent months, while others reported theirs had been in effect for several years. Several states indicated that programs were being planned. Many of the states (57%) stated that they had a definition for abnormal milk, and a majority (74%) of the states indicated that their definition was the same as that of the Public Health Service (3). Approximately one-half (52%) of the states responding stated that they presently did not have specific procedures for enforcing an abnormal milk control program, and a majority (68%) revealed that

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²Portions of a paper presented at the annual conference of Fieldmen and Sanitarians, University of Kentucky, Lexington, Ky., Feb. 23-24, 1966.

TABLE 1. RESPONSES OF STATE REGULATORY AGENCIES TO SPECIFIC QUESTIONS ABOUT THEIR ABNORMAL MILK CONTROL PROGRAMS

Question	No. of states responding ^a	% of states responding	
		Yes	No
Does the state have:			
A current abnormal milk regulatory program?	49	33	67
A definition of abnormal milk?	35	57	43
The same definition of abnormal milk as the USPHS code?	31	74	26
Specific procedures for enforcement of such a program?	31	48	52
A standard for Leucocyte count?	28	32	68
Is the program concerned with:			
Grade A milk only?	30	67	33
Milk for manufacturing only?	24	0	100
Both Grade A milk and milk for manufacturing?	30	33	67

^aAll questions were not answered by all states.

they did not have an established standard. Many of the states indicated that their program was of an educational nature and that participation was voluntary. While 67% of the states responding reported that their program was concerned with the Grade A supply only, none of the states stated that their program dealt only with milk for manufacturing. Only about a third (33%) indicated that their program was concerned with both grades of milk.

Table 2 shows the testing procedures used by the state regulatory agencies for detecting abnormal milk. Only 27 of the states provided information concerning screening tests employed. The microscopic leucocyte count was the most widely mentioned test, followed closely by the California mastitis test. It is significant that state agencies used all of the tests on which the Public Health Service (4) has published information. Nineteen (70%) states indicated that more than one of these tests were used. The most frequent combination was the microscopic leucocyte count and the California mastitis test. A few states reported the use of physical examination by a veterinarian and the use of a strip-cup.

The use of a standard based on a leucocyte count of 500,000/ml was reported by five states, while

eight reported the use of a leucocyte count of 1,000,000/ml as a standard. One respondent, who reported using the higher standard, stated that this standard was tentative and indicated that it would be lowered to 500,000/ml. Fourteen states declared that they were conducting or planning studies to obtain information to serve as a basis for establishing standards for abnormal milk. Fifteen states indicated they were conducting or planning investigations relating to conditions and prevalence of mastitis. Nineteen states reported that they have conducted tests for abnormal milk on individual producer samples, while one state indicated that tests had been conducted on commingled samples (350 samples). The number of samples tested by individual states during the past year ranged from 50 to 775,656. The total number of samples tested by 11 states which reported this information was 972,401. The percentage of samples in violation of standards reported by individual states ranged from <1 to 40% for Grade A milk and from <2 to 65% for manufacturing milk.

The survey findings reported here indicate considerable differences in the types of abnormal milk control programs in effect or planned by state regulatory agencies. Such differences could cause many problems in the initiation and enforcement of an effective regulatory program and could be particularly disturbing to plants involved with interstate milk shipments. Although a majority of the responses received from the states indicated that recommendations of the National Mastitis Council (1) are being followed, more specific recommendations must be advanced if a consistent program between states is to be realized. Items of major differences appear to be the selection and use of screening tests and establishment of standards.

TABLE 2. SCREENING TESTS EMPLOYED BY STATE REGULATORY AGENCIES FOR THE DETECTION OF ABNORMAL MILK

Test	States Using Test	
	No. of States	% of States Responding ^a
Microscopic leucocyte count	21	80
California mastitis test	18	67
Catalase test	9	33
Modified Whiteside test	9	33
Wisconsin mastitis test	5	19
Other (includes strip cup, physical examination, and veterinary diagnosis)	6	22
Combination of tests	19	70

^aA total of 27 states responded to the question about the screening test used for detecting abnormal milk.

ACKNOWLEDGEMENT

The authors gratefully acknowledge the cooperation and assistance of the regulatory officials who completed and returned the questionnaires.

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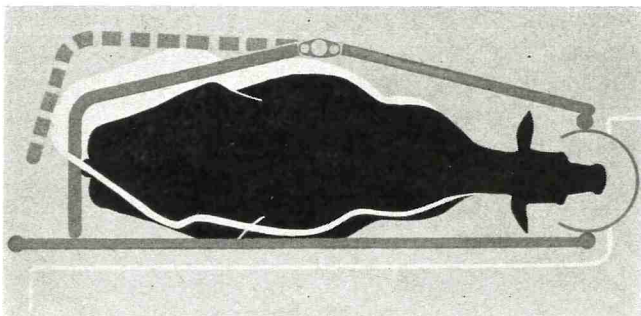
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INFORMATION FROM INDUSTRY

Editorial Note: Following are items of information on products, equipment, processes and literature based on current news releases from industry. When writing for detailed information, mention the Journal.

MILKING STALL ADJUSTS TO DIFFERENT SIZE COWS



Dairy farm equipment designers have come up with an answer to the milking parlor operator's problem of how to handle cows of all different sizes. Although some localized attempts have been made in building adjustable stalls, the first available on a nationwide basis is the new SURGE Diagonal "Cow Control" Stall with instant operator control of the rear gate position.

By means of a special ratchet-type locking device, the operator can confine either a big Holstein or a small Jersey in best milking position by crowding her not only forward, but toward the machine operator. Additional features of the newest Surge milking stall are a circular stainless steel feed box and shield, and an acrylic-epoxy painted finish to withstand wear and moisture. Improved operator safety features include tubing with rounded corners and vertical operating lever positions. The stall is also adaptable for manual feeding or electronically controlled automatic feeding.

This new milking stall, designed and built by Babson Bros. Co., is being made available through all Surge Service Dealers in the U. S., Canada and South American countries.

AUTOMATIC FLOW DIVERSION VALVE CLEANED-IN-PLACE

A new automatic flow diversion valve unit, offered by Tri-Clover Division of the Ladish Company, is designed to direct the flow in accordance with the temperature setting of the thermo controller of the HTST system. The valve unit is built so that a "leak-detector" port is automatically flushed before pasteurization system goes into forward flow. Valve is air-actuated.

Several advantages of the system are cited by the manufacturer. The unit has full CIP capability and there is no need to dismantle valve during cleaning operations on the HTST press and holding tube. As a fail-safe feature, air or electric power failure will automatically divert product into balance tank. The unit is designed to operate with existing HTST Thermo/Controllers and is available in sizes to handle any existing HTST flow requirements. Testing can be accomplished without complete disassembly of the valve.

Write for Bulletin FD164A: LADISH CO., Tri-Clover Division, Kenosha, Wisconsin.

PORTABLE WATER-POWERED PUMP PROPORTIONS LIQUID

Users of hypochlorite solutions and other chemical sanitizers can now dispense these materials more economically and quickly with a new pump that can easily be attached directly into a water line. Offered by Pennsalt Chemicals Corp., the Imperial Proportioner Pump, a four-pound portable unit, requires only water for power and measures approximately 11 x 7 x 12 inches. It requires no adjustment for changes in water pressure from 5 to 85 psi, resulting in excellent accuracy. It can be used with cold water or hot (maximum 180 F.) water lines.

The Proportioner also has a wide selection of concentration ranges that will permit a minimum of 1/12 ounce of stock solution per gallon of water to a maximum 3 ounces per gallon to be automatically dispensed at a rate of up to 6 gallons per minute or 360 gallons per hour. It is highly accurate without changing proportioner settings at any water pressure. A rugged integral unit with few moving parts, it requires little cleaning or maintenance attention. Further information can be obtained from the B-K Department, Pennsalt Chemicals Corp., 3 Penn Center, Philadelphia, Pa. 19102.

COMPARISON OF THE OVAL TUBE WITH THE STANDARD PLATE COUNT METHOD FOR DETERMINING VIABLE COUNTS OF RAW MILK

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SUMMARY

Standard plate counts (SPC) and oval tube counts (OTC) were compared and analyzed by the statistical method on 547 samples of raw milk from the Wichita milk shed. 389 of these milks were paired as routine two-dilution standard plates vs. single tube estimates of viable bacteria; 127 were set in duplicate by each method; and 31 samples were set in replicates of five for the purpose of two-factor variance analysis. Using the criterion of the IAMFES Committee on Applied Laboratory Methods, the experimental results indicated that the comparison odds were approximately even for equivalent counts between methods (48.9% of samples); two out of five random samples showed that the oval tube counts were higher (39.6% of samples) and that one out of ten of the standard plate counts was superior (11.5% of samples). Also, revised data of differences between two-dilution SPC's and single OTC's that passed the chi-square test for goodness of fit for a normal distribution gave a significant difference of means at the 1% level (89 samples). However, with another trial run, two-factor analysis did not yield a significant difference between methods (33 samples x 5 replicates), and the F ratio of the means of the pooled variance data showed no difference in precision between methods; the interaction between samples and methods was highly significant. A comparison of the results from these experiments with data obtained in five other laboratories over a span of 25 years is shown in Table form. It was concluded that there is no significant difference between the two methods where paired estimates are based on replication, but the oval tube is preferred where time and economy are important.

Among the several miscellaneous microbiological methods that may be substituted for the standard plate count is the oval tube technique (1). This rapid method which evolved from the Burri quantitative smear culture of the 1930's has the well known advantages, first discussed by Myers and Pence (10), of taking one-half the time of standard plating, of using one third the amount of agar, of eliminating dilution blanks and pipettes and requiring less incubator space. And, although the general consensus of opinion by authorities (5, 8) of this field that the oval tube is essentially equivalent or compares favorably with the standard plate count, Chapter 9 of "Standard Methods" (1) suggests that there is still wide opportunity for systematic and critical studies of any of the rapid methods in comparison with the conventional standard.

A loop method using an agar slope for counting bacteria was originally described as a quantitative smear culture by Burri in 1928 (9). Later, Dorner found that the agar slope method gave higher counts than the standard Petri plate procedure (7). In 1937, G. S. Rydzewski modified the Burri technique by using multiple plates (10). Hucker and Haynes (9) found that 73% of the milks examined gave higher counts with the Burri slants as compared to 27% equivalent counts. Myers and Pence (10) felt that both the Burri and Rydzewski methods had certain disadvantages due to spreaders, coalescing colonies, the surface dry-slant requirement, etc., and introduced the standard 0.001 ml loop filled with pasteurized milk directly into melted agar at 45 C. With this oval tube method, they obtained geometric means of 1879 (SPC) and 1816 (OTC) for 76 comparisons involving thermoduric bacteria. Donnelly, Black, and Lewis (5), found no significant difference between the oval tube and the standard plate count except that the former showed statistically better agreement between duplicates. With a technique using a 0.001 ml calibrated loop attached to a continuous volume syringe for rinsing a sample into a standard Petri dish, Thompson et al. (14) found this method equivalent to the standard plate count in a study of 85 samples used in four experiments.

PROCEDURES

The milk samples used in the following experiments were picked up by the Wichita City-County Health Department sanitarians at farms from 250 gallon bulk tanks. These samples were drawn with 18-inch straw pipettes, transferred to sterile bottles or plastic bags, placed in an ice chest, and brought to the laboratory where they were held at 2 C for not more than 24 hr before initial plating.

Only 10 samples per day were picked at random to plate and loop until it was desired to increase the number of samples in certain ranges. The procedure was thus modified to include an immediate oval tube count in order to find samples of a certain category, and these milks were held at 2 C until ready for use. After shaking the bottles or bags vigorously 25 times, the standard plate method was first performed while the milks were held at 2-5 C in the refrigerator. The small elapse of time that did not exceed 20 min in the refrigerator allowed the foam to break before the loop was inserted 2-3 mm below the surface.

TABLE 1. ANALYSIS OF OVAL TUBE AND STANDARD PLATE COMPARISONS OF 547 PRODUCERS SAMPLES ACCORDING TO CRITERION OF THE IAMFES COMMITTEE ON APPLIED LABORATORY METHODS (2)

Experiment	Category or range (Thousands/ml)	Equivalent counts		Significantly higher OTC		Significantly higher SPC		Totals	
		No.	%	No.	%	No.	%	No.	%
1	I (1-9)	40	43.5	38	41.3	14	15.2	92	100
	II (10-29)	57	49.0	49	42.4	10	8.6	116	100
	III (30-99)	47	44.5	38	35.7	21	19.8	106	100
	IV (100-300)	24	51.0	17	36.2	6	12.8	47	100
	V (> 300)	16	57.0	11	39.3	1	3.7	28	100
Total or Weighted Average		184	47.3	153	39.3	52	13.4	389	100
2	I-V	66	52.0	54	42.4	7	5.6	127	100
3	I-V	17	54.8	10	32.4	4	12.8	31	100
Grand Total and weighted Means		267	48.9	217	39.6	63	11.5	547	100

Standard methods for the Examination of Dairy Products, 11th ed. (1), were followed for both the standard plate count and the oval tube. Special attention was given to preliminary tests for growth inhibition or stimulation and tests for toxicity of the distilled water. Freshly prepared Difco Plate Count Agar, whose pH was verified electrometrically, and never held beyond 48 hr in the oval tubes or kept in screw cap bottles for the standard plate count, was used throughout the experiments. All counts recorded were averages of at least two count-readings whose difference was never greater than 5%.

The 0.001-ml welded platinum-rhodium loops, Lot no. 24105 2, were purchased from the Central Scientific Company. Four of the loops were calibrated gravimetrically by rapid weighings of milk-loaded loops and an average volume of 9.69×10^{-4} (SD 6×10^{-6} ml) was recorded. This work was checked by measuring the diameters at $1.46 \pm$ SD 0.02 mm and the volume calculated as 7.9×10^{-4} ml. The discrepancy of 1.8×10^{-4} ml between the gravimetric and metrical method for determining the volume of the loop could be accounted for as the difference in viscosity between milk and water and was observed as the greater adhesion of the former to the "doughnut-rim" of the metal loop. This observation will be referred to later to help interpret results.

The rules of Section 3.33, Standard Methods of Dairy Products, 11th ed. (1), for estimating colonies on crowded plates were followed exactly for the standard plate count. This provides for a lower limit of estimated counts at 5 colonies/cm² which would be equivalent to a total count of only 85 colonies with the oval tube due to the OTC/SPC area-ratio of 1:3.8. By using a 4X hand lens in conjunction with a dark-field Quebec counter for both methods, counts of the oval tube were not estimated unless the density exceeded 18 colonies/cm²; or, in other words, no quantity less than 300 was a factor-count by either method.

RESULTS AND ANALYSIS

The analysis of three experiments in which the oval tube method was compared to the standard plate is summarized in Table 1. Experiment 1 involved a comparison of single tube and standard two-dilution plate counts from 389 producers samples. Experiment 2 consisted of 127 samples done in duplicate by each method while the counts of Experiment

3 were averages of replicates of five by each method. Table 1 shows that the largest percentage (54.8%) of equivalent counts occurred in Experiment 3. Results of Experiment 3 differ, also, from the other two by producing the least percentage (32.4% as compared with 39.3%, and 42.4%) of significantly higher OTC according to the arbitrary 80% rule set by the IAMFES Sub-committee (2). Results of experiment 1 and 3 agree on the percent of significantly higher SPC's. The weighted averages of the grand totals of the three experiments indicate that only about half of the samples gave equivalent counts while there were approximately four times as many significantly higher OTC's than SPC's. Reasons for this interaction between samples and milks will be discussed in a later paragraph.

The breakdown of the results of Experiment 1 into five categories according to range is given in Table 1 and shown graphically in Figure 1 where degree of agreement is recorded as a mean concordance ratio with a 95% confidence interval. By inspection the chart indicates, with the exception of the very low counts of Category I which actually has only one significant figure, that there is no significant difference among the mean arithmetic ratios of the five categories. Also, if the true mean log ratio is no higher than 1.01, we can conclude that the average of the comparisons shows equality of methods. Also, such a low ratio is derived from logs whose variance would be less than the critical 0.012 set by Donnelly, et al. (6) for acceptability of observed results reported between a pair of SPC's by a single analysis, or between SPC's reported by two different analysts. But if the true value of the ratio is as high as 1.02, the results cannot be accepted as equivalent by the same critical standard.

The results of Experiment 1 were also analyzed by selecting at random twenty paired counts from each

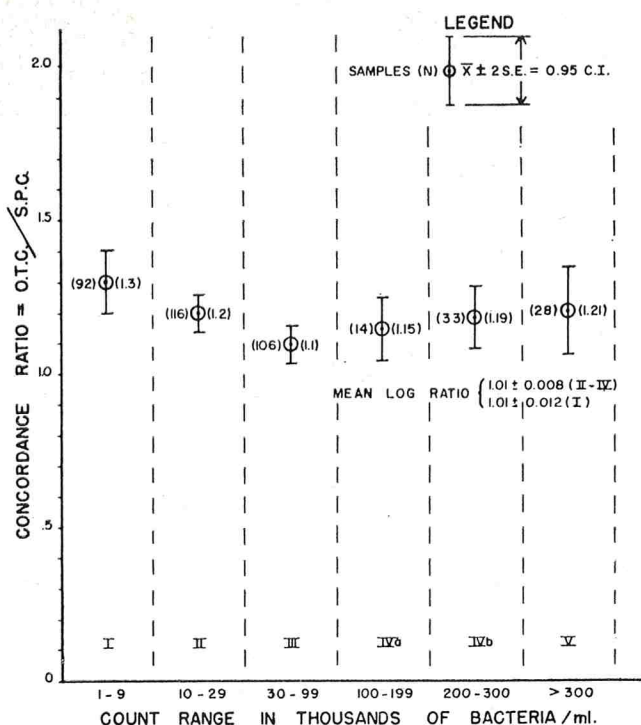


Figure 1. Mean Arithmetic Ratio's and Mean Log Ratio's with 95% Confidence Intervals of Viable Count Densities of 389 Raw Milk Samples Comparing Oval Tube with the Standard Plate Method.

of the five categories. Revised data of the square roots of counts passed a goodness of fit test for a normal distribution only after rejecting eleven paired counts from the original hundred. With these 89 paired counts, the "Student's" t statistic was 3.92 and highly significant in rejecting the null hypothesis that the means were equal. However, the result was not taken too seriously since the data were both revised and the counts based on a single dilution plate and oval tube.

In Experiment 2, 127 samples of raw milk were set in duplicate; the 52.0% equivalent counts were

slightly higher than the 47.3% of Experiment 1. There was also a slight increase of the significantly higher OTC's with a relatively large decrease of the significantly higher SPC's. The geometric means for the OTC and SPC of this series was, respectively, 120 X and 100 X 10³/ml where the mean of the SPC's was 83.4% of the mean OTC, indicating that the two methods could be considered equivalent. Just for curiosity each OTC was multiplied by 0.83, the reciprocal of the $\frac{OTC}{SPC}$ mean found in Experiment 1. When these revised data were averaged, the two geometric means differed now only by 10 X 10³/ml, and the lower counts of the standard plate averaged 90.9% of the higher OTC's.

Tables 2 and 3 are summaries of the same data of Experiment 3. Each sample was subjected to the same replication of five by each method. Again, the square roots of the counts were used and in pooling sums of square to arrive at generalized pooled variances, it was necessary to M test (12, 4) for homogeneity and to prepare a contingency Table. When tested, the series of results by each method showed that their variances were homogeneous; in other words, the variability was the same for the 31 milks and, also, independent of the means in magnitude. Experiment 3 differed from the other two in that none of the results exceeded 300 colonies where factor-counts can contribute to an excessive range of concordance ratios.

Table 2 shows the mean of the counts, the average of the pooled variances, and the average Coefficient of variation for each method when the reported count is an average of five plates or tubes and transformed into square roots to obtain normality. The F ratio of 1.09 for variance indicates there is no difference in precision between the two methods. The Coefficients of variation are also similar, and the t statistic value of 0.72 for difference of means is not significant.

TABLE 2. SUMMARY DATA OF SQUARE ROOT TRANSFORMATIONS OF SPC AND OTC SET IN REPLICATES OF 5 WITH 31 PRODUCERS SAMPLES

	(n-1)		Mean (\bar{x})		$\sum (\bar{x} - x)^2$		Variance (s^2)		Standard deviation		Coef. of variation	
	SPC	OTC	SPC	OTC	SPC	OTC	SPC	OTC	SPC	OTC	SPC	OTC
Total or Mean	119	122	9.67	10.13	39.7841	36.5164	0.321	0.294	0.546	0.503	6.1	5.6
$\frac{1}{x} \text{ SPC} / \bar{x} \text{ OTC}$			1/1.05		1.09		1.09		1.09		1.09	

s (SPC) = 3.54
 t = 0.72
 t 0.25, 30 = 2.042

F.025, 30/30 = 2.07

TABLE 3. ANALYSIS OF VARIANCE OF OVAL TUBE AND STANDARD PLATE METHOD COMPARISON DATA (SQUARE ROOTS OF COUNTS WITH REPLICATION OF 5) OF THIRTY SAMPLES OF RAW MILK

Source of variability	Sum of Squares	Degrees of freedom	Mean square
Between Methods	23.4	1	23.4
Among Milks	2377	29	82**
Interaction	255.6	29	8.81**
Subtotal	2656	59	
Within Subclasses	229.7	235	0.9816
Total	2885.7	294	

**Highly Significant

The data of Experiment 3 was again analyzed and presented in Table 3 by partitioning total sum of squares of deviations from mean into a methods factor, a milk factor, interaction of milk and methods factor, and a factor associated with experimental error (within subclasses), along with a parallel partitioning of total number of degrees of freedom. Due to accidental omission of one set of results, only 30 samples are included in the Table. Since this two-factor analysis of variance is a mixed model (methods factor is fixed), the F tests for methods and milks are against interaction while the mean square of the error is used in the denominator for testing interaction. The F value for both milks and interaction is highly significant, while the difference between methods is less than significant and agrees with the acceptance of the null hypothesis of equality of means shown by the t statistic of Table 2.

DISCUSSION AND CONCLUSION

These results show clearly that there is a differential response among milks to the two methods. There are several factors that could be responsible for the 4 to 1 ratio of significantly higher OTC's according to the 80% rule. Among factors that could cause an increase in viscosity which would tend to produce significantly higher than normal variation in OTC/SPC ratios are the leucocyte contents of the milks (12), certain proteolytic bacteria which produce changes in the hydrophilic properties of casein and, possibly, the effect of fat content at the temperatures (6-10 C) at which the milks were looped. An extreme difference of this property of "stickiness" or just simple adhesion was observed in preliminary standardization of the loops with water and milk.

Of lesser importance is the probability of more surface colonies of strict aerobic bacteria developing in the oval tube since the surface to volume of media is about 1.35 times as great with the latter when

compared to the standard plate. It is well known that surface streaking of agar slants give higher counts than the standard plate method. Punch and Olson (13) has shown that five-day surface counts of raw milk were significantly higher than seven-day SPC's when estimating aerobic psychrophilic bacteria in milk. The antithesis of this surface growth is, of course, the possibility of more microaerophilic streptococci and lactobacilli developing in the deeper agar of the plate and producing a large discrepancy in favor of the dilution method.

Table 4 is a summary of the work done in comparing four different loop methods with the standard plate count by six laboratories within an interval of 25 years. The data of Table 4 was prepared by converting actual counts reported in these papers into mean arithmetic ratios, mean log ratios, and percent differences in order to have a common denominator of comparison among laboratories. Half of the laboratories (the Sealtest, Inc., the Robert A. Taft Engineering Center, and the Wisconsin State Laboratory of Hygiene) reported nearly perfect agreement between methods when they used a grand total of 203 samples and obtained a range of counts not quite as broad as the second group of laboratories. The other three laboratories (The New York Agricultural Experiment Station, the Producers Creamery of Springfield, Missouri, and the Wichita City-County Health Department) reported slightly higher counts for a loop method with a grand total of 1,342 samples. To these reported comparisons could be added the early work (1930) of Dorner (7) at the New York Agricultural Experiment Station where he found that the agar slope method gave higher counts than the commonly used standard Petri plate procedure. In contrast with these results, Donnelly, Black, and Lewis (5) reported from four trials and a total of 43 samples at the Chicago Board of Health that there was no difference between methods, but the oval tube showed statistically better agreement between duplicity. Surface streaking in one instance and placing the loop directly in the melted agar in another instance is, no doubt, an important factor in explaining such differences of results.

All of the counts included in Table 4 were done with raw milks except the original tube work of Myers and Pence (2) who recommended this method for counting the surviving thermophilic bacteria of pasteurization as a better criterion for correcting unsanitary practices of milking machines, open seam utensils, and conditions of cows' udders. With the exception of the preliminary 71 samples where the mean lower count was 69% of the mean higher one reported by the Robert A. Taft Engineering Center, every one of the paired geometric means shown in

TABLE 4. COMPARISON OF RESULTS REPORTED BY SIX LABORATORIES IN EVALUATING RAPID LOOP METHODS WITH THE STANDARD PLATE COUNT

Laboratory	Workers	Year	Rapid method used	No. of paired samples	Range of counts (Thousands/ml)	Geometric means (Thousands/ml)	Geometric mean ratios	Geometric mean log ratios	% Difference $\frac{\text{SPC-OTC}}{\text{SPC}} \times 100$	
N. Y. State Agr. Exp. Station & (Geneva)	Hucker & Haynes	1939	Buri	299	1-10	Rapid	SPC	>1.2 (69.5%)		
			slant	74	10-100	Loop	Count	<1.2 (30.5%)		
			14	>100			>1.2 (79.7%)			
							<1.2 (20.3%)			
								>1.2 (100%)		
Sealtest, Inc. Baltimore, Md.	Myers & Pence	1941	Oval tube	77	0-59	1.816	1.879	0.967	0.996	3.4
Robt. A. Taft Sanitary Engineering Center	Donnelly Black Lewis	1960	Oval tube	71 (Prelim)	19-139*	47	68	0.690	0.968	30.9
				41	27-59	43	43	1.00	1.000	0.0
Wisconsin Lab. of Hygiene Madison, Wis.	Thompson Donnelly Black	1960	Loop plate	85	<3-290	27	27	1.00	1.00	0.0
Producers Creamery Co. Springfield, Mo.	Heinemann & Rohn	1953	Loop bottle	104	<1->100	61	53	1.15	1.01	15.2
				100	<1->100	84	84	1.00	1.00	0.0
				Total 204	<1->100	72	68	1.06	1.01	5.9
Wichita-Sedgwick County Health Department	Wilson	1963	Oval tube	132	3->300	40	34	1.18	1.015	17.7
				132	3->300	32	28	1.14	1.01	14.3
				125	3->300	26	24	1.08	1.01	8.3
				389	3->300	32	28	1.14	1.01	14.3
				127	3->300	120	100	1.20	1.016	20.0
	31	3->300	93	84	1.11	1.01	10.8			
							$^{\circ}1.09^b \pm \text{SE}$	$^{\circ}1.01 \pm \text{SE}$	$^{\circ}9.2 \pm \text{SE}$	
							0.022	0.001	2.0	

*Result not included in averaging.

^bAverage result of five research laboratories.

Table 4 could be considered an equivalent result. The mean log ratio with its approximate 95% confidence limits for five laboratories, 1.01 ± 0.002 , would also indicate that these specific microbiological loop methods are equivalent to the standard plate count method.

From the results of the t statistic, two-factor variance analysis with replication, and the F test for variance ratio for normal distribution, it is concluded that there is no significant difference in either accuracy or precision between the oval tube and standard plate method. Although the results discussed in this paper are not new and do not differ significantly from what has been found by others, the data confirms that the oval tube can be used with confidence by analysts preferring a simplified method for the purpose of screening and sanitary control of producer's samples.

ACKNOWLEDGMENT

The author wishes to acknowledge that Barry H. Lloyd, Chief of Laboratory Services, Wichita-Sedgwick County Health Department, introduced the oval tube method at this laboratory and suggested the comparative study presented in this paper.

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PET FOODS AND SALMONELLA

An interesting editorial on the role of pet foods in the increase of salmonellosis appears in the February, 1966, issue of the *Public Health Inspector*, the journal of the Association of Public Health Inspectors, London, England. The editorial reads as follows:

"Salmonellosis still remains the major problem in food poisoning and in 1964 there was an increase of 17 per cent in the number of persons affected with salmonellae compared with the figure for 1963.

"A recent report by the Public Health Laboratory Service shows that the total number of cases of food poisoning in 1964 was 9,975 of which 5,115 were caused by salmonella organisms. It was not possible to trace the food responsible for these in more than half the general outbreaks and only in very few of the family outbreaks, but where a particular food was incriminated it was generally found to be one of the meat products.

"It is known that many of the salmonellae causing disease in man are also found in domestic animals and on occasions a relationship is established between organisms isolated at abattoirs and the prevalence of the same serotype in human infections. Contaminated feeding stuffs, infection among farm animals and contamination in abattoirs all contribute to the introduction of salmonellae into the food factory, shop and home. If the increase in salmonella infections is to be stopped every possible step must be taken to break the chain of infection.

"In the October 1965 issue of *Public Health vn-*

spector a paper by Dr. Betty Hobbs was published in which the author referred to a survey that had been carried out to find the amount of raw meat contaminated with salmonellae that was being sold for pets. It was found that 21.9 per cent of the 214 samples were contaminated by salmonellae and for comparison purposes the examination of 195 samples of butchers' meat revealed a salmonella contamination in 1.5 per cent.

"When investigating family outbreaks of food poisoning, are questions always put to the housewife about the type and sources of raw pet meat? It has been demonstrated that this meat may be heavily contaminated by organisms of the salmonella group and cross infection can occur very easily in the domestic kitchen. Storage of the pet meat is invariably close to other foods, it may not be kept in a closed container, and frequently the same utensils and knives are used in the preparation of the family's meal.

"Several years ago a very small boy, whose family had been patiently providing faecal samples for the 'three negatives' asked the public health inspector why he did not have a sample from his cat. Perhaps the unconscious wisdom of a five-year old gave the clue. Perhaps the public health inspector would have asked about the pet foods in the house in any case. It was in any event a line of enquiry that should now be one of the standard questions on family outbreaks."

A SUGGESTED PROCEDURE FOR WASHING AND SANITIZING A SOFT-SERVE FREEZER WITHOUT DISASSEMBLING¹

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(Received for publication December 5, 1965)

Some regulatory officials insist that soft-serve freezers must be taken apart for cleaning and sanitizing after each day's operation whereas other regulatory officials believe that, when done properly, equally good cleaning can be obtained by the cleaned-in-place (CIP) method as by the disassembling method.

Although most soft-serve freezers are constructed in such a way to permit easy assembling and disassembling, a considerable amount of labor is still involved. Therefore, any additional information on how to improve the washing and sanitizing procedure for freezers cleaned-in-place should be of interest both to soft-serve operators and health officials.

This report describes a type of CIP procedure which has been evaluated in a local soft-serve establishment, where it has been successfully used for a year.

CLEANING PROCEDURE USED

At the end of the day, after the freezer (Mills Twin-Head Model 4201-430) had been emptied, cold water was run through the hopper into the freezer, and the machine operated for just a few revolutions. After the cold rinse water had been drained off, the procedure was repeated with warm water. When the warm rinse water was discharged, the freezer was then filled with a hot (145 F) alkaline pipeline cleaner (Eastern States Farmers' Exchange) solution, containing 1 oz of cleaner to each 2 gal of water. The beater was operated for 1 min only, after which the mix hopper and the tubes (leading from the mix hopper to the freezing chamber) were thoroughly brushed with the pipeline cleaning solution. After it was left standing for one-half hour, the pipeline cleaning solution was drained from the hopper and freezer, which were then rinsed with clear warm water.

SANITIZING PROCEDURE USED

The freezer and hopper were filled with a stabilized chlorine dioxide solution², containing 200 ppm of chlorine dioxide. Immediately before it was added to the freezer, the solution was acidified to pH 5.5 with phosphoric acid. The addition of 2 ml of a 5% phosphoric acid solution to 1 gal of local tap water produced the desired pH. The freezer was oper-

ated for 1 min using the beater switch only. The solution was left in the freezer until it was time to start the next day's operation. After the stabilized chlorine dioxide solution was drawn off, the freezer was ready for use. It was not flushed with water because chlorine dioxide is non-toxic in the concentration used. The amount of sanitizing solution that leaked from the freezer during the long-holding period was insignificant. It is possible that a serious sanitizer leakage problem might develop with some other types of freezers. It should be noted that the total running time of the freezer, when filled with an aqueous solution, was extremely short for both washing and sanitizing. It is unlikely that this very brief period of operation would have any adverse effect on the equipment.

²Stabilized chlorine dioxide is manufactured by International Dioxide, Inc., 518 Fifth Avenue, New York, N. Y. This product remains in stable solution until the chlorine dioxide is released under control by acidification, at which time it becomes free chlorine dioxide available to perform the function for which it is intended.

RESULTS

The washing and sanitizing procedures previously described were found to be satisfactory when used on a stainless steel, soft-serve freezer (Mills Twin-Head Model 4201-430) for a period of one year in a soft-serve establishment. This was even true when the freezer was used for making ice creams containing fibrous fruits, such as pineapple, strawberries, etc., which make cleaning very difficult.

Frequent checks for cleanliness were made during the test period by taking the freezer apart, swabbing and making visual observations of the swabs. Frequent checks were also made of the sanitary condition by the water rinse method, and by the swab contact method (as prescribed in *Standard Methods for the Examination of Dairy Products*, 11th Edition 1960). The swab tests included areas such as front bushing under the blade and near the rear bearing. Coliform counts were negative when the freezer was checked according to Standard Methods. In all instances, the water rinse test method indicated less than one colony per ml of freezer capacity. The swab contact method indicated less than two colonies per cm².

Product samples were also checked monthly by a commercial laboratory for coliform and total bacteria content. The coliform count was always far below the widely-used standard, not exceeding 10 per g

¹A contribution from the Massachusetts Agricultural Experiment Station, Amherst.

in three out of four samples. The average bacterial plate count per g was always far below the widely-used standard, not exceeding 50,000.

The rapidity of germicidal action of stabilized chlorine dioxide increases as the pH is lowered. Its action is much slower than that of hypochlorite at a pH of 5.5, but this is of no consequence because the sanitizing agent is left in the freezer overnight.

One significant advantage of stabilized chlorine dioxide over hypochlorite as a sanitizing agent is that it is less corrosive. The stainless steel freezer showed a very slight and unobjectionable tarnishing during the one-year period of its use.

While it has been demonstrated that a soft-serve freezer can be satisfactorily washed and sanitized without disassembling each day, it is still advisable to take the freezer apart occasionally to check for cleanliness and corrosion.

Various types of stainless steel, varying in corrosion-resistance, are used in the manufacture of freezers. The composition, such as chromium, nickel

and molybdenum content, and also surface finish are known to affect the corrosion-resistance of stainless steel. This study did not encompass the corrosion-resistance of various types of stainless steel to the pipeline cleaner and sanitizer used. Therefore, it cannot be positively stated at this time whether a particular freezer is suited to the treatments prescribed. Should a soft-serve operator wish to use the cleaning and sanitizing procedure herein described, a close check for the first signs of corrosion would be advisable. This would avoid serious corrosion damage in the event that the freezer in question proved unsuited to the washing and sanitizing procedure we have described.

In conclusion, it does not seem fair that a conscientious and painstaking soft-serve operator (one who can produce a sanitary product without taking the freezer apart each day for cleaning and sanitizing) should be penalized by having to conform to regulations which were designed mainly for the careless operator.

FARM TANK INCREASE CONTINUES

The eleventh annual Farm Milk Tank Survey, conducted by the Bulk Tank Market Action Committee of the Dairy and Food Industries Supply Association, shows 217,823 farm tanks installed and in use in the United States as of January 1, 1966. The U. S. figure represents an increase of 12,569 in a 12 month period. Canadian figures indicate a total of 17,843 farm tanks installed and in use as of January 1, 1966, an increase of 4,575 in the past year.

The widespread adoption of the farm bulk system of milk handling has been one of the most rapid and revolutionary changes within the dairy industries in recent years. Reviewing U. S. figures and using the survey date of January 1, three years ago (1963) there were 193,580 tanks, six years ago (1960) there were 140,785 and ten years ago (1956) the total was 29,885. The big milk producing areas in the U. S. and Canada, of course, lead in the number of tanks in use. The ten leading states and provinces and the counts for each on January 1, 1966 are as follows: Wisconsin (31,024), Minnesota (21,000), Ohio (14,960), New York (14,578), Michigan (12,475), Illinois (11,337), Ontario (10,653), Pennsylvania (9,770), Iowa (7,987) and Indiana (7,887).

Interestingly, California, a very large milk producer utilizing unique "factory-type" production methods particularly in the southern area, nevertheless ranks 16th with 4,441 farm bulk milk tanks. By contrast, Florida, a big fluid milk consumer relying

to a great extent on big producers, had only 836 tanks in operation. Hawaii had 55 tanks and Alaska 41 tanks and in each case this was less than the figures reported a year earlier.

MICHIGAN IMPROVE CONTROL OF CRACKED EGGS MARKET

Further steps to prevent movement of cracked eggs into consumer channels became effective in April, 1966, through amendment to the state egg law of 1963. "The purpose is to eliminate the hazard of food poisoning traceable to several types of organisms associated with eggs," said J. L. Littlefield, chief of the Michigan Department of Agriculture's Food Inspection Division.

Under the amendment now effective, no dealer may offer cracked eggs for resale except to a licensed egg-breaking plant. Any egg producer, however, may sell cracked eggs to egg grading stations, egg breaking plants, or directly to a consumer for his own family use. This prohibits movement of cracked eggs in the shell to bakeries, institutions, restaurants, hotels or any other eating or processing establishments. This practice was permitted in the past until the law was amended.

By strict controls in the hands of the Michigan Department of Agriculture, cracked eggs move only to licensed egg breakers who are equipped to eliminate the hazard in liquid eggs or frozen eggs.

VARIATIONS IN VOLUME OF MILK DELIVERED BY A STANDARD 0.01 ML LOOP

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SUMMARY

Milk smears were prepared and the weights of milk delivered were determined following use of the syringe and use of the 0.01 ml loop. Large and significant increases in the volume of milk delivered resulted when the angle of the loop with the milk was 20° rather than 90° or when the flat surface of the loop was brought out of the milk in the manner of a dipper. Slow withdrawal of the loop resulted in loss of milk and delivery of small volumes. Delivery of 0.01 ml of milk required that the loop be held in a vertical position and withdrawn quickly, but not with forced rapidity.

The platinum loop, calibrated to deliver 0.01 ml of milk, has been used extensively for counting leukocytes in milk (1, 3, 5). Some limitations have been encountered, particularly the tendency for the loop to pick up an excessive volume of cell-laden fat from the surface of poorly mixed milk (1, 6). With well-mixed milk, leukocyte counts from smears made with the loop using carefully standardized techniques were found not to differ significantly from those made with the syringe¹ (6).

Standard procedure calls for the loop to be withdrawn vertically from the milk (1, 3). It has been observed, however, that workers from different milk quality control laboratories may withdraw the loop in differing ways so that the volumes of milk removed may vary substantially (2). During the course of these studies, it also became evident that the speed with which the loop was withdrawn influenced the volume of milk delivered.

When the milk container is level, the loop is easily withdrawn vertically at an angle of about 90° to the surface of the milk, or it may be withdrawn at angles considerably smaller. When the milk container is tipped, it becomes convenient to withdraw the loop at an angle of about 20°. With the container tipped, the loop may also be used as a "dipper" by bringing it out with the broad surface almost horizontal with that of the milk. Tendencies toward use of each of these procedures have been noted in general laboratory practice.

Because leukocyte counts have become a vital part of many milk quality control programs, any causes of error inherent in use of the loop should be understood. The following observations were made in order to evaluate the nature and magnitude of differences in volume of milk delivered by the loop as a consequence of variations in the manner of withdrawal of the loop from the milk.

METHODS

Milk samples contained in two ounce bottles about two-thirds full were mixed by shaking back and forth 25 times. The milk was undisturbed for three to five minutes prior to each sampling.

Observations on the volume of milk delivered by each procedure were made on 31 smears prepared as follows:

1. After sampling the milk with a 0.01 ml syringe.
2. After withdrawal of the loop at an angle of 20° from the surface of the milk.
3. After bringing the flat surface of the loop upward through the milk while the shank of the loop is held at an angle of 20° from the surface of the milk (dipping).
4. After withdrawal of the loop in a position vertical to the milk surface at a slow leisurely pace.
5. After withdrawal of the loop vertically with care at medium speed.
6. After withdrawal of the loop vertically at a very rapid rate.
7. After withdrawal of the loop vertically, quickly, but without forced rapidity.

Round smears equal to one cm² surface area were made, with the loop on edge, on clean glass slides of known weight. Each slide was immediately reweighed, and the weight of the milk delivered to the smear determined by difference. Counts were made utilizing a working factor of 5,000 (7).

Smears were made, weighed and counted in the same fashion after using the syringe to withdraw the milk and make the smears (1, 4).

RESULTS

The syringe used was found to deliver 0.0101 ± 0.00018 g of milk which is slightly below the optimum value of 0.0103 g (1, 4). The weight of milk delivered by the loop with each of the technics used was found to differ significantly from that obtained with the syringe (Table 1). The actual differences in volume were, however, small in the case of the loop when it was withdrawn quickly or even when it was withdrawn at a very rapid rate. When comparisons were made with a hypothetical syringe delivering 0.0103 ± 0.00018 g, the volume delivered by the loop when quickly withdrawn in a vertical position was not significantly different ($Z = -1.22$).

The volume of milk delivered was markedly and significantly reduced when the speed of withdrawal was reduced to a deliberate (medium) pace or to a slow leisurely pace. On the other hand, the volume of milk withdrawn was greatly and significantly increased when the angle of the loop with reference to the milk surface was reduced to 20° or when the flat surface of the loop was brought through the surface of the milk in the manner of a dipper (Table 1).

Leukocyte counts on these smears varied in a manner apparently proportional to the difference in weights. Because different milk samples of varying cell count were used, the data on counts were not suitable for statistical analysis.

DISCUSSION

Smears satisfactory for counting leukocytes can be made with the loop providing procedures are standardized. The

¹Applied Research Institute, 2 E. 23rd St., New York 10, N. Y.

TABLE I. WEIGHTS OF MILK SMEARS MADE BY DIFFERENT METHODS

Method	Weight (g) range	Weight (g) mean	S.D.	Z
Syringe	0.0098-0.0105	0.0101	0.00018	
Loop 20°	0.0101-0.0151	0.0124	0.00151	- 8.64
Loop 20°-flat	0.0135-0.0203	0.0169	0.00185	-19.8
Loop 90°-slow	0.0061-0.0089	0.0074	0.00064	22.7
Loop 90°-medium	0.0081-0.0113	0.0094	0.00100	3.8
Loop 90°-rapid	0.0100-0.0124	0.0106	0.00064	- 4.2
Loop 90°-quickly	0.0096-0.0116	0.0104	0.00042	- 3.65

correct volume can be very nearly approximated when the loop is withdrawn directly upward with the shank at a 90° angle from the surface of the milk. As the angle between the loop and the surface of the milk narrows a greater volume is obtained. Volume is greatest when the flat surface of the loop is brought through the surface of the milk in a nearly horizontal position in the manner of a dipper. In the presence of a concentration of fat at the milk surface, the resulting discrepancy would be enhanced (1, 6).

The variation induced by the speed of withdrawal is also important. Slow withdrawal allows milk to drain away while the loop is in contact with the milk surface so that less milk is retained. Even a moderately slow rate of withdrawal can be responsible for a major error. A medium rate of speed, which was inadvertently somewhat slower than our routine rate because of extra care being taken, proved to be too slow since the volume removed was too small. When care was taken to withdraw the loop quickly, without hesitation, satisfactory volumes were attained. By forcing rapid withdrawal, a small error on the high side resulted. Error, which can be quite large, is most likely to occur from withdrawal of the loop at a rate of speed which is too slow since one is not naturally likely to withdraw the loop too fast for good results.

Errors which result from small variations in the quick or rapid withdrawal of the loop are small (< than 5%) even though statistically significant. Error of this magnitude can be tolerated in most circumstances where cells in milk are counted, but the errors resulting from slower withdrawal or withdrawal with the loop at the wrong angle or in a wrong position are much too large to be tolerated.

Extreme differences in volume of milk held in the loop can be visualized. After proper withdrawal, the surface of the milk within the loop is flat. After withdrawal in a flat position, the milk surface tends to be convex. After slow withdrawal, the film of milk within the loop becomes very thin or may even break. Wide differences in volume also become evident when the milk is transferred to a glass slide.

Although the syringe is less subject to error in delivering a uniform volume of milk, and is to be recommended for routine use, (1) some workers believe the loop is easier or quicker to handle in making smears. Those who prefer the loop should be especially careful that it is used properly in

order to assure delivery of a standard volume of milk. Actual standardization of technic by quantitative methods is recommended when the loop is used routinely. Those who prefer the syringe should maintain it properly and check the calibration biennially or oftener, if needed.

CONCLUSIONS

1. The loop should be withdrawn from the milk vertically with the shank of the loop perpendicular to the surface of the milk.

2. As the angle between the loop and the milk narrows, an increased volume of milk is removed.

3. When the flat surface of the loop is brought upward through the surface of the milk while in a nearly horizontal position, the volume of milk may be increased about 1.8 times the standard volume.

4. Slow withdrawal allows milk to drain away, greatly reducing the volume retained.

5. Very rapid withdrawal allows retention of an excessive amount of milk within the loop.

6. Proper technic requires that the loop be removed in a vertical position from the milk. The speed of removal must be quick and without hesitation, avoiding a motion which is either too slow or too fast.

7. Use of the syringe, when properly calibrated and maintained, will avoid several errors inherent in use of the loop. The syringe is, therefore, generally to be preferred for withdrawing 0.01 samples of milk for cell counts.

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BRING THE LADIES

The ladies' activities committee has planned exciting items for the ladies during the annual "Sanitariums" meeting. On Tuesday, the 16th, they will tour Minneapolis-St. Paul scenic spots by bus. The day will be highlighted by a luncheon at Diamond Jim's! There will be time to browse (and shop!) the unusual wares of this unique Minneapolis establishment.

On Wednesday, the 17th, Betty Crocker Kitchens will host the gals in the morning. Samples of new products are to be given away. And recipe books! The afternoon will be left free—just in case a shopping might be in order. So come! Bring the ladies—53rd Annual Meeting!

THE NEW THREAT OF CHOLERA¹

No cholera has been observed in the Americas in this century, and since 1923 Europe has been free from it. An epidemic occurred in Egypt in 1947, but with its decline outbreaks ceased to occur in Africa, and cholera retreated to its endemic foci in and around the Ganges delta. Even there its incidence declined, and by 1954 it looked as if the eradication regarded as a feasible aim by the Second World Health Assembly would be unnecessary, since the disease was apparently disappearing spontaneously.

Flare-ups occurred after 1955, however, and since 1961 cholera El Tor has spread from its endemic focus in Sulawesi (Celebes) to many countries in the Western Pacific and South-East Asia, establishing a foothold in areas from which cholera had long disappeared. Indeed, cholera El Tor seems to be invading the endemic areas of classical cholera. These areas, and many of the other places into which cholera El Tor is spreading, have the common characteristics of poor sanitation and poverty, and Russell & Sundararajan's remarks in 1928 still largely apply to them:

"The association of high relative humidity with high temperature, accompanied by intermittent rains, forms the most favourable atmosphere for the development of the disease. The presence of endemic centres from which epidemics spring at short intervals is also a fact which must be accepted. No single factor, however, can be held responsible for the periodic waves of the disease . . . and it must be recognized that these waves are preceded by conditions too complex to admit of complete solution with the aid of available data. Individual susceptibility, foci of infection, favourable atmospheric conditions, fairs and festivals, carriers, insanitary habits, all play their part in a manner which defies analysis."²

Whatever the exact reasons for the present recrudescence of cholera, it is all the more dangerous in that a factor not mentioned by Russell & Sundararajan has now become of vital importance: the speed of modern transport, which means that a person sickening from cholera can step on an aircraft in a cholera area and be thousands of miles away among susceptible people before recognizable symptoms appear.

DIFFERENCES BETWEEN CLASSICAL AND EL TOR CHOLERA

An important point that needs elucidation is whether cholera El Tor is merely a mild variation of classical cholera or essentially a different disease. This has given rise to a good deal of controversy, not yet resolved.

Examining the situation in 1962, a WHO Scientific Group on Cholera Research noted that, in its pathology and physiology, the disease caused by the El Tor vibrio is indistinguishable from that caused by the vibrio of classical cholera. It therefore decided that El Tor infection should be regarded as essentially identical with classical cholera and treated as such. Also in 1962, the Fifteenth World Health Assembly accepted the proposal of the Committee on International Quarantine that cholera should be defined in the International Sanitary Regulations as including cholera El Tor.

CHOLERA CONTROL

Cholera is one of the quarantinable diseases included in the International Sanitary Regulations, which are administered by WHO as a statutory responsibility. These regulations govern all international traffic, so that persons aboard a ship or aircraft coming from areas where cholera occurs are carefully screened, and suspected ships, aircraft, trains, and road vehicles are subjected to certain precautionary measures. The intention of the International Sanitary Regulations is to limit the spread of quarantinable diseases, and the history of cholera shows how successfully this has been achieved in the past.

When cholera breaks out, its prompt suppression depends on early detection, proper diagnosis, and effective treatment. In many of the countries where it occurs early detection is not a simple matter, because the health services are lacking in manpower, the areas where the disease is found are often remote, away from adequate roads, and periodically cut off by floods, and the people are illiterate and unused to calling in the health services for their ailment. WHO has helped alleviate this situation by its efforts to improve the health services in general both in quantity and quality, to encourage health education of the people, and to help in the establishment of the necessary laboratories and rehydration centres. WHO has also made arrangements for a cholera vaccine bank, so that a sufficient amount of vaccine can be made available to countries on request.

¹Adapted from an article in the *WHO Chronicle*, Vol. 19, No. 6, June, 1965.

²Russell, A. J. H. & Sundararajan, E. R. (1928) *The epidemiology of cholera in India*, Calcutta (*Indian med. Res. Mem.*, No. 12).

To give direct assistance in emergencies, WHO set up a cholera team in 1964. The team consists of an epidemiologist, a bacteriologist, and a clinician, and as well as helping to control actual outbreaks it assists in long-term national efforts at control. It worked in the Philippines during the latter part of 1964. In addition to its work, aid has been given by a consultant who visited a number of countries in 1962, 1963, and 1964 to help governments prepare programmes against cholera.

With all this activity in cholera research and control, it is to be hoped that the potential threat re-

resented by the spread of cholera El Tor will be averted. But WHO is well aware that a fundamental prerequisite to cholera control is improved environmental health. Once the population in the countries where cholera occurs have adequate supplies of safe drinking-water and systems for the safe disposal of human excreta the threat of the disease will diminish. This is not to underestimate the part played by, for example, improved standards of living, better public health services (permitting the rapid hospitalization and rehydration of cholera patients), a rise in the level of food hygiene, and systematic health education of the population.

ASSOCIATION AFFAIRS

NOTICE OF PROPOSED AMENDMENT TO BY-LAWS

The Executive Board of IAMFES, Inc. proposes that the By-Laws of the Association be amended as follows:

Article 1, Section 2. The annual membership dues payable to the Association on or before January first of each calendar year shall be determined by a majority vote of the Executive Board. Such determination shall be predicated on the financial needs of the Association as disclosed in the current annual audit by a Certified Public Accountant.

Not less than sixty (60) days prior to such vote a notice to that effect shall have been published in the Journal of Milk and Food Technology.

Provided further, that any dues adjustment shall become effective only on January first of the year following that in which the Executive Board has voted such change.

FRED E. UETZ, President

PAPERS PRESENTED AT AFFILIATE ASSOCIATION MEETINGS

Editorial Note: The following is a listing of subjects presented at recent meetings of Affiliate Associations. Copies of papers presented may be available through the Secretary of the respective Affiliate Association.

CONNECTICUT ASSOCIATION OF DAIRY AND FOOD SANITARIANS, INC.

40th Annual Meeting

Cheshire, Conn.

January, 19, 1966

(Secretary, R. M. Parry, Dept. of Agriculture and Natural Resources, State Office Bldg. Hartford, Conn.)

Loose Housing Standards for the Northeast—*R. P. March*
Effect of Bulk Tank Gauge Rod Storage Methods on Milk Weight Losses—*A. Pernice*

Standards Now Being Considered by the 3-A Committee—*F. E. Uetz*

A Close Look at the Drug Abuse Bill—*Nevis E. Cook*

The AMFair Automated Restaurant System and Sanitary Aspects—*N. N. Potter*

Purifying Water With Ultra Violet Light—*G. Ellner*

CENTRAL ONTARIO MILK SANITARIANS ASSOCIATION

8th Annual Meeting

Etobicoke, Ontario

January 26, 1966

(Secretary, T. Dickison, 57 Aldershot Crescent, Willowdale, Ont.)

Communication Techniques for Sanitarians—*H. J. Neely*

Progress Report on Mastitis Control Programme—*K. A. McEwen*

Chemical Cleaners and Sanitizers—Their Possible Effects on Milk Flavor—*Chater Sen Gelda*

Problems Associated With In-Place Cleaning of Raw Milk Conveyer Systems and Tanker Trucks—*B. E. S.cheib.*

KENTUCKY ASSOCIATION OF MILK AND FOOD SANITARIANS

Conference of Fieldmen and Sanitarians

Lexington, Kentucky

February 23-24, 1966

(Sponsored jointly with the Dept. of Dairy Sciences, University of Kentucky)

(Secretary, Leon Townsend, 2205 Brent Drive, Madisonville, Ky.)

Freezing Point of Milk, Preliminary Report—*T. R. Freeman*
Status of Abnormal Milk Regulatory Programs—*D. J. Conner*
Temperature Control and Bacteriological Quality of Dairy Products—*J. C. Olson, Jr.*

New Products and Concepts for Cleaning and Sanitizing—*R. F. Rintelmann*

New Concepts in Milking—*Lloyd Duncan*

Practical Problems Encountered in Sanitation and Fieldwork—*R. F. Rintelmann*

Interrelationships Between Bacteriological Methods of Examining Farm Bulk Tank Milk—*J. C. Olson, Jr.*

What is Happening to Kentucky's Milk Production—*E. C. Scheidenhelm*

Present Brucellosis Testing Situation—*L. T. Fisher and R. J. Henshaw*

Setting up a Total Farm Program for Manufacturing Milk Producers—*H. L. Hunt*

Results of USDA Study of Manufacturing Milk Quality—*J. C. Olson, Jr.*

Selling Farmers on an Adequate Forage Program—*Warren Thompson*
 Milking Machine Operation in Relation to Quality Milk—*J. O. Mead*
 Requirements for a Liquid Manure System—*Harvey Hamilton*
 What is the Select Sire Program?—*R. L. Conner*

MICHIGAN ASSOCIATION OF SANITARIANS

22nd Annual Conference
 on Environmental Sanitation
 Gull Lake Conference Center
 March 15-16, 1966

(Sponsored jointly with Michigan State University)
 (Secretary, T. J. Kilmer, Oakland County Health Dept. 1200
 N. Telegraph Rd. Pontiac, Mich., 48053)
 New Pasteurization Requirements for Egg Products—*L. E. Dawson*
 Tuberculosis in Michigan Deer Parks—*David Towar*
 Water and Food-Borne Viruses—*Maurice Becker*
 Effective Sampling in Food Control Programs—*Harold Faig*
 Controlled Environments for Food Storage—*Donald Robach*
 Our Recreational Areas—Sanitation Problems and Programs—*Robert Novick*
 Effective Photography as a Program Aid—*George Jennings*
 Atomic Energy and the Environment—*Gerald J. Walke*
 Federal Programs for Environmental Health Planning at the
 State and Local Levels—*Oscar Sutermeister*
 Can We Recover all the Organisms from Food and Water?—*W. L. Mallman*

MISSOURI ASSOCIATION OF MILK AND FOOD SANITARIANS

34th Annual Milk and Food
 Sanitation Conference
 Columbia, Missouri
 April 4-6, 1966

(Sponsored jointly with Dept. of Dairy Husbandry and Ex-
 tension Div., Univ. of Missouri and Missouri State Di-
 vision of Health)
 (Secretary, Erwin P. Gadd, 424 Ridgewood,
 Jefferson City, Mo.)

GENERAL SESSIONS

The Merit System and the Sanitarian—*Harold Patrick*
 Educational Opportunities for Sanitarians—*Stanley L. Silberg*
 Federal Programs Related to Environmental Health—*H. Clifford Mitchell*
 Inter- and Intra-Agency Communications—*Joe Reichart*
 Characteristics and Relationship of Microorganisms—*Harold Bensch*
 Cleaning With Cold Water and Biodegradable Detergents—*J. E. Edmondson*
 Quats, Hypochlorites, and Iodophors—*David Weddle*
 New Laboratory Procedures for Milk Plants—*L. B. Garrett*
 Lagoons—What is One?—*John Schlandmeyer*
 New Legislation Pertaining to Solid Wastes—*Charles Wright*
 Water Resources—*Clifford Summers*
 Pesticides—*George Thomas and John Campbell*

FOOD SECTION

Salmonella in Egg Products—*Owen Cotterill*
 Sanitary Control of Vending Machines—*William Goldman*
 Grease Fire Control—*John Dinneen*
 Food Salvage Problems and Control—*Vincent Foley*
 Cereal and Other Food Infesting Insects—*Tom Hugel*

ENVIRONMENTAL SECTION

Ice Manufacture and Dispensing—*Jerry Lemonds*
 Bird Infestation and Material of Control—*Lyle D. Goodhue*
 New Raticides—*Earl Forbes*
 Radiological Health—*Warren G. Hansen*
 Air Pollution—Its Causes, Effects, and Significance to Sanitarians—*Charles M. Copley*

MILK SECTION

Plastic Jugs—Problems and Benefits—*Owen D. Larrison*
 New Developments in Disease Control—*Joyce DeWeese*
 Screening Tests for Bulk Milk—*R. T. Marshall*

PAT DOLAN PROMOTED

California Director of Agriculture Charles Paul announced the appointment of Patrick J. Dolan as Regional Administrator, Bureau of Dairy Service, California Department of Agriculture, with headquarters at Fresno. He will succeed the late George L. Hasler who held the state civil service position for the past several years.

Mr. Dolan held first place on a civil service list of eligibles. He has been an employee of the Bureau of Dairy Service since 1942, and his most recent assignment was District Supervisor with headquarters in Sacramento. Pat comes from a dairy family. His father, the late Patrick J. Dolan, Sr., operated a large producer-distributor dairy in Los Angeles County. He received his early training in the dairy industry as an employee in the family dairy. He has been a member of the IAMFES Committee on Sanitary Procedures for several years and long has been active in promoting dairy equipment standards on the West Coast.

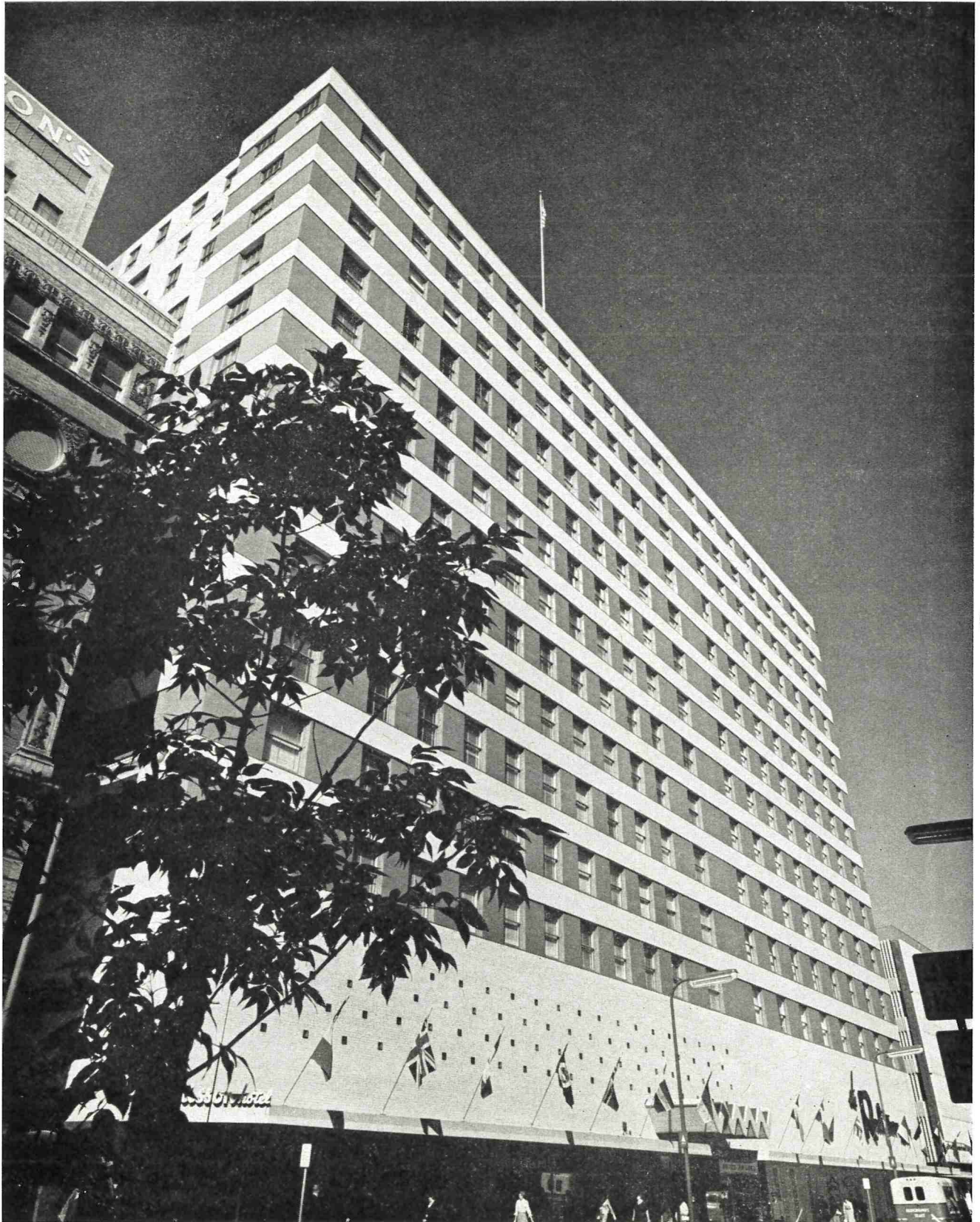
CLYDE N. MONDA ELECTED PRESIDENT OF NADEM

Elected as directors of the National Association of Dairy Equipment Manufacturers at its 21st Annual Meeting held at the Kenwood Golf and Country Club, Bethesda, Maryland, on May 24 to serve for a three year term were George Hamilton, Product Manager, Whirpool Corporation, St. Paul, Minnesota; and Robert L. Nissen, General Sales Manager, Ladish Company, Tri-Clover Division, Kenosha, Wisconsin.

Clyde N. Monda, Vice President, Sales Pumps, Waukesha Foundry Company, Waukesha, Wisconsin, was elected President of the association at the Board of Directors meeting immediately following the Annual Membership Meeting on May 24. G. F. Barnum, Division Sales Manager, Taylor Instruments Company, Rochester, New York, was elected Vice President and Mike Hughes, Vice President and Sales Manager, Stainless & Steel Products Company, St. Paul, Minnesota, was elected Treasurer.

Clyde Monda succeeds Walter Z. Meyer, who is retiring President of NADEM and Secretary and Sales Manager, Food Processing Equipment Division, Paul Mueller Company, Springfield, Missouri.

At the Board of Directors meeting on May 24, John Marshall was re-appointed as Executive Vice President and Secretary, and the firm of Fistere and Habberton was again retained as General Counsel for the ensuing year.



Hotel Radisson site of 53rd Annual Meeting of International Association of Milk, Food and Environmental Sanitarians, Inc.

NEWS AND EVENTS

NEW NRA BOOKLET ON EMPLOYEE SAFETY

The National Restaurant Association has released a new booklet entitled "An Employee Safety Message for Food Service Operators." This is the second in a series of publications designed to aid and counsel its members in common problems of operation. The first booklet "A Food Protection Message for Food Service Operators" released last year emphasized the costly consequences of foodborne illnesses.

The new booklet, also using the medium of actual case histories, points out the harmful effects and dollar impact on an establishment's business resulting from situations not directly related to sales. The subject this time is employee safety and information is presented to show the restaurant operator the importance of careful hiring and the need for removal of hazards to reduce the likelihood of employee injuries.

Four key points are emphasized as follows: (1) Pre-employment checks are extremely important. Blind hiring can be very costly. (2) Training and constant supervision are both a must to insure understanding and safe performance. (3) Identifying and eliminating hazards and maintaining equipment in good repair will remove the hazard from the employee. (4) Insisting on safe practices is absolutely essential. Do not tolerate or excuse unsafe acts.

In distributing the pamphlet to NRA members, Mr. Donald Greenaway, Executive Vice-President, expresses the hope that it will "help to reduce costly and interruptive employee accidents and injuries."

FOUR MORE STATES ADOPT USPHS MILK ORDINANCE

The States of Alaska, Michigan, Montana, North Dakota and Utah have adopted the latest USPHS Grade "A" pasteurized milk ordinance. In addition, Weber County, Utah, and three municipalities, Battle Creek, Michigan, and Grinnell and Des Moines, Iowa, have also adopted the new standards, known officially as "The Grade 'A' Pasteurized Milk Ordinance—1965 Recommendation of the U. S. Public Health Service."

The new standards, as well as earlier versions published over the past 40 years, are used as the basis of milk sanitation law or regulations in 39 States and have been adopted by over 2,000 local communities with a total population of over 110,000,000 persons.

The original recommended standard, known as the "Standard Milk Ordinance," was issued in 1924. To

provide for uniform interpretation by State and local health officials, the Public Health Service has been publishing accompanying codes since 1927. The 1965 standards represent the 13th revision since 1924 and incorporate new knowledge into public health practice. Significantly, the new standards, unlike previous ones, apply only to pasteurized milk. They thus, in effect, do not recognize as acceptable the retail sale of raw milk in any State or community that adopts the standards.

Malcolm C. Hope, Acting Chief of the Division of Environmental Engineering and Food Protection, said: "During the past decade, problems associated with the sanitary control of milk and milk products have become extremely complex because of new products, new processes, new chemicals, new materials and new marketing patterns. These must be evaluated in terms of their public health significance. The 1965 recommendations of the Public Health Service translate the new marketing, processing and other developments in milk and food technology into successful and practicable health practices for State and local health officials."

CRUMBINE AWARDS TO SOUTHERN AND WEST COAST COUNTY HEALTH DEPARTMENTS

Winners of the 12th annual Samuel J. Crumbine Awards to local health agencies have been announced. The Imperial County Health Center, El Centro, Calif. was cited for its outstanding program in food and drink sanitation while the Jefferson County Department of Health in Birmingham, Ala. was honored for its environmental health program.

Announcement of the winners was made by William V. Hickey, spokesman for the Crumbine Awards jury, which is made up of eminent public health officials and educators. The contest is sponsored by the Public Health Committee of the Paper Cup and Container Institute, New York City.

This year's winner of the food and drink sanitation award is a county community of 72,000 persons in southern California. Although mainly an agricultural area, Imperial County has some unique problems, including the seasonal change in population, because of tourists as well as the influx of workers from Mexico during the harvest season. But with inventive methods, the jury noted, the health department attained excellent results in its programs for training sanitarians, reviewing individual problems in food establishments and developing methods

to cope with chronically occurring food service difficulties.

Jefferson County, recipient of the environmental health program award, has a population of about 700,000 persons. The jury especially recommended the Birmingham based health department for its long-range planning and its methods of keeping the public aware of health problems through the press, radio and television. Basically industrial, Birmingham has the needs of most big cities. The health department, the jury felt, provided an effective new program for housing, accident prevention and radiological health without neglecting established programs such as food protection and milk sanitation.

"Although all of this year's entrants showed evidence of increased awareness of new problems as well as a continuing fight against the old ones, the jury felt the two agencies chosen as the winners did an extraordinary job in accomplishing tangible results that should serve as a model for other health departments throughout the country," Mr. Hickey said.

Dr. Samuel J. Crumbine, for whom the awards are named, was a public health pioneer until 1954 when he died at the age of 91. He was instrumental in getting the State of Kansas to outlaw such unhealthy practices as the use of the common drinking cup and the communal towel. He had become almost a legendary figure around 1885 in Dodge City where he practiced medicine prior to becoming the state health officer and, subsequently, the general executive of the American Child Health Association.

As a state health official, his fight for sanitary practices included such episodes as going through railroad coaches tearing metal drinking cups from walls to prevent the spread of disease. Although he usually depended upon gentle persuasion and education to correct some of the health hazards of that day, he was known to be equipped with a six-shooter beneath his Prince Albert coat—just in case.

Members of the jury were Ralph T. Fisher, director, Division of Special Consultant Services of the New Jersey State Department of Health; Verdun Randolph, Assistant Chief, Division of Sanitary Engineering, Illinois Department of Health; Mrs. Winona Banister, Executive Secretary, Society of Public Health Educators; Dr. George J. Kupchik, Director of Environmental Health, American Public Health Association; Dr. Harald M. Graning, Chief, Division of Hospital and Medical Facilities, United States Public Health Service; and Harold S. Adams, Associate Professor, Department of Public Health, University of Indiana.

Previous winners of the Crumbine Awards for environmental health were: New York City Department of Health, 1955; Mason-Bibb-Jones Health District, Macon, Ga., 1956; San Diego Public Health Depart-

ment, 1957; Los Angeles Health Department, 1958; Salt Lake City Board of Health, Salt Lake City, Utah, 1959; San Bernardino Health Department, San Bernardino, Calif., 1960; Philadelphia Department of Public Health, Philadelphia, Pa., 1961; Seattle-King County Department of Public Health, Seattle, Wash., 1962; Lake County Health Department, Waukegan, Ill., 1963; Orange County Health Department, Santa Ana, Calif., 1964, and Albuquerque Health Department, Albuquerque, New Mexico, 1965.

Previous food and drink sanitation award winners were: Cowlitz-Wahiahum District Public Health Department, Kelso, Wash., 1955; Tulsa City-County Health Department, Tulsa, Okla., 1956; San Jose Health Department, San Jose, Calif., 1957; Spokane City Health Department, Spokane, Wash., 1958; San Diego Department of Health, San Diego, Calif., 1959; Health and Hospital Corporation of Marion County, Indianapolis, Ind., 1960; Albuquerque Health Department, Albuquerque, New Mexico, 1961; City of Rocky Mount Health Department, Rocky Mount, North Carolina, 1962; Hamilton County Health Department, Cincinnati, Ohio, 1963; Orange County Health Department, Santa Ana, Calif., 1964, and Spokane County Health Department, Spokane, Wash., 1965.

As a result of its sponsorship of the Crumbine Awards program over an 11-year period, the Paper Cup and Container Institute last year received an Award of Merit from the American Society of Association Executives.

MICHIGAN LABELING REQUIREMENTS FOR HOUSEHOLD HAZARDS

Common household products that present a hazard to children or others must be better labeled in the future so persons are forewarned of the danger involved. This is the intent of a new Michigan state law that became effective in April, 1966.

Among the potentially hazardous substances are ammonia, cleaning materials, polishes, paint thinners, fuels and all flammable materials or toxic substances.

The new labeling law makes enforcement the responsibility of the Michigan Department of Agriculture whose Food Inspection Division already checks on the wholesomeness of food, the honesty of its labeling and advertising, and the accuracy of scales and all other weighing or measuring devices. The new state law is similar to a 1960 federal law on the same subject.

"Keep out of the reach of children," is the warning statement that must appear on all items presenting a threat to children. Hundreds of lives of youngsters are lost each year through their getting into haz-

ardous substances. Also there are thousands of injuries, some of which are permanent.

"In addition to the hazardous substance labeling law, extra precautions should be taken by collecting all such materials in the home and putting them in one place under lock," said Food Inspection Division Chief J. L. Littlefield.

FOOD HANDLERS GO TO SCHOOL

H. A. CATE

*Cooperative Extension Service
University of Illinois, Urbana*



John Cipolla, Chief Sanitarian of the Quadri-County Health Department, addresses Pope County class of food handlers.

Food handlers of Pope, Hardin, Johnson, and Mascas counties, in southeastern Illinois, have learned the basics of food sanitation. In a course taught by the Quadri-County Health Department, they learned about health codes, germs and bacteria, food poisoning, cleaning and sanitizing, pest and insect control, grooming, and personal sanitation. John Cipolla, Chief Sanitarian for the Health Department who conducted the course said that 437 food handlers completed the lessons. This number represents more than eighty per cent, of the food handlers in the area. The *Health Officers Digest* awarded the Quadri-County group the Honor Roll Award for the most successful health classes in the midwest.

Growing tourist interest in southern Illinois provided impetus for better food service. Annual visits to parks and the Shawnee Forest land in the area are estimated to exceed six million, and an improved highway system will bring more and more visitors from greater distances. The need for better food

services became apparent to the Area Resource Development Committee. A special committee of this group, with members from the Cooperative Extension Service, Quadri-County Health Department, hotel, motel, and restaurant associations, tourism and recreation councils, and Southern Illinois University, developed plans, gave support, and stimulated public interest in the Quadri-County food handling schools.

Personal contacts were made; letters and the course outline were mailed to every food handler. The letters varied in content and were directed to the specific food handler, whether grocer, waitress, packer, restaurateur, school cook, prison employee, or tavern operator.

Class schedules were arranged for the convenience of the food handlers. Three classes—morning, afternoon, and night—were held one day a week for ten weeks in each of the four counties. High school students who hope to work in food handling during the summer months were encouraged to attend the afternoon sessions.

INDUSTRY SUPPORT

Mr. Cipolla says that the excellent publicity given the program by newspapers, radio, and television contributed greatly to the interest and record attendance at the food handling classes. Industries, business men, chambers of commerce, and service clubs encouraged the program and pledged financial support to pay for the pins and diplomas. At the graduation ceremonies, Cipolla praised the cooperation that he had received from the many agencies, organizations, and groups and stated, "The Health Department had neither the funds nor the manpower to accomplish what has been done. The success of this course proves that several organizations can work together to get a job well done."

Food handling businesses completing the Quadri-County course may display distinctive window decals to be promoted by tourism groups. Symbols of the decals are to be used on recreation maps, guides, and other promotional materials. The decals represent standards of quality which identify the establishments displaying them as those who participated in the program for the benefit of the tourist.

PROGRESS SINCE COURSE

Nothing succeeds like success. Cipolla said, "The small minority of food handlers in the Quadri-County area who did not take the course now realize that they are in the small minority and are asking for make-up classes." The Quadri-County success has awakened interest in adjoining counties. These counties are asking for help and information not only on food sanitation but on other health problems such as air and water pollution.

Several restaurant owners have applied fundamentals learned in the course by installing new dish drying racks, replacing booth cushions with improved seamless cushions, and are asking the advice of the Health Department in their remodeling plans. Grocers have installed improved sinks and a meat packing plant is planning to remodel following the Health Department guidelines.

The Health Department plans to continue inspection services and advice to food-handling businesses. New courses are being planned with future lessons to concentrate on new foods and foods processed under new methods.

REVIEW SOLID WASTE PROBLEMS AT CALIFORNIA CONFERENCE

The development of new management science techniques offers the prospect of eventual solution of the Nation's worsening solid wastes disposal problem. This is the view of participants in the First National Conference on Solid Wastes Management April 4 and 5, 1966, on the Davis campus of the University of California.

"The availability of computer technology and other new management tools plus rising public interest in improving the national environment justify cautious optimism toward the problem," Wesley E. Gilbertson, Chief of the Public Health Service's Office of Solid Wastes, told the conference. Jointly sponsored by the University and the Public Health Service of the U. S. Department of Health, Education, and Welfare, the conference was attended by 350 health authorities, scientists, engineers, and government officials from all sections of the country.

"I think that we are now, for the first time in history, on the road toward resolution of the solid wastes problem," Mr. Gilbertson said. "This is full awareness of the fact that the burden of solid wastes is going to spiral upward during the next two decades. This country, by and large, is ill prepared to deal with this problem in its present dimensions, to say nothing of what the future will bring."

The Office of Solid Wastes has underway a comprehensive program, authorized by the Solid Waste Disposal Act of 1965, to support research and training, projects for demonstrating new solid waste management technology, and planning for Statewide and interstate wastes disposal programs.

Speakers at the conference identified four major areas in which new concepts and practices need to be introduced in working toward effective solid wastes management. Data processing and computer procedures and other scientific management techniques will have to be employed with each innovation be-

cause of the multiplicity of scientific, engineering, economic, and political factors involved.

The first need, it was agreed, is to end the fragmenting of solid waste operations among small political subdivisions, a practice now prevailing in many sections of the country, and to foster waste management integration in disposal districts embodying communities with common waste problems and often crossing State lines. "Much of what is wrong with solid wastes management in the United States," said Ralph J. Black, Assistant to the Chief of the Office of Solid Wastes, "can be attributed to the fact that waste disposal responsibility often is relegated to political jurisdictions too small to have sufficient resources for the job. No more than nine States have adopted legislation authorizing cities, counties, and other political subdivisions to establish waste disposal districts."

Consolidation of waste management with planning for air and water pollution control was identified as another major need. Isolated waste management planning, it was pointed out, may produce solutions which worsen air and water pollution through atmospheric dispersal of waste combustion products or the leaching of contaminants into ground water.

A third major concept which must drive and shape solid waste management in the future will involve a shift in the present emphasis on the nature of solid wastes to consideration of the environmental consequences of their disposal, according to Frank M. Stead, Chief of the Division of Environmental Sanitation, California Department of Public Health. "Wastes must be managed within the assimilative capacity of the environment," Mr. Stead said. He pointed out that in many parts of the country the capacity of air and water to assimilate new wastes is approaching zero.

A fourth major need is for new emphasis on research for reduction of wastes at the source through the introduction, for example, of manufacturing processes which produce less solid wastes or the development of packaging which safely disintegrates in the environment. "The best kind of pollution control is not to produce the waste," said R. F. Weston, a Philadelphia consulting engineer.

High priorities also were urged for research on recycling wastes in manufacturing processes and salvaging usable materials and energy from wastes as well as for the development of improved waste disposal methods. Waste disposal technology was estimated by Mr. Weston to be from 5 to 20 years behind air and water pollution control.

In urging the application of systems analysis, or scientific management, principles to the solid wastes problem, Dr. John A. Logan, President of Rose Polytechnic Institute, Terre Haute, Indiana, called for

the development of "highly qualified 'generalists'—men able to correlate knowledge in different fields in a meaningful and predictable way." Dr. Logan stated that there is a logical argument that engineering is now taught backwards, producing specialists in various technical disciplines instead of graduates with "broad systems understanding" which puts engineering, economic, social, and other problems in perspective.

"If we are not to march blindly ahead into a chaotic world of uncontrolled application of scientific discovery, professional responsibility must be assumed not only by politicians and statesmen, but by scientists, engineers, agriculturalists, and physicians," Dr. Logan said.

In a special message to the conference, California Governor Edmund Brown urged all possible speed in putting waste management practices in order. "We are on a collision course with disaster unless we completely revolutionize, in a few short years, patterns which have undergone relatively little change in the last three decades," Governor Brown said.

GOVERNMENT STRENGTHENS PESTICIDE CONTROLS

The Federal Government moved April 8, 1966 to strengthen controls over pesticides in food. Tolerances will be fixed for safe low levels of pesticides occurring inadvertently in some foods. The practice of allowing the use of pesticides on a "no-residue" basis will be ended because it is not realistic. Where a safe, low-level tolerance cannot be established, "zero-tolerances" will be set as a basis for removing contaminated foods from the market.

The new approach in setting tolerances for residues of pesticides in foods was jointly announced by Secretary of Health, Education, and Welfare, John W. Gardner and Secretary of Agriculture Orville L. Freeman. The interdepartmental agreement follows recommendations made last summer by a National Academy of Sciences-National Research Council (NAC-NRC) Committee that looked into minute pesticide residues in foods.

Federal pesticide registration is handled by the Pesticides Regulation Division of USDA's Agricultural Research Service under the Federal Insecticide, Fungicide, and Rodenticide Act. Products are accepted for registration only on the basis of proven safety and effectiveness. The Food and Drug Administration is responsible for setting safe pesticide residue tolerances under the Federal Food, Drug, and Cosmetic Act. It is the responsibility of the manufacturer to submit safety data for tolerance to FDA. The Public Health Service is participating in

the review of any proposed uses of pesticides from the standpoint of human health.

Most "no-residue" pesticides currently registered by USDA will be discontinued for food use by December 31, 1967, unless a tolerance has been set by FDA or enough progress has been made to determine safety limits to warrant their continued use. In some cases there is no expectation of even a minute residue of the pesticide remaining on the food when the pesticide is used as directed. These pesticides will be unaffected.

Many pesticides were previously accepted by USDA for label registration on a "no-residue" basis because no residue was detectable in food by the analytical methods then available. However, the "no-residue" and "zero-tolerance" concepts have gradually become the subject of concern as more sensitive methods for detecting trace amounts of residues have been developed. These new methods have shown that it is reasonable to expect that the use of many pesticides will result in small residues in some foods.

The new procedure provides a means to establish minute tolerances for these pesticide residues in foods when such tolerances are safe. Both USDA and HEW agreed that the "zero-tolerance" concept cannot be totally abandoned. It is necessary to control the misuse of registered pesticides and the incidental contamination of crops by pesticides for which safe tolerances cannot be established.

COLD vs. HOT WATER IN MECHANICAL CLEANING¹

Cold water washing has periodically been a subject of discussion. When queried, some chemical manufacturers will respond that all their cleaners have cold water cleaning capabilities—but—hot water enhances proper cleaning of milk handling equipment from a chemical activity standpoint.

The soils most commonly encountered on milk handling equipment are butterfat and protein. They cannot effectively be removed without utilizing the proper combination of detergency, physical action, temperature, or compensating factors for variances.

When the detergent concentration factor is determined to provide adequate soil conditioning, hot water aids soil suspension and removal. In addition, there is a lack of bacterial control with cold washing as revealed by a recent USDA (Agricultural Research Service) report.

Suggested temperature for mechanical cleaning is 155-160 F. Compensation can be made for any slighting of the temperature factor by stepping up the detergent concentration. When it becomes necessary to increase the amount of detergent use, due

to improper water temperature, one must consider added cost. A rise in temperature of 17° will double the chemical activity (not physical). It is much more inexpensive to increase temperature than double the amount of cleaner used. In a simple comparison—temperature can be considered as a catalyst—"makes things work"—so why not make use of it!

We must also remember that low temperatures have a direct effect on possible soil re-deposition during an extended wash cycle. Seasonal temperature changes certainly have an effect.

Regulatory agencies recognize the importance of temperature to the point of requiring a minimum starting temperature, *adequate* hot water heating facilities, and in some cases require facilities for maintaining a certain temperature level during the wash cycle.

Cleaning of milk handling equipment still remains a chemical operation involving time, detergent concentration, and temperature. Commercial "cold water detergents" should be relegated to the household and clothes washing—and even then hot water improves the results.

¹Maryland and Virginia Milk Producers News, April, 1966.

WISCONSIN BULLS LIVE LIFE OF RILEY¹

From all points across the nation some 100 bulls, representing the elite of beef and dairy bulls, have been brought together in Wisconsin. Their activities are under strict security measures. They lead pampered lives in a "castle" of conveniences. There is only one way in which these bulls differ from royalty: they work for a living but its only a one-hour work week.

Operated as a world-wide artificial breeding service by the American Breeders Service, Inc. of DeForest, Wisconsin, the production record of this "factory-on-hooves" is quite impressive. Last year the 64 dairy bulls artificially serviced an average of 4000 cows per day. At a typical service fee of \$6 this certainly is big business, warranting the utmost in care of the semen producing animals and handling of their product.

All aspects of modern veterinary science are utilized in the operation of the stud farm. Initially, bull calves from selected parents are purchased from professional pure bred breeders and the young bulls undergo a five year costly testing program to determine which, if any, are qualified. At the American

¹Based on a feature article in the Madison, Wis. *Capitol Times*, Feb. 28, 1966.

Breeders Service establishment three full-time veterinarians work with the mature bulls and the several hundred young bulls in various stages of testing and each bull endures a total of 78 tests and vaccinations each year.

The utmost in the way of environmental sanitation and maintenance is applied to insure comfort and contentment for the producing bulls. There are no irritating flies and insects and filtered humidity-controlled air gives the barn a comfortable year-round temperature of 55 to 60 degrees. Under the stall's wood-chip bedding is an electrically-heated rubber floor guaranteeing a warm, dry stall.

A manure disposal system and recirculated fresh air practically eliminates barn odor. Controlled feeding insures controlled weight and a 40 minute walk on a power-driven artificial exerciser gives each bull a mile walk several times a week. Stalls are even equipped with infrared lamps to provide the equivalent of an Arizona climate. A loud speaker system plays soft music as a final touch in this life of royalty.

In return for all this the bull earns his keep by twice weekly donating several ccs. of semen which is tested for fertility and frozen in liquid nitrogen at a minus 320 degrees. It can be kept indefinitely until called for by a dairyman anywhere in the U. S. or foreign country. Semen from a bull deceased 12 years is still frozen and when sampled is found to be still fertile.

Unfortunately, this bull story does not have a pleasant ending. One would assume that, having lived the life of Riley, the bull would be retired to the leisure of a well-kept pasture when his reproductive fertility reached a certain minimum. Not so. In spite of his elite standing he goes the way of all bovine flesh—to the slaughterhouse.

"HOT TIPS FOR FOOD PROTECTION"

The PHS Milk and Food Branch has just released a new leaflet entitled "Hot Tips for Food Protection." Well written and readable, the leaflet is designed for general distribution.

Emphasizing the importance of heat in the preparation of certain types of food, the brochure urges complete cooking of foods high in protein and moisture, such as milk products, meat, poultry and eggs, fish and shell fish, cream pies and custards. Common organisms capable of producing food-borne illness through under-cooked and under-protected foods are reviewed and recommendations are made for proper preparation of potentially hazardous foods.

The leaflet is available from the Superintendent of Documents, Government Printing Office, Washington, at 10c per copy or \$5.00 per hundred.

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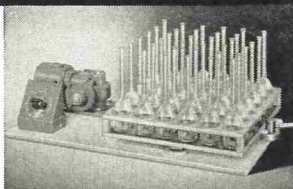
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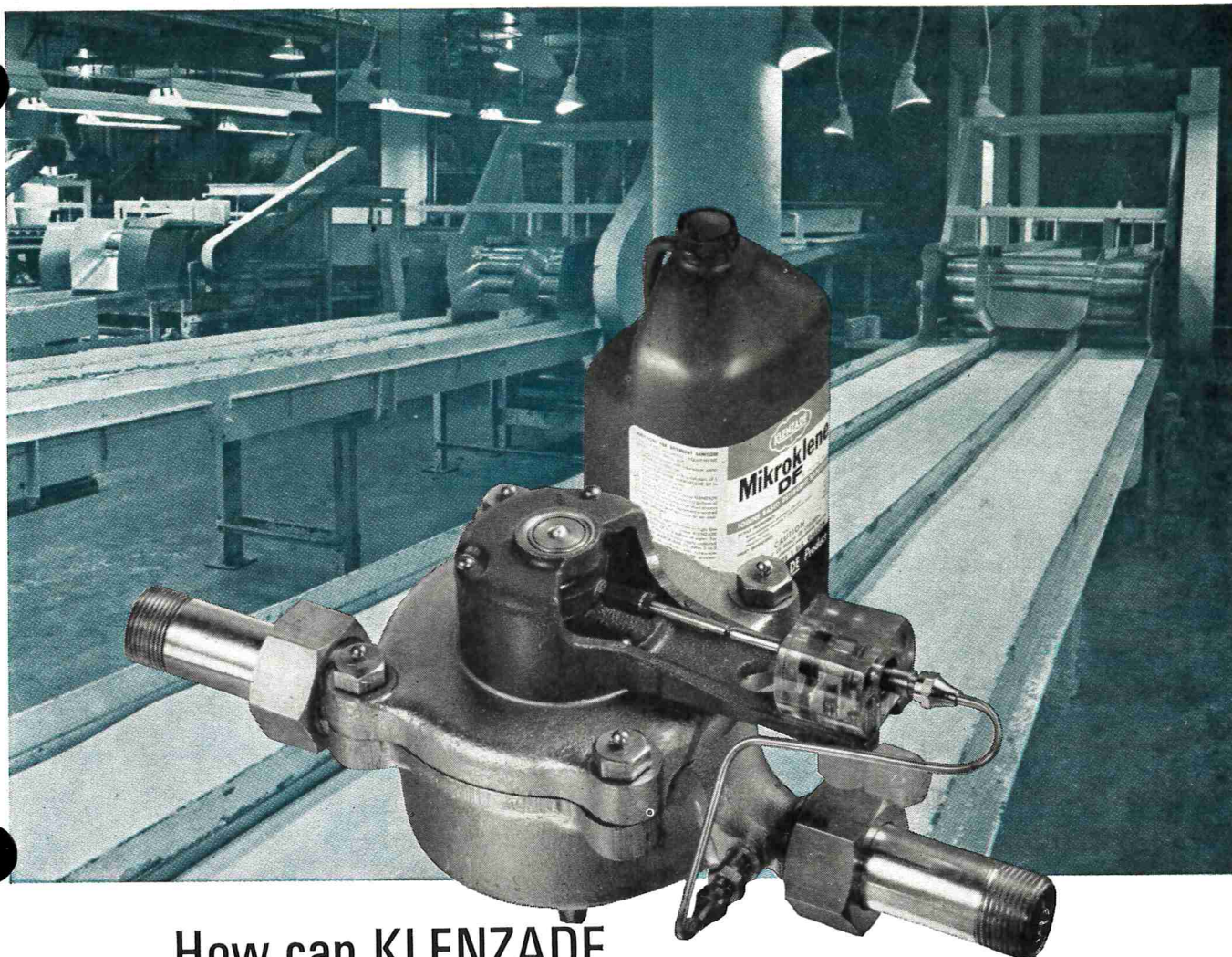
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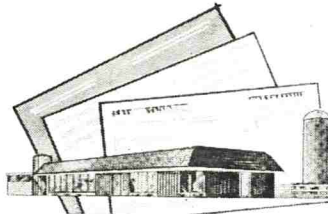
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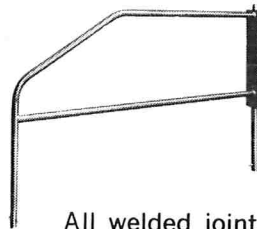
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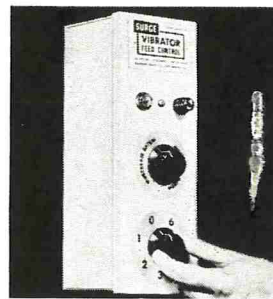
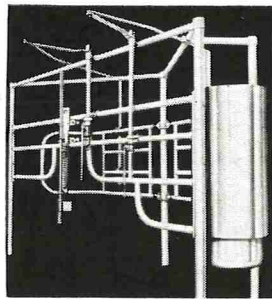
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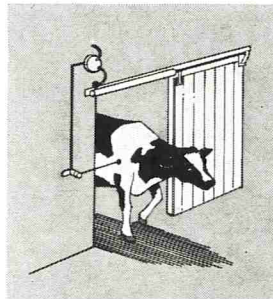
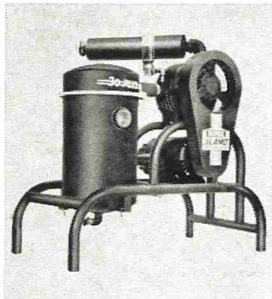
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