SANITIZATION — WHAT DOES IT MEAN?

The word “sanitize” appears in Funk and Wagnall’s New Standard Dictionary, 1913. Sanitize means “to apply sanitary measures to; to bring into condition conducive to health.”

The word “sterilize” means to free of living microorganisms as by physical or chemical means.

Glassware and media are sterilized in the laboratory by the application of dry heat at 180° C. for the former and moist heat at 121° C. for the latter.

When heat or chemical agents are applied to restaurant dishes or dairy utensils, it has been common practice to state that they have been “sterilized” although it is known that only a diminution of microorganisms has occurred. It is seldom that sterilization is accomplished under practical conditions, although the physical or chemical treatment has been effective enough to kill all common non-spore forming pathogens and many of the vegetative cells of non-pathogenic bacteria.

The process of physical or chemical treatment when properly applied to utensils is comparable to the extent of microbial kill to the pasteurization of milk. Pasteurization is not necessarily sterilization. Pasteurized milk is never sterile.

There is a need for a word to cover the process of rendering equipment such as dairy utensils and restaurant dishes free of public health hazard. The word sanitize—to bring into condition conducive to health meets the need. The process of rendering free of public health hazard then would be sanitization.

The words sanitize and sanitization are in current use and have been used since 1937. Let’s use sterilize and sterilization correctly so no one will misunderstand.

W. L. Mallmann
"IN UNION THERE IS STRENGTH" *

There is no better indication of the widespread interest in sanitation in the food industry than the appointment by a considerable number of food processors and food industry associations of Sanitation Directors to develop modern sanitation control programs.

The men given the responsibility for devising and supervising sanitation programs have felt the need for contacts with others in the same or related fields to exchange information and experiences, which would be helpful in carrying out their assigned duties. The modern sanitation concept is such that almost all sciences and professions can contribute something to its achievement. There is need for the expert council of public health engineers, chemists, bacteriologists, entomologists, public health officials, machinery design and building construction engineers, administrators, training experts, and other specialists.

As a natural result of the realization of this need, a number of more or less similar organizations have developed. Such groups as the "Association of Food Industry Sanitarians" and the "National Committee of Food Sanitarians," to mention only two, have aims which are essentially similar.

The next logical step would appear to be an amalgamation of the various groups into one strong national organization representing all the various branches of the food industry. A strong national association could be very valuable to its individual members and to the further advancement of the profession. Some of the advantages of a national association would be its ability to:

(a) Help standardize sanitation codes.
(b) Promote uniform legislation.
(c) Promote advanced machinery design.
(d) Publish sanitation information bulletins, etc.
(e) Promote research.
(f) Bring together groups more representative of the full field of food industry sanitation.
(g) Attract outstanding speakers to its meetings.

Present local groups and other local branches which may be formed could continue as regional branches of the national organization. The advantages of local groups in holding frequent meetings along lines close to the specific interest of most of its members should be encouraged. Affiliation with a unified national association should help in obtaining company approval of membership and attendance at such meetings.

Officers and members of the several associations of sanitarians in the food field should find this a worthwhile subject for discussion and consideration.

A NEW METHOD FOR THE EVALUATION OF QUATERNARY AMMONIUM DETERGENT SANITIZER FORMULATIONS *

G. R. Goetchius and W. E. Botwright
Research Laboratories, the Rohm & Haas Company, Philadelphia, Pa.

When the quaternary ammonium compounds made their appearance as a new group of germicides, the phenol coefficient test was used almost exclusively as a laboratory measurement of bactericidal potency. It soon became apparent, however, that the phenol coefficient test did not afford a reliable guide to the disinfectant properties of germicides differing chemically from the phenolic or cresylic type.1, 2 As pointed out by Reddish,3 the misuse of the phenol coefficient test by various modifications has resulted in considerable confusion as to the real merits of quaternary ammonium germicides.

Quisno et al.4 presented data to show that deviations in test method can cause considerable variation in the apparent antibacterial power of quaternaries, and emphasized that studies on disinfectant action should not be devoted toward the development of a single test procedure but toward establishing a number of tests corresponding as closely as possible to actual use conditions. A test designed especially to evaluate chemical compounds as sanitizing agents for use in food handling equipment was devised by Johns.5 In this technique, the lower half of a sterile glass slide is immersed in a suspension of Staphylococcus aureus (200,000,000 bacteria per ml) in a 1:10 dilution of sterile skim milk. After draining, the slides are immersed in the sanitizing solution, agitated for a given period of time, and placed in sterile petri dishes which are poured with agar. The time required for 99.9 percent destruction of the bacteria is taken as the endpoint. By measuring the degree of destruction obtained against bacteria semi-dried on a glass surface, rather than rate or amount of bactericidal action in liquid medium, a much more realistic approach is made to the practical significance concerning the use of the test materials in food utensil sanitation.

In the field of dairy sanitation, the most recent trend has been toward the use of the quaternary ammonium detergent sanitizer. These mixtures are prepared to contain a quaternary ammonium compound for bactericidal action as a non-ionic synthetic detergent for greasier emulsification together with alkalis for cleaning and sequestering action. Thus, one formulation serves the dual purpose of cleaning and sanitizing. The advent of dairy detergent sanitizers has posed the problem of finding a suitable laboratory test for measuring their comparative efficiency. Mueller et al.6 suggested a time-survival test for measuring the efficacy of dairy sanitizers. This consisted of the addition of a standardized inoculum to a germicide and reporting results as percentage survival for a definite contact period. On the basis of this type of test, detergent sanitizer formulations representative of good performance and poor performance were selected in our laboratory for further testing on a dairy farm. When these formulations were used on milking machines, we had the unusual result of finding that the preparation exhibiting the best activity in the laboratory was relatively ineffective in the milking machine, whereas one with

poor laboratory performance showed a much greater advantage in the field. It was thus obvious that the laboratory "yardstick" bore no relation to practical efficacy, and it was for this reason that a new laboratory procedure was developed which would more nearly simulate use conditions.

It has been established that the rubber parts of the milking machine are the most difficult to sanitize, because they present a much more porous surface than the metallic parts and thereby offer greater opportunity for build-up of bacteria through the accumulation of soil. The irregular surface of the test cups also meets this objection. It seemed important, therefore, to test for destruction of bacteria which had been deposited on rubber from a milk medium. This resulted in what we have termed the "rubber strip test."

**Rubber Strip Test**

**Preparation of Strips.** Strips the size of an ordinary glass slide were cut from 1/4"-thick gasket rubber, and a hole just large enough to admit a 6-mm. glass rod was bored in the center of one end. To prepare for use, the strips are held at the boiling point for one hour in a solution containing approximately 1 percent sodium metasilicate together with a small amount of one of the non-ionic synthetic detergents. After thorough rinsing the strips are packed upright in 250-ml. beakers, covered with aluminum foil, and sterilized by autoclaving.

**Culture Suspension.** Streptococcus fecalis, Escherichia coli, and Pseudomonas aeruginosa were selected as representative of both Gram-positive and Gram-negative organisms known to be somewhat resistant to quaternary ammonium germicides. A 15 percent by volume suspension of 24-hour broth culture of either S. fecalis or E. coli is made in sterile whole milk. In the case of P. aeruginosa, a 1.5 percent suspension is used. The whole milk is obtained by diluting certified evaporated milk 50-50 with sterile distilled water.

Other organisms isolated from milk were tried at first but were found to be too susceptible to quaternary detergent sanitizers.

**Preparation of Sanitizing Solution.** Because quaternaries are less effective in hard water, a solution of the test preparation is made at the recommended use dilution in water of a good degree of hardness. Our tests have been made routinely in a natural water of 330 p.p.m. hardness.

**Performance of Test.** Five rubber strips are transferred from their container by means of forceps which have been flamed, to hang equidistant apart on a 6" length of a 6-mm. glass rod. The rod is laid across the top of a 400-ml. beaker containing 300 ml. of the milk culture suspension. The organisms are thus deposited slightly more than half way up the strip. After a 10-minute period the strips are removed from the culture suspension and the rod is laid across the top of an empty beaker, where the strips are allowed to drain and semi-dry for a period of 10 minutes. The rod is then laid across the top of a 400-ml. beaker full of the sanitizing solution under test. This beaker has been heated to an Arthur H. Thomas magnetic stirring apparatus set at a rheostat speed of 40. After three minutes exposure to the gently swirling sanitizing solution, the rod is removed and the strips rinsed by an up-and-down motion in a beaker of fresh tap water for a period of 10 seconds. The strips are removed from the rod by forceps and placed in individual sterile petri dishes, which are poured with tryptone glucose extract agar containing 0.1 percent TAMOL N as a quaternary inactivator and subjected to vigorous agitation. As a control fresh tap water is substituted for the sanitizing solution, and following the final rinse the strips are placed in dilution bottles and thoroughly shaken. In this instance the dilution water is plated.

Figure 1 displays the physical setup required for the performance of the rubber strip test. The beakers in the illustration contain from left to right: (1) the sterile rubber strips; (2) the inoculation of bacteria from the milk suspension; (3) the drainage and drying; (4) the detergent-sanitizer solution in place over the magnetic stirrer; (5) the fresh tap water for rinsing.

**Test Results.** The surviving bacteria are counted after 48 hours incubation of the plates at 35° C. A logarithmic average is made of the 5-time replicates for each sample and the control. A sanitizing solution which reduces the bacterial count 99.9 percent from that obtained in the control may be considered an excellent preparation. Typical results are shown in Table 1. This table represents different formulations of the same quaternary ammonium compounds with various alkaline materials and wetting agents, and readily shows why reliance cannot be placed upon a laboratory evaluation against a single test organism. There is only one preparation in the table which reaches the 99.9 percent mark against all three test organisms, although the others show to good advantage against one or two of the test bacteria. Although it appears from the water controls that the inoculum is not too heavy, it must be remembered that many of the bacteria are removed by the physical agitation applied in two steps of the test.

**Table 1**

<table>
<thead>
<tr>
<th>Detergent Sanitizer</th>
<th>E. coli</th>
<th>S. fecalis</th>
<th>P. aeruginosa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Control</td>
<td>Log Av.</td>
<td>% Reduction</td>
<td>Log Av.</td>
</tr>
<tr>
<td>150,000</td>
<td>104.88</td>
<td>99.95</td>
<td>104.88</td>
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<tr>
<td>2</td>
<td>96.92</td>
<td>99.93</td>
<td>96.92</td>
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<tr>
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<td>100</td>
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Detergent sanitizer formulations 5 and 9 were used to sanitize milking machines on a dairy farm and were compared to a standard hypochlorite and cleaner for effectiveness. Immediately after milking a warm water rinse was drawn through each machine, and this was followed by cleaning with the detergent sanitizer solution. Following the sanitizing procedure the machines were untouched until just previous to the next milking, when another warm water rinse was drawn through them. Between the pre-milking rinse and milking, one liter of sterile phosphate buffer solution containing both chlorine and quaternary inactivators was drawn through the machine. The bacterial population of this solution was determined according to Standard Methods for the Examination of Dairy Products. Additional counts were made after pasteurizing the samples at 143-145°F for 30 minutes. During a fourteen-day control period three machines were sanitized with a standard cleaner and hypochlorite, and at the start of an eleven-day experimental period one machine was switched to quaternary detergent sanitizer 5, the second machine to quaternary detergent sanitizer 9, while the third machine was maintained as the hypochlorite and cleaner. Results of this experiment are given in Table 2, which shows the relative degree of efficiency of the various sanitizing agents. This led to the selection of quaternary detergent sanitizer 5 for large-scale field studies, which were made with the cooperation of a large Philadelphia dairy. Results of this study have shown that formula 5 over standard hypochlorite, in bringing about a reduction in the pasteurized bacterial count of milk by those suppliers which had consistently high counts previously. These results will be published separately.

The composition of the most effective formula (5) is as follows:

- Hyamine 1622: 10%
- Triton X-100: 5%
- Sodium metasilicate: 36%
- Tetrasodium pyrophosphate: 55%

**Summary**

A new method is described herefor determining the bactericidal efficiency of dairy detergent sanitizers, especially those formulated from quaternary ammonium germicides. The "rubber strip test" measures the ability of the sanitizing solution to destroy cells of Streptococcus faecalis, Escherichia coli, or Pseudomonas aeruginosa which have been semi-dried on rubber strips from a whole milk suspension. The test has been designed to measure the combined effect of germicidal and detergent activity. Excellent correlation has been obtained between results obtained by this test and actual large-scale field experiments.

**TABLE 2**

<table>
<thead>
<tr>
<th>Log, Av. Count for</th>
<th>Machine I</th>
<th>Machine II</th>
<th>Machine III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Period</td>
<td></td>
<td></td>
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<tr>
<td>(All machines</td>
<td>Ratio</td>
<td>Past.</td>
<td>Ratio</td>
</tr>
<tr>
<td>on hypochlorite)</td>
<td>1,300</td>
<td>25</td>
<td>1,100</td>
</tr>
<tr>
<td></td>
<td>1,100</td>
<td>25</td>
<td>1,100</td>
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<td>Change to</td>
<td>Det San 5</td>
<td>Change to</td>
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<td>Unchanged</td>
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<td></td>
<td></td>
<td></td>
<td>470</td>
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<tr>
<td>Experimental Period</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**Effect of Germicidal and Detergent Activity**

Outstanding correlation has been obtained between results obtained by this test and actual large-scale field experiments. The authors wish to acknowledge the technical assistance of Shirley Holman and D. Elizabeth Gold.

**Acknowledgment**

The Committee wishes to call attention to the fact that a study of the effect of milk regulations on milk quality is currently being conducted under the auspices of the National Research Council. The Committee takes the liberty of suggesting that the greatest benefit to the Association from the extended deliberations of the Committee would be obtained by continuing the Committee to serve as liaison between the Association and the National Research Council, in connection with the study currently being conducted.

**Report of the Committee on Milk Regulations and Ordinances**

Without undertaking to review the accomplishment of this Committee since its organization after the 1942 Annual Meeting, suffice it to state that it has labored earnestly, but has, as yet, not succeeded in accomplishing its purpose. At the 1947 Annual Meeting the Committee submitted the Tentative Revised Edition of the Milk Ordinance recommended by the U. S. Public Health Service as the nearest approach which could at that time be made to a generally acceptable set of standards and requirements which would conform to the stipulations of the motion which established the Committee. That Committee report also recommended that the Tentative Revised U. S. Public Health Service Milk Ordinance be published and circulated in order to provide an opportunity for study by the Association membership; that the Committee consider suggestions for changes submitted during the ensuing year; and promised to present a draft of an ordinance for consideration at the 1948 Annual Meeting.

The proposed ordinance was published and circulated among the Association membership during 1948. But comments and suggestions had not been received in sufficient number in time for the preparation of a comprehensive report to be presented at the 1948 annual meeting. It is now possible to report that a total of 59 of our members studied the proposed ordinance and submitted criticisms, or suggestions, or both. A summary of these criticisms, some of which are diametrically opposed, and others of which include no constructive suggestions, would take up much space and time, and would serve no good purpose.

In view of the criticisms submitted, however, the Committee has adopted a new approach, and has tentatively formulated an ordinance which places greater emphasis upon pasteurization, and greater dependence upon platform inspection than did the ordinance submitted in 1948. In drafting this tentative form of an ordinance, the Committee has considered the views of the members of the dairy industry, and others. The Committee suggests that, after additional suggestions now in hand have been considered, this report and the suggested draft of an ordinance be published in the Journal, so that comments and suggestions may be submitted to the Committee for consideration.

It is the desire of the Committee that association members and all other interested parties give the suggested ordinance careful consideration and send in their comments at an early date. They should be mailed to C. J. Babcock, Research Division, Dairy Branch, Production and Marketing Administration, U. S. Department of Agriculture, Washington 25, D. C.

The Committee wishes to call attention to the fact that a study of the effect of milk regulations on milk quality is currently being conducted under the auspices of the National Research Council. The Committee takes the liberty of suggesting that the greatest benefit to the Association from the extended deliberations of the Committee would be obtained by continuing the Committee to serve as liaison between the Association and the National Research Council, in connection with the study currently being conducted.

C. J. Babcock, Chairman
A. P. Abele
W. N. Dashiel
H. L. Dulfster
H. J. Dunsmore
O. A. Ghiggoile
C. S. Leete
A SUGGESTED MINIMUM MILK ORDINANCE

The essential features of a milk supply system, as in number and readily understood: cleanliness, safety, initial high quality, nutritive value, and keeping qualities, are so interrelated that all of them influence each other to the consumer and promote increased consumption, which is in the public and economic interest. The attainment of these qualities, though complicated, is not impossible under ordinary, normal, environmental conditions.

First: Because digressions from normal may occur in milk, including disease potentialities from time to time, procedures and supervision providing adequate safeguards are essential.

Second: Because volume consumption of fresh milk tends to preserve and promote the public health, and because fresh milk should be regarded as a universal rather than a luxury product, abundant supplies of fresh milk should always be available to the public at the lowest price consistent with safeguards mentioned.

This ordinance is drawn in pursuit of these principles.

EXPLANATORY NOTES

Graduates

Although the factor of safety should be considered in human consumption, it is in the public interest to encourage those producers who set the pace for better methods and general improvement in milk supply. This is desired to do so, the establishment of a premium grade of milk as a part of the general program of quality improvement should not be discouraged.

Direct Microscopic Counts

Direct microscopic bacterial counts of milk and milk products before and after pasteurization, are reasonably accurate indexes of keeping quality but without significance so far as safety (phosphatase test can be used) is concerned. A high content in the count may be observed in different milk sheds which level out under monthly testing. A thorough initial survey of the present situation in each locality may well precede the fixing of a definite direct microscopic count standard. Since some markets prefer the practice for pasteurized products, this procedure is provided as an alternate method.

Enforcement Based on Quality Tests

This ordinance depends upon quality tests on the product for enforcement; and, while many dairy farms and milk plant requirements are not specifically stated in the code, such requirements may be expected to follow naturally where farmers and dealers consistently produce and process milk that meets the quality test requirements of this ordinance.

Judicious and Safe Application

It is anticipated that when this ordinance is adopted and applied to existing dairy farms and milk plants, the requirements will be applied judiciously and sanely.

New Structures and Alterations

For new or altered structures, the ordinance requirements shall be complied with.

Adoption Time

In submitting this ordinance, it is the recommendation that the effective date should not be less than one year after its adoption, during which time it is anticipated that the dairy farms and milk plants not in conformity with the ordinance will make necessary changes in procedures so as to be in compliance by the effective date.

Local Departures

In order to conform to local conditions and promote harmonious public relations in the communities to be served (frequent testing of the finished products considered), reasonable departures from the proposed tests are not only permissible but sometimes desirable.

Larger places, for instance, have the advantage of volume processing and, possibly, already well-established systems of milk control. Therefore, where it is feasible, processing milk from many hundreds or thousands of different sources, in contrast, smaller places have the advantage of close proximity to a limited number of sources.

Economic Status

The economics of processing and consuming populations may temporarily dictate variations in the aesthetic or non-operative features to be required. Adequate safeguarding (through frequent testing of the finished products) permits no departure from fixed principles.

Suggested Minimum Milk Ordinance

AN ORDINANCE TO REGULATE THE PRODUCTION, HANDLING, SALE AND DISPENSATION OF MILK, AND CERTAIN PRODUCTS: TO DEFINE DIFFERENT KINDS OF MILK PRODUCTS AND PRESCRIBE STANDARDS FOR THE SAME, TO PROVIDE FOR APPROVAL IN CERTAIN STANCES AND FOR THE RECOGNITION THEREOF AND TO FIX PENALTIES AND TO PROVIDE FOR THE REPEAL OF THIS ORDINANCE AND TO REPEAL CERTAIN ORDINANCES.

Be it ordained by the ..., as follows:

Section 1. Pasteurization Required. No person shall sell, offer for sale, or deliver, or have in his possession with intent to sell, for direct consumption any milk or milk product (except certified unadulterated fluid milk) which has not been pasteurized, provided, however, that nothing contained herein shall prohibit the delivery of unpasteurized milk to a milk plant for pasteurization as provided for in this ordinance.

Section 2. Examination of Pasteurized Milk and Milk Products. In order to safeguard the public health and to assure that the pasteurized milk and milk products processed in the City of ..., or brought into the City from other areas, are (1) clean, (2) of initial high quality, (4) safe for consumption, (5) of good keeping quality, and (6) kept at the proper temperature, as defined in this ordinance, the enforcing officer shall, as often as he deems advisable, but not less than once a month, cause a representative sample of pasteurized milk and milk products produced in the City to be provided for examination.

Samples. Samples of milk and milk products shall be available to the enforcing officer for examination.

All proprietors of processing plants, store, restaurants, and similar places shall furnish the enforcing officer upon his request, the names of all suppliers from whom milk and milk products are obtained.

Examinations may include other bacteriological, chemical and physical determinations provided such examinations shall be made in accordance with the latest Standard Methods for the Examination of Dairy Products published by the American Public Health Association.

Section 3. Standards for Pasteurized Milk

(a) Standards. All pasteurized milk shall be produced on the premises and shall not have an average direct microscopic bacterial count in excess of the number permitted at the time of the ingesting plant for raw milk (see Section 15), or a standard plate count in excess of 300,000 per milliliter; shall contain no trace of sediment when a pint of milk is filtered through a clothed sediment tester; shall show a negative phosphatase test; shall contain not less than one percent of butterfat; shall contain not less than one percent of solids not fat; shall be over 50°F., and the milk shall be free of objectionable color, odor, and consistency, and shall not have a coliform count of over 10 per milliliter and shall not have a positive coliform test in OWV of milk. The OWV is an over one day out of 5, the provided samples are collected within 4 hours after pasteurization and that the milk has been properly refrigerated during the interval between collection and testing. For enforcement purposes, the bacterial counts shall be logarithmic averages of samples taken on five different days.

(b) Samples. Samples of milk and milk products shall be available to the enforcing officer for examination.

All proprietors of processing plants, stores, restaurants, and similar places shall furnish the enforcing officer upon request, the names of all suppliers from whom milk and milk products are obtained.

Examinations may include other bacteriological, chemical, and physical determinations provided such examinations shall be made in accordance with the latest Standard Methods for the Examination of Dairy Products published by the American Public Health Association.

Section 4. Milk Plant Construction and Facilities

(a) General. A milk plant, as defined in this ordinance, shall be provided with: (1) a room or rooms for receiving and washing equipment, cans, and bottles, (2) a room for processing, cooling and bottling, and (3) a room for storing of milk and milk products. The various milk plant operations shall be so located as to prevent contamination of the milk or milk products or of the cleaning equipment.

(b) Floors. Floors, including platform and stairs, of all rooms in which milk or milk products are handled shall be constructed of concrete or other impervious material, shall be smooth, graded to drain, and in good repair. Floors shall be equipped with adequately trapped drains discharging into proper sanitary drains.

(c) Walls and Ceilings. Walls and ceilings of the milk plant that is impervious and smooth to provide an impervious, smooth surface.

(d) Light and Ventilation. All rooms in which milk is received, washed, heated, and ventilated to prevent condensation on walls and ceilings.

(e) Insect Control. Openings to the outside shall be effectively screened and/or such other means shall be employed as are necessary to eliminate insects.

(f) Rooms. Rooms in which milk, milk products, cleaned utensils or containers are
MILK ORNAMENTS AND REGULATIONS

Section 4. Equipment Installation. All major equipment shall be constructed of stainless steel or other approved material. All equipment shall be constructed to prevent contamination, to be easily cleaned, to be adequately designed and to be of approved design. All equipment shall be thoroughly cleaned and sanitized before being returned to service.

Section 5. Water Supply. Water used in a milk attrition shall be from a supply that is adequate in quantity and quality supplies. Water shall be of a quality that is acceptable to the appropriate water supply authority and shall comply with the regulations of the State Department of Health covering cross connections and or in the processing rooms. Water shall be used in compliance with the regulations of the State Department of Health covering cross connections and or in the processing rooms.

Section 6. Milk Supply. (a) Supply. All milk and milk products received for pasteurization shall be in accordance with the requirements of this ordinance and shall be delivered in good physical condition.

(b) Reclamation. Pasteurized milk or pasteurized milk products shall not be permitted to be in contact with equipment used for other purposes. Pasteurized milk or pasteurized milk products shall be reconstituted only after being sanitized in accordance with the requirements of this ordinance.

(c) Material Storage. Bottle caps or caps shall be handled in accordance with the requirements of this ordinance. Bottle caps or caps shall not be misplaced or lost.

(d) Sanitary Conditions. Sanitary conditions shall be maintained in all storage, handling, and processing areas. Sanitary conditions shall be maintained in all storage, handling, and processing areas.

(e) Equipment. Equipment shall be properly maintained and shall be in good condition. Equipment shall be properly maintained and shall be in good condition.

(f) Cleaning. Equipment shall be cleaned in accordance with the requirements of this ordinance. Equipment shall be cleaned in accordance with the requirements of this ordinance.

(g) Sanitary Storage. Sanitary storage shall be maintained in all storage, handling, and processing areas. Sanitary storage shall be maintained in all storage, handling, and processing areas.

Section 15. Standards for Milk to Be Pasteurized. All milk intended for pasteurization in the City of .... must come from animals pastured on pastures free from voles and infected with infectious diseases; such pastures shall be inspected and in excess of the limits prescribed by the New York State Department of Agriculture and Markets, and such areas shall be satisfactory to the systems of the State Board of Agriculture and Markets.

Section 15a. Pasteurized Pasteurization. Pasteurization shall be performed by a person who is a member of a recognized association of dairy officials and who has been approved by the New York State Department of Agriculture and Markets. Pasteurization shall be performed in accordance with the regulations of the New York State Department of Agriculture and Markets.

Section 15b. Pasteurized Milk. Pasteurized milk shall be labeled with the words "Pasteurized" and shall be sold only in containers that are approved by the New York State Department of Agriculture and Markets.

Section 15c. Pasteurized Milk Products. Pasteurized milk products shall be sold only in containers that are approved by the New York State Department of Agriculture and Markets.

Section 16. Herd Health. All milk sold for human consumption shall come from cows that are located in herds under federal or state supervision for the eradication of tuberculosis.

Section 17. Cow Cleanliness. The flanks, belly, and udder of all milking cows shall be kept free from visible dirt at the time of milking. Cows shall be milked in a clean manner. Milking wet-handed is prohibited.

Section 18. Personnel. Persons handling milk or milk products shall be clean about their person and clothing. No person with soiled hands or upon which there are open sores shall milk cows or handle milk utensils or milk products.

Section 19. Cow Stable. (a) General. A cow stable or milking parlor shall be required in which all milking is done. (b) Floors, Gutters, and Cleanliness. Floors and gutters shall be constructed of concrete or other approved impervious and easily cleaned material. Floors shall be maintained in good repair and kept clean.

Section 19. Cow Stable. (c) Walls, Ceilings, and Partitions. The interior walls and ceilings of the milking barn or stable shall be whitewashed or painted in white as often as may be necessary, and shall be kept clean and in good repair.

Section 20. Barnyard, and Manor Disposal. Barnyards shall be properly graded and kept clean. No wastes from the stable or milk room shall be allowed to accumulate in the barnyard.

Section 21. Pro-Born and Milking Parlor. All pen-type barns shall be well drained and the walls and ceilings shall be kept clean, and be made heavy enough to keep cows clean. A milking parlor is deemed to be a place where cows are milked, and, except for the feeding of concentrates, shall be used for milking purposes only; have impervious floors, properly drained, good impervious walls, well lighted, and adequate ventilation.

Section 22. The Milk House. (a) General. A milk house or milk room shall be provided in which all milk is received and pasteurized. (b) Floors, Walls, Ceilings, Doors and Windows. The milk house floors shall be of concrete or similar impervious material, graded to drain. Walls and ceilings shall be of such construction as to permit easy cleaning and inspection. (c) Liquid Waste Disposal. Waste water from the milk house and milk room shall be disposed of in such a manner as to prevent contamination of water supplies or accumulation on the ground surface.

Section 23. Washing Facilities. Suitable facilities for heating a sufficient amount of water and suitable vats for washing and sanitizing utensils shall be provided.

Section 24. Cooling. Milk to be delivered to the creamery or dairy shall be cooled to 60°F or lower within one hour after milking and so held until delivered.

Section 25. Containers, Utensils and Equipment. (a) Construction. Containers, utensils, and equipment used in the handling, storage, and transportation of milk or milk products shall be of smooth, non-absorbent material and free from odor. Joints shall be soldered flush. New milk pails shall be of 3-A or similar design.

Section 26. Storage. Containers, equipment, and utensils shall be so thoroughly rinsed, cleaned, and sanitized that they will not contribute to the contamination of the milk as reflected in the tests listed in Section 14.

Section 27. Washing Equipment. Containers and equipment shall be stored so as not to become contaminated before being used.

Section 28. Storage Tanks. On farms where two or more milk tanks are used, the lower shelf of which shall not be more than 6 feet above the floor, the tank shall be separated therefrom by a dust-tight partition and door.

Section 29. Cooling Equipment. The milk house shall contain equipment necessary for the proper cooling and storing, in a sanitary manner, the volume of milk or milk products handled.

Section 30. Teat Cups. Teat cups, other than those used in pasteurization, shall not be used in the pasteurization of milk. Teat cups shall be sterilized before and after use.

Section 31. Transportation of Milk. The milk shall be transported to the creamery or dairy in cisterns, cans, or other approved containers. Milk shall not be transported in any manner that will cause contamination or impurity.

Section 32. Milk Fat. Milk fat is a portion of milk containing less than 18 percent milk fat.

Section 33. Sour Cream. Sour cream is cream which contains not less than 18 percent milk fat.

Section 34.ipplied. Milk immediately following milking shall be cooled to not more than 36°F and shall be transported to the milk house, where it shall be strained through approved single-service straining pads. Unused pads shall be stored so as to be protected from contamination.

Section 35. Sampling and Bacteriological Standards. Samples of milk and milk products shall be taken or caused to be taken as often as the enforcing officer deems advisable, but not less than once a week, for examination.

Section 36. Milk Ordinances. When suspicion arises as to the possibility of infection from any person handling milk or milk products, the health officer is authorized to require the following measures: (1) the immediate exclusion of that person from milk handling, (2) the immediate exclusion of the milk supply, if necessary, and (3) the immediate exclusion of the milk supply, if necessary, of the individual or organization responsible for the contamination.

Section 37. Milk and Food Technology. The Journal of Milk and Food Technology is published by the American Public Health Association.

Section 38. Definitions. The following definitions shall apply in the interpretation of this ordinance:

A. Milk. Milk is hereby defined to be the lacteal secretion, obtained by the complete expulsion of milk from the mammary glands of cows, and may be separated in any manner, the volume of which shall not be more than 18 percent milk fat.

B. Milk Fat or Butterfat. Milk fat or butterfat is the fat of milk.

C. Cream. Cream is a portion of milk which contains not less than 18 percent milk fat.

D. Skim Milk. Skim milk is milk from which a sufficient portion of milk fat has been removed.
1. Milk Products. Milk products shall be taken to mean and include cream, homogenized milk, vitamin D milk, butter milk, skim milk and milk beverages as herein defined.

2. Cottage Cheese. Cottage cheese is the soft uncurdled cheese prepared from the curd obtained by adding harmless lactose acid-producing bacteria or without rennet, to pasteurized skim milk, concentrated skim milk, or non-fat dry milk solids. It contains not more than 80 percent moisture.

3. Pasteurization. The terms "pasteurized," "pasteurization" and similar terms shall be taken to mean the process of heating every particle of milk or milk products to a temperature no lower than 145°F for at least 30 minutes, after which it has been promptly cooled to 30°F or lower; or heating every particle of milk or milk products to a temperature not lower than 161°F and holding it at such temperature continuously for not less than 15 seconds, after which it has been promptly cooled to 30°F or lower.

4. Dairy Farm. A dairy farm is any place where one or more cows are kept, or part of all of the milk or milk products from which it is sold or offered for sale.

5. Milk Plant. A milk plant is any place, premises, or establishment where milk or milk products are received, handled, processed, stored, bottled pasteurized and/or prepared for distribution, except an establishment where milk or milk products are sold at retail only.

6. Health Officer. The term "health officer" shall mean the health authority of the... or his authorized representative.

7. And/or. Where the term "and/or" is used, "and" shall apply where possible, otherwise "or" shall apply.

8. Section 31. Penalty. Any person who shall violate any of the provisions of this ordinance, upon conviction thereof before a court of competent jurisdiction, shall be punished by a fine not exceeding $... or by imprisonment in the city jail for a period not exceeding ninety days, and/or imprisonment in the discretion of the court. (To be worded according to state involved.)

9. Section 35. Unconstitutionality. The sentences, sections, and provisions of this ordinance are declared to be unconsitutional and/or invalid for any reason by a court of competent jurisdiction and in no way affect the remaining sentences, sections, or provisions of this ordinance. (To be worded according to state involved.)

10. Section 36. Repealing Clause. All ordinances and parts of ordinances inconsistent with the provisions of this ordinance are hereby repealed.

11. Section 37. Effective Date. This ordinance shall be in full force and effect on and after... 19...
A modified phosphatase test for determination of leucine in milk and other foodstuffs, which does not require preliminary hydrolysis of the protein.

Microdetermination for determination of free amino acids, biacetyl in butter given by Pien.

Chillson describes the application, significance, and interpretation of the acidity, odor, reduction, sediment, phosphatase, and incubation tests, and plate, microscopic, thermodynamic, and colorimeter counts of milk and dairy products.

Suitable balance and rapid method described by Kozharin for the determination of moisture in butter.

Moseley describes a rapid method for determining quantitatively amylolytic activities in concentrations of 10 to 800 ppm.

In refractometric determination of solids in milk, Konokotina claims 0.25% accuracy by detn. of n of ice cream in standard refractometer, calibrated in percent dry solids instead of conventional values.

Ting showed that the methods of Hilchitz and Lea did not work well in the determination of fully saturated fats in New Zealand butter and stated that methods of determination and isolation are needed.

Govorenko mentions, but no details given, of glass butyrometer with direct calibrations on upright cylinder for determination of fat content in milk products.

Ek spruce found that the higher serum nitrogen content in normal milk occurs at the beginning and end of the lactation period, the highest average values being obtained in September and the next July.

Formula given and reference table for rapid calculation of sugar content in evaporated milk by Chekuawa.

Improved method for determination of casein in milk described by Chri.

Hodson and Krueger describe a direct Neospora method for the determination of raw or improperly pasteurized milk.

Kramer et al. reported that the color of raw and canned tomatoes can be determined by extracting the sample with benzene and measuring the color photometrically for percentage transmittance.

To prevent absorption of color by proteins, color liberated by hydrolysis of milk with trypsin. Simple, reproducible method outlined by Choi et al.

Reeder proposes a modification of the Gerber butyrometric fat determination by using 1.07 cc. of sample in place of 11 cc. to bring the Gerber method in line with gravimetric analysis.

Ball's method mentioned by Lear and Foster as basis for effect on rate of phosphatase inactivation in milk pasteurized by different methods.

Shefman reported that the Monier-Williams procedure for determining SO2 in salt-water fish gives low values because the trimethylamine breaks down and reacts with HCHO. Pork, mutton, and beef yielded good recoveries.

Nickel describes hand-operated syringe for mixing predetermined size sample in handle with predet. amt. std., alkali and phenolphthalein. Sample ejected by spring and color used for extn. of sample visually.

Kruschev suggests that in the determination of acidity in milk, the titration endpoint should be determined by comparison with a synthetic standard or by electrometric determination and to express the results in N, i.e., cc. N NaOH per 1. of milk, not as % lactic acid.

Rapid determination of milk acidity done with indicator paper impregnated with bromocresol purple which gives color change pH 0.3 reports Gott.

Madsen recommends comparison of the percentage fat in the milk and in the dry substance to detect the addition of water to milk.
Sands and Sager list chemicals which will preserve milk for the phosphorus content. They found that after 10 days to 3 weeks under summer conditions at room temperature, CHCl₃ had the least inhibitory effect on milk phosphatase.

Value of \( n^2 \) of the serum is a useful criterion of the dilution of milk, whereas the density of normal serum is a further guide according to Anis and Tracy. \( F \) concludes from data obtained on dry buttermilk as high quality that it does not appear possible to select a definite ash alkalinity value which will exclude all samples containing added neutralizers and which will include only those containing no added neutralizers.

A rapid method for the determination of N in milk by direct nesslerization of the digested sample is described by Hetrick and Whitney. Mohr and Hasing compare the methods of Schmidt-Bondzynski, Roese-Gottlieb, Schloemer, Grossfeldt, and Stoldt, and recommend the latter as a standard method for determination of fat in dry milk and baby foods. Studying the applicability of the method of titration of Thoburn, Sjostrom found that Fe in milk, cream, and whey cannot be determined on trichloroacetic filtrates of the sera; that whole and skim milk can be dehydrated by lactation and then gradually increased.

Gorbacheva describes a method for determining casein and albumin in milk. Shepard et al. conclude that total Fe in milk, cream, and whey cannot be determined by lactation and then gradually increased.

The freezing point is taken and from this value the added water is calculated. For determining casein and albumin in milk, cream and whey cannot be dehydrated by lactation and then gradually increased.

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The control of thermoduric bacteria is presented from the standpoint of the manufacturer. Joffre compares chlorine sterilizers with quaternary ammonium compounds. Packer reports on penicillin levels in the udder during treatment.

Bacteriology

Methods methylene blue stain and extremely low concentrations of penicillin in milk lengthened dye reduction times. Air express shipment of milk samples for bacteriological analysis at a central laboratory is reported to give good results.

Cone and Ashworth recommend revision of Standard Methods (1941) for bacterial examination of reconstituted milk powder. Advantages of quaternary ammonium germicides are presented by Salton. Thomas et al. found steam sterilization best, hypochlorite next best in treatment of dairy utensils. Bacteriostatic action of the compounds, and organic matter on the germicidal organisms, gave better reproducibility in reduction of bacteria in milk. Thomas et al. found that milk sanitarians ascertain the ratios, and employ them as a check on the accuracy of the laboratory technic.

Watson reviews the literature on the resazurin test. Five major causes of bacteriological shortcomings of milk, related to producing farms, are listed by Boland and comparative residual effect depends on whether wet or dry storage was used.

In a study of the factors influencing thermoduric counts in cow milk, Thomas concluded that the manner of milking made no appreciable difference in the thermoduric count when udders were effectively sterilized; the use of milking machines, washed only in warm water, led to much higher incidence of excessive thermoduric counts; and that, in general, the proportion of samples with high thermoduric counts increased with increasing raw milk counts, although some high-count milk had low thermoduric counts.

Packer compares chlorine sterilizers with quaternary ammonium compounds. Cousins and Wolf found hypoxychlorites most effective for destruction of Staph. aureus at pH 9.5-11. Johns compares quaternary ammonium and hypochlorite solutions in sanitizing dairy utensils and equipment. Hucker et al. found a wide variation in germicidal efficiency of various cationic germicides studied.

Prouy summarizes the current knowledge of quaternary ammonium compounds, with respect to: (a) methods of determining germicidal efficiency, (b) physical reaction of bacteria in contact with quaternaries, (c) bacteriostatic action of the compounds, (d) the influence of pH, type of water, and organic matter on the germicidal efficiency, and (e) selective action on organisms.

Jones-Evans compares different screening and rejection tests in relation to the keeping quality of milk.

Watson et al. report that resazurin gave better reproducibility in reduction time than methylene blue.

Method for determining butyric bacteria contamination in milk by Roddy.

Levine and Black compare several staining procedures for direct microscopic counts of pasteurized milk.

Comparative analysis of the Standard Methods methylene blue stain and advantages of the polychrome and acid-fast stains in direct microscopic examination of milk shown by Levine and Black.

Johns and Katznelson found that extremely low concentrations of penicillin in milk lengthened dye reduction times. Air express shipment of milk samples for bacteriological analysis at a central laboratory is reported to give good results.

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Watson reviews the literature on the resazurin test. Five major causes of bacteriological shortcomings of milk, related to producing farms, are listed by Boland et al. and the functions and equipment needs of fieldmen are outlined and discussed.

Singh et al. recommend the use of the ten-minute resazurin test at the platform for rapid examination of milk. The test was useful in identifying milks of high count and poor keeping quality but milks showing intermediate quality should also be given the 1-hour test.

Having determined that Str. cremoris in cheese starter is markedly inhibited by as little as 0.1 unit of penicillin per ml of milk, and Str. lactis by 0.25 to 0.50 unit per ml of milk, and that very little inactivation of penicillin results from pasteurization at 145°F for 30 min. Hunter suggests the exclusion from the supply of milk from quarters being treated with penicillin in order to avoid a real problem in the cheese industry.

Elliott et al. found hypochlorites more rapid-acting than quaternaries and comparative residual effect dependent on whether wet or dry storage was used. The sources of thermoduric bacteria, the avenues by which they enter milk, and precautions and method of control, including methods of cleaning and sanitizing milk utensils and milking machines are discussed and described by Partin, et al. Thomas et al. suggest sterility standards for apparatus and equipment in British milk laboratories. Findings in an analysis of colony counts of the dilutions of 7,427 samples of dairy products lead Courtney to confirm the position taken in the US PHS Milk Code that the ratio of colony counts which lie between 30 and 300 on plates of both dilutions should not exceed 1:2, and to recommend that milk sanitarians ascertain the ratios, and employ them as a check on the accuracy of the laboratory technic.

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In a study of the factors influencing thermoduric counts in cow milk, Thomas concluded that the manner of milking made no appreciable difference in the thermoduric count when udders were effectively sterilized; the use of milking machines, washed only in warm water, led to much higher incidence of excessive thermoduric counts; and that, in general, the proportion of samples with high thermoduric counts increased with increasing raw milk counts, although some high-count milk had low thermoduric counts.

Katznelson and Hood found that, when penicillin is used in the treatment of mastitis, the carry-over into milk may be sufficient to inhibit the activity of acid-producing bacteria in cheese starters added to milk from cows so treated.

Although boric acid in culture media inhibits some strains of Aerobacter aerogenes more than some strains of Escherichia coli. Poe and Charkey report that because of overlapping results secured from individual strains of each genus, boric acid media are not suitable as differential media for these two genera.

Sixteen reproductions of electron micrographs of cells of Str. lactis in the presence of and in various stages of lysis resulting from attack by phage particle, are presented by Parmele et al.

Poe and O'Kelly report that Escherichia coli and Aerobacter aerogenes are not inhibited by media containing as much as 11% bile and 0.1% phenol, whereas spore-forming lactose-positive aerobes were inhibited by 5% bile and 0.05% phenol, and conclude that solid media containing bile and phenol do not serve to differentiate between Escherichia coli and Aerobacter aerogenes.

Selcher and Walker observe temperature characteristics of some facultative psychrophilic bacteria. Boyd and Hanson compare the resazurin test with other tests for the quality of milk.
Methods of controlling mold in milk plants and dairies are given by Knight.\(^{124}\) Morton and Vincent\(^{133}\) present a temp. compensation scale for decreases of dye-reduction time with storage time and temperature.

Lenhardt and Casper\(^{126}\) found molds, yeasts and bacteria inhibited by 0.1% benzoic or acetic acid in immersion solutions of the polyphase quick freezing process.

Types of thermotolerant bacteria in farm milk cans are presented by McKenzie et al.\(^{129}\) McKenzie and Lambert\(^{128}\) present a modified procedure for determining the thermotolerant bacterial content of milk.

Morris and Edwards\(^{120}\) report a summer bacterial contamination of a pasteurization plant.

Bacterial counts on washed milk cans were found by Jones\(^{130}\) to be lower during June-Sept. with staph. peak in February.

Thomas and Thomas\(^{131}\) found a high percentage of farm water supplies containing milk-souring organisms.

Epstein\(^{132}\) found that a quaternary killed yeasts in carbonated beverages.

An improved medium for enumeration of bacteria in milk and milk products is described by Pelczar and Vera.\(^{133}\)

Thomas and Evans\(^{134}\) found thermotolerant counts in milk highest in the Dec.-Feb. and June-Aug. periods.

Singh et al.\(^{135}\) found the 10-min. resazurin test useful for application at the platform.

Laxminarayana\(^{136}\) finds the 1-hr. resazurin test useful in identifying milk produced under insanitary conditions or for finding mastitis, late lactation or colostrum.

It is pointed out by Golding\(^{137}\) that the resazurin test in milk is a greater timesaver and more adaptable to various grades than the methylene blue test.

Felsenthal et al.\(^{138}\) discuss the ecology of 85 strains of Salmonella belonging to 18 serological types which were isolated.

Soto and Oterd\(^{139}\) give results of typing 130 cultures of Salmonella typhosa by the Craigs and Yen method, and also according to Kristensen’s scheme.

Golding\(^{140}\) recommends using vials containing dry sterile resazurin where resazurin test operators have little or no bacteriological or chemical training.

A milk staining procedure which gives higher bacterial counts is described by Levine et al.\(^{141}\)

Dorset and Spence\(^{142}\) suggest that the resazurin test and direct microscopic count be used together for bacteriological examination of milk.

Weber and Black\(^{143}\) describe their method for evaluating quaternary ammonia compounds and other germicides.

Laxminarayana\(^{144}\) recommends the 1-hr. resazurin test in identifying milk produced under unsanitary conditions or for drawing attention to mastitis, late lactation, or colostrum.

Anderson et al.\(^{145}\) give a new staining technique for use in direct microscopic counts of milk.

Chapman\(^{146}\) presents a medium with no inhibition for coliforms. About 30% higher counts are obtained than on other media.

Kesler et al.\(^{147}\) report little difference in bacterial flora between sterilized milk and the second 15 ml sample, fewer long chain streptococci in mid-milk, and excessive numbers of leucocytes in strippings.

Techniques and a series of “highly selective media” used in the discovery of typhoid carriers are described by Rys\(^{148}\).

Pooch\(a\) et al.\(^{149}\) compared the standard plate and direct microscopic methods of bacterial examination of milk and found 75% agreement as to compliance with the Standard Ordinance, but neither method gave complete information.

Wyss and Poe\(^{150}\) reported that the phenol coefficients of 11 benzoic acids on 6 different microorganisms showed that salicylic, 3-nitrosoacetic, and 3,5-dinitrosalicylic acids exhibited the greatest germicidal effectiveness against the food-spoilage organisms, and that the phenol coefficients of the food-spoilage organisms were generally higher than those of the pathogenic organisms.

Moore\(^{151}\) states the addition of from 50 to 175 p.p.m. quaternary sanitizer to milk, with or without added starter, definitely reduced rate of acid development upon incubation for 20 and 40 hrs. Musty, putrid or acetic odors were noted in all but one of 36 samples containing 50 or more p.p.m. quaternary sanitizer.

Thomas\(a\) et al.\(^{152}\) find the thermotolerant bacterial content of monthly samples of milk from 210 farms was highest in summer and lowest in winter, increasing with raw milk total counts.

One extra miller head assembly for every 2 complete milking machines used is recommended by Mueller and Seeley\(^{153}\) to increase contact time between test cup and germicide.

Corns\(e\) et al.\(^{154}\) report on control of thermotolerant bacteria in milk.

Paper disks saturated with lactose fructose were used by Müller\(^{155}\) as economical media for growth of coliform colonies.

Hilim and Poe\(^{156}\) found ethylene glycol, diethylene glycol, propylene glycol, and trimethylene glycol gave phenol coefficients that varied from 0.0 to 0.021, while six benzoic acids gave values ranging from 0.0 to 7.8 when tested against Staph. aureus and E. typhi.

Twenty-one days incubation at 3-5°C were necessary to give maximum counts of psychrophyls on yeastestr. agar, state Thomas, and Chandra Sekar.\(^{157}\)

Raw and pasteurized milks contained psychrophyls; laboratory pasteurized milks (53°C C-30 min.) did not.

Pure cultures did not suffer laboratory pasteurization.

Leggatt\(^{158}\) found the remarkable affinity of wood for quaternary ammonium compounds affects the latter’s suitability as a sanitizer for equipment such as wooden churns. Microflora may be conditioned to become gram-negative which types are known to affect flavor.

Thermotolerant counts of over 100/ml were found by Thomas and Roberts\(^{159}\) in 21% of 116 farm water supplies; of 342 thermotolerant colonies bacilli 74%, micrococci. 91.1%; actinomyces, 9.5%; gram negative rods, 35% yeasts, 25%; microbacteria, 25%; streptococci, 25%. Thermophyls were present in 21% of the samples; only 2.5% had more than 10/ml.

**Butter**

The use of yeast in prevention of mold and souring of butter discussed by Blok.\(^{161}\)

Milk inoculated with lactic acid culture produced higher acidity in ghee. Preboiling milk reduced acidity and curd report and Anantakrishnan.\(^{162}\)

Gurug\(e\) et al.\(^{163}\) report ghee made by boiling cream gave high yield if previously agitated but quality not up to curd process.

Chen. changes in ghee studied by Acharya\(^{164}\) attributed to oxidation, polymnization, lipolysis.

Addn. yeast to butter compn. prevents mold growth, states Bogdanov.\(^{165}\)

Oily taste of butter caused by oxidative decompn. of fat. Causes and prevention explained by Csiszar.\(^{166}\)

Process for stabilizing canned butter concentrate for hot climate reported by Coombs.\(^{167}\)

Godel states addn. cit. E, ascorbic acid and Na\(_2\)CO\(_3\) gave stability and resistance to oxidation in butter.\(^{168}\)

Faulty butter consistency and its characteristics described and causes explained by Tvedokihle.\(^{169}\)

Stability of butter does not depend on protein content but on freshness of...
milk and sanitation in production, claims Dyachenko.\textsuperscript{160} Dyachenko\textsuperscript{160} states that butter affected adversely by excess protein. Plasma content varies with effectiveness of washing.

Gregory\textsuperscript{163} finds that 4-day cream delivery improved Indiana butter quality.

Olsson\textsuperscript{164} found that a suitable treatment of cream eliminates the possibility of poor consistency of butter which is caused by too low or too high 1 values of the butter fat and recommends temperature control of cream.

Neseni\textsuperscript{165} found that total protein content of butter varies from 0.5-0.6\% of butter weight; that casein makes up 86-89\% of the protein and sol. albumin concentration of cream is due to close packing of fat globules which lose their roundness and is a factor in cream to butter conversion by the new Fritz process.

Barnicot\textsuperscript{166} found that in Ayewa, it is important in determining the quality of butter of ordinary packing. Best flavor obtained by adjusting acidity of starting material to \( \text{pH} \) 5.5-6.5, giving a butter that is easily retarded acid production of 5 of 7 cultures worked with as compared to 100\%; that 104\% appreciably retarded acid prod. Kosikowsky\textsuperscript{167} found that in cheesemaking operations, a cooking temperature of 102\° to 105\° slightly retarded acid production of 5 of 7 cultures worked with as compared to 100\%; that 104\% appreciably retarded acid prod.

Ramaswamy and Banerjee\textsuperscript{168} recommend that method for chemical flavoring of butter be adopted as official. Itself, \( \text{pH} \) 3.5-4.5 in cheese is being made.

Kochankov\textsuperscript{169} describes manufacture of pasteurized Minas cheese.

Water sol N index of aging of cheese. Method of extr. for detn. given Yakhina.\textsuperscript{170} Babel\textsuperscript{171} found that in cheesemaking operations, a cooking temperature of 102\° slightly retarded acid production of 5 of 7 cultures worked with as compared to 100\%; that 104\% appreciably retarded acid prod.

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Barnicot\textsuperscript{182} found that in Ayewa, it is important in determining the quality of butter of ordinary packing. Best flavor obtained by adjusting acidity of starting material to \( \text{pH} \) 5.5-6.5, giving a butter that is easily retarded acid production of 5 of 7 cultures worked with as compared to 100\%; that 104\% appreciably retarded acid prod.

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Swiss cheese poor source of riboflavin, niacin and pantothenic acid. Camembert and Roquefort cheeses are better.

Bacterial count, tyramine content, and quality of American Cheddar and stirred curd cheese made with Streptococcus faecalis starter is described. Little difference from com. lactic acid starter and Strept. faecalis starter. Slightly in favor of latter. 198

average flavor scores.

cheese soon will be made

ized
definitely in favor of pasteurized milk

traditional method of evaporating the

whey in open Fe kettles. .

food products; or fermentmg to form

lage; drying and

oped, however, according to

COOH,

logically determined in cheese by means

preparations from casein for human

and animal use and also for the matur­

in processed cheese as calcium tartrate .

found the greatest elasticity at 35 ° ; at

pH 6.54; the

addition of 60 g. CaCl₂ per 100 kg.
milk doubled the elasticity (pH 6.54).

Maas and Noer. 199 describe the use of

Dermonol Z to precipitate proteins from whey. They claim precipitation

is more complete than by the use of

heat. In the concentration employed

Dermonol is not toxic and does not affect

According to Dahlberg and Koski­

kowsky 194 Cheddar cheese containing

S. faecalis developed more tyramine and Cheddar flavor as the ripening

temperatures were increased. The increase in the tyramine content of cheese

showed an approximately direct logar­
thmic relation to the days ripened.

Thome 195 describes the maturation

process in hard rennet cheese.

Kishanmurty and Subrahmanyan 196 describe the use of vegetable rennets

in the preparation of cheese. Cheddar cheese prepared with F. carica extract

which had been precipitated with alco­

hol from citrate-phosphate buffer at pH 4 compared well with cheese made

with animal rennet.

Hansson and Hietaranla 197 found that pasteurization and cool-storing

of skim milk decrease curd'-elasticity considerably.

CONCENTRATED

King 198 showed that spray dried

milk has spherical particles; always

contains air cells; it is optically active

when old, not active when fresh; readily

soluble in water when fresh, not so

old that roller dried milk has irregular

platelets; very few air cells; shows

optical activity; is not readily soluble

in water.

Coulter et al. 198 show that the de­

velopment of deteriorative products may

occur in dry whole milk during storage

according to increase in vapor pressure

of water in the system.

Effect of heating whole milk before

drying on enzymes, bacteria after dry­

ing and on flavor of reconstituted milk discussed by Ashworth.

Costillon et al. 198 recommend pro­

cedures for the manufacture of cultured

buttermilk from non-fat dry milk solids.

Method for estg. equiv. processes in
time of temperature, with respect to

physical properties of evaporated milk described by Nelson.

Higginbottom 200 reports that higher

preheating temperatures and better plant management have reduced bac­
teria counts in British spray dried milk powder.

Colvard and Roberts 200 indicate a

relatively good concentrated milk after

6 months storage at -12° F or lower.

Lebedev 200 discusses procedure for

prevention of crystal, of lactose in large

crystals in cond. milk.

Higginbottom 200 discusses the bac­
terial growth in reconstituted spray­
dried milk.

Addn. of ascorbic acid to milk be­

fore drying increased keeping quality
dried product, state Wright and Green­

bank.

Hawley 212 found better cleaning of
equipment necessary to improve the

quality of sweetened condensed milk.

Parfitt 215 presents an outline of the

Sanitary Standards Program of the

Evaporated Milk Industry.

FOOD INDUSTRIES

Winter and Wrinkle 214 state that

frozen egg quality depends on clean
eggs, clean equipment, and quick

cooling.

Milbratina 215 reviews new technology

of sour cream production.

Dennov 216 reviews production of

our milk products in Soviet Union.

Montequi 217 reported that the de­
tenmination of volatile basic N, tri­

methyamine, actual acidity or buffer
capacity, alteration of the fat, and
fluorescence did not give concordant
results in measuring the alteration of

fish.

Production of antioxidative prepa­

rations from whey and their effect in

food products is discussed by Ashworth.

Rogers 218 found that possibly

skin milk should not be pasteurized

until the curd-forming process is

started.

Current U.S.S.R. procedure for

preparation of leaven described by

Bogdanov 219 and application of new

method by Khelebnikova. 221 New

method satisfactory.

Dorn 222 suggests frozen food re­

search is necessary in processing; pro­
cess evaluation, financing and equipment,

and merchandising and marketing.

Procedure for preparation high­

quality casein described by Pozdnjak.

Seales 223 gives general precepts

about building food plants from a sanita­
tarian's point of view.

Belgian regulations for private

slaughterhouses are detailed.

Henmerich 224 states that the food

manufacturer's sanitary responsibility

extends to the final consumer.

Wagner 225 relates experience of a

bakery in reorganizing for higher sanita­
tary standards.

A simple empirical formula is

worked out by Merrill 226 for extending

the process time in tin to glass con­

tainers.

Gubser 226 indicates that high veloc­

ities at least 500 ft. min. are necessary

in air blast freezing.

Morse et al. 227 found acetic acid

effective in preventing yeast and mold

growth in carbonated beverages. No

taste difference was detectable.

Licensing of frozen food locker plant

is provided for in this Frozen Food

Locker Act and Regulations.

Vaughey and Muirhead declare that con­
tinuous sanitzing of conveyor belts,

e. in food preparation plants is effect­

ive with routine control.

Sterilization of foods, processing

eatable fats, and the frozen food industry

are discussed in this symposium on food

technology.

Duffy 228 describes the canning in­
spection services operated by Cali­

ifornia.

Abrahamson 229 gives specifications

for sanitary design of food handling

equipment.
The baking industry with effort can improve on the construction standards of the New York City Health Department. Barron describes the methods used by National Biscuit Company to provide for plant sanitation.

Solworth believes great improvement necessary in sanitation of food plants. It was observed by Bashford that the number of spoiled cans was greatly reduced by substituting good water for contaminated cooling water.

Woodruff and Selsol found a continual loss of natural appearance, color, aroma and flavor, related to temperature of storage in vegetables and fruit stored over one year.

Pottinger found pH values an indication of the freshness of shucked Eastern oysters. "The Mites Associated with Stored Food Products," by A. M. Hughes, is reviewed.

Shilich describes casein p.t.p. from defatted milk neutralized by baking soda to give water soluble caseinate, dried and packaged as powder. Used in food fortification.

Biswas showed that fresh confectioners' waste (whey discarded after separating the casein from milk for the preparation of edible products) yields 2% or more of weight as lactose.

Sanitation standards for bakeries are discussed by Holmes.

Gilman and Selnik hold that mold deterioration in stored grain is best controlled by drying because fungal chemical residues are possibly toxic.

Nishiyama reports that margarine prepared from coconut oil, hydrogenated whale oil, hydrogenated stearin from cottonseed and cottonseed oil, stored in the dark at 27°, remained unchanged until the fourth week and markedly increased in 6-10 weeks in the Reichert-Meissl value, the Polenske value somewhat, the peroxide value gradually, and the saponification number decreased gradually.

Possibilities of high-frequency heating in the frozen food industry are given by Bartholomew.

Bure maintains that until the present 90% extraction flour can be reduced to 80-85%, it is advisable to add 0.2% CaCO₃ to neutralize the decaffeinating effect of phytic acid.

Tavernier and Jacques showed that apple juice when pasteurized in acid (Pyrex) glass gave the best flavor, especially when deaerated and more so when carbonated.

Production of milk sugar described by Bubnov of yield of lactose 2.5% of wt. of whey used.

Mishustin et al. showed that since grain which had spent the winter in the field sharply reduces yeast growth, this indicates the use of a fermentation test for such grain which is capable of producing aleukia.

Procedure for acid hydrolysis of casein outlined by Dyachenko et al.

Product used for food fortification.

Okolov showed that defective meat reveals a great increase in catalase activity, using the procedure of Balh and Zubkova which is based on the determination of the residual amount of 2% H₂O₂ after 5 min.

Discussion of methods of casein production by Romanov.

Leskov reported that fluorescence of spoiled fish is useful in detecting spoilage, and that white or blue-white fluorescence of skin punctures is a definite indication.

Allison reviewed attempts to correlate numerous tests with quality of fish. Sodium citrate and NaK tartrate for raw or frozen salt-water fish and volatile acids for all fish and fish products are best.

Discussion of process for fractionation of lactose and soluble proteins by low temperature methanol extraction by Leviton.

Fries reported that through the crystallization of CuCl₂ mixed with plant extract, it is possible to demonstrate changes brought about by processing.

Overman et al. showed that the desirability of doughnuts fried in fat was not affec ted by fat that was stored 2.5 years prior to use but was lowered after 5.5 years by the fat.

Rozanov describes technology of lactose production.

Tarr and Deas found that NaNO₂ inhibited bacterial growth more than sulfanilamide (0.001-2%) or sulfanilamide (0.002%). The sulfa compounds did not delay the fading of the red salicylum pigment but did delay the development of malodors.

Kertesz and Sondheimer described the loss in red anthocyanin color in commercially prepared strawberry preserves was greater above 60-70°F. storage, and that flavor deterioration was slight until after the loss of 50% color.

Exposure of foods to cathode rays and X-rays decreased the nisin content as shown by Proctor and Goldblith but the destruction was affected by various protective ingredients.

Gilroy and Champion state that containers of pure Al and alloys of Al with Mn and Mg are satisfactory for storage and transportation of apple and a variety of juices, and also for citrus juices if the SO₂ preservative is suitably controlled.

When the moisture content of beef muscle was below 150% (as% dry weight), ozonation at 3-5 ppm for 3 hrs. daily extended storage life, according to Kefford.

Malherjee and Goswami found that dissolved hydrogen, pyrogallol, catechol and NaK tartrate were effective as hydrolytic and oxidative rancidity stabilizers.

The B vitamins were completely preserved but the buffering properties were practically lost in the demineralizing whey by electro-dialysis according to Wiechers and De Vries.

By adding demineralized whey powder and fat to a water-milk mixture, a synthetic milk was prepared which was practically identical in all details to human milk.

The equipment and procedure used to prepare milk products of soft-curd properties by removing calcium and other mineral elements by means of hydrated synthetic sodium aluminum silicate, crystaline, are presented by Otti.

Cuenot describes the composition of the various Milkie products (products of skim milk and milk serum) made in Germany.

The methods of preparation of different milk products in India--their composition, properties, and nutritive value are described by Sen and Dastur.

The composition of khoa or nawa is given by Iyer et al.

Food Infection and Poisoning
Gray analyzes two outbreaks of botulism in man from canned beetroot. Perry et al. found no danger from botulism in commercially frozen vegetables in hermetically sealed tin cans or in cartons.

The report of a conference on food and drink infections is said to be useful propaganda on an important subject.

Babione describes a gastro-enteritis outbreak caused by contaminated reconstituted milk powder.

Little describes an outbreak of para-typhoid fever from chicken salad prepared by a carrier of the disease.

The most important cause of fish poisoning occurs when the flesh of the fish is itself poisonous according to Van Bonde.

Gorman reports on an outbreak of food poisoning from roast turkey.

Ruh describes the bacteriology of food poisoning.

Four outbreaks of food poisoning were traced to custard filled cakes.

West gives statistics on foodborne disease and discusses regulation of public eating places.

Grant and McMurray describe an outbreak of staphylococcal food poisoning from tinned ox tongue.
The eating of either raw or cooked rock cod, black jack, bonito, surgeon fish, or red fish, schnapper, red schnapper, greenfish, mullet, bream, and balloon fish was shown by Ross to be poisonous.

Moustafa et al. present the bacteriology and incidence of food poisoning in Egypt.

Jones and Symons report an outbreak of food poisoning (Salm. dublin) caused by and food. In summarizing the PHS Disease Outbreak Reports, Brooks deals with the causative agents. He doubts that outbreaks with unknown causes should be reported.

Sanitation, properly trained inspectors and location and operation of slaughterhouses are the main principles of safety in England according to Tweed.

Fabian classifies infections and infestations of food causing outbreaks of disease or poisoning. Modes of infection and sources of Q fever are thought to be related to residence, occupation or household milk supply according to Beck et al.

Andrews et al. give data to prove that pasteurization prevents milk-borne disease and causes no significant loss of nutritive value.

The Spinose ear tick was found to be a possible vector of Q fever by Jalison et al.

Fitzhugh shows that small amounts of DDT in animal food become significant amounts of Q fever rickettsiae were demonstrated to be in milk and udder tissues of all 4-quarters of an infected cow and in the supramammary lymph nodes proximal to the udder. Possibly excepting lung tissue, no other tissue demonstrated infection according to Howison et al.

Although specific therapy is available for brucellosis, Tureman stresses prevention and discusses methods of diagnosis.

Baum recommends a State meat inspection service to be conducted by local governmental units.

Legal sparring over a 12-year period was required by Fowler to protect the public health from a dairy owned and operated by a typhoid carrier.

Lehman tabulates the toxicology of the newer agricultural chemicals.

The food of the nation is considered by Riley to be more and more the concern and responsibility of public health officials.

McKenzie reports on a milk-borne diphtheria outbreak in children. The committee discusses three methods of preventing transmission of trichinosis by microscopic inspection of pork, boiling garbage for hogs or processing (freezing) of pork.

Galton and Hardy conclude that the carrier state in salmonellosis is relatively transient.

A dysentery outbreak involving 45% of a ship's crew is reported by Mount and Floyd.

Bhat et al. showed that mawa (crude evaporated milk used in Bombay) is a dangerous source of infection as it quickly deteriorates in storage, has a high plate count, and pathogenic organisms survive for long periods.

A study by Lentette reveals that Q fever is a rickettsial disease occurring naturally in ticks, possibly transmitted through milk, not seasonal or confined to any one age group or sex.

Wilson suggests that the nitrate fertilizer, stored in leafy vegetables, from green foods, and prepared infant foods may cause illness.

Potential health hazards of new pesticides are discussed.

McCullough et al. report the recovery of Brucella abortus from naturally infected hogs.

A case of typhoid from raw clams is reported.

Jordan found brucellosis in humans closely associated with occupation.

In a serological survey in eastern Washington, reported by Dodmanfy, 6 of 289 samples of human sera, and 9 of 337 beef and dairy cattle sera, were found to contain Q-fever complement-fixing and bodies in tilters ranging to 1:128, although only three of the human subjects had close contact with animal.

Kemkes lists sources of pathogens and shows the manner of their entrance into milk.

In an epidemiological study of 268 cases of human brucellosis in Minnesota, occurring between January, 1945 and June, 1946, incl. (5 years), Mages reports that Br. abortus was the causative organism in 85% of the cases; the causes of the remaining cases were divided almost equally between Br. suis and Br. melitensis, and occurred mainly among meat-packing plant employees handling infected swine. Raw milk was the only recognized potential source of infection in about one-fourth of the cases. The authors conclude that prevention of the human disease is dependent upon eradication of the disease in animals.

Br. abortus was isolated from two, and Br. melitensis from one, of 34 enlarged prostates examined; and Br. abortus from one of 43 fibrous fallopian tubes, of individuals having had farm contact with animals, and clinical records of illness compatible with brucellosis, but the blood of whom was negative for agglutinins for brucella, in research conducted by McCay et al.

It is concluded that pasteurization must remain the greatest bulwark against brucellosis until methods of control can be developed.

Van Drimmelen reports infection of rats with brucellosis by injection of infected milk.

News item in re. movement to control brucellosis. At meeting of interested national organizations, in Washington, March 15, 1949, decided to form permanent committee to advise Congress.

Resumé, by Mulholland, re. animal diseases affecting man. Part of a symposium at National Conference on Rural Health.

Olson reports the ability of the cockroach to harbor Salmonella organisms.

Abstract of article in Amer. Jour. Medical Science which says that out of 8 cases of human ornithosis, 7 patients had been in close contact with domestic ducks. No reference to use of ducks as food.

Shadwick presents methods of eliminating coliform bacteria from ice cream.

Snyder believes artificial emulsifiers in ice cream useful, but of doubtful legality.

**Milk**

Robertson et al. give the correlation between off-bottom sediment testing and farmer's filter aids.

Trotter states that different groups consider quality factors in milk to be: cream line, appearance, safety, cleanliness, good flavor, keeping quality, nutritive value, production background, composition, and miscellaneous such as no adulteration, no watering, etc.

A review of the literature by Trotter indicates that homogenized milk is especially suitable for hospital dietary use.

Hagen points out that in fluid milk plants 36-45% of sales income is required for operation, depreciation reserves, and return on investment.

Clayson et al. give methods of cleaning and sanitizing utensils.

The adequacy of standard pasteurization times and temperatures for chocolate milk is questioned by Speck et al.

Eagan believes that lack of plant operator education causes most consumer prejudice against pasteurized milk.

Babcock et al. conclude that homogenized milk should be frozen as soon as possible after pasteurization.

Judkins states that essentials of milk quality control are: physical tests by employees, complete lab tests, raw milk quality, care in the plant, and general employee habits.

Fat-free vitamin fortified milk is presented by Weckel as a low-cost very nutritious food for those with low incomes or on special diets.

Moore found addition of sanitizers to milk very detrimental to the quality as well as being illegal.
Gologorski indicates the desirability of adding vitamin C to the winter milk in Dnepropetrovsyk.

It is shown by Weckel that greater uniformity of sediment testing is needed among sanitarians in procedures and interpretation of results.

Crossey and Paten found pasteurized, cooled milk shipped in cans without refrigeration for 24-hour periods to be generally satisfactory.

Babcock believes that enforcement should make it impossible to judge a milk supply by the ordinance under which it is produced.

A cooperative milk inspection program of six Wisconsin communities is described by Keown.

Cimino reports that 

Homes reports no significant difference in rate of loss of reduced ascorbic acid when lactose added to milk.

Ciszar et al. report 1 gm. HCHO used and neutralization before consumption with NaHSO, or K2S2O3 proved unsatisfactory.

Communities awarded milk sanitation ratings of 90% or more in 1947 and 1948 are listed.

Alexander and Yapp recommends testing 3 times during lactation, 2nd, 6th and 10th months. Sufficiently accurate to keep down costs of testing for milk and fat production.

Krukovsky et al. state NDGA added to milk before pasteurization prevented oxidized flavors. Salt added to butter prolonged stability of fat stored at low temperatures.

Singh Verma et al. found that hydrogenated peanut or coconut oil when used as supplements to a wheat bran-grain husk-peanut cake-green grass-ragi straw ration of cows, there was a decrease in milk and butterfat yield; on buffaloes, an increase was shown; however, the changes in composition of the butterfat were the same in both cases.

Krukovsky et al. used the emulsification test to show that ascorbic acid was important in the oxidation deterioration of milk fat at the end of its storage life, which results in off-flavors and loss in vitamins A and E and carotenoids. Factors include milk treatment, pasteurization temperature, type of product, storage conditions and light.

Anantakrishnan and Herrington isolated glucose from fresh cow milk and found that the glucose content of cow colostrum decreased with time.

The addition of vitamin C is more rapid in sydenham milk than in cow milk. state Rangnekar et al.

Georgievskii found that in regions where the water supply is high in fluoride, the F content of milk is no greater than in regions of low fluoride water.

Thacker gives desirable characteristics of chocolate milk or chocolate drink.

Formulas derived for arnths. cream to be added to dehydrated milk powders to give final products of standard fat and protein content are given by Kivenko.

Burnett believes pen stables will cut milk production costs.

Vitola, a low-fat milk is described by Foust.

Reaves described the conversion of Evansville, Indiana, to grade A milk production.

The fieldman's role in producing quality milk is presented by Boland.

Amering described dairying on the West Coast and in Hawaii.

A progress report is presented by the Louisiana Division of Milk and Dairy Products.

Lightner discusses tank truck hauling of milk from farm to plant.

Koepler suggests that in Switzerland, a minimum requirement of 5 hours on the methylene blue test be established as the quality of milk cannot be judged solely by its degree of acidity.

Indianapolis milk dealers give the results of a 3-day delivery plan.

Nabben and Wagner recommend electric heaters in milk houses to attain a temperature of 40°F.

Methods of control in production and marketing of certified milk are discussed by Brown.

Krizenecky and Podhradsky give biometric analysis on liquid and dry milk and compare said milk and value for manuf. Correlations do not always correspond.

Physical constants of milk and their application of food control discussed by Borrell.

Kugenev and Alatyrtseva discuss chemical composition and microflora of sheep milk.

Kamal and Basu report that goat and sheep milk show highest phosphatase activity at pH 5.3 and 10. Cow and buffalo at 10 only.

Proctorclaims no present method of detg. leucocytes in milk reliable criterion of presence of infection.

Singh and Laxminarayana found that normal cow milk, milk from cows in early lactation, and milk of advanced lactation, when used as a medium for lactic streptococcus, showed faster acid production when pasteurized or boiled; that milk from cows with clinical mastitis gave the least acidity and this acidity was not affected by pasteurization or boiling.

Previtera describes the amino acid behavior in milk treated with pure electrolytic 39% hydrogen peroxide solution. The addition of 0.3% did not affect amino acid content by giving rise to the formation of keto acids and NH3.

Results of treatment of enzymes in cow's milk with pure and stable 39% hydrogen peroxide solution are described by Cimino.

Ascorbic, lipase, tryptase and phosphatase were not affected but peroxidase, catalase, and reductase were nearly destroyed.

Provan and Jenkins show trends in butterfat content of bulk milk in England and solids-not-fat which indicate a deterioration in over-all milk quality. They believe quality and bulk of hay are important factors in the decrease in S.F.

Future trends in milk production are discussed by Fout with reference to breed, artificial insemination, feeds, fertilizers, grazing, hay, artificial stimulants, machine milking, and control of disease.

Krukovsky, Loosli, and Whiting found that a significant correlation (0.51) exists between the tocopherol content of milk fat and the ability of milk to resist the reaction, involving ascorbic acid, which produces oxidized flavors.

Peroxidase in milk may be responsible for the quick conversion of ascorbic acid to dehydroascorbic acid by added H2O2 according to Krukovsky.

Moghul et al. report the effects of oil feeding in ghee made from the milk after 5-day intervals of oil feeding and 7 days after the end of oil feeding. Oil lowered the Reichert value and increased number, and butyro-refractometer value, the changes being more pronounced in buffalo milk than in cow milk.

Composition of South African milk is given by Bakalar. Extensive tests in the winter rainfall area show a positive relationship between S.F and fat content where the highest averages are obtained in the winter period.

Allen showed that the bacteria count of milk produced by clipped cows was definitely lower than that from unclipped cows when hand milked, and similarly favorable when machine-milked.

Milk Processing

Geiger indicates that brine is probably most satisfactory as a cooling medium in small milk plants.

Flash boiling of water contents of milk prevents oxidized flavor and ascor-
bic acid destruction in a process by Sharp et al.414. Hetrick and Tracy415 indicate that the destruction of phosphatase by heat is a first order reaction. Automatic liquid level controls in milk plants save man hours and product losses, says Maxwell.416 Luchterhand417 outlines a course for pasteurization plant operators and employees.

A book by Cattell, The HTST Plant: An Introduction to Technique, Control and Management.418 Trout and Bortree419 conclude that home electric milk pasteurizers adequately pasteurize milk when operated according to instructions. The 3-A sanitary standards for homogenizers and high pressure pumps of the plunger type are given.420 Stanberg421 finds that recombined milk is superior in quality to most products from whole milk powder. In discussing the 3-A sanitary standards program Tiedeman422 points out that the purpose of the sanitary standard must carefully follow and apply the standards in the field. Baker423 points out that the coliform count is an index to the sanitation in a pasteurizing plant. Electroneutralization of milk is reported by Benson.424 Milk subjected to 0.091 T acidity by 40 ° F requires 1,000 coulombs. Huddleston et al.425 found electric home pasteurizers effective in destroying Brucella abortus organisms. The effects of low temperature holding and HTST pasteurization on cream line and bacterial destruction are compared by Izercott.426 Jordan and Holland427 discuss procedures in the conductivity method of testing HTST pasteurizer holding time. A continuous electric pasteurizer has been patented by Southercott.428 Olson429 has patented a HTST pasteurization system stopping any possible leakage of raw to pasteurized milk. A small town plant—"one of the most modern and sanitary plants to be found anywhere" is described.430 Doan431 discusses frozen storage of milk as a method of preservation. The report of the British Committee on Milk Distribution recommends pasteurization wherever feasible and control of distribution.432 Jordan et al.433 report the factors affecting holding time measurements for HTST pasteurizers. Removal of vitamin C removed oxidized flavors. Addn. of vit. C caused a development of oxidized flavor, report Guthrie and Krukovsky.444 Meyer445 gives advantages of newer types of electronic temperature indicating recording and controlling equipment in dairy plants. Effect of pasteurization on reduction ability of whole milk, skim milk, and cream studied by Sjostron and Larsen.446 Chilson et al.447 propose the addition of ascorbic acid to milk to prevent oxidized flavor. The Stambaugh-Graves method of pasteurizing and canning milk, immediately after it is drawn, is described by Rudolph.448 Milk is drawn by vacuum, homogenized, heated to 200 ° F for 19 seconds, and canned in an atmosphere of nitrogen. The method is considered to hold promise for the disposal of seasonal surplus production. Milk is homogenized c. 22°C, packed at 0.067 P, state rotation of homogenized milk during freezing kept solids evenly distributed, but did not improve keeping quality.

Bell449 found that a low oxidation-reduction potential, obtained by the addition of ascorbic acid to milk, greatly deleters but does not prevent oxidized flavor; that this potential does not increase retention of vitamin C in the form of ascorbic acid. The cardinal points in checking the performance of HTST pasteurizing units, and compliance with milk ordinance requirements, are divided into four phases by Dolan.450 An efficient electric pasteurizer for home use is reported upon by Moore.451 Hetrick and Tracy452 showed that the time required to inactivate the lipase enzyme in milk varied with the rate of heating to and cooling from the holding temperature. Herrell and Francis453 report that the addition of dissolved oxygen in raw milk influenced by temperature, bacterial content, and amount of milk in the cans at the time of delivery and that the greatest amount of O absorption occurs during milking.

The results of the use of different stabilizers in frozen homogenized milk are described by Babcock et al.454 Addition of Na citrate with ascorbic acid to homogenized milk frozen and stored at -11.5 to -17.8 ° doubled the time the milk remained normal in appearance and flavor when thawed and compared with the control. Chilson, Martin and Parrish455 claim that no oxidized flavors developed in milk fortified with ascorbic acid in 5- or 7-day storage periods, which in control samples, they began to develop after days' storage, increasing with storage time. According to Barker456 cream of high uniform quality may be produced if: milk at intake is closely graded for flavor, color, sediment, bacteria, clean cans are used; milk is cooled to 40 ° F; air is excluded; copper contamination is avoided; the can is cleaned and sterilized, and of proper design; and shipping cars are properly iced. Letroi457 states that milk can be heated to 205 ° F in 0.007 sec. in an electronic system wherein the milk falls freely between two electrodes joined to alternating current. There is no trace of cooked flavor and the bacteria count is less than 1%.

MISCELLANEOUS


Abstracts of the papers presented at Symposium of Sanitation Study Section, Division of Grants and Fellowships, are given.460 Searles461 discusses methods of preventing insect infestation in dairy plants. Methods of evaluating detergents for dairy plants are recommended by Harding and Trehler.462 Gilbou and Brown463 report that microlysin (chloropicrin) was used during the war to preserve milk in France.

The use of ultraviolet light for the detection of rodent urine and its chemical confirmation is discussed.464 Page and Lubatti465 report the results of the effects of fumigants on food. Flavor changes may be detected by the taste test.

Carter et al.466 found that pigs fed beef containing DDT stored 49-57% of the amount ingested.

Only aerobic spore-bearing bacteria survive pulp and paper manufacture according to Tanner.467 Smith et al.468 report that alfalfa sprayed with DDT at 0.25 lb. per acre gave a residue on the hay of 7-8 p.p.m. The milk from the cows that were fed this hay contained 2.3-3.0 p.p.m. and the butter therefrom contained 65 p.p.m. DDT. This did not seem to affect the cows nor the milk production. Test insects, inserted deep into sacks or bales with a special pointed cage provide a good check on fumigation.469 Crocker et al.470 stated that color, size, or consistency, are examples of food properties that can be measured directly, but others such as flavor, odor, and taste must be evaluated organoleptically by expert tasters.

"Milk Products," by Harvey and Hill, a British book of general information, is reviewed by Robertson.471 Krishnamurti and Subrahmanyan472 found that the most potent source of rennet among a number of plant materials including Euphorbia was the latex of F. carica (edible fig). The
are given by Birch. 4 69
and animals.
are given by Zipfel. 465
controls of metallic
on fruits, vegetables, and forage crops,
without precautions to avoid contami­
herd of Shorthorns, which had been
extracts, is reported. 4 6 7
sion very effective as an insecticide in
insect and rodent control respectively.
Brushes for piping should not mat, but
should swab. The bristle should
Bow. Nylon bristles are more durable
than animal fibre bristle, and do
become water soaked, states Myrick. 620
Reif 630 found that pure AI and
alloys (Pantel, Mangal, BSS), chrome
and chrome-nickel steel have no
effect on the vitamin C content of milk,
but alloys containing Mn and those
with Ti carbide precipitates do.

According to Tracy 631 physical condi­tion of a milk can is not significant
unless open seams are present. Wash­ing
solutions with compounds that can
stand high temperature must be hot
to kill the bacteria. "Dry" cans have
sufficient moisture to support bacteria
growth.

NUTRITION
Kiri and Henry 481 present an
extensive review of nutritive value of many
dairy products with 913 references.
Kinken et al. 485 found that when
hens were fed isopropanol extracted
cottonseed meal, their eggs did not
develop olive yolk or yolk albumin on
storage which is found in eggs from
hens fed hydraulic meal.

The Council on Foods and Nutrition
486 finds evidence lacking that fortifi­
fication of milk with vitamin A is in
the interest of public health.
Brenner et al. 485 studied the vitamin
recapture in 15 foods through an 18-
month storage period and 100° F.
Thiamine and ascorbic acid decreased,
per 1. milk most effective. claims Vin­
tika. 631 Palatability not affected.

Fletcher 642 gives precautions neces­sary
for methyl bromide fumigations.
Koewe 642 discusses measures effec­tive
in insect and rodent control.

Nutrition of a good fieldman
is reviewed. Such slight reduc­tions in nutritive value as may occa­sionally result "do not significantly
affect the over-all value of the milks." 645

Noble et al. 485 reported that beef
concentration of A raw milk for pasteuriza­
tion, developed in collaborat ion by
Wisconsin. The desirability of heating milk­
houses in cold climates is set forth by
Wagner and Nabben 675 and approxi­
mations of the current (kw-hr. per sea­
son) required to maintain a tempera­
ture of 40° F inside the milkhouse,
under various conditions of construc­tion and location, and by several means
of heating are given.

Weed 646 gives best applications of
pyrethrum, DDT, chlordane and ben­
zenhexachloride in milk and food
plants.

General principles of the design
standards for milking barn and milk­
house combinations for the production
of grade A raw milk for pasteuriza­tion, developed in collaborat ion by
Oklahoma A. & M. College, Oklahoma
State Health Department, and 19
county and city health departments, are
emphasized by Nielson. 646

Yoemans et al. 647 report that the
chemical recovery of DDT applied by
aerosols is only 1.0%, in the case of
wall panels, as great as the recovery
from floor panels.

Studies conducted by Burgess and
Sweetman 647 indicate that the toxicity
to houseflies of DDT treated screens
declined from 70% at 60°F to 60% to
60% to 75% relative humidity as
heat increased from 73.4°F to 75% and
25% to 40% relative humidity.

Eddy and McGregor 648 report that
of 11 recently developed organic
insecticides which were tested, DDT and
methoxychlor were fastest acting,
and the bromine analog of DDT were
to others in knockdown and duration of effectiveness.

Of 5 preservatives H2O2, 3 ml. 3%
per l. milk most effective, claims Vin­
tika. 648 Palatability not affected.

Fletcher 642 gives precautions neces­sary
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Noble et al. 485 reported that beef
tongue contained 0.10 mg. thiamine and
0.35 mg. riboflavin most raw meat,
and around 0.04 and 0.35 mg. per
cooked meat respectively.

Sheft et al. 485 reported that storage
temperatures of 50, 65, and 85°F
accelerated losses of ascorbic acid and
thiamine more than did extended stor­
age periods. Carotene in tomato juice
and niacin in peas held up well.

Niacin in tomato juice decreased 6–8% in
2 years at 50–80°F and 8–15% in
whole tomatoes.

A new vitamin which increases the
resistance of the mouse to Salmonellosis
has been discovered by Schneider. 492

Varma and Paul 493 showed that the
vitamin C content of the milk of some
important breeds of Indian cattle was
low in the first month of lactation
and reached peaks in the 4th month and
toward the end of the period.

Krijt 494 found that the amounts of
fat, vitamin A, thiamine and ascorbic
acid present in goat milk are higher
than those of cow milk, making it an
important food.

The sale of fat-free milk is being
promoted with the backing of the medical
profession. 495

Golodorski 496 found that summer
milk contains 36.4% more vitamin C
than winter milk; that winter milk can
be vitaminized by extracts or tablets
which showed 30%.

Dairy products retained 85–100% of their
carotene and vitamin A content. The riboflavin
department of the other products increased.

Millares and Fellers 497 showed that
chicken meat is an excellent source of the
indispensable amino acids, and that
it is equivalent to beef, pork, lamb, and
veal therein. No significant differences
were found in feeding chicken, beef,
and fish at 8% levels.

Answer to query re effect of pas­
teurization on nutritive value of milk.
Review of changes. Such slight reduc­tions in nutritive value as may occa­sionally result "do not significantly
affect the over-all value of the milk." 486

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tongue contained 0.10 mg. thiamine and
0.35 mg. riboflavin most raw meat,
and around 0.04 and 0.35 mg. per
cooked meat respectively.
In the food industry, there is a need for refrigeration requirements for ice cream and milk plants. Analyzing refrigeration requirements, irradiation of milk does not seem to modify its composition or digestibility; however, for ice cream and milk plants, colostrum and milk, reported by Ray Helmholz, point out the qualitative and quantitative inadequacy of milk for European children.

Average values of amino acids in milk albumin: arginine 3.25, histidine 1.63, lysine 10.21, cysteine 2.56, tyrosine 4.45%, reports Kugenev.

Cary and Hartman identify nutrient X present in non-fat portion of milk, as vitamin B12.

Scott and Norris conclude that the rat is a poor experimental animal for evaluating young infants' food.

Quaife found vitamin E content much higher in human milk than in cow's milk.

In studying the riboflavin content in a variety of child foods, Pushinkova found that exposure to light for 24 hours leads to average loss of 30% and elimination of light cuts the loss to 0.3%. Those foods based on polished rice are devoid of riboflavin, those with barley are highest, oatmeal type is intermediate.

Wolf states that with irradiated milk, the vitamin D potency increases with the fat content of the milk but is not proportional to it and that normal irradiation of milk does not seem to modify its composition or digestibility appreciably.

Regulations

Dodsworth discusses regulations and methods to deal with adulteration of food, especially milk.

Walter suggests that Britain needs more specific regulation of the food industry.

A committee has recommended adoption of the USPHS Milk Ordinance for the State of Washington.

Tobey gives his conception of a "reasonable" city milk ordinance.

The district court upheld the constitutionality of a Pueblo, Colorado, ordinance requiring pasteurization within 3 miles of the city.

Lounsbury summarizes New Jersey's new bacteriological standards for milk, cream and ice cream.

Food and Sanitation

Fuchs presents recommendations of the First National Sanitation Clinic of 1948.

Mallmann et al. found that 100% of restaurants complying with swab-testing bacteria requirements in a N.Y. City survey.

Brown finds that 27% of Pennsylvania eating places surveyed violate swab test standards.

According to Channell, the elements of restaurant sanitation are food purchased, methods used, equipment, and personnel.

Mangold abstracts A Guide to the Selection and Training of Food Service Employees prepared by the American Dietetic Association.

Chamberlayne believes the Janieson Kit for swab slant testing of utensils gives a "seeing is believing" approach to sanitary control.

Oregon is using a mobile laboratory to check bacteria on eating utensils in restaurants. Williams believes that food handler education contributes to the over-all control of certain communicable diseases.

In discussing methods of sanitation of restaurant utensils, Weber points out that any new chemical germicide should be thoroughly tested before being placed in use.

Henderson believes an understanding of restaurant economics aids greatly in eliminating insanitary practices.

The Oregon State Board of Health's mobile laboratory found many restaurants not complying with bacterial standards for utensils.

Villadur gives New York City procedure for checking plans of new restaurants.

The procedure of examining 14,000 Columbus, Ohio, food handlers is described and results given.

Molner and Wilson present Detroit's program for control of food sanitation.

For bacterial examination of eating and drinking utensils, Henderson believes agar slant practical and useful.

Davis and Resuggan show that transmission of infection in drinking establishments occurs through glass rinser water.

Methods of, and reasons for, restaurant sanitation programs are given by Mallmann, Slubert discusses interpretation of the Standard Restaurant Ordinance.

The Evanston, Illinois, Health Department found a 1-hour concentrated food handlers' course most effective.

Belam outlines methods of awakening interest of food handlers in food cleanliness and safety.

Communicable disease and food poisoning are stressed in a Baltimore food handlers course by Konoff.

Mallmann gives characteristics of a good cold sanitizer and discusses various methods of cold sanitation.

A Newark food handlers course of four 1-hour periods is described by Haskin.

Gerberg gives measures for insect and rodent control in food industries.

The APHA Committee on Sanitary Practices in the Food Industry is preparing a manual of sanitary practices.

Karnes describes the Bestrice Foods Co. sanitation improvement program.

Methods of insect and rodent control in food establishments are discussed by Barron.

Fisher tells of the frozen food locker sanitation program in Indiana.

Requirements for operating eating houses in Freemantle, Australia, are detailed.

Rowland and Fritz suggest for food handlers courses: Some bacteriology, specific categories of personnel, stress violated items, plan adaptable course, and controlled speed of presentation.

A food handler's home study course using Benney's book, "Sanitation for Food Handlers and Sellers," is reviewed.

Eagan describes 2 week refresher courses in milk and sanitation at Tupelo, Kansas.

Searls states effective rodent control requires rodent-proof barrier construction on openings into the building, after which clap-type traps baited with foods unavailable to rats.

Searls recommends keeping insects out of plants, cleaning out breeding and hiding places, using 5% DDT in odorless kerosene by trained personnel with proper sprayer only on insect roosting, nesting and hiding places, and avoiding contact of spray with food or food holding containers.

Technology

Stull found that concentrations of 0.00125 to 0.005% dihydroxyquinuacetic acid retard the development of oxidized flavor in unsweetened frozen cream.

Flecker reports that studies with modified non-ionic quaternary mixtures for use in dairy and food plants indicated satisfactory performance, provided surfaces are brushed as part of the cleaning techinic.

A simple means of determining the effectiveness of can-washer nozzle-jets is presented, and the importance of maintaining wash-solution strength at...
an effective level is emphasized by Abele.\textsuperscript{57}

Jamieson and McLeod\textsuperscript{58} present
to provide proof that education in sanita-
tion is needed in Manitoba, and that
improvement in conditions and milk
quality is possible.

Poe and Leberman\textsuperscript{59} give the effect
of acid foods on aluminum utensils.

The reasons for adopting the inter-
mittent use of organic cleaning mate-
rials, or the alternate use of alkaline and
organic (acid) cleaning materials in
the dairy industry are set forth by
Shogren.\textsuperscript{60}

Thomas\textsuperscript{61} reports that hand-
washed bottles followed by chlorine or
steam sterilization gave better results
than bottle-washing machines.

The various factors to be considered
in deciding upon the installation of a
can-washer are outlined and discussed
by Faust.\textsuperscript{62}

Bacon and Smith\textsuperscript{63} show a rela-
tionship between concentration of detergent
and amount of work necessary to
remove soil.

A few simple rules for the operation
of straight-line can washers, and the
alteration of alkaline and acid deter-
gents, are given and recommended, re-
spectively by Shogren.\textsuperscript{64}

Robinson\textsuperscript{65} shows that milk plant
clean-up economies can be effected by
using the right cleaning compound in
the minimum concentrations.

The functions of the polyphosphates
in softening water, preventing precipi-
tation of detergent chelates, and water
minerals in form film on cans and scale
on can-washers, and in dissolving the
denatured proteins in milkstore are out-
lined by Razee.\textsuperscript{66}

Resganan and Davis\textsuperscript{67} describe a
new non-foaming wetting agent with
strong bactericidal powers which may
be of use in cleaning milk bottles.

Kamungo et al\textsuperscript{68} showed that
re-
separation of high-fat skim milk after
addition of NaOH could be used to
make remelt casein from cow or buffalo
milk.

Alternating acid and alkaline deter-
gents in mechanical can washing is
recommended by Shogren.\textsuperscript{69}

Solberg and Hansson\textsuperscript{70} showed that
precipitation of Ca in milk with sodium
oxalate decreases the cream volume
obtained with a separator, but increases
that obtained on natural standing at 40°C
for 24 hours.

Good practices in laying out a milk
plant are presented by Mitten.\textsuperscript{71}

Denatured proteins in milk stores are out-
lined by Razee.\textsuperscript{72}

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Resganan and Davis\textsuperscript{81} describe a
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Kamungo et al\textsuperscript{82} showed that
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Kamungo et al\textsuperscript{89} showed that
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separation of high-fat skim milk after
addition of NaOH could be used to
make remelt casein from cow or buffalo
milk.
This supplementary statement is made to amplify and correct certain items in the present publication, dated 7 October 1949.* That draft is now amended as indicated below.

1. Under Curtain Rinse, delete entire paragraph and substitute the following:

A curtain rinse is not required. A top limit of two gallons of water per minute is proposed for such a rinse, if provided, in order to limit this ineffective use of hot water.

2. Under Construction, insert the following between the last two paragraphs:

All fittings, fittings and pipes shall be so placed as to avoid obstructing door openings.

3. Under Water Supply, the "100 grains" in the underparagraph is a misprint. This paragraph should read:

When the hardness of the water exceeds five grains per gallon (855 p.p.m.) a hard water detergent should be used, when it exceeds 10 grains per gallon (170 p.p.m.) softening to five grains or less is recommended.

4. Under Water Supply, delete the last paragraph and substitute the following:

Means shall be provided, as by boiler heater with or without storage tank, to supply not less than 204% per 100 square inches of tray area per minute of water at 100° F., or higher, at the inlet to the spray arms for single tank machines, and as much as two gallons per minute of water at 100° F. for each curtain rinse on a multiple tank machine. Adequate provisions shall be made to prevent the delivery of water at less than 180° F. at the spray arms when operation starts after the machine has stood idle for one hour.

5. After the last paragraph under Water Supply, insert the following:

Sewer Connection

There shall be an airbreak in the line for each machine to the sewer to prevent possible backflow of sewage into the machine.
DRINKING STRAWS

W. D. Tiedeman
New York State Department of Health, Albany, N. Y.

Health officials having responsibility for the enforcement of regulations requiring that only wrapped drinking straws be used have been interested in determining whether or not wrapped drinking straws offer greater health protection to the consuming public than unwrapped straws and, if so, whether such protection is adequate. This investigation was designed to give such information.

Manufacture

Straw manufacturing operations were observed at two large manufacturing plants selected as being typical in equipment and operation of the general run of plants producing wrapped and unwrapped drinking straws.

It was learned that drinking straws were not manufactured in a single machine, but in a series of separate steps. The first operation was to split relatively large rolls of paper into narrow strips. Two of these narrow rolls were attached to a machine with a revolving steel mandrel on which one strip was automatically wound spirally followed rapidly by the overlapping second strip to the under side of which an adhesive at about 180° F. was applied continuously. The adhesive used was said to be a vegetable preparation similar to paraffin. The hot paraffined straws from these trays were dumped on a long metal top table, and were rolled along by hand to prevent the straws from sticking together as the paraffin solidified on cooling. At the end of this table the cooled straws were gathered by hand into bunches of about 500, and rubber bands were placed around each end.

These bunches of paraffined double length straws were carried to and fed by hand into another machine where disc cuts trimmed each end and a third saw then cut the bundle through the middle making two bundles of single length straws.

An operator then examined each bundle, touching the ends in doing so and removing occasional straws with ends cut unevenly. Some of these bundles then were placed in large cartons to be taken to the wrapping machine and others were placed in printed boxes while the rubber bands were removed. These were to be sold as unwrapped straws.

The cartons containing bundles of straws were trucked to the wrapping machine to which the bundles were transferred by hand. The tissued paper for wrappers was made to be of cigarette paper grade. It came in large rolls about 29 mm. wide. It passed through printing wheels where the outside was printed in from one to three colors. The paper then was formed in the shape of a tube, the edge being sealed by milling wheels.

Bundles of straws were placed in the machine by hand and the rubber bands were removed. As the tissue paper tube was formed it was cut automatically into sections slightly longer than straw length, the machine inserted two straws and then the ends were sealed by milling wheels. These were placed in cartons of 500 pairs of wrapped straws each, ready for sale.

Handling in the Plant

Wrapped and unwrapped straws were subjected to about the same handling in the plant so the following comments apply to both. In fact the wrapped straws received an additional handling in being taken to, and the bundles placed in the wrapping machine. After the hot paraffin bath which may be considered to be the sanitizing treatment, all of the straws were handled in rolling them along the table during cooling, in assembling them in bunches held by rubber bands, in placing them in the trimming machine, and in inspecting and packaging them. Many studies have been made to show the bacterial load of the hands of the average person and there is no doubt that some of these bacteria are transferred to the straws at the plant. We would not expect the numbers per straw to be great in view of the tremendous number of straws handled daily. However, there is the possibility for hand contamination of a number of straws. Although we do not consider it to be a serious problem, we would recommend supervised sanitizing treatment for the hands of these workers. The problem here is the same for wrapped or unwrapped straws. The manufacturers were interested and cooperative. In fact, we are advised that a sanitary practices code has been drawn up by the Drinking Straw Institute and has been adopted by all of its member plants.

Observations at the Soda Fountain

Some limited observations were made of the manner in which drinking straws were handled at soda fountains. There was altogether too much handling of unwrapped drinking straws by operators in removing them from the cartons to place them in dispensers, and also, in removing them from the dispensers to place them in drinks or on the counter along the side of fountains. There also appeared to be considerable opportunity for air-borne contamination of such straws under the conditions in which they were stored and handled, for example, by sneezing.

Although the possibilities for contamination were not so great, some unsatisfactory procedures were observed in the handling of wrapped straws. There was a tendency on the part of clerks in some cities to remove the wrapper partially in handing a straw to the customer. Also, there was a tendency to throw the unwrapped straws over a wet counter that had just been wiped with a rag that looked like a floor mop. There was also a possibility of contamination of the wrapper by mouth spray or by sneezing.

Experimental Work

Some samples were taken at intervals during a period of four months and tests were run with a view to comparing bacteriologically the condition of wrapped and unwrapped straws as found at soda fountains. Fifteen samples of wrapped straws and an equal number of samples of unwrapped straws were collected by Mr. N. J. Hohlt* at various soda fountains, restaurants, and hot dog stands taken at random without any attempt at selecting the good or bad ones. The straws collected were from 11 different manufacturers.

The samples were examined in the Field Sanitation Laboratory, Division of Laboratories and Research of the

* Bureau of Environmental Sanitation, New York State Department of Health.
Department, under the direction of Mr. F. W. Gilcreas. To make the standard surface, the straw was cut aseptically into pieces that would fit in a sterile Petri dish. The pieces then were cut longitudinally and flattened. The dish was flooded with standard tryptone glucose extract, skim milk agar and kept submerged until the agar hardened. The colonies were counted after incubation for 48 hours at 35°C. Other straws from the same sets of samples were disintegrated in sterile buffered distilled water, a portion plated, incubated, and counted. and the bacteria count per straw was calculated. The results are shown in Table 1.

**TABLE 1**

<table>
<thead>
<tr>
<th>Straws</th>
<th>Outer Surface — per Straw</th>
<th>Per Disintegrated Straw</th>
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<tbody>
<tr>
<td></td>
<td>Wrapped</td>
<td>Unwrapped</td>
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<td>85</td>
<td>1,400</td>
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<tr>
<td>Median</td>
<td>&lt;10</td>
<td>85</td>
</tr>
</tbody>
</table>

A study of these counts indicates considerably less surface contamination of the wrapped straws and also a slight tendency for the count of the unwrapped straws on disintegration to run higher than the wrapped. Disintegration counts vary considerably between plants and runs so these differences are not significant.

**Protection Offered by Tissue Paper**

After seeing wrapped straws placed and possibly bacteria-laden counters and noting the exposure to possible contamination by mouth droplets or sneezes, the question arose as to whether bacteria might readily penetrate the tissue paper under these conditions. Ten samples of wrapped straws dipped for 5 seconds in a solution containing coliform organisms showed on examination surface counts of coliform organisms per straw after the wrapper was removed, ranging from 120 to too numerous to count. Most of the coliform counts were between 1,000 and 10,000 per straw. Of course, this treatment was tremendously more drastic than was likely to occur in ordinary practice. It was evident that these organisms would readily penetrate the paper and contaminate the enclosed straws.

**Bacteriostatic Paper**

This indicated that the use of a paper impervious to bacteria was desirable. Such paper, however, did not lend itself to the present process of manufacture involving sealing the paper by means of milking wheels. Studies were undertaken by the New Jersey Dairy Laboratories sponsored by the Drinking Straw Institute, of methods to prevent bacteria from penetrating the wrapper to the straw. Dr. Levowitz (1) has reported on the impragration of the wrapping tissue with an germicidal with a view to preventing viable bacteria from penetrating the paper. Tests made by spraying cultures of E. coli on such paper by means of a De Vilbiss No. 15 Atomizer showed no viable E. coli on the straws after 20 seconds contact. In this work, also done under the direction of Mr. Gilcreas, two 20 second treatments were used to inhibit further action of the quaternary ammonium compound after the contact period. In some of these tests a few organisms were recovered from the wrapper but none from the straws. It is believed that the concentration of moisture and bacteria used was greater than might result from a vigorous sneeze or the handling of the wrapper with moist bacteria laden fingers.

There appears to be no danger in the use of a quaternary ammonium compound for this purpose. Experience in other uses as in surgery and in the disinfection of eating and drinking utensils indicates that such compounds are not highly toxic. Dr. Levowitz reports that at the maximum level of treatment the extractable quaternary per square inch of paper is 0.000139 gram. The wrapper ordinarily used for two straws measures 17.4 square inches and thus contains a total of 0.000242 gram of extractable quaternary. The treatment required to wash all of this through to the straw would leave the wrapper drenched and make it unpreventable for use. The spray treatment used for testing possible penetration of bacteria did not carry enough quaternary through to the straw for detectability by available tests.

The Drinking Straw Institute has announced a plan for supervising the manufacture and distribution of this bacteriostatic or bactericidal paper to all users with a view to insuring its potency.

**Dispensing of Unwrapped Straws**

The investigation at the factory showed that unwrapped straws are handled in the same manner as wrapped straws, and are as satisfactory from the standpoint of sanitation when they leave the factory, as the wrapped straws. If these could be placed in a dispensing device in the original package, or without handling from the original package, and dispensed automatically and directly to the hands of the user, they should be as satisfactory as wrapped straws.

An examination of all of the dispensers known to be on the market revealed that none of them met these requirements. It is believed, however, that the door should be left open for the use of unopened straws in the event that adequate dispensers should be developed.

**Suggested Regulation**

In view of these findings, it is recommended that: Straws when offered for use shall be completely enclosed in an impervious or a bactericidal wrapper to be opened by the ultimate user; or unwrapped straws may be used when they are kept in an approved sanitary dispenser loaded from the original package without handling, which dispenses one straw at a time directly to the user and which is so constructed that the interior may be cleaned and kept in a sanitary condition. Unused loose straws already dispensed from the dispensing container shall not be used again.

**Reference**

REPORT OF THE COMMITTEE ON PROFESSIONAL STATUS OF SANITARIANS FOR 1949

In the report of last year this committee pointed out that there existed a general unsatisfactory situation with respect to the rates of compensation, being paid to sanitarians in comparison to other categories in the field of public health. It was also pointed out that it was questionable whether there was a general acceptance of the sanitarian as a professional entity because, among the different states, there existed no uniform training specifications for sanitarians in merit system job description sheets from the state health departments. From this it could be concluded that there existed a need for professional development of the sanitarian.

During the past year this committee has endeavored to explore the questions basic to the professional development of the sanitarian.

1. What does the sanitarian do and how does it relate to training needs?
2. What are the means by which professional recognition may be further developed?
3. How should a program of professional development be projected?

The first question, "What is the work of the sanitarian and how does it relate to training needs?" has a variety of answers which may be found in merit system specifications of the various sanitary agencies and has been answered in a general way in the report of the Committee on Professional Education of the American Public Health Association.* There is, however, a need for a detailed description of the work of the sanitarian which will bring to light the specific skills which he must possess and which may tend to characterize him as a professional in the field of public health. One approach to the question is to derive an empirical answer from a study of the procedures employed by sanitarians in the daily performance of their duties. This method is somewhat beyond the resources of this committee but will be explored by the research project currently being conducted by the Engineering Section of the American Public Health Association.

The committee in the past year was privileged to confer with the directors of this project and review the forms which they will use in their appraisals. It is hoped that an answer to this question can be derived from this project.

The second question, "What are the means by which professional recognition may be further developed?" has two approaches. First, status of the sanitary programs in which the sanitarian is engaged must be established as matters requiring the services of a professional. Consequently, it is this committee's recommendation that our association lend its full support to the development of sanitary programs in which the sanitarian is engaged.

Second, the status of the individual might be improved by the enactment of legislation which would tend to identify him as a person requiring certain special talents to practice as a sanitarian. Such legislation could be either laws requiring the licensing of sanitarians or requirements incorporated in the merit system laws of the state or municipality. It is believed that the desirable type of legislation may vary among the different states. Consequently, this committee is unwilling at this time to recommend any one program of legislation for general application.

This leads logically to the third question, "How should a program of professional development be projected?" It is the opinion of this committee that further development of sanitation programs is essential in the field of public health.*

*American Journal of Public Health 38, 1003-7 (1948). (Continued on page 120)

DAIRY PRODUCTS IMPROVEMENT INSTITUTE

The Third Annual Meeting of the Dairy Products Improvement Institute was held in New York City, January 12. Officers elected were:

President, W. A. Wentworth, New York, N. Y.
Vice-President, J. F. Gerber, Lancaster, Pa.
Treasurer, R. C. Hibben, Washington, D. C.
Secretary and Managing Director, C. W. Larson, 1107 Liberty Bank Bldg., Buffalo 2, N. Y.

The New Jersey State Commissioner of Health, Dr. Daniel Bergsma presented a paper, "Public Health and the Dairy Industry," from which excerpts follow:

Through the years legislatures and public health officials in their respective areas of jurisdiction, have passed laws and adopted regulations governing the production, processing, and distribution of milk and milk products. Most of these laws have had one basic aim, namely, to provide a safe and wholesome product. When collectively examined, however, lack uniformity in detail. As a result, a producer or dairyman cannot always know what the laws require. The standardization of the basic requirements and the elimination of conflicting, out-dated regulations on a milk-shed basis, are timely and necessary and would enable all consumers to meet the demands of the market.

Through the years legislatures and public health officials have passed laws and adopted regulations governing the production, processing, and distribution of milk and milk products. Most of these laws have been aimed at providing a safe and wholesome product. When collectively examined, however, lack uniformity in detail. As a result, a producer or dairyman cannot always know what the laws require. The standardization of the basic requirements and the elimination of conflicting, out-dated regulations on a milk-shed basis, are timely and necessary and would enable all consumers to meet the demands of the market.

Standardization of the basic requirements and the elimination of conflicting, out-dated regulations on a milk-shed basis, are timely and necessary and would enable all consumers to meet the demands of the market. Some of the codes that I have seen, particularly those regulating producing farms, cannot be supported by evidence that they improve the quality of the product. Many of them contain unnecessary details relating to the type of building construction and costly equipment which may not or cannot be afforded by the producer. Through the years legislatures and public health officials have passed laws and adopted regulations governing the production, processing, and distribution of milk and milk products. Most of these laws have been aimed at providing a safe and wholesome product. When collectively examined, however, lack uniformity in detail. As a result, a producer or dairyman cannot always know what the laws require. The standardization of the basic requirements and the elimination of conflicting, out-dated regulations on a milk-shed basis, are timely and necessary and would enable all consumers to meet the demands of the market.

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work and data analysis. They considered the problem and came up with some useful suggestions that could not overlook the importance of delineating the greatest amount of time at the time they are feeding. Therefore, we set up a procedure for a separate system of management procedures for the loose housing of cattle, which could be cleaned with the aid of a tractor. This group studied and evaluated all the possible solutions, and it called in experts in veterinary medicine, agriculture, and engineering from Rutgers University. The final result was a more acceptable management procedure for the loose housing of dairy cattle. This was in response to a simple, earnest request of industry to attempt to lower the costs.

Health authorities have seen the gradual increase in distance between dairies and markets. Schools for dairymen, and urbanization continues, land becomes more valuable and the dairy industry continues to seek more efficient, more productive land. Feed and space to house dairy cattle are becoming increasingly important to the producer. As a result of such considerations, new and important public health problems arise. Health authorities are now facing the problem of determining whether states should provide dairies with a livestock that is marketed exported milk that is marketed. Milk inspectors and health authorities should be: what status and authority should they have and what part should they play in the solution of such problems within each state? Small states have to know the degree of reliance that can be placed in an inspection system which is subject to their own control. Final agreements will, of necessity, have to be clearly defined. Considerable standardization, inspection criteria, and terminology will be necessary. Conflicting inspection reports should not exist. However, if these problems develop, they should not be the result of control procedures, if properly accomplished within each state and between states, can eliminate much confusion.

Mr. W. S. Anderson, Director of the Pennsylvania State Bureau of Milk Sanitation, Harrisburg, addressed the meeting on the subject of "Quality Milk Production Under the Pennsylvania Dairy Farm Inspection Program." Excerpts from his address follows:

We realize that the lack of cooperation between the various States and Health Departments has retarded the progress of quality milk production, since their requirements have varied to such a great degree that the farmers have been at a loss to know to whom they should look for proper guidance.

When every one knows that the intent of all milk sanitation laws is identical, it has always been difficult to understand why there is so little uniformity in the enforcement of these laws. We can only assume that the problem is one of interpreting and enforcing milk sanitation regulations.

Some consider it impossible that the failure of accomplishing the desired sanitary conditions on a dairy farm might not be largely due to the manner in which in many inspectors have been trained. The health authorities must understand the agricultural industry as large as the dairy industry is, and in order to supply rapidly concentrated feeds may be eliminated by the farmer himself, thus conserving its use. The farmer who raises the farm by putting up the green-grass silage and moving his hay can help himself. That is what I appreciate most in good milk production, will agree that the protein content of most farms, if it is raised, will be either the farmer himself, with the help of the best trained men in the industry. I am confident that the best trained men in the field cannot be too good, since they must know thoroughly their subject and, above all, must be diplomatic in their dealings with the public. Being a farmer myself, I cannot say that it was not annoying to an inspector to try to sell me a program with which he could not be expected to be thoroughly familiar. A good inspector should know the farmers' problems. He should be more than a member of a practical standpoint, and he should never become so technical that he might lose the practical application of his knowledge.

For an inspector to build up a pleasant relationship with the producer should be brought to impress the producers with the fact that the recommendations which he makes will naturally help to provide a better brand of milk. When there is evidence that the producer is not using the milk in its raw state. Most milk producers are interested in providing a product of such quality that it will be brought to the attention of the farmer and the necessary recommendations made. The same approach should be used when there is evidence of improper feeding. A number of inspectors believe that in these days of the combat of the losing war, it will be well to mention the fact that many farmers today are pasteurizing their supplies of milk used on the farm. I am very much interested in getting the producers to be interested in the laws that are being passed. The whole problem should probably be discussed to show that the producer is interested in the regulations and is being caused by rough handling or improper feeding. I feel that a belated attempt to clean the milk will probably be a success. A larger, better and more clean milk can be produced from a clean herd, rather than from one carrying an infection. It might be interesting to know that some cow in my herd, which had previous infections, produced over 2,500 lbs. more milk during a lactation period, after the udder infection had been cured. I find that in the fact that there is no sound reason why mastitis is taking the toll that it is today, while it can be eliminated or prevented by the application of proper methods of feeding and handling the dairy herd.

After an inspector has made his physical inspection of the dairy herd, as it is known from the source of supply, he should make inquiries as to the home in which the producer, the producer's operator or his foreman, he should consult his local veterinarian relative to the treatment. I have learned from my own practical experience with the secrets of handling the udder, that a herd of cows that are producing milk, much of which is being destroyed in the washing of udders, can be cleaned up. A larger, better and clean milk can be produced from a clean herd, rather than from one carrying an infection. It might be interesting to know that some cow in my herd, which had previous infections, produced over 2,500 lbs. more milk during a lactation period, after the udder infection had been cured. I find that in the fact that there is no sound reason why mastitis is taking the toll that it is today, a person who is interested in the regulations of feeding and handling the dairy herd.

More from the west arrived by carload in 1924. When 1928 came around, a carload from the西部 was found in every month of the year and, on the average, every week in the year and by the carload. Since 1928 without western cream we would have had no northern market. In the beginning the quality of the cream supply from the west was very bad. The control was limited to the market was subject to spot shipments. Consequent that the cream might go first to Philadelphia and finding possibly diverted to some other market, perhaps Boston. In 1923 I arranged with the railroads, as there were no truck shipments by highway, to hold every carload under seal until my
representative had sampled it. In the laboratory we then did a complete analysis of that cream, and it was found that the cream was adulterated by neutralizers, water or foreign milk before pasteurization.

I define good quality as pasteurized, free from cream contamination, and having a standard plate count at 32°C of less than 40,000 colonies of bacteria in one cubic centimeter. I arrived at 40,000 as the border between good and bad in the same way; one grade of milk before pasteurization whether the final result is sold as milk or cream.

I then recognized that we were therefore looking for an industry we then did a complete analysis of one cubic centimeter. I arrived at 40,000 as the border between good and bad in the same way; one grade of milk before pasteurization whether the final result is sold as milk or cream.

I then recognized that we were therefore looking for a control of the quality of the cream. I recognized further a fundamental fact: the potential of control of the quality of the cream. We believe that others can do just as well in this respect. As far as the cream is concerned, the law is interpreted in a uniform manner, and the results are the same. In 1939 Herbert F. C. F. F., of Massachusetts, showed that the cream samples in 7 days at 38°F were not very practical, even for an experimental procedure. I now found that 1 hour incubation at 90°F is the equivalent of 1 day at 38°F.

Mr. Theodore Marcus, Director of the Massachusetts Dairy Laboratories, Boston, spoke on "Why Some Dairy Plants Fail to Deliver Quality Cream to the Market." Excerpts of which are the following:

There are two reasons why there is considerable trouble with sweet cream. First, the not enough is known about the keeping quality of sweet cream and the bacteriology involved; second, there is not enough attention paid to the quality of the cream.

The keeping quality of sweet cream has always been a real problem. First, because milk changes under certain conditions. An example is that when milk is heated to 85°F and then cooled to 45°F, the milk changes under certain conditions. An example is that when milk is heated to 85°F and then cooled to 45°F, the milk changes from an acid to a non-acid state.

I also found that E. coli count using Deoxycholate agar was an excellent measure of cream contamination. Incubated cream samples for 7 hours at 38°F, then plated 1-1000 on tryptone glucose extract agar, incubating these plates for 90°F, and milk direct on agar. I read these plates in 24 hours and had a good measure of the quality of the cream. However, if cream is good in the vat, and poor thereafter, it is due to two things:

1. The time and temperature of storage after pasteurization are such that survival of bacteria is not occurring; and

2. The bacteria added after the cream leaves the pasteurizer continue growing.

Let us explore the first of these reasons. Why good cream in the vat goes bad thereafter. Suppose that somehow there are surviving bacteria in cream even after 33 minutes at 160°F...
it could take weeks, even months. I think that if cream can be cooled quickly enough and kept cold enough, this lag phase can be maintained for 30 days. Thirty-four degrees F would be a good storage temperature: 40°F would shorten the lag phase: 45°F even more so. The temperature of the cream after it leaves the vat is of utmost importance, the lower, the better. Cooler chest temperatures with blowers to take out the heat of pasteurization, and the heat of air absorbed in jugging the cream, would help. Even more important is the temperature of cream after bottling. The temperature must be kept low if surviving bacteria are to be kept in their lag phase.

As to the second reason why good cream in the vat goes bad thereafter, I cannot but agree with Dr. Jensen's statement in his "Microbiology of Meat," "When you contaminate at the logarithmic phase, your growth from then on is logarithmic." If the plant equipment were as sterile as my laboratory equipment, the cream would keep if the first condition of temperature is observed. But if active, growing bacteria from a jug or from equipment were added after pasteurization, all the refrigeration of freezing will not stop growth at a logarithmic rate. Lower temperatures may slow them down but not stop them. I am inclined to view this as a problem in psychrophilic growth as well as psychrotrophic bacteria. Apparently many bacteria are capable of psychrophilic growth.

Following these principles of bacteriology, I have set up certain general rules which must be followed in making cream that will have a long and good-keeping quality:

1. Pasteurize cream at 160°F for 30 minutes.
2. Cool to below 40°F and place in a blower chest to cool below 34°F for storage at that temperature. Bottled cream should be cooled immediately before using with 180-180°F water. The smaller the equipment, the better.
3. All equipment must be sterilized immediately before using with 180-180°F water. The smaller the equipment, the better.
4. The cream jugs, besides being clean, must be steamed not more than an hour before filling.
5. There is no substitute for heat in sterilizing equipment or jugs.
6. Good cream after 7 hours' incubation at 90°F will show a low plate count and E. coli 0.

That, gentlemen, is what I have learned of the keeping quality of cream and the bacteriology involved. It has done wonders in the plants that have faithfully followed it. It has not solved all the problems, especially that of the human nature. This material was given to a large cream shipper over a year ago. That plant has still not figured out how to steam jugs. Perhaps it is too much trouble. If cream still bothers it and has to be threatened with a shut-off to bring it in line. Another thing is that cream quality is at the mercy of the first good salesman in line. Another thing is that cream quality is threatened with a shut-off to bring it in line. Another thing is that cream quality is at the mercy of the first good salesman. The cream jugs, besides being clean, must be steamed not more than an hour before filling.

Report on Professional Status of Sanitarians

(Continued from page 114)

definitive action can best be taken by the state governments. Consequently, it is our recommendation that organizations of milk and food sanitarians affiliated with the International Association of Milk and Food Sanitarians establish within these organizations a committee on the professional development of sanitarians whose duty it shall be to investigate the situation within their own area, and initiate a program which they deem to be desirable in the interest of improving the professional status of milk and food sanitarians. Harold B. Robinson, Chairman, Joseph J. Donovan, James A. King, H. Clifford Mitchell, J. L. Rowland, John Taylor

NEW BOOKS AND OTHER PUBLICATIONS

Patent Practice and Management, by Robert Calvert. Published by Scarsdale Press, Box 536, Scarsdale, N. Y. xii + 371 pages. 1950. $5.00.

This book deals with the essentials of patent law and practice from the standpoint of the interested executive and inventor. The author himself was formerly a research director. Starting with a chapter in "What to Patent," the author deals with the many questions which concern the executive and would-be patentee such as "When to Patent," inventions, rights of employers, and employees, policies, claim drafting, application, interference, secret information, license, validity, infringement, and an excellent glossary of patent law terms. The subject is handled in a pleasing, conversational style. This enables the reader to glean a lot of practical information that is not clouded under dry, complicated legal phraseology. In fact, it is so readable that one finds himself reading page after page from mere interest.

Correction

The book, Judging Dairy Products, by Nelson and Trout, published by the Olsen Publishing Company, was reviewed in our January-February, page 50. The price is given as $5.00, this is incorrect. The correct price is $6.00 plus $2.00 per copy for mailing.

HAVE YOU SEEN

(Compiled by Dr. R. G. Hecht, University of Wisconsin, Madison)


"Labor Requirements on Dairy Farms," Hoard's Dairyman, Dec. 10 (1949).

Michigan Food Sanitarians School

The Seventh Annual Dairy and Food Sanitarians School will be held at Michigan State College on April 4-7. This is an opportunity for the busy worker in these fields to secure the latest information on many aspects of food inspection with a minimum of time and expense. Considerable effort is expended each year in bringing together national leaders on the various topics pertaining to sanitation problems. Anyone interested may obtain full details of the School and a copy of the program by writing Dr. W. L. Mallmann, Department of Bacteriology and Public Health, Michigan State College.
IN-SERVICE TRAINING PROGRAM AT WISCONSIN

This In-Service Training Program, sponsored by the Wisconsin Milk Sanitarians Association and presented at the University of Wisconsin by cooperation of members of the University Faculty, Wisconsin State Board of Health, Wisconsin Department of Agriculture, U. S. Public Health Service, and Industry Organizations is intended as a refresher course for dairy sanitarians currently engaged in and having responsibility for dairy sanitation work.

It is intended that all participants enroll for the entire five-day period of the course. Advance registration is necessary for participation. Application for enrollment, by letter, accompanied by a registration fee of $5.00 should be mailed to—

Dr. K. G. Weckel
Department of Dairy Industry
University of Wisconsin
Madison 6, Wisconsin

by April 1, 1950. Checks should be made payable to "The College of Agriculture".

Monday, April 10, 1950
Dairy Animal Diseases Transmissible to Man
Dr. John Schwab
Human Diseases Transmissible to Man via Milk
Dr. A. R. Zintek
Changes in Micro-flora in Milk During Pasteurization
Dr. E. M. Foster
Problems in Pasteurization, and Equipment Deficiencies
Harold Waatness
Pasteurization Plant Layout
Professor L. C. Thomsen
HTST Pasteurizer Control Requirements and Test Procedures
H. E. Eagan

A complete panel of a HTST control system, including pumps, holding tube, recording and indicating thermometers, and flow diversion valve will be set up for operation demonstration. Participants will be requested to demonstrate familiarity with operating parts and test procedures, including dye test, solubrige, cold milk injection, and instrument interval timer.

Tuesday, April 11, 1950
Problems of Municipalities in Administering Public Health
Frederick MacMillan
The Accredited Area Plans
Dr. W. R. Winner
The Use and Interpretation of the Phosphatase Test
Dr. L. W. Brown
The Direct Microscopical Count of Raw Milk
Prof. Erroll Wallenfeldt
Significance and Control of Coliform Bacteria
Dr. K. G. Weckel
New Techniques in Selling Sanitation
Ralph Kuhli
Antibiotics and Milk
Dr. W. C. Winder
Sanitarians Travelogue

Wednesday, April 12, 1950
Laboratory Tests, Putting First Things First
Dr. H. E. Calbert
Problems of Meeting Requirements of Interstate Milk Shippers
Clarence Luchterhand
Harvey Weavers
C. H. Adkins
Farm Water Supply and Water Systems
Harvey Wirth

SUMMER SESSION OF MASSACHUSETTS INSTITUTE OF TECHNOLOGY

A three weeks special course in food technology, from June 12 to June 30, a feature of the 1950 Summer Session at the Massachusetts Institute of Technology, has been announced by Professor Walter H. Gale, in charge of M.I.T. summer session activities.

To be given under the direction of Dr. Bernard E. Proctor, professor of food technology at the Institute, the intensive course will give particular emphasis to recent developments in food manufacture and control. In addition to lectures, demonstrations, and conferences at M.I.T., there will be opportunities for group visits to representa
tive food industries throughout greater Boston.

The course, intended principally for those having some knowledge of the basic sciences pertinent to food technology, should prove valuable to advanced students in other sciences as well as to executives and employees in food industries, according to Dr. Proctor.

The following subjects are among those on which the course will include fundamental material: economics and statistics of food supplies; food cost accounting and business law; food bacteriology, sanitation, and fermention; food chemistry and nutrition; materials handling; food control instrumentation; flavor and food acceptance; and food sterilization by electronics. Detailed
Dr. Lavery Appointed Director of Food Control

Dr. Lavery is a graduate of the Ontario Veterinary College, and after leaving college engaged in general practice, which he left to serve for three years during the first World War as a Veterinary Officer with the Imperial Army in France and Germany.

On his return to Canada he resumed practice until June 1925, when he joined the Toronto Department of Health in the capacity of Meat Inspector, and was later transferred to Dairy Farm Inspection.

For a period of ten years previous to his appointment as Director, Dr. Lavery acted as Assistant to Dr. Richmond, during which time he supervised the inspection of farms, dairies, and also food establishments in the City, thus familiarizing himself with the various problems affecting these industries.

Dr. L. Franklin Lavery was appointed Director, Division of Food Control, Department of Public Health, Toronto, Ontario, Canada, on June 10th, 1949, succeeding Dr. A. R. B. Richmond, who was retired after 38 years service. The latter will be remembered as President in 1930-31 of the International Association of Milk Inspectors.

THIRTY-SEVENTH ANNUAL MEETING, 1950, AT ATLANTIC CITY

The 37th Annual Convention of the International Association of Milk and Food Sanitarians will be held in Atlantic City on October 13th, 14th, 15th and 16th, with headquarters at the Dennis Hotel. Since this convention is scheduled during the end of the week preceding Dairy Industries Exposition sufficient rooms have been set aside for our group at the Dennis Hotel. Registration for rooms should be made directly with Mr. Wesley T. Keenan, Convention Manager of the Hotel.

The Program Committee is under the direction of Dr. R. G. Weckel, President Elect. University of Wisconsin, Madison, Wis.

Note that the convention runs for four days including Sunday, October 15th, and Monday, the 16th. The Executive Board felt that because of the large volume of association business, Constitutional Amendments, etc., which will consume considerable time, decided that Sunday, the 15th, would be a good day to carry on these discussions. The 16th is the start of the Dairy Show.

Evaluation of Quaternary Compounds

(Continued from page 66)

REFERENCES

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The Journal of Milk and Food Technology (including Milk and Food Sanitation) is issued bimonthly beginning with the January number. Each volume comprises six numbers. Published by the International Association of Milk and Food Sanitarians at 374 Broadway, Albany 7, N.Y.

The subscription rate is $2.00 per year, including respectively the Journal of Milk and Food Technology (including Milk and Food Sanitation) and the International Association of Milk and Food Sanitarians, including applications for membership, remittances for dues, failure to receive copies of the Journal of Milk and Food Technology, and other such matters should be addressed to the Secretary of the Association, George A. West, 44 Marshall St., Rochester 2, N.Y.

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ASSOCIATION NEWS

Philadelphia Dairy Technology Society

The Philadelphia Dairy Technology Society has made a grant-in-aid to further the work of the Nutrition Clinic of the Philadelphia General Hospital.

W. S. Holmes
Secretary-Treasurer

Michigan Association of Sanitarians

The annual meeting of the Michigan Association of Sanitarians will be held in East Lansing on Tuesday, June 4, 1950. This same week, the Annual Michigan Food and Milk School will be in session at Michigan State College.

Mr. John Pomeroy, Director of the Division of Sanitation of the Kalamazoo County Health Department, has been selected by the Executive Committee of the Michigan Association of Sanitarians as their representative to the Program Committee for the 1950 Michigan Public Health Association meeting to be held in Grand Rapids in 1950.

The Michigan Association of Sanitarians participated on February 14, 15, and 16 in the Annual Michigan Allied Dairy Association meeting in Grand Rapids. Thursday, February 16, was devoted to programs principally of interest to milk sanitarians.

ASSOCIATION NEWS

METROPOLITAN DAIRY TECHNOLOGY SOCIETY

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Vice-President, P. C. Garth, Long Island Agricultural and Technical Institute, Farmingdale, N. Y.
Secretary-Treasurer, E. H. Fletcher, Long Island Agricultural and Technical Institute, Farmingdale, N. Y.
Assistant Secretary, W. K. Mosely, Indianapolis, Ind.
Assistant Secretary, W. K. Mosely, Indianapolis, Ind.

PHILADELPHIA DAIRY TECHNOLOGY SOCIETY

Secretary-Treasurer, W. S. Holmes, Philadelphia Dairy Council, Inc. 234 South 22nd Street, Philadelphia 3, Pa.

THE INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., 1950

APPLIED LABORATORY METHODS:
Luther A. Black, Chairman, USPHS Environmental Health Center, Cincinnati, Ohio.
F. W. Barber, Nat'l Dairy Research Laboratories, Oakdale, Long Island, N. Y.
P. W. Elliker, Oregon State College, Corvallis, Oregon.
C. K. Johns, Dominion Dept. of Agriculture, Ottawa, Ontario, Canada.
J. N. Murphy, Jr., State Department of Health, Austin, Texas.
J. C. Olson, Jr., University of Minnesota, St. Paul, Minn.
W. K. Mosely, Mosely Laboratories, Indianapolis, Indiana.
Harry Scharer, New York City Health Department, New York, N. Y.

COMMUNICABLE DISEASES AFFECTING MAN:
J. G. Hardenbergh, American Veterinary Medical Association, Chicago, Ill.
R. J. Helvig, USPHS Milk & Food Branch, Washington, D. C.
C. K. Mader, Board of Health, Kitchener, Ontario, Canada.
E. R. Price, USPHS, 2200 Fidelity Bldg., Kansas City, Mo.

DAIRY FARM METHODS:
R. G. Ross, Chairman, State Health Department, Oklahoma City, Okla.
C. F. Bletch, Maryland & Virginia Milk Producers Association, Washington, D. C.
L. E. Babcock, Babcock Bros., Chicago, Ill.
Geo. H. Hopson, DeLaval Separator Company, New York, N. Y.
E. H. Paffrath, Evaporated Milk Association, Chicago, Ill.
F. L. Schacht, State Department of Health, 18 Dove St., Albany, N. Y.
J. E. Dolan, Department of Public Health, Denver, Colo.

FOOD HANDLING EQUIPMENT:
C. W. Weber, Chairman, State Health Department, Allentown, Pa.
Lewis Dodson, 1609 Van Buren, Amarillo, Texas.
F. H. Downs, Jr., Major MSC, Hq. 4th Army, Fort Sam Houston, Texas.
John Faulkner, University of North Carolina, Raleigh, N. C.
W. A. Machin, Rutgers University, New Brunswick, N. J.
James H. McCoy, State Board of Health, Indianapolis, Ind.

FROZEN DESSERTS SANITATION:
W. C. Cameron, Dept. of Agriculture, Ottawa, Ontario, Canada.
O. A. Ghioggo, Dept. of Agriculture, Sacramento, Calif.
David Levowitz, New Jersey Dairy Laboratories, New Brunswick, N. J.
J. M. Scott, State Department of Agriculture, Gainesville, Fla.
M. L. Speck, University of North Carolina, Raleigh, N. C.

ORDINANCES AND REGULATIONS:
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H. J. Dunsmore, City Health Department, Pittsburgh, Pa.
A. W. Fuchs, USPHS, Washington, D. C.
O. A. Ghiggoile, State Department of Agriculture, Sacramento, Calif.
C. S. Leete, State Health Department, Albany, N. Y.

PROFESSIONAL STATUS OF SANITARIANS:
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J. A. King, State Department of Public Health, Denver, Colo.
H. C. Mitchell, State Health Department, Richmond, Va.
John Taylor, State Board of Health, Indianapolis, Ind.
Milton E. Held, State Board of Health, Des Moines, Iowa.

RESOLUTIONS:
W. D. Tiedeman, 18 Dove Street, Albany, N. Y.
A. W. Fuchs, Chairman, USPHS, Washington, D. C.
R. G. Ross, State Health Department, Oklahoma City, Okla.

SANITARY PROCEDURE:
C. A. Abele, Chairman, Diversey Corporation, 2617 Hartzell, Evanston, Ill.
M. R. Fisher, Div. of Health, Milk Control Section, St. Louis, Mo.
H. E. Bremer, State Department of Agriculture, Montpelier, Vt.
Paul Corash, Department of Health, New York, N. Y.
C. B. Dalzell, Cherry-Burrell Corporation, Little Falls, N. Y.
H. L. Thomasson, State Board of Health, Indianapolis, Ind.
O. A. Ghiggoile, State Department of Agriculture, Sacramento, Calif.
Harold Wainess, USPHS Regional Office, Chicago, Ill.
C. W. Weber, State Health Department, Albany, N. Y.
Mark Howlett, City Health Department, Los Angeles, Calif.
H. J. Weavers, Chief of Dairy Section, Dept. of Agriculture, Madison, Wisc.

PROGRAM:
K. G. Weckel, Chairman, University of Wisconsin, Madison, Wisc.
C. S. Leete, State Health Department, Albany, N. Y.
H. L. Thomasson, Indiana State Board of Health, Indianapolis, Ind.

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Chicago—Host City for the IFT Decennial Conference

The Chicago Section of the Institute of Food Technologists are hosts to the National Society for the IFT Decennial Conference to be held May 21-25, 1950, at the Edgewater Beach Hotel. The first annual conference was held in Chicago in 1940 when IFT had a membership of about 700 food technologists and has since grown in size to approximately 3,000 members.

In view of the growing influence of food technologists in the continuing development of food and allied industries, it is planned to extend invitations to outstanding leaders in finance and industry for a special luncheon to be followed by a timely and provocative address by an international banker. The purpose for such a gathering is to create a broader appreciation of the significant roles food technologists have already assumed and are prepared to extend in the future development of food industries and the national economy. As a means of emphasizing past and potential capabilities, no technical sessions will be held on Tuesday afternoon May 23 (following the luncheon for their business guests) in order to permit uninterrupted inspection and review of the exhibits by the invited executives, IFT members, and guests.