VOLUME 17 NO. 2
February, 1954

Journal of

MILK and FOOD TECHNOLOGY

Official Publication

International Association of Milk and Food Sanitarians, Inc.

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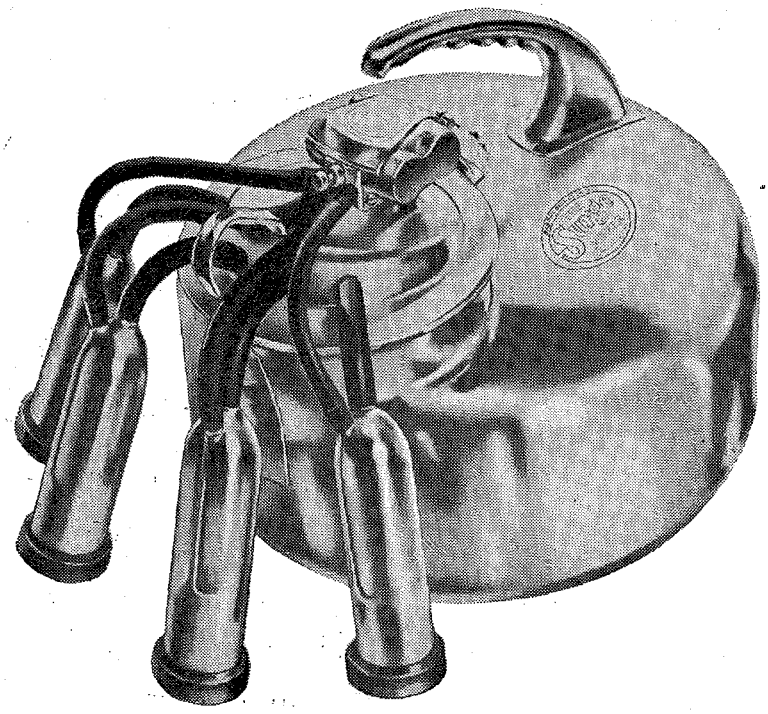

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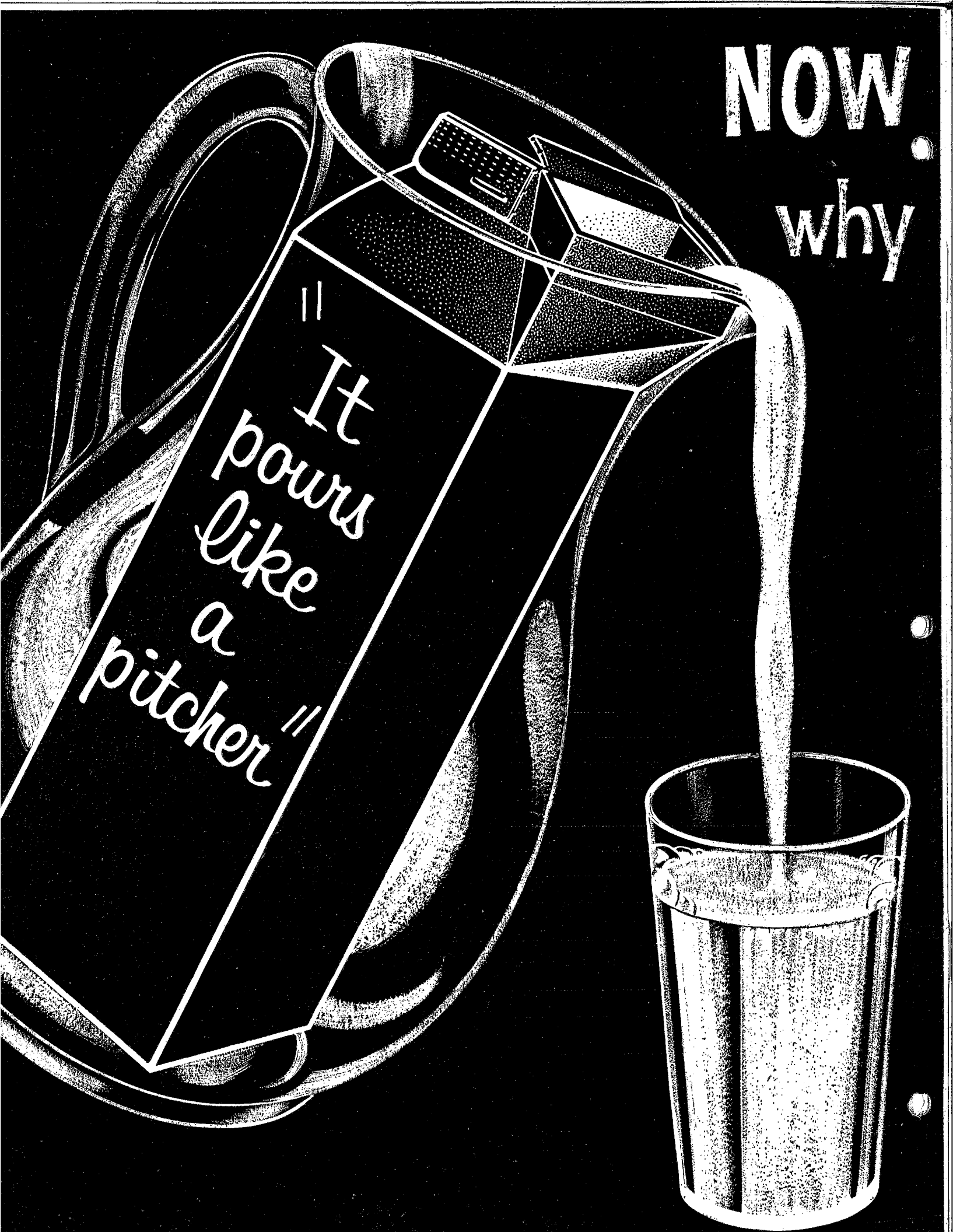
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Entered as second class matter at the Post Office at Shelbyville, Ind., March 1952, under the Act of March 3, 1879.

EDITORIAL OFFICES: J. H. Shrader, Editor, 23 E. Elm Ave., Wollaston 70, Mass; H L. Thomasson, Managing Editor, P. O. Box 437, Shelbyville, Ind.

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

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

Journal of

MILK and FOOD TECHNOLOGY

INCLUDING MILK AND FOOD SANITATION

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Vol. 17 FEBRUARY No. 2

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

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Orders for Reprints: All orders for reprints should be sent to the executive office of the Association, P. O. Box 437, Shelbyville, Ind.

Membership Dues: Membership in the **International Association of Milk and Food Sanitarians, Inc.,** is $5.00 per year, which includes annual subscription to the **Journal of Milk and Food Technology,** (including **Milk and Food Sanitation**). All correspondence regarding membership, remittances for dues, failure to receive copies of the **Journal,** changes of address, and other such matters should be addressed to the **Executive Secretary** of the Association, H. L. Thomasson, Box 437, Shelbyville, Indiana.

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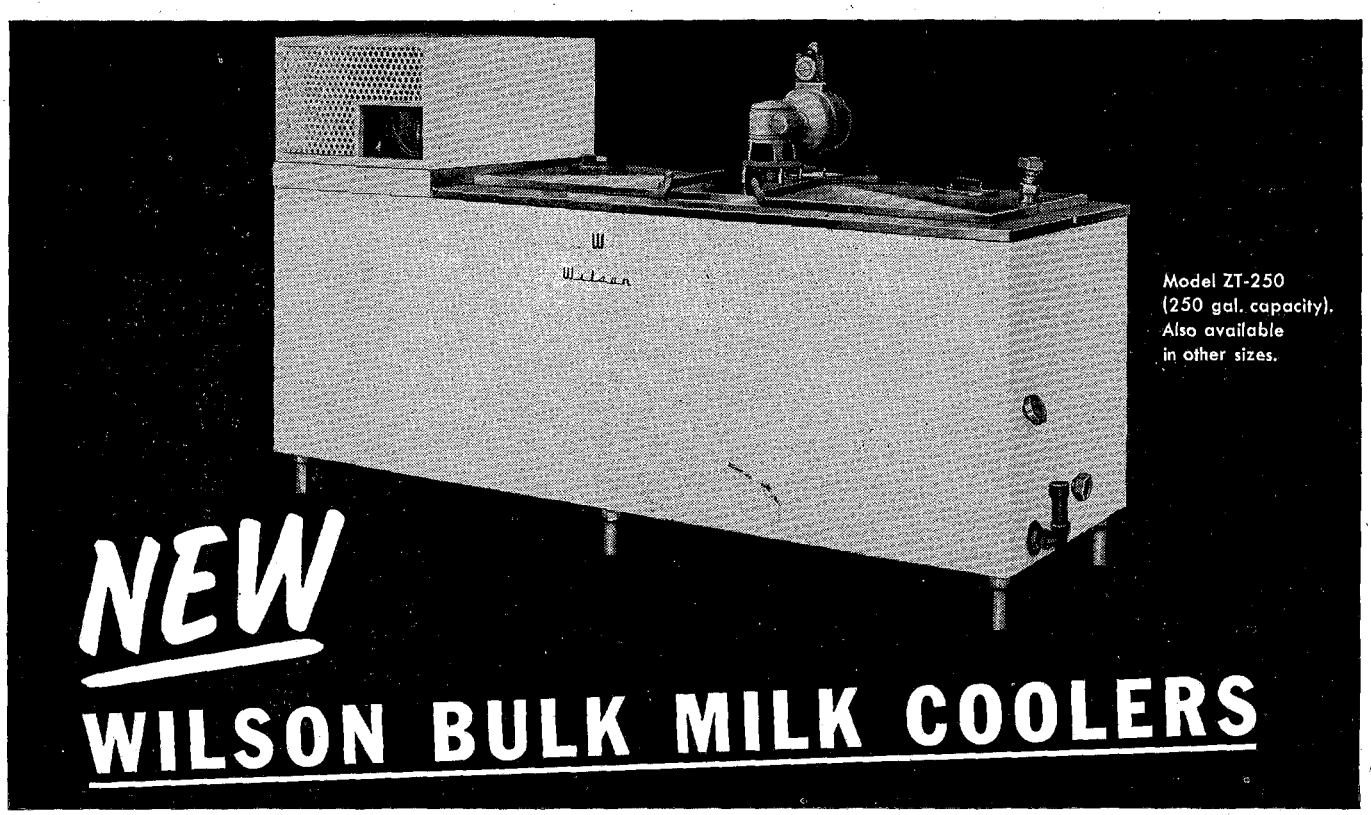

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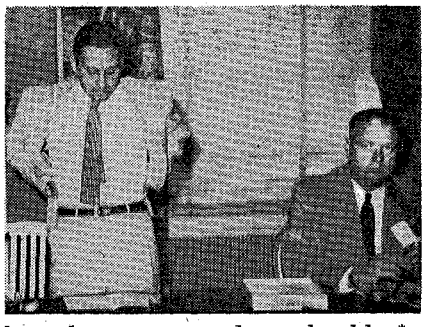
Editorial Notes

CANDY INDUSTRY SANITATION SEMINAR



Several organizations — commercial and technological—of the candy industry set up a Sanitation Conference in Philadelphia last September. Some of the papers presented have been reprinted in a booklet* which is abstracted as follows:

Principles and Practice, by Charles A. Wood. He gave a list of references, laboratory procedures, and tabular description for the identification of the types of extraneous matter found in food.

Standards in Foods with Special Reference to Nut Meats and Dried Fruits, by Eugene J. Gerberg. He discussed the general basis for, and practice of, setting up food standards.

Limitations of Use of Insecticides in the Food Plant, by Harry B. Holmes. The two liquid insecticides most prevalently used are Lindane and Pyrethrum, coupled with the synergists sulfoxide, piperonyl butoxide, N-propylisome, and Lethane. Aerosols are effective but may form droplets locally. Dusts are dangerous for plant use, and particularly if Chlordane and D.D.T. Gases are most effective fumigants, highly adapted to special plant needs. These are: methyl bromide, cyanide, ethylene oxide and dibromide and dichloride, and carbon tetrachloride. Their high toxicity necessitates their use by trained personnel.

Proper Inspection and Use of Outside Services in Candy Plant Sanitation, by Gerald S. Doolin. He described the greater effectiveness of having an outside man called in to evaluate plant sanitation practices. Then follows a detailed inspection procedure dealing with equipment common to many plants.

Insects in Food Plants and Their Control, by Ray R. Kriner. Two orders of pests of prime importance are (1) the Coleoptera, weevils and beetles, and (2) the Lepidoptera, including the grain and cocoa moths. These four chief offenders and their habits are described in detail.

Cleaning Compounds, by Edward Hoffman. No one cleaner is all-purposive. The properties and application of the alkaline, acid, and neutral agents are explained.

Methods of Cleaning Equipment, Housekeeping, and Storage, by Sam Goldstein. The author shows how construction is related to cleaning effectiveness.

Cooperation Results in Improved Quality, by Robert C. Stanfill, who described the effectiveness of cooperation.

Organization and Duties of the Pennsylvania State Department of Agriculture, by Willard S. Hagar. He gave a general description of food law enforcement in Pennsylvania.

J. H. Shrader

*A *Report of the Candy Industry Sanitation Seminar,* Sanitation Series, No. 2, 47 pages, 1953. Published by the National Confectioners' Association, 221 N. La Salle St., Chicago 1, Illinois, at 50 cents each.

FIELD TRAINING OF SANITATION PERSONNEL

The Subcommittee on Field Training, Committee on Training, Engineering Section, American Public Health Association, has just issued its fourth annual report under the title: *A Guide to Field Training for Sanitation Personnel in Public Health.* The Committee was chairmaned by Professor William C. Gibson, School of Public Health, University of Michigan, Ann Arbor, Michigan. This publication is the final report of the Subcommittee, and ". . . is largely a collation and reedit of the three annual progress reports of the Subcommittee, submitted in 1949, 1950, and 1951, respectively."

In the language of the Foreword: ". . . A studied effort has been made to present fundamental objectives, principles, and practices observed in the development of well-organized operating programs". These ". . . agree in principle with those developed for other public health professional workers." Responsibilities of educational institutions, financing, minimum standards for field training areas, and accreditation are expected in a forthcoming report.

The respective chapters may be abstracted as follows:

Chapter I. *Introduction.* Field training is increasing, and must be geared to those "with appropriate academic backgrounds," and also to those lacking these. The former would need a minimum of three months of this field training.

Chapter II. *Definitions of Field Training.* This is graded to several levels:

Observation—brief visit of a few days to witness a good public health program in action;

Orientation—for a prepared person for a specific job, usually requiring a few weeks;

Supervised field experience—planned instruction, orientation, observation, and active participation in a good public health program, supplemental to formal academic training in public health, usually requiring three months;

Apprenticeship—about one year of service under supervision in a public health program for those without prior academic training in public health.

Chapter III. *Objectives.* 5 general, and 16 special, covering a wide range of practical and theoretical knowledge as to how to originate, administer, and execute a public health sanitary program.

Chapter IV. *Types of Sanitation Personnel to be Trained.* The classification of the personnel follows:

Engineer — graduate of 4-year degree course in engineering, eligible for licensure. Requires 12 weeks supervised field experience.

Public Health or Sanitary Engineer—graduate of full year graduate study in public health or sanitary engineering. Requires 12 weeks supervised field experience.

Sanitarian—graduate of 4-year curriculum in recognized institution, with major in sanitary science or the physical or biological sciences. Requires 12 weeks supervised field training.

Sanitary Inspector—graduate of 4-year high school with 12 weeks in-service apprenticeship plus topical short course programs.

Chapter V. *Principles and Practices of Field Training.* Detailed outline for setting up field programs.

Chapter VI. *Criteria for Field Training Areas.* Interim standards for approval of suitable field training areas are provided pending the realization of the idealistic ones published by the APHA Committee on Professional Education [*J. Amer. Pub. Health Assoc.* 37, 709–714 (1947)].

Chapter VII. *Administration and Supervision of Field Training Programs.* Three patterns of field training are: (1) Regional training center; (2) State training center (single local unit); and (3) Multiple local unit. The first serves groups of states, usually in cooperation between Public Health Service, states, university, and health department. The second is arranged entirely by a single health department. The third uses multiple local health departments closely around basic service programs. In general the governing principles accord with those governing residences in public health for physicians. This chapter carries detailed directions.

Chapter VIII. *Financing Field Training Programs.* No final plan is offered but suggests federal grant-in-aid funds to states, state and local funds when these areas are immediately benefitted, academic contributions for curriculum service when field training is a baccalaureate requirement, and student tuitions.

Chapter IX. *Evaluation of Field Training Programs.* Although in process of development, a codification of 17 criteria of sound field training programs provides a "Good," "Fair," and "Poor" measure of effectiveness.

Chapter X. *Miscellaneous Considerations.* Usefulness of field training programs: not intended to substitute for formal academic education but helpful to those without adequate training; merit systems are beginning to recognize field training experience in employment requirements.

J. H. Shrader

DUNN REVIEWS AMENDED FOOD INSPECTION LAW OF FEDERAL FOOD, DRUG, & COSMETIC ACT

On August 7, Congress enacted an amendment to section 704 of the Food, Drug, and Cosmetic Act. This section authorizes an agent of the Federal Food and Drug Administration to inspect an establishment wherein foods, drugs, devices, or cosmetics are manufactured or held for interstate commerce. As enacted in the original Act of 1939, this provision was interpreted by the FDA to be compulsory but the U. S. Supreme Court ruled in the Cardiff case that the provisions allow only voluntary permissive entry. Such a decision so weakened the initial law of section 704 that Congress amended the section to authorize clearly such FDA action. However, Congress provided certain limitations to the exercise of that authority. These restrictions are reviewed herewith.

The present law carries the same compulsory authority to enter and inspect but adds the limitation of only reasonable times and reasonable manner. The inspector must show his credentials and may not enter by force —although refusal to admit constitutes a criminal offense under the FDC Act. An inspector is required to give an inspected establishment a copy of any adverse report and copy of analytical results of a sample taken. It stresses the sanitary importance of the basic law; it greatly benefits manufacturers by providing them with information for a due compliance with the FDC Act; but they remain subject to a criminal prosecution under this Act for any violation thus discovered.

The restrictions are comprised in an interpretation of the "reasonable limit and manner" provisions for inspection authority but imply that such entry must not be used as a fishing expedition, such as, for example, manufacturing processes, the files, and other confidential business.

Dunn believes that the courts will support this limitation. He points out three qualifications: (1) the FDA is not bound by this limitation because it can use broadly other sections of the Act and other laws; (2) it now has broad administrative control over the production of all new drugs and certain others; and (3) it is given no clear definition of several important terms, such as "inspect" and "establishment".

He adds that the FDA has announced that it will surmount this limitation by invoking a search warrant procedure, and moreover, that it will seek voluntary disclosure of needed enforcement information. This latter raises some contradictory reactions from the industry.

J. H. Shrader

EFFECT OF TYPE OF INSTALLATION AND CLEANSING PROCEDURE ON THE SANITATION OF FARM MILK PIPELINES [1, 2]

J. E. Hunter, E. H. Marth and W. C. Frazier
Department of Bacteriology, University of Wisconsin
Madison

Bacteriological studies were made of a permanent, cleansed-in-place, cow to cooler pipeline system and another pipeline designed for dismantled cleansing. The sanitary conditions of the two pipelines were compared and a study was made on the effect of frequency of brushing on the sanitary condition of the pipeline that was disassembled for cleaning. The swab contact and the brush and rinse methods of testing the sanitary condition of milk pipelines were compared.

During these studies the milk from both pipelines was of excellent quality. Swab tests indicated that both pipelines were maintained in a satisfactory sanitary condition. The bacterial population on the surface of the pipeline increased as the frequency of brushing decreased, but the milk passing through the pipeline did not increase in bacteria count. The results of the swab and brush and rinse tests had little direct relation to each other.

Until recently, the only accepted cleansing procedure for sanitary milk pipelines was to dismantle and brush them[7]. Now, however, the 1953 U.S.P.H.S. *Milk Ordinance and Code* permits the use of cleansed-in-place pipelines that conform to certain standards.[8] Parker *et al.*[5] found that the results of swab tests of cleansed-in-place dairy pipelines were more satisfactory than the results of swab tests of pipelines cleansed by conventional take-down and brush procedures. Alexander, Nelson, and Ormiston[1] reported that the bacteriological quality of milk from a cleansed-in-place farm pipeline was not significantly different from that of milk from a pipeline that was disassembled for cleansing. The laborious dismantling and brush cleansing required for care of sanitary milk pipelines not designed for circulation cleansing makes their use less attractive and advantageous than use of cleansed-in-place pipelines.

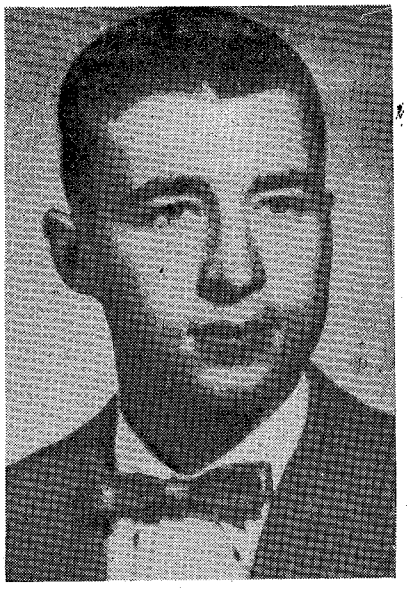
The following experiments were designed to learn: (a) how well farm pipelines were cleansed by the treatments immediately following milking, (b) how the length of the interval between disassembling a pipeline for cleansing would affect its sanitary condition, and (c) whether a cleansed-in-place pipeline could be kept in as good condition as one that was frequently disassembled.

Methods

Studies were made of two farm milk pipeline systems where all pipes were of stainless steel and all rinsing, cleansing, and sanitizing of pipelines in place was by means of the same vacuum system used for milking. In one system, hereafter referred to as the "milking parlor system," the cows were milked in a parlor and the milk was transferred to the bulk cooling tank in a pipeline designed for cleansing after dismantling; in the other system, to be called the "stanchion barn system," the cows were milked in a conventional stanchion barn and the milk was transferred to the bulk cooling tank through a permanently assembled pipeline designed for in-place cleansing by recirculation procedures. Calbert[3] has described and pictured the stanchion barn system in detail.

The milking parlor pipeline was dismantled at one day, twice weekly, or bi-weekly intervals. Before dismantling, the system was flushed with cool water until the water ran clear. The pipeline then was dismantled and brushed with a balanced alkaline detergent at 140°F. Every fourth day a solution of organic acid was used in place of the alkaline detergent. After the cleansing operation, the pipeline sections were rinsed in a tank of cold water and drained. Just before the next milking, the pipeline was assembled and was sanitized by the passage of 3 gallons of a 200 ppm chlorine solution at 110-120°F through the complete line. At all times that the pipeline was not dismantled for cleansing, it was cleansed in place by flushing with 6 gallons of cold water, then by circulation with 8 gallons of hot (170-180°F) balanced alkaline detergent solution for 15 minutes and finally by flushing with 8 gallons of water at 160°F. Every fourth day an organic acid was substituted for the alkaline detergent. Prior to the next milking, the line was sanitized by flushing with 3 gallons of warm, 200 ppm chlorine solution. Measurement of velocities of the various cleansing and sanitizing solutions through the pipelines was not practicable when the vacuum system was used because of the variations in the amounts of air included in the "air brush."

The stanchion barn pipeline, 160 feet in length by 1.5 inches in diameter, described by Calbert was left permanently assembled and was cleansed in place by the following procedure: (a) flushed with cool water until it ran clear and then with 6 gallons of water at about 110°F to warm the long pipe, 20 feet of which is out of doors, so as not to cool off the detergent; (b) cleansed in place by the recirculation of 12 gallons of a balanced alkaline detergent for 15 minutes at 140° to 170°F, (an



John E. Hunter obtained his B.S. Degree in bacteriology at the University of Wisconsin in 1951 and his M.S. degree in the same department in 1953. This paper is in part based on a thesis submitted by the senior author in fulfilling the requirements for his Master's Degree.

1 Published with the approval of the Director of the Wisconsin Agricultural Experiment Station. This work was supported in part by funds from the United States Steel Corporation.

2 The research reported herein was conducted as a part of North Central Regional Research Project NC-3, One Story Dairy Barns and Related Structures.

organic acid was substituted for the alkaline detergent every fourth day); (c) rinsed in 6 to 8 gallons of water at about 175°F and (d) sanitized prior to use by the passage of about 3 gallons at 200 ppm chlorine solution at 110°F through the pipeline.

The balanced alkaline detergent used on both pipelines was composed of a caustic nonionic wetting agent, polyphosphates, sodium metasilicate, and a small amount of basic carbonates. The pH of the solution was about 11.8 and the surface tension was 37 dynes per cm. The active alkalinity was 35 percent Na_2O and the inactive alkalinity was 8 percent Na_2O. The acid cleanser was a substituted alpha hydroxy organic acid mixed with a nonionic wetting and dispersing agent and when used it was at pH 4.

Milk samples from the cooling tanks that were supplied by each pipeline were plated for thermoduric, psychrophilic and standard plate counts[2] to indicate the bacteriological quality of the milk after it had passed through each pipeline system. Three times during the course of the experiments whole quarter samples were taken from the cows in each barn to obtain assurance that no cow was contributing abnormally high numbers of bacteria to the mixed milk and to obtain a rough idea of numbers as the milk came from the cows. Special inserts were placed in the milking machine so that all of the milk produced by each quarter could be collected separately.

The milk produced by each quarter was weighed and a sample was plated for a standard plate count (35°C). The milk samples also were tested for pH, abnormal chloride content and abnormal number of leucocytes. Those udders having one or more quarters yielding milk that was found to be abnormal according to all four tests were assumed to be infected and such quarters received treatment for the infection. The standard plate count of the milk from each quarter was weighted according to the pounds of milk yielded by the quarter, and the weighted average standard plate count for each cow was calculated. The calculated standard plate count of the milk from each cow and the total weight of the milk from each cow were used to calculate the weighted average standard plate count for each herd. It was realized, of course, that numbers of bacteria in milk from any quarter or cow would vary from day to day, and that average counts on herd milk obtained in this way would only approximate the numbers of bacteria in the freshly drawn, pooled milk from the herds and would differ from day to day.

The sanitary conditions of the milk contact surfaces of the two pipelines were compared by means of swab contact tests. A different section joint in each pipeline was opened each time the pipeline was swabbed, so that the test would be made on a previously undisturbed surface area. A sterile swab, prepared as recommended in *Standard Methods for the Examination of Dairy Products*[2], was dipped into a tube of sterile buffered solution and was rubbed five times over the entire interior surface of five lineal inches of pipeline adjoining the open joint. The swab was returned to the tube of sterile buffered solution, whip-rinsed by striking the tube against the palm of the hand 50 times, pressed against the side of the tube until free of excess liquid, and then removed and discarded. The iced buffered solution was taken to the laboratory and plated within half an hour for psychrophilic and standard plate counts as recommended in Standard Methods[2]. Two ml of the buffered solution was placed in a tube and held in a water bath at 61.7°C (143°F) for 30 minutes, cooled, and then plated for the thermoduric count.

A brush and rinse method also was used to test the effect of frequency of dismantled cleansing on the sanitary condition of the pipeline. The tests were made after the morning cleanup, daily when the pipeline was dismantled for daily cleansing, and on the day before and the day after the pipeline was disassembled for cleansing at other intervals. A sterilized nylon brush with a nine foot wire handle was inserted and withdrawn from each section of the pipe and rinsed in sterilized water. After all parts had been brushed, the pipeline was assembled and the brush rinsings, plus the remainder of 10 liters of sterile distilled water, were flushed through the line and collected at one end in sterile flasks. An iced sample was taken to the laboratory and within 30 minutes plated for psychrophilic and standard plate counts. Also a thermoduric plate count was made on a pasteurized sample.

A comparison was made of the swab contact test of five lineal inches of the interior surface of the pipeline with brush and rinse tests of single eight foot sections of pipeline and of the entire pipeline. Results by both methods were calculated and expressed as psychrophilic, thermoduric and standard plate counts per eight square inches of pipeline surface.

RESULTS

Comparison of Cleansing-in-Place with Disassembling and Brush Cleansing

A comparison of the arithmetic mean and logarithmic mean of the plate counts on milk from the two pipelines is shown in table 1. The milk from the biweekly brushed pipeline was compared with that from the cleaned-in-place pipeline because lower count milk was obtained than with daily disassembling, as will be shown later (table 2). Results show that milk of low bacterial content could be produced by either method of treatment of the pipelines and that there were no marked differences in numbers of thermodurics or psychrophilics. The small difference in favor of the cleansed-in-place pipeline could be due partially to higher counts in milk as it left the udders of the cows in the milking parlor as indicated by the weighted, calculated standard plate counts of the freshly drawn milks from the two herds. The average was 1600 colonies per ml for milk from the herd furnishing milk to the cleansed-in-place pipeline and 3700 colonies per ml for milk from the herd furnishing milk to the periodically disassembled pipeline.

The results of the repeated swab contact tests[2] indicated that both pipelines were maintained in a very satisfactory sanitary condition. The U.S.P.H.S.[8] standard for milk pipelines was met (less than 100 colonies per eight square inches of milk contact surface in three out of four contact tests), even though the pipelines had not yet been given a final germicidal treatment at the time of the test.

TABLE 1—COMPARISON OF PLATE COUNTS OF MILK FROM THE BIWEEKLY BRUSHED AND THE CLEANSED-IN-PLACE PIPELINES. ALL RESULTS ARE EXPRESSED AS NUMBER OF COLONIES PER ML OF MILK

	Cleansed-in-place pipeline			Biweekly brushed pipeline		
	SPC	TPC	PPC	SPC	TPC	PPC
Arithmetic mean	3,800	70	3,700	5,500	96	2,500
Logarithmic mean	2,500	42	1,400	3,500	45	1,300
Maximum	18,000	460	36,000	35,000	400	22,000
Minimum	600	9	150	610	6	150
Number of samples	33	33	30	27	26	27

SPC=Standard plate count
TPC=Thermoduric plate count
PPC=Psychrophilic plate count

Experiments indicated that the chlorine treatment effected a thirty-fold or greater reduction in numbers of bacteria in the pipeline. For example, a series of 14 swab tests on the cleansed-in-place pipeline after chlorination showed a maximum standard plate count of 46 per eight square inches of surface, a minimum of less than 3; a maximum of 44 thermodurics and a minimum of less than 3; and a maximum of 20 psychrophiles and a minimum of less than 3.

The results indicate that both pipelines were maintained in an equally satisfactory sanitary condition by their treatments following milking and these conditions were guaranteed by the chlorination procedure.

Effect of Frequency of Brushing

The build up in numbers of bacteria in the parlor pipeline between disassembling and brushing treatments, as tested by the brush and rinse method, is illustrated in table 2. It will be observed that standard plate counts, thermodurics, and psychrophiles increased as the interval between dismantling-brushings lengthened. These marked increases in numbers of bacteria were unexpected because the pipeline was cleansed and sanitized between dismantlings like a cleansed-in-place pipeline, the latter, as is shown in table 1, consistently yielded milk of relatively low bacterial content.

Average bacteria counts of the pipeline (table 2) are broken, in table 3, into two components, average after brushing and average before the next brushing. Net average differences presented in table 3 indicate the same build up of numbers of bacteria in the pipeline that was previously mentioned. The greatest increase between brushing intervals took place when the pipeline was disassembled and brushed biweekly.

TABLE 2—COMPARISON OF AVERAGE PLATE COUNTS OF MILK AND BRUSH-AND-WATER RINSE SAMPLES OF A PIPELINE BRUSHED AT DAILY, TWICE WEEKLY, WEEKLY AND BIWEEKLY INTERVALS. EIGHT TO ELEVEN BRUSH-AND RINSE SAMPLES WERE TAKEN DURING EACH INTERVAL

	Count on entire pipeline			Average plate count of milk*		
Brushing interval	SPC	TPC	PPC	SPC	TPC	PPC
Daily	1,400,000	9,000	8,800,000	5,200	32	3,600
Twice weekly	7,100,000	7,200	14,000,000	3,200	19	2,500
Weekly	5,200,000	26,000	11,000,000	2,200	17	1,600
Biweekly	28,000,000	69,000	53,000,000	2,900	24	1,600

*Average plate count per ml of eight to 15 milk samples taken during the period each brushing interval was in effect.
SPC=Standard plate count
TPC=Thermoduric plate count
PPC=Psychrophilic plate count

The build up of bacteria in the pipelines took place in spite of twice daily chlorination and the previously mentioned cleansed-in-place methods. Since a similar amount of milk passed through the pipeline during the entire test period (approximately 120-130 gallons), it would be expected that the build up might be reflected by higher numbers of bacteria in the milk. This, however, did not happen, as is indicated in table 2.

Comparison of the Brush and Rinse with the Swab Contact Method for Bacteriological Testing of Pipelines

The relationship between the results obtained by the swab contact and the brush and rinse method of testing the sanitary condition of milk contact surfaces of pipelines is of interest. Both methods were applied to the pipeline in the milking parlor, since that pipeline could be dismantled easily for sampling. The total milk contact surface of the milking parlor pipeline was about 3,000 square inches, of which 22 square inches were sampled by each swab contact test. When results of both tests were calculated as plate counts per eight square inches of surface, the standard and psychrophilic plate counts obtained by the brush and rinse method averaged two to three thousand times as great as corresponding plate counts obtained by the swab method. The average thermoduric plate counts were about 20 times as great as those obtained by swab tests. The relationship between the results obtained by the two methods of testing was not constant.

It was believed that more uniform conditions existed in single eight foot sections of the pipeline than in the pipeline as a whole because the section had no joints, el-

TABLE 3—CHANGES IN NUMBER OF BACTERIA ON ENTIRE MILK CONTACT SURFACE OF PIPELINES DURING INTERVALS BETWEEN DISASSEMBLED BRUSHINGS.* NUMBERS ARE IN THOUSANDS

	Frequency of Brushing								
	Twice weekly			Weekly			Biweekly		
	SPC	TPC	PPC	SPC	TPC	PPC	SPC	TPC	PPC
Av. nos. after brushing	3,000	11	5,700	1,700	35	4,800	6,700	5.6	26,000
Av. nos. before next brushing	11,000	8.5	23,000	9,500	16	30,000	50,000	130.0	81,000
Average difference	8,000	-2.5	17,300	7,800	-19	25,200	43,300	124.4	55,000
Max. increase between brushings	25,000	-	47,000	17,500	-	46,020	91,360	288	136,000

*Samples taken on day of disassembling and brushing and day before next such treatment; 8 to 11 samples taken for each interval.
SPC=Standard plate count
TPC=Thermoduric plate count
PPC=Psychrophilic plate count

bows, and vertical risers. A more unbiased sample also was possible for 22 of a total of 340 square inches of milk contact surface were covered by the swab test. The swab test was made just prior to the brush and rinse test, consequently results of the later may be slightly lower than if the swab test had not been made. The results of the two tests were not as widely separated in magnitude when applied to eight foot sections instead of the entire pipeline. The average plate counts per eight square inches that were obtained by the two methods were as follows: standard plate count—brush and rinse method, 620 colonies—swab method, 79 colonies; thermoduric plate count—brush and rinse method, 260 colonies—swab method, 11 colonies; psychrophilic plate count—brush and rinse method, 10,000 colonies—swab method, 2,900 colonies.

The brush and rinse method does not duplicate the results of the swab method when applied to either single sections of pipeline or to the pipeline as a whole. The results differ less markedly when the tests are applied to individual eight foot sections than when applied to the entire pipeline. Either test probably would indicate a generalized unsanitary condition, although the brush and rinse method should be the more reliable since it samples the entire surface being tested.

DISCUSSION

The observations by other workers [1, 5] that a properly designed and constructed cleansed-in-place pipeline can be maintained in as satisfactory sanitary condition as a pipeline that is cleansed by conventional dismantled-cleansing procedures was substantiated by these results. The actual numbers of bacteria entering the milk from the surface of a pipeline that has been properly cleansed and sanitized by either procedure is apparently not great, as is evidenced by the small average plate counts of milk that has passed through the pipelines. The fact that the average plate counts of the milk were higher when the pipeline was being dismantled daily than when dismantled at less frequent intervals indicates the possibility that the frequent disturbance of the pipeline surface may result in a greater contribution to the bacteria count of the milk than when the pipeline is left relatively undisturbed.

The very high results of the brush and rinse tests as compared to the results of the swab contact tests indicate that the former method effected a more complete removal of the bacteria from the surface of the pipeline than did the swab method. The completeness with which the bacteria were removed from the surface of the pipeline by the brush and rinse method was not determined but could have been estimated by making second and third tests on the pipeline immediately following the first test. Fellers, Levine, and Harvey[4] found that the swab test recovered from 40-80 percent of the organisms present on an artificially inoculated surface. Speck and Black[6] found that about 21 percent of the organisms recovered by a moistened swab were retained in the cotton. Probably, a film that has resisted intensive cleansing operations would be less easily removed than an artificially inoculated surface film and would allow even less effective sampling. The brush and rinse samples could be expected to be more representative of the pipeline surface flora than the swab samples, since the former is applied with more force and samples the entire pipeline surface and joints while the latter contacts only a small portion of the surface and with a relatively small degree of force. The main disadvantage of the brush and rinse method is that it is laborious and time consuming. Also, sanitary standards have been established for the swab method, whereas none have been worked out for a rinse method in which the pipeline is brushed before being sampled.

SUMMARY

Studies were made to determine whether milk of good bacteriological quality could be produced on a farm using stainless steel pipelines to carry milk from the barn to bulk cooling and holding tanks in the milk house. Two systems were compared. In one the cows were milked in a milking parlor and the milk was transferred to the bulk tank in a pipeline designed for dismantled cleansing. In the other system the cows were milked in a conventional stanchion barn and the milk was transferred to the bulk tank in a permanently assembled pipeline designed for in-place cleansing by recirculation procedures. The two pipelines were compared as to the sanitary condition of their surfaces before the final germicidal treatment and the bacteriological quality of the milk that passed through them. The milking parlor pipeline was dismantled and brushed at daily, twice weekly, weekly, and biweekly intervals but cleansed in place after all other milkings, while the stanchion barn pipeline was cleansed in place at all times by a recirculation procedure. The effect of the frequency with which the milking parlor pipeline was dismantled for cleansing on the sanitary condition of its milk contact surfaces was determined by brush and rinse tests and the plate counts of milk samples taken during each period between dismantlings. Two methods of testing the sanitary condition of the pipeline surface, the swab contact and the brush and rinse tests, were compared.

From the results of these studies the following conclusions were drawn:

1. The bacteriological quality of the milk produced by the two cow-to-cooler systems was excellent. The higher average plate count of the milk from the parlor pipeline could be attributed largely to a difference in the bacteriological quality of the milk produced by the herds supplying the two pipelines. Swab contact tests of the two pipelines indicated that both were maintained in satisfactory condition by the cleansing procedures alone and hence would be in even better condition after the bactericidal treatment.

2. The bacterial population on the surface of the parlor pipeline increased as the interval between brushings was lengthened. This increase was not reflected in the bacteria count of the milk passing through the pipeline, for the average plate counts of the milk decreased as the interval between brushings was lengthened.

3. The brush and rinse test gave results indicating a much higher population on the pipeline milk contact surface than did the swab

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PEN STABLING*

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The upsurge of interest in New York State in pen stabling or the loose housing of dairy cattle prompted the New York State Health Department to make an experimental study of performance under field conlitions. Five years of observation on a hundred pen-stable and comparison conventional-stable dairy farms led to the conclusion that "it is now possible to accept the loose-housing of dairy cattle as a normal part of the dairy industry."

I would like to start my part of this discussion with a definition. Pen stabling is a method of handling dairy cattle which permits the cows to roam at will, between milking periods, in a heavily-bedded barn free from conventional stanchions, mangers, cow bed, and gutters, the milking being done in a small adjacent area set aside for this purpose alone.

New York State has permitted this type of housing and it has been practiced, in the upstate milk shed, on a limited scale since the early nineteen thirties. New York City, on the other hand, had no provisions in its Sanitary Code which permitted this practice, although in certain sections of its milk shed, particularly Southern Pennsylvania, a similar method of housing dairy cattle has been practiced for many years. I have personally visited one farm which has used the loose housing system since 1897. Let me say that New York City officials know this, but since the dairymen provided separate conventional milking stables with as many stanchions as there are milking cows, the inspectors report no violation of the Sanitary Code.

This was the situation in the New York Milk Shed when in 1943, Mr. H. E. Babcock of Ithaca, N. Y., one of the state's outstanding agricultural leaders, became interested in pen stabling. He was convinced that this method of housing cattle had good prospects as a means of controlling mastitis. Quite a number of farmers agreed with him and began to change from the conventional type of housing to the new system—among them, a number of producers for the New York City market. Immediately they found their business in jeopardy because of non-compliance with the New York City Sanitary Code regulations. The City officials felt that they could not accept this new method of dairy cattle housing, since there was little, if any, experimental data to show the effect upon the quality and safety of the milk produced by this system under practical field conditions as they exist in the north eastern states.

To solve this problem, Governor Thomas E. Dewey suggested that an experimental program be set up by the State of New York to study and evaluate this type of dairy husbandry under actual field conditions. New York City officials accepted this idea and, through an agreement between the two departments of health, a five-year study of pen stabling began in 1946.

The experiment was, at first, limited to one hundred New York City producers located in upstate New York. As each was approved, a companion conventional stable with about the same number of animals and an operator of the same caliber, was set up for comparative study. No effort was made to select the farms on the basis of size, cattle breed, wealth of owner, or anything else.

The plan called for semi-annual physical examinations of all milking cows, quarterly inspection of the dairy premises, and quarterly bacteriological examination of samples of milk from all producers. The detailed recommendations for construction, maintenance, and operation were not rigidly set, and in the course of the experiment, recommendations were revised several times. For example, in the early stages, certain stables were approved where the feeding, watering, and loafing areas were combined. Later, after experience had shown several defects in this type of operation, we recommended the separation of the loafing and feeding areas, with special attention to the location of watering facilities. It was further recommended that the feeding-watering area be paved and kept clean. The experiment was to continue for five years at the end of which time the accumulated data was to be used to formulate an official opinion as to the value of the new system.

In the agreement between the two departments, provision was made to protect the participating farmers' investment in new facilities by assuring them that, even though the experiment proved the system to be impractical for general use, they would be permitted to continue to operate as approved producers as long as satisfactory conditions were maintained on the farms, and the milk produced there met sanitary code requirements.

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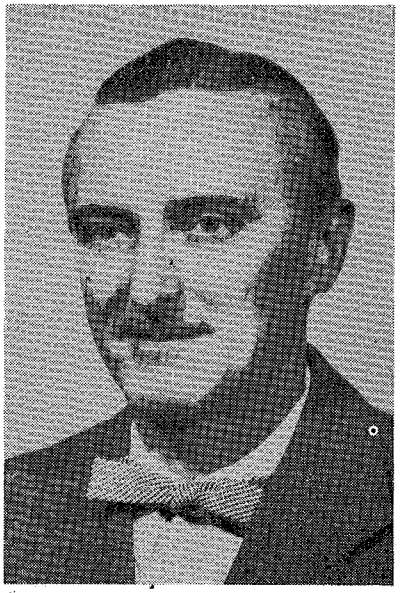

Dr. Franklin L. Schacht received his B.S. at Beloit College and his M.S. and Ph.D. at the University of Wisconsin. He held a fellowship from the Chicago Medical Milk Commission to study the streptococcal flora of certified milk. In July, 1930, he began working for the State of New York, first as Senior Food Bacteriologist in the Food Laboratory of the Department of Agriculture and Markets later as District Milk Sanitarian and Supervising Milk Inspector in the Bureau of Milk Sanitation, Department of Health.

*Part of panel discussion an "Pen Stabling" at 39th annual meeting of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., Minneapolis, Minn., Sept. 18-20, 1953.

THE ADHERENCE OF ORGANISMS AND SOIL TO SURFACES OF EATING UTENSILS

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The surface wetting properties of china and plastic eating utensils were measured by preparing solutions of a given "wetting number." Swab tests were not as reliable when applied to plastic surfaces as they were for china ones. Even on used dishes, the removal from china exceeded those from plastic. Swabs from cultures of relatively long standing on plastic dishes showed greater reduction than when freshly taken.

The ability of bacteria and foreign soil to adhere to any surface may be in direct proportion to the wetting property of such surfaces. When films of moisture do not readily form between the adhering substance and the substrate, bacteria and soil may require more pronounced mechanical action or dissolving by chemical methods for effective removal. For this reason in the routine cleaning of dishes, the wetting property of the surface may be of particular importance.

Surface Wetting Property and Film Adherence

There are no acceptable methods for routinely determining the wetting properties of surfaces of eating utensils. A procedure has been developed in this study which gave repeatable results and reflected the relative ability of surfaces, whether plastic or china to wet.

To determine approximately the surface wetting properties of the samples studied the following procedure was used. A drop of a prepared solution from a series with graduated wetting properties was delivered from a pipette with a bore of approximately 1 mm in diameter, to the edge of a plate. The plate was then tilted until the drop ran down the surface of the plate. If the track left by the drop, as it passed over the surface, remained unbroken and wet, the solution used was considered to have the ability to wet the surface. A so-called "wetting number" was recorded which corresponded to the last graduated solution in the series capable of wetting a given surface. The solutions used to give an index of the wetting properties of the surfaces were prepared as follows:

Solution	Wetting Number
80% calcium chloride	+8
70% " "	+7
60% " "	+6
50% " "	+5
40% " "	+4
30% " "	+2
20% " "	+3
10% " "	+1
Distilled water	0
.01% Nacconal	−1
.02% "	−2
.03% "	−3
.04% "	−4
.05% "	−5
.06% "	−6
.07% "	−7
.08% "	−8
.09% "	−9
.10% "	−10

A survey of a number of china and plastic* dishes indicated that clean china generally gave a wetting number of approximately +4 to +7 and plastic from −5 to −10. The plastic surface required solutions with increased wetting properties in order to wet the surface, while china required solutions with reduced wetting properties in comparison with water, to wet the surface to a similar degree.

It was found that temperature may have some effect upon wetting ability, particularly on plastic surfaces. Plastic will become more easily wettable as the temperature is increased. At room temperatures, plastic has a wetting property slightly less than normally clean restaurant drinking glasses. Clean china, however, wets easier than a comparable clean glass. These results would indicate that although the wetting property of the plastic may be increased with the increase of the temperature in the washing procedure, this may not be a factor to increase the ability of such surfaces to release soil in the cleaning process.

Considerable conjecture is prevalent that detergents will affect the wetting properties of the surfaces even though the detergent may contain a wetting agent. It was indicated that china washed in an alkaline detergent and then rinsed and dried will return to approximately the same wetting number after washing as found prior to washing. In the case of plastic, under the conditions and particularly at the lower temperatures, the alkaline cleaning compound generally tended to decrease the ability of the plastic used to wet readily.

*The plastic used in all of these tests was of the Melamine-Formaldehyde Resin type.

A study was made to determine the relation of surface wetting to film deposit on both china and plastic. China as well as new and used plastic plates were soiled with a standard soil (peanut butter, 40 gms.; butter 40 gms; lard, 40 gms.; evaporated milk, 60 cc.; and distilled water 200 cc.; and after drying was passed through a mechanical dishwasher. It was found (table 1) that after routine hand washing the china dishes retained their original wetting properties. However, plastic dishes required additional intensive washing to return to the original wetting number.

A similar series of both plastic and china dishes (table 2) were soiled. After being passed through a mechanical dishwasher, again it was found that the china, on the average gave a +5 wetting number prior to washing and +1 after mechanical washing, but following rigid hand washing returned to a +5 and +6 wetting number.

The plastic surfaces gave a −6

TABLE 1.—RELATIVE ABILITY OF CHINA AND PLASTIC DISHES TO WET FOLLOWING HAND WASHING

Wetting of surface; average of series

Type of	Before	After wash	After hand scrubbing
China (new)	+8	+7	+7
	+5	+6	+4
	+8	+8	+8
	+8	+7	+8
	+8	+8	+7
China (used)	+7	+8	+7
	+7	+7	+3
	+8	+8	+6
	+6	+4	+4
	+4	+3	+4
Plastic (new)	−4	−3	−4
	−4	0	−5
	−5	0	−4
	−4	0	−4
Plastic (used)	−2	−1	−1
	−2	0	−2
	−2	0	−2

wetting number prior to washing and a +6 after washing. Following hand scrubbing the wetting number of the plastic returned to −7.

These results of mechanical dishwashing indicate that films of soil were not completely removed from the plastic by the mechanical dishwashing procedure used. The remaining films on the low-wetting surfaces had a more easily wettable surface than the original surface and for this reason, soil films on the surface would be more easily washed than the original low-wetting surface. This may be due to the fact that there is a greater adherence between the initial film of soil and the wetting surface than between the initial film of soil and the subsequent soil films.

THE ADHERENCE OF ORGANISMS TO EATING UTENSILS

Dishes in public eating establishments should have a minimum number of organisms present. Various standards have been elaborated by Health Departments and although sterility or complete absence of organisms would be an ideal condition, it is not readily or practicably obtainable. The difficulty with which organisms may be removed from dishes is a daily routine problem. The swab procedure is generally accepted as routine. The adherence of organisms to surfaces with different wetting properties, as between china and plastic is important insofar as it may reflect the condition of the dishes subsequent to use, in indicating the number of organisms remaining on surfaces.

To study the relation of the number of organisms removed to those remaining on china and plastic eating surfaces, subsequent to swabbing, discs four inches in diameter were prepared from plastic dishes and restaurant-ware china plates. These discs were completely cleaned and sterilized, dried at room temperature as well as at 55°C, and then inoculated with a given amount of a broth culture of *E. coli*. After drying at room temperature, the discs were then submitted to a series of three swabbing procedures by the usual method employed by health departments, and following the third swabbing, the disc was removed aseptically to a large diameter Petri plate and completely covered with nutrient agar. The nutrient agar containing the pre-swabbed discs was then incubated at 32°C for 48 hours and the number of organisms remaining on the discs determined. In addition to these laboratory tests, a large number of such swab series were taken on plastic and china plates which were comparably used as eating utensils in a public restaurant. In certain of these cases the dinner plate was removed to the laboratory subsequent to swabbing, and agar added to the surface of the plate and incubated.

Observations were made on both plastic and china dishes in restaurants to compare the number of organisms on plastic and china as reflected by the swab procedure. As a result of these observations, considerable variation was noted in the case of both the plastic and the china in the number of organisms removed from the surfaces by the swabs. These variations were more obvious in the case of the plastic than the china and indicated that other factors may be present which were affecting the removal of the organisms from the surfaces of the plastic. This variation appeared to be more apparent as films were built up on the plastic as the dishes were submitted to increasing use.

In addition to these studies, both china and plastic plates were inoculated with broth culture of *E. coli* and submitted to the washing procedure in the routine commercial restaurant. Again, with this known inoculant a great variation was noted, particularly in the plastic and in the main the average number of organisms removed from the swabs from the plastic was somewhat less than in the swabs from the china glazed surfaces.

As a result of these studies of plastic discs and china discs it was found (table 3) that in a large num-

TABLE 2.—RELATIVE ABILITY OF CHINA TO WET FOLLOWING MECHANICAL WASHING

Wetting of surface; average of series

Type of	Before	After mechanical washing	After hand scrubbing
China	+5	+1	+6
Plastic	−6	+6	−7

TABLE 3—RELATIVE NUMBER OF ORGANISMS SECURED BY SWABBING FROM CHINA AND PLASTIC

Type of swabbing	Organisms removed by swabbing: First swab	Second swab	Third swab	Organisms remaining on discs after swabbing
Heated to 55°C, cooled, inoculated, tested.				
China	25	18	46	74
	250	180	21	81
	900	640	38	21
	421	920	400	326
Plastic	8	4	1	TNTC
	10	21	21	TNTC
	120	110	90	TNTC
	86	200	40	TNTC
China (new)	960	1,124	280	3
	98	102	140	8
	60	56	32	6
	91	86	42	6
China (used)	40	36	28	3
	36	92	46	10
	18	120	31	2
	92	46	81	14
Plastic (new)	68	96	28	34
	41	39	21	120
	20	14	13	400
Plastic (used)	104	136	110	28
	4	4	4	600
	4	4	4	TNTC
	4	4	4	TNTC
Heated to 55°C, cooled, inoculated. Held 24 hours, tested.				
China	92,000	14,000	8,000	355
	2,800	628	64	115
Plastic	2,600	108	356	43
	2,400	404	256	81
	400	400	400	0
	10,400	800	400	7

ber of instances in which the swab procedure indicated a larger contamination on the china dishes, the number of organisms remaining on the dishes was considerably less than the organisms remaining on the plastic. It was found that on an average the three swabbing procedures removed more than 80 percent of the organisms present. Similar studies with plastics, when held for less than 24 hours after surface inoculation, indicated that although the number of organisms removed by the swabs from plastic were relatively low, the percentage remaining was higher than in the case of china. In other words, the organisms adhered more readily to the plastic surfaces than to the china surfaces and the standard swab procedure did not remove the organisms, thus giving a false indication as to the sanitary condition of plastic dishes. It was found, for example that in most instances the number of organisms remaining on the plastic was many times the number removed by the swabbing procedure.

A study of a series of used and unused china and plastic dishes indicated that in the continued use of china, even though the surfaces were badly cracked the adherence of the organisms to the surface of the china was not increased. On the other hand, in a majority of cases, it was found that after long usage organisms adhered more closely to used plastic than to new plastic surfaces. This may not be due to any change in the actual surface of the plastic but probably to the penetration of the organisms into the sub-surfaces, making removal by the swabs even more difficult.

It was noted also, as a sideline to these studies, that the organisms were more readily removed from plastic surface which had accumulated a thin film of soil than from completely cleaned surfaces. These results are, no doubt, due to the greater ease of wetting of the soil films than by the original plastic surfaces, thus allowing the organisms to be more easily removed.

These results would indicate that the surfaces of china being more easily wettable do not allow the organisms to adhere as tenaciously to china as to plastic, with the result that the swabbing procedures remove most of the organisms from the surface of china, giving a false reflection of the sanitary condition of the china plate in relation to the plastic plate by similar conditions. In the case of the plastic plate, the organisms will adhere more tenaciously and not be removed by the swabbing procedure and thus indicating a false sanitary condition. These results confirm the reported findings of Ridenhour and Armbruster (1953) and Hucker and Emery (1951).

Further studies on plastic and china discs indicated that the residual number of organisms remaining on the surfaces was affected by the time elapsed after inoculation with a pure culture as well as the temperature at which the discs had been dried. These results were evident (table 3) when this type of plastic discs were held in contact with the culture of *E. coli* for as long as 24 hours before culturing. It was found in such cases that the number of organisms remaining on such plastic discs after swabbing was materially reduced in comparison to the number of organisms remaining on the plastic discs which had not had long contact with the *E. coli* cultures.

The results may indicate that some material or materials of a germicidal nature may be liberated from melamine-formaldehyde plastic dishes upon heating, which, in turn, would have a germicidal action on the *E. coli* on the longer period of contact. Due to the chemical nature of this type of plastic disc it would be indicated that under such conditions, traces of formaldehyde may be liberated.

TABLE 4—FORMALDEHYDE LIBERATED FROM MELAMINE-FORMALDEHYDE PLASTIC AT VARIOUS TEMPERATURES

Time of holding (minutes)	Temperature of water. 16°F.	180°F.	190°F.	200°F.
10	−	−	+	+
30	−	±	+	+
60	−	+	+	−
90	−	+	+	+
180	−	+	+	+
240	±	+	+	+

In order to study the question of the possible liberation of formaldehyde from melamine-formaldehyde plastic dishes, a series of both this type of plastic discs and cups was studied. It was found as under the conditions of these experiments (table 4) that, when 4" melamine-formaldehyde plastic discs were held at 190° F for periods up to 4 hours, in 20 cc of water, a demonstrable formaldehyde reaction could be determined in the water.

No data were collected to indicate any health significance of the presence of traces of formaldehyde released from (melamine) plastic under the conditions used in the experiment.

SUMMARY

Studies on china and melamine-formaldehyde plastic surfaces indicated that organisms and experimental soil adhered more readily on this type of plastic than on china. For this reason the standard swab procedure for enumerating the number of organisms on eating surfaces did not indicate the relative surface flora as the swabs may remove a larger percentage of organisms from china than from plastic surfaces.

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PEN STABLING

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Now as to the practical results of the experiment, these can best be stated by quoting from an article on Pen Stabling in the March, 1952, issue of HEALTH NEWS, a New York State Health Department publication.

"The comparative study extending over a five-year period collected adequate evidence that milk quality is not significantly affected by the change in the method of housing of the dairy animals. The percentage of samples meeting bacterial standards was greater, although only slightly, in the milk from pen-type stables than in that from stanchion barns. The fears of the Sanitarian as to the deterioration in quality under this type of production were therefore removed. Based on the five-year comparative study, it is now possible to accept loose housing of milking animals as a normal part of the dairy industry."

The problem of fitting this new practice into the regulations of the Sanitary Code governing the production of milk was a thorny one. In order to promote uniformity of interpretation and to minimize confusion on the part of farmers, inspectors, and plant operators, a committee was appointed by the Commissioner of Health of New York State to establish minimum standards of compliance by pen barn operators with existing Sanitary Code regulations.

This committee, composed of representatives of health departments, dairy farmers, milk industry, and educational institutions, has completed its work. This is published by the New York State Department of Health as a bulletin under the title of *Pen-Type Dairies —Minimum Standards for Compliance* which is available for general distribution.

A number of ancillary developments occurred in connection with the experiment. Three of these will probably become permanent fixtures in the dairy industry in the New York milk shed. The first is the rapid extension of the use of elevated milking stalls as a feature of the milking parlor idea, which has had a most interesting evolution. The second is the expansion of the use of pipeline milkers in the milking parlor. Both of these ideas had very limited application in New York until the pen stable idea caught on. The third is the practice of washing pipeline milkers in place without disassembling. This practice has presented a problem, that of a satisfactory job of cleaning, which, while receiving a great deal of attention at the present time, is not completely solved. Only recently, within the month, we have had some very encouraging reports which lead us to believe that ultimate success is not far off.

Dr. Roberts Appointed To Membership On Milk and Food Sanitation Advisory Board

Dr. William M. Roberts, of North Carolina State College, Raleigh, North Carolina, has been appointed to membership on the Milk and Food Sanitation Advisory Board of the Public Health Service, U. S. Department of Health, Education, and Welfare, it was announced by Surgeon General Leonard A. Scheele. Dr. Roberts represents the American Dairy Science Association on the Board.

Dr. Roberts becomes the twelfth member of the Board, which provides consultation and guidance to Public Health Service in the preparation and development of sanitation standards covering milk and milk products, frozen desserts, foods, and food establishments. Such standards are then recommended by the Public Health Service for adoption by States and communities.

Dr. Roberts has been professor-in-charge of the dairy manufacturing section of North Carolina State College, since 1943. Previously, he taught dairy husbandry at the Universities of Tennessee and Minnesota. He is a graduate of the University of Tennessee, and obtained his master's and doctor's degree at the University of Minnesota.

MILK and FOOD SANITATION

RECENT DEVELOPMENTS IN ICE CREAM RESEARCH

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The current literature on ice cream is voluminous. Scientific articles are published in technical journals such as the *Journal of Dairy Science, Journal of Milk and Food Technology,* and in several trade journals. From 1939 to 1946 Alan Leighton, Bureau of Dairy Industry, U.S.D.A., published annually in the *Ice Cream Review* a bibliography of the technical literature on ice cream. This compilation was not published in 1947 and 1948. Recently the International Association of Ice Cream Manufacturers published special Bulletin No. 83 entitled "The Literature of Ice Cream for 1949 and 1950." Reference is made to 272 articles in 1949 and 371 in 1950, a total of 643. The subject matter referred to is classified under the following headings: defects, delivery, economics, flavors, ingredients, merchandising, nutrition, patents, plant plans, production, sherbets, sanitation, sales, selling standards, vending, and miscellaneous publications. In addition to this bibliography there appears monthly in the *Journal of Dairy Science,* abstracts of current literature on ice cream. *Chemical Abstracts* and the English *Dairy Science Abstracts* also include citations of ice cream literature. In the time allotted to this discussion it would be impossible to cover all the literature on this subject; however, I shall try to touch on the most important problems which have received attention of the researchers during the past year or two.

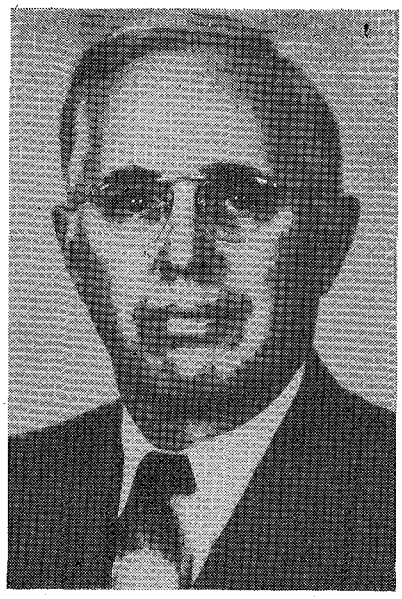
Clarification — Clarification of white ice cream mix[1] has been carried out successfully in a new clarifier at pasteurization temperature. The clarifier, which is generally installed between the homogenizer and the mix cooler, is of simple construction, and easy to clean, sterilize, and reassemble. The machine will produce the desired clarity without removing any significant percentage of mix ingredients. Continuous runs of 25,000 pounds of mix may be made before it is necessary to clean the bowl. Less than 6 pounds of residue remained in the bowl and consisted of 22 to 60 percent solids and less than 1½ percent butterfat. Bowl cakes contained ash, protein, reducing sugars, lactose, and traces of undissolved stabilizer.

Insulated Bags—The importance of insulated bags for "carry home" ice cream business[2] has been studied at the University of Illinois. The ideal combination was a low pre-storage and holding temperature. Ice cream in insulated bags was kept satisfactorily at 72°F for 2 hours when the previous storage temperature was −10°F. At 90°F the ice cream was held satisfactorily for 1 hour when the storage temperature was 0°F or less. Considerable differences were found between ice cream mixes, degrees of overrun, initial temperature, and time and temperature of holding in insulated bags before consumption. Dry ice 3¾ oz. per quart delayed softening and extended storage time about one-third. Air movement over the bags hastened warming.

Low Lactose Solids—(a) De Lac (a low lactose powder) improved whipping of ice cream mixes, and the ice cream showed less tendency to develop sandiness. Nickerson[3] concluded that there is a place in the ice cream industry for milk products modified in composition or with special properties to minimize specific ice cream problems.

(b) High protein products, low in lactose which contain added minerals, stabilizer and emulsifier, prevented sandiness in low fat, high solids mixes, but often detracted from the flavor. Morris[4]

Stabilizers—(a) The effect of several stabilizers, sodium carboxymethylcellulose sulfate 0.15 percent, Irish moss 0.05 percent, sodium alginate 0.25 percent and gelatin 0.35 percent, on mix whipability and viscosity, as well as on body and texture of the ice cream, were studied by Krienke[5]; sodium cellulose sulfate and gelatin resulted in mixers of the low viscosity. All except gelatin resulted in better whipping, and all improved the body and texture of the



W. H. Martin was born at Salem, Indiana. He attended Indiana State Normal and received his B.S. degree from Purdue University. After serving in World War I, he was employed in the Creamery License Division at Purdue University, and as plant superintendent of the Furnas Ice Cream Company of Danville, Illinois. From 1921-25 he was on the Dairy Department staff at the Pennsylvania State College, and received his M.S. degree while there.

Since 1925, Professor Martin has been at the Kansas State College in charge of the dairy manufacturing teaching and research work. He has served the industry as secretary of the Kansas Association of Ice Cream Manufacturers from 1929 to 1943, and has been executive secretary of the Kansas Butter Institute since it was organized in 1940. In 1943, while on leave of absence from the college, he was head of the Dairy Products Section of O. P. A. in Washington, D. C. He has been author or co-author of more than 100 scientific publications in the field of dairy products.

*Presented at Utah State College short course and Washington State College Dairy Institute.

ice cream over that made from mixes containing no stabilizer.

(b) The use of stabilizer in fruit for ice cream is receiving attention. Koerver[6] says it is still in the experimental stage. Results of experiments by Arbuckle[7] indicated that the addition of 0.06–0.4 percent of C.M.C., pectin, and algin derivatives produced desirable stabilization. More fruit juice was retained in the berries, and the fruit had a more desirable appearance in the ice cream.

(c) Stabilizers which were found suitable by Dahle[8] to use to prevent bleeding and iciness and to develop sufficient viscosity in strawberry and chocolate variegating syrups, were pectin 2 percent for chocolate and slightly over 1.0 percent for strawberry, gelatin (200 Bloom) 1 percent for chocolate but inadequate for strawberry. Gum Karaya was least efficient.

Flavor—(a) A study of the vanilla-sweetener relationship in ice cream has been made by Windlan and Scheuring[9]. When 50 percent of the sweetener was replaced with corn syrup solids, there was a definite masking of the vanilla flavor. The fortification of a standard vanilla with vanillin is desirable for flavoring ice cream in which corn syrup solids sweetness are used. Three ounces of single strength Bourbon vanilla fortified with 2 ounces of methyl vanillin per gallon of extract appeared to provide adequate vanilla flavor in ice cream in which 25 percent of the sugar solids on a sweetening basis are replaced with corn syrup solids.

(b) The Scientific Research Committee of the Flavoring Extract Manufacturers Association[10] has reported on a study of how sugar might affect the optimum level of addition of vanilla in ice cream. Four samples of ice cream designated as low sugar 11 percent, low vanilla 4 oz.; low sugar, high vanilla 8 oz.; high sugar 17 percent, low vanilla; and high sugar, high vanilla, were submitted to 271 tasters. There was a decided preference for the high sugar ice cream regardless of the level of vanilla flavor.

(c) Tangarine puree[11] made from tree-ripened tangarines by passing them through a 0.042 inch screen, produced excellent ices, sherbets, and ice cream. Fifty-five pounds of tangarine puree was added to 95 gallons of sherbet base.

(d) The Florida Agriculture Experiment Station has developed a process for preparing citrus injections and toppings sauces for ice cream. Orange, lemon, lime, and tangarine have been prepared. Coconut was reduced to very small particles, and colored blue for blue colored sauces. Krienke and Mull[12] also prepared nut sauces from pecans, walnuts, peanuts, and almonds. The injection of these fresh fruit and nut sauces into ice cream makes a pleasing flavor and color combination.

(e) Vast improvements have been reported by Jagenburg[13] in the manufacture of banana puree, and combination of banana puree with orange and pineapple sherbet, rippled through and with other combinations.

(f) Black walnut oil from black walnuts screenings was added to mixes used in making black walnut ice cream at the rate of 200-400 ml/45 pounds of mix and found to improve markedly the flavor of the ice cream. Homogenization of the oil in the mix improved flavor intensity according to Flora *et al*[14].

(g) A special candy has been developed by A. Mams[15] for use in continuous frozen ice cream without the danger of jamming the fruit feeder. It is available in a wide variety of flavors at the rate of 3 to 6 lb. for each 5 gallons of mix.

Short-Time High-Temperature Pasteurization—(a) At the present time there are about 20 high-temperature short-time pasteurizers in commercial ice cream plants in eleven states. Indications are that 175°F for 25 seconds is adequate. The process appears to be acceptable from the public health point of view, and the system is favored by processors because it offers an opportunity to reduce labor costs and increase speed and efficiency. Fitzmaurice[16] says larger plants are giving serious consideration to the use of the method.

(b) Experimental mixes were pasteurized at 170, 180, 190, and 200°F for 15 seconds by Arbuckle[17]. Mix viscosity increased as the temperature increased but the body and texture characteristics were little affected by pasteurization temperature. Mixes pasteurized at 190 to 200°F did not develop an off flavor in 6 months storage.

(c) To obtain bacterial destruction comparable with 160°F for 30 minutes, Tracy[18] found it was necessary to use 177.5°F for 30 seconds, and with 155° for 3 minutes required 175°F for 30 seconds.

(d) According to Barber[19] the U.S.P.H.S. has given tentative approval for the pasteurization of ice cream mixes at 175°F for 25 seconds.

Reports from some commercial plants indicate that they are experiencing some processing difficulties when using short-time high-temperature pasteurization for ice cream mix. Proper stabilization of the mixes presents a problem on which additional work is needed.

Shrinkage—Shrinkage may be accentuated by one or more of the following: continuous freezer, dry ice, paper containers, high overrun, certain malt syrups, sweetened condensed milk, and unsatisfactory temperatures on trucks and in cabinets.

"Most research workers now feel that a partial hydrolysis of certain milk proteins is the chief cause of shrinkage. There is evidence that prior heat treatment of the ingredients may cause some hydrolysis of these proteins, resulting in shrinkage of the final product. Mix prepared from unheated products and not pasteurized showed marked resistance to shrinkage."

(a) Heat treatment sufficient to coagulate an appreciable amount of the serum proteins increases the tendency of ice cream to shrink according to Thomas *et al.*[20]. The addition of colostrum milk before and after pasteurization of the mix in quantities sufficient to increase the globulin content 0.05 and 0.10 percent resulted in increase in shrinkage regardless of the treatment of the ice cream samples prior to storage.

Vegetable Fat—(a) Several articles have been published on this subject. The properties of vegetable fats and formulas for mixes are given by Deck[21], and the results on a rather extensive survey made by Thom[22] present information on composition and merchandising methods.

(b) Some work has been done on methods of detecting vegetable fats in frozen products. Martin and Rutz[23] have reported the use of the Reichert-Meissl number as a method of detection. Butterfat is the only fat that yields appreciable amounts of volatile soluble fatty acids. This is the basis of the Reichert-Meissl number which ranges from 24-33 on butterfat from cow fed a normal ration. Most normal samples have a value of 28 ±2. Most other fats have a value of 1 or less, except coconut oil which has a value of 7. The number of the resulting mixtures should be the weighted average of these fats. Butyric, caproic, caprylic, and capric are the fatty acids measured by this method.

(c) Another method of detection suggested by Lawrence[24] employs a specially designed fluorescent ray lamp having a wave length of 2540 Angstrom units. Butterfat exposed to the light fluoresces a bright yellow, cocoa fat intense blue, cotton oil slightly tan, corn oil blue, green, lard violet, and peanut oil blush white. Fat for the test is obtained from the ice cream by using Minnesota test reagent and a Babcock centrifuge.

(d) According to Keeney[26], his test is essentially, a method of detecting admixtures of butterfat and vegetable fat based upon analysis of a fat for its butyric acid content. Non-milk fats do not contain butyric acid, and since the butyric acid content of fat from mixed herd milk is fairly constant, an analysis of butyric acid will indicate the degree of milk fat adulteration. Essentially, such a method is a substitut efor the well-known reichert - Meissl method.

The main steps in the analysis, as taken from the publication cited above, are: (1) isolation of fat from sample by Sager and Sanders detergent method; (2) saponification of the fat with alcoholic KOH; (3) hydrolysis of the resulting soap with sulphuric acid and extraction of the fatty acids into hexane; (4) partition chromatography of the fatty acids to separate the butyric acid fraction, and another fraction containing the fatty acids of longer chain lengths than butyric; (5) titration of the two fractions with alcoholic KOH; (6) calculation of the molar percentage of butyric acid in the mixed acids from the fat.

(e) Kummerow[25] suggests a method based on the differences in tri-glyceride structure of fats. This method is based on the fact that approximately 80 percent of butter fat is synthesized in the mammary gland, the remaining 20 percent is exhausted from the blood as preformed lipids. The latter tri-glycerides fraction has approximately the same composition as the depot fats. The tri-glycerides produced by the mammary gland contain all the short-chain fatty acids which impart characteristics to the tri-glyceride not enjoyed by any other edible fat. These desirable characteristics are due to the influence of the short-chain and unsaturated fatty acids on the melting point of the tri-glyceride. A change in a single acid in the tri-glyceride causes a large change in melting point.

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Michigan Dairy Engineering Conference March 3-4

Mr. V. Schwarzkopf of the Lathrop-Paulson Company will discuss, "Engineering the Modern Receiving Room." Mr. Gordon Hobbs, Chief Engineer of Beatrice Foods will present a paper on "In-Place Cleaning Installations for Specialized Processing Equipment." Other topics to be discussed include,

- Engineering Design and Operation of Different Bulk Milk Coolers
- Which Bulk Tank and Truck Is Best Suited for Your Operation
- Effect of Bulk Handling on Plant Operations
- Everyday Problems of a Dairy Plant Engineer
- Boiler Water Treatment
- Planned Preventive Maintenance of Processing Equipment
- Keeping a Floor in Your Plant
- Hardening Room Longevity

Outstanding engineers from industries and educational institutions are being obtained to present the engineering viewpoint and discuss the urgent problems in the field.

HOW TO CARE FOR YOUR STAINLESS STEEL EQUIPMENT

D. H. JACOBSEN
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The author points out numerous causes of damage to stainless steel equipment, especially rough handling, controled heating of the surfaces, proper cleaning procedures, handling of water deposits and discoloration, detergents and disinfectants, and a code of "don'ts."

Although stainless steel has been used in the manufacture of dairy and food products processing equipment for nearly thirty years, its care is not well understood. Manufacturers of equipment are frequently blamed for the failure or poor performance of equipment, when, as shown by investigation, the equipment has been abused by customer's employees who do not know how to care for and clean it properly. Actually, stainless steel dairy and food processing equipment should give satisfactory service for many years if properly treated and cleaned by approved methods at recommended intervals.

HANDLING STAINLESS STEEL PARTS

Stainless steels are very hard and durable. Nevertheless, stainless steel parts can be damaged by careless, rough handling.

Sanitary lines should not be dropped or dragged on the floor but handled on pipe racks. Parts and fittings should be placed on rubber mats when machines are dismantled.

Many leaky joints and valves can be avoided by reasonably careful handling. In addition, this care means the stainless steel surfaces wil remain brighter and be easier to clean.

OPERATING CARE

Milk products processed at high temperatures may, indirectly, affect the life of stainless steel equipment if "burned on" coatings are allowed to accumulate. These deposits are difficult to remove, and vigorous scraping and scouring with metal sponges may mar the finish. These coatings can be more effectively removed by applying acid milkstone remover as a daily cleaning process.

The heating of partially filled vats should also be avoided. Heating should be started after the vat is filled to the normal operating level. When emptying the vat or tank, the heating medium should be stopped and, if possible, the vat should be precooled by turning cold water into the system. When equipment with propeller type agitators is used, it is advisable to stop the agitator when the product begins to splash. These precautions will help prevent "burn on" and make cleaning easier.

Excessive heat used in the sterilizing process can also result in physical damage to the stainless steel equipment. Steam suddenly turned on a small area of a vat lining will cause excessive strains and may even bulge the sides of the lining.

DAILY CLEANING

A new machine must be cleaned before it is used for the first time to process dairy products in order to remove any residues of oil and dust picked up during shipping and installation. This initial cleaning is best accomplished by brushing the surfaces with hot (120-130°F) solutions of the regular alkaline dairy cleaners, using a solution concentration of about four times that used during routine cleaning procedures. Stainless steel surfaces can then be maintained in a good-as-new state by giving them a thorough cleaning each day. Afterward, they should be allowed to dry and remain dry until used again.

First step in cleaning is to rinse and, when necessary, to cool equipment after use. These preliminary steps make cleaning easier and prevent the drying of product solids on the steel surface. The regular cleaning procedure should then be followed as soon as possible. Because equipment varies in size and use, different cleaning methods must be used. Specific information for individual equipment has been worked out and is usually available from the distributors of cleaning compounds.

Both inside and outside surfaces of the equipment should be cleaned. Dairy products, as well as other food products and foreign materials, which are allowed to adhere to the surfaces for any length of time can cause a change in the finish and even start corrosion of the stainless steel by removing the protective layer of chrome oxide on the surface of the steel.

To maintain and build up this protective layer, the surfaces must have free access to air. Usually, sufficient exposure to air occurs between one day's processing and the next. *That stainless steel surfaces are clean is indicated by rinse water draining off completely and no longer forming droplets.*

CLEANING METHODS

Equipment such as small vats, freezers, surface coolers and homogenizers is cleaned by brushing with a cleaning solution.

Parts and fittings should be cleaned in the special wash tanks designed for this purpose. Research has shown that cleaning compounds do not generally affect

Dr. D. H. Jacobsen graduated from South Dakota State College in 1926, obtained his M.S. in Dairy Industry at the State College of Washington in 1930 and his Ph.D. in Dairy Bacteriology and Chemistry at Iowa State College in 1936. He taught for 10 years in the Dairy Division at S. D. State College and has had several years of commercial plant experience. He frequently speaks at college conferences and dairy technology meetings.

stainless steels. However, long soaking periods in these cleaning solutions may result in coatings which are difficult to remove. This is especially true where extremely hard water supplies are used. To avoid such an occurrence, it is recommended that the cleaning operations be completed as soon as possible after parts and fittings are placed in the wash tank.

Large tanks and vats may be cleaned by brushing or a combination of brushing and spraying with a cleaning solution. Since an operator must enter the tank or vat for this job, it is very important he does not track into the equipment any foreign material which may mar or corrode the stainless steel surface. Traces of salt or grit from the operator's shoes can seriously damage a stainless steel lining.

The brushes used on stainless steel equipment should preferably be fiber or nylon bristle brushes. Metal sponges must be used with caution because they eventually break up, and the metal particles may find their way into moving parts and cause trouble. They may also remain in the equipment and contaminate the product. *Ordinary steel brushes or steel wool should never be used on stainless steel because bits of plain steel will become attached to the stainless surface and cause rust spots.*

Enclosed systems, such as tubular and plate equipment, sanitary lines, and pumps are cleaned by circulating the cleaning solutions. It is recommended these systems then be dismantled as far as possible, brushed, and rinsed.

The amounts of cleaning compounds required for each job depend on the cleaners and methods of cleaning used as well as the machines to be cleaned. To establish a range of solution concentrations for use on stainless steel equipment would be desirable but is not practical because of the many different and acceptable compounds available.

TYPES OF CLEANERS

In general, the cleaners used on stainless steel are classified in the following manner: (1) alkaline, (2) neutral, or (3) acid.

Alkaline and neutral cleaners are used for general clean-up. Acid cleaners usually are used on high-temperature heat exchange equipment and for the removal of milkstone; however, they may also be required for machines used for processes at temperatures below 145°F if inefficient cleaning has resulted in milkstone formation. Their function is to dissolve the films of milk salts which form when milk is heated or dried on equipment. The films treated with acid cleaner are then removed more easily with the alkaline detergent.

Acid cleaners are also used as an occasional extra cleaning process for the removal of residues left by the regular cleaning method or from hard water deposits.

The *prevention* of milkstone in plants having hard water supplies involves good processing control as well as good cleaning. By using cleaners with polyphosphate content in line with the water hardness, the milk film can be removed and the surface rinsed free of all film. The amount of polyphosphate required to meet the water hardness must be carefully considered in each plant, and no general rule can be given. It is essential that the plant operators know the hardness of the water supply and then select cleaning products which contain water-conditioning phosphates in sufficient proportions to prevent precipitation of insoluble salts on the equipment.

The polyphosphate portion of the cleaning compounds may range from 10 to 50 percent to meet the demands of water supplies found in various areas. The polyphosphate not only prevents milkstone deposits but also improves the detergency or cleaning properties of dairy cleaners. By preventing the formation of milkstone, we eliminate the need for the more vigorous cleaning procedures used in removing milkstone. Such methods may involve metal sponges or scouring detergents which scratch the surface of the stainless steel and eventually result in imperfect finish. The practice of removing milkstone by means of acid type cleaners is also a possible source of damage if improper acids or methods are used. It is important that noncorrosive acids be used, and then strictly according to directions regarding concentration time and temperature of application. Strong acids such as muriatic and sulphuric should be avoided. From a standpoint of economy and effectiveness, standard cleaning procedures should be followed. Remember, high concentrations of cleaning agent do not necessarily mean faster and better cleaning. Rather, these concentrations may only serve to make the rinsing operation more difficult.

WATER DEPOSITS

Water, as ordinarily used in dairy and food processing plants, is a very complex substance. Hard water generally causes trouble. It it advisable, therefore, in many cases to treat the water before use to maintain efficiency in processing machines.

The very common problem of lime scale can be eliminated by using Zeolite softeners. The "Threshold Treatment," employing Micromet, can also be used to prevent scale and rust in water systems.

When hard water is heated, it leaves deposits on the metal surfaces. These deposits often discolor the surfaces and, in time, can seriously affect the heating and cooling rates of equipment. According to authorities on boilers, a lime scale layer one-eighth inch thick will reduce the rate of heat transfer by approximately 15 percent.

Hard water coatings can be removed with inhibited muriatic acid and usually without extensive dismantling of the equipment. *It should be recognized that muriatic will attack stainless steel,* and such treatments should be used only when necessary and under close supervision.

Water deposits in the form of red or brown films often are found on the water sides of the plates in plate equipment. Daily washing of both sides of the plates with the same solutions as used on the product side of the plates will prevent these coatings. To remove similar coatings already formed, use a good acid cleaner.

Water supplies with high salt content or other impurities such as acid sulphate, cause more serious corrosion problems with stainless steel equipment. Stainless steels are much more resistant to these effects than other metals, but long use under such conditions can cause corrosion. It is advisable to treat these waters before use. The ordinary Zeolite Water Softeners do not satisfactorily overcome these

problems. Water treatment engineers should be consulted.

DISCOLORATION

Discoloration showing up as rainbow colors on vat or tank linings has been found in some cases after vats are in operation in the plant. These areas have been rather easily returned to normal by lightly polishing the area involved. This can be done with a fine abrasive material such as crocus cloth or a 300 to 400 grit paper. The latter should be "manufactured grit" such as "wet or dry" paper, not one using emery. This rainbow discoloration is apparently a surface reaction which may be related to the manufacturing operation on the stainless steel itself, and no solution to the problem has been found. It apparently has no effect on the life of the vat or on the product processed.

In certain machines, such as positive pumps, "Straight chrome" stainless steels which have hardening qualities are necessary to prevent seizing or galling of frictional surfaces. These steels discolor and corrode more readily than the 18-8 stainless steels. It is essential that these parts be thoroughly cleaned and dried after use.

CHLORINE DISINFECTANTS

There has been extensive research conducted to determine the effects of chlorine disinfectants used on stainless steel equipment. The work shows that the surfaces will not be corroded by the solution concentrations normally used in processing plant. Tests made with 200 parts per million and 100 parts per million solutions gave no indications of corrosion. Stainless steels are much more resistant to corrosion by chlorine compounds than other dairy metals and markedly better than tinned surfaces in this respect.

Careless handling of high concentrations of chlorine compounds may, however, result in damage to stainless steel surfaces. For example, calcium hypochlorite compounds, in powder form, spilled on stainless steel surfaces, will cause corrosion.

Prolonged soaking in chlorine solutions is not recommended. For this reason, chlorine disinfection should be accomplished immediately before the equipment is to be used rather than at cleanup time.

The chlorine disinfection process for stainless steel equipment should always be carefully controlled on concentration and time.

EFFECT OF BRINE

The use of brine for cooling in stainless steel equipment should be done with caution. Brine properly neutralized, may be used when the surfaces may be cleaned daily as in plate type coolers. In vats and other enclosed systems, sweet water or direct expansion refrigeration should be used.

SUMMARY OF PRECAUTIONS

The following general precautions in handling stainless steel equipment are recommended by the Alloy Tank Manufacturers Council:

1. Don't use steel wool, particles of which break off and become embedded in the stainless steel and later show up as rust spots.

2. Don't use a water supply having excessive iron, salt, or sulphur content.

3. Don't allow chemical sterilizers, alkalies, or cleaners to remain too long on equipment. Soaking overnight is not recommended.

4. Don't allow particles of foreign matter to adhere to equipment.

5. Don't allow rubber protective items which are fitted over stainless steel surfaces to remain on such surfaces for any length of time, for this would exclude air and prevent the surface from drying.

6. Don't allow wrenches, sanitary fittings, or other metal parts to lie on stainless steel surfaces which remain wet.

7. Don't close the covers of a tank after steaming unless a vent is provided to avoid creating a vacuum which might result in collapse of the tank.

8. Don't apply air or steam pressure unless equipment is specifically designed for such pressures.

9. Don't direct the steam hose on the tank wall so that localized overheating and strains will occur. Rust, discoloration or pitting may result from any one of the first six causes listed here.

American Dairy Science Association 49th Annual Meeting

State College, Pa.—The Pennsylvania State University will be host this summer to the 49th annual meeting of the American Dairy Science Association. Approximately 1600 delegates from the United States and Canada are expected for the national gathering here from June 22 through 24.

Membership in the Association is composed largely of college specialists in the dairy and dairy cattle industries. It also includes scientists and technicians in dairy plants, dairy cattle breeders, and others in the commercial field.

Technical research papers, symposia, and organized discussions on all phases of dairying will be features of the June meeting.

Persons who wish to attend, and who are not members of the Association, are urged to write to the Registration Committee, Dairy Department, State College, Pa., for pre-registration information and to register in advance, if possible.

F. J. Doan, professor of dairy manufacturing at Penn State, is chairman of the general committee planning for the event. Other members are D. V. Josephson, department head, and C. D. Dahle, R. H. Olmstead, C. R. Gearhart, and J. O. Almquist.

Market Milk and Ice Cream Meetings To Be Held At Purdue

Two one-day dairy meetings will be held in April, 1954, at Purdue University according to an announcement by Professor H. W. Gregory, Head, Department of Dairy Husbandry. These meetings are as follows: Market Milk Conference, April 13 and Ice Cream Institute, April 14.

The conferences are a continuation of the series held annually in cooperation with the Indiana Dairy Products Association. Specialists from the dairy industry and universities will be on the programs. Ice Cream samples submitted by plants to Purdue for analysis and scoring will be examined and discussed as a part of the ice cream meeting. Foremost problems relating to the processing and distribution of bottled milk and cultured buttermilk will be discussed at the market milk conference. Also, a milk clinic on commercial samples will be a part of the latter meeting.

BULK HANDLING OF MILK ON THE FARM AND ITS TRANSPORTATION TO THE PLANT*

(1953 Report of the Committee on Dairy Farm Methods)

Farm cold wall tanks and pipe line milkers have been the subject of article after article in trade journals and farm magazines since they were first introduced. For the past three years interest has grown so widespread that this new equipment promises to bring about more changes in dairy farm methods than anything since the advent of the milking machine.

Although every range of opinion has been expressed, the fact remains that the use of the cold wall tank has mushroomed wherever it has been tried. Its users are its most ardent salesmen.

As with all pioneering endeavors, this new method brings its problems to those of us whose major concern is an ample supply of quality milk. Farmers all over the nation are asking questions about the cold wall tank and health agencies are seeking information on which to base proper regulations for their use. There is urgent need of a summary of all available experience.

As a result of this need, the Dairy Farm Methods Committee of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC. decided at their mid-year meeting to devote this year's report entirely to bulk handling of milk on the farm and the use of pipe lines. A questionnaire type of approach was decided upon. A questionnaire was worked up with six copies sent to each member of the Committee so that he in turn might send them to those he thought most qualified to fill them out. A total of 37 was returned from 13 states located from the east coast to the west coast. This report will endeavor to give a summary of these results so that regulatory officials and dairy farmers may benefit from such experience on the subject. We hope this will be helpful, as markets which have previously started this method of handling milk have had to learn the hard way—through costly experience.

*Presented at 40th Annual Meeting, INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., East Lansing, Mich., Sept. 1-3, 1953.

Please keep in mind the fact that each of the 37 questionnaires reported represents the experience of not just one tank installation but largely that of a group of bulk tank installations. However, Paul Corash, a member of the Committee, wrote in connection with this report, "It should be pointed out that it is frequently difficult to get adequate short answers to an involved question. In other words, a yes or no response will not necessarily tell the entire story and any statistical compilation of answers should bear this in mind."

The following lists the questions contained in our questionnaire with a summary and analysis of the information received.

MILK HOUSE

"What size milk house is recommended for farm tanks?"

Answers to this question varied from 12 x 12 feet to 15 x 30 feet. The average size recommended was about 12 x 20 feet, although seven preferred a 14-foot width. In planning the construction of a new milk house, it would be essential that the size of the tank to be installed be taken into consideration. As a guide to the size of milk house needed, the following is a table of the dimensions of the tanks of one manufacturer giving those sizes in most common use.

"Should a minimum distance of farm tanks from the walls of the milk house be established?"

We received an almost unanimous reply that a minimum distance should be established. The distances suggested varied from 18 inches to 3 feet, with some noting that allowance should be made for other equipment. Most of the answers recommended a minimum of at least 2 feet, with 3 feet on the valve end of the tank. We were informed that some health departments in making regulations relative to the use of farm tanks are now requiring minimum distances between the tanks and the walls of the milk house.

"What directions should be given for the placement of the farm tanks in the milk house?"

The answers to this question varied considerably, but there was general agreement that the tank should be so placed as to allow ample working space around it. This was in line with the previous question concerning a minimum distance between the tank and the walls of the milk house.

The following items regarding placement of tanks also were mentioned and might well be kept in mind: "The tank should be convenient for tank truck and milk hose. The tank should be convenient for straining or filtering milk and, if a pipe line is used, located so that the pipe line may go directly to the tank. Space should be allowed for placement of other equipment. Tanks should be conveniently located for cleaning and sanitizing. The outlet valve should face the point which the tank truck can most easily approach." In addition, some answers warned that tanks should not be placed over drains.

"Is there objection to the compressor being located in the milk house?"

The feeling was almost unanimous—28 out of 34—that there was no objection to the compressor being located in the milk house. Of those who objected, "heat from the compressor in summer" was given

DIMENSION OF TANKS

(in inches)

Tank capacity (Gallons)	Length	Height	Width
150 (round)	40 1/8	36	43 1/2
150 (rectangular)	40 3/4	35 3/4	43 1/2
200 "	51 3/4	35 3/4	43 1/2
300 "	74 3/4	35 3/4	43 1/2
400 "	97 3/4	35 3/4	65
500 "	81	39	65
600 "	96	39	

COMPRESSORS

Tanks	½ HP	¾ HP	1 HP **	1½ HP **	2 HP **	2½ HP **	3 HP **	3 HP *	4 HP *	5 HP	6 HP *
150 gal	1	2		12	3						
200 gal		2	1		15						
300 gal			3			1	15				
400 gal				1	1		9	4	3	1	
500 gal					2		4			9	
600 gal					1					9	3

* Water cooled

** Air and water cooled

as the main reason, but one stated that the local code prohibited the compressor being located in the milk house. It might be noted that some of the tanks now on the market are package units with the compressor attached to the tank as shipped from the factory. However, most compressors are not an integral part of the tank unit.

FARM TANK

"What is the percentage of the following sized farm tanks used?"

The table below contains the summary of the 33 answers we received:

Size of Tank	Percentage in Use
150 Gallons	30.95
200 "	25.95
300 "	19.76
400 "	14.90
500 "	5.01
600 "	6.06
	99.63

The remaining percentage of the total lies below 150 or over 600 gallons. It is interesting to observe that as the size of the tank increases above 150 gallons, the percentage of tanks used sharply decreases.

"What type and size compressor do you recommend for the following sizes of tanks: 150 gal., 200 gal., 300 gal., 400 gal., 500 gal., 600 gal?"

This is a highly important question and the information we received is extremely interesting. The chart below is a complete tabulation of this information.

The committee feels that since there are many variables in determining the type and size of refrigeration units, the producer should obtain the advice of refrigeration personnel to determine his requirements.

"What procedure do you recommend for the calibration of tanks?"

A few answers stated that tanks should be calibrated at the factory. This procedure has the disadvantage of leaving a lot to the installation of the tank at the farm, as the tank must then be so precisely installed and leveled as to cause it to comply with the pre-installation calibration. The majority of our answers to this question, as well as independent data, indicate that the tank properly should be calibrated after installation at the farm. Generally, farm calibration is done jointly by a dairy-plant representative and the producer or his representative. The answers indicated in some places that the tanks are calibrated by professional calibrators. Others stated that it was the responsibility of the Department of Weights and Measures to calibrate the tank. In any event, the Department of Weights and Measures having jurisdiction should be consulted for regulations on calibration procedure and calibrating equipment.

When the tank is calibrated on the farm the following is the usual procedure. Calibration may begin after the tank has been securely positioned into the dairy house floor. Water is then added in 5-gallon lots using a standardized 5-gallon container approved by the Department of Weights and Measures. After each 5-gallon addition. the depth is measured on the calibration stick. The calibration stick is marked in either sixteenths or thirty-seconds of an inch, the latter usually when the tank capacity is 500 gallons or more. Each 5-gallon addition becomes the known values when converted to pounds (43, 86, 129, etc.) and intermediate, unknown values are interpolated. The finished chart is made into enough copies so that the producer, plant, hauler, and Department of Weights and Measures may each have copies. Shown below is a portion of a chart for a 300-gallon tank that has been calibrated in sixteenths of an inch.

"What is the average size of herds on farms installing tanks?"

The size of the herds reported varied considerably—from 10 up to 160 cows. However, a compilation of all figures received shows an average herd of 39 cows on farms using tanks. This might indicate that, due to the investment necessitated by installing this equipment, it is being employed mainly by the larger dairy units. The Bureau of Agricultural Economics states that the average herd on dairy farms in this country is 15.8 cows.

"Is there a minimum size of producer before a farm should be recommended to use a farm tank?"

Sixteen of the 21 persons replying stated that there should be a herd minimum before the producer is advised to install a farm tank, and 11 of the 16 further stated that such a minimum would be 15-20 cows.

WASHING AND SANITIZING EQUIPMENT

"What size hot water heater should the producer install for use with his farm tank?"

Sanitarians are frequently asked for advice as to the size of equipment needed, and of particular importance is the size of hot water heater necessary for proper cleaning of dairy equipment. We were most concerned about the size of hot water heater needed with farm

Calibration Chart for 300 GALLON (make) Producers Cold Wall Tank

Installed at: (name)

(address)

Model No. .....

Serial No. .....

Stick No. .....

Depth given in Inches and 1/16"

Calibrated: (date)

Installed: (date)

Inches depth	Gals.	Lbs. milk	Inches depth	Gals.	Lbs. milk	Inches depth	Gals.	Lbs. milk
2"			5		186	15		414
12	5	43	6		191	8"		419
13		46	7		196	1		425
14		48	8		201	2	50	430
15		51	9		204	3		436
3"		53	10		210	4		442
1		56	11	25	215	5		448
2		58	12		220	6		455
3		61	13		226	7		461
4		64	14		229	8		467
5		66	15		234	9	55	473
6		69	6"		239	10		480
7		72	1		244	11		487

tanks of various sizes and the tabulation below gives us valuable information from those who have had experience with this problem.

A few of the answers did not give exact sizes, but made comment which we feel is worthy of quoting. From California came this notation: "We have been recommending a 100-gallon water heater where warm water is used for both equipment washing and washing cows prior to milking. Also, many dairy farms use the instant water heater which has no storage tank. This is a combination of steam generator and water heater. The size of the farm tank is not necessarily an indication of the capacity of the water heater required because most dairymen use the paste method of cleaning and sterilizing the tanks which takes only a small amount of water. We believe it is impractical to set any standard in this regard."

Another answer received from New York State gave a "rule of thumb" which is interesting: "We have found and believe that one gallon hot water capacity for each 10 gallons of farm tank is satisfactory."

It is the recommendation of the committee that the 50 gallon heater should be the minimum size for use in bulk handling of milk on the farm.

We also asked: *"What size hot water heater should the producer install if both farm tank and pipe line milker are used?"* The following table is a summary of the information submitted:

Recommended Hot Water Heater Sizes
gallons

Size of Farm Tank	12	15	20	30	40	50	60	80	100	120	150
150 gal.	1	3	2	7	2	8	1	4			
300 gal.		1	1	8		5		8	1		
500 gal.				5		9		5		2	1

It is difficult to recommend definite hot water heater capacities when the pipe line milking system is employed in connection with farm tank operations but it does feel that the minimum of 50 gallons suggested above should be exceeded.

"What steps do you recommend in the cleaning and sanitizing of pipe lines?"

The answers were in general agreement and reveal that the following procedure is in common practice: 1. Rinse with water about 100°F. 2. Wash with water about 180°F. 4. Five minutes of calculation of chlorine rinse 200 ppm just utes. 3. Rinse by circulation for 5 to 10 minutes with hot water 170°—180°F. 4. Five minutes of circulation of chlorine rinse 200 ppm just prior to milking. Use an acid

Recommended Hot Water Heater Sizes
Where Farm Tank and Pipe Line Milkers Are Used

Size of Farm Tank	Gallons 30	40	50	60	75	80	100	120	150
150 Gal.	5	1	7		1	7	1		1
300 Gal.	2		6			9	1		
500 Gal.	1		4	1		8		1	1

cleaner once or twice a week. Several answers suggested using the manufacturer's recommendations which is usually good practice as the time of circulation of water will vary somewhat with the type of system used. The Committee notes that there are sanitizing agents other than chlorine suitable for use.

"What experience have you had in cleaning pipe lines on farms with vacuum systems?"

In summarizing the answers, we found that six had no experience, seven had only limited experience, eleven had satisfactory results, and two had varying results, indicating some variation in experience with the vacuum system. While most of the replies stated that satisfactory results were obtained, others cautioned that great care must be taken in operating this system.

We also asked in this connection: *"What experience have you had cleaning pipe lines on farms with positive recirculation of cleaning solutions?"*

Here we found that two had limited experience, nine had satisfactory results, and three had varying results. One had unsatisfactory results. Again the majority of those with experience reported satisfactory results. However, one comment stated, "Satisfactory, but you do not get the cleaning action that is produced by vacuum". Another from Missouri says, "Areas in which CIP (cleaning in place) has been utilized for some time favor or require positive circulation."

"Who has responsibility for rinsing farm tanks, the driver or the farmer?"

In order to wash tanks properly, it is essential that they be rinsed immediately after the milk is drawn from them, and the question often arises as to whose responsibility this should be. A high majority—28 out of the 34 answering— stated that this was the driver's responsibility and should be done by him. As one answer aptly put it, "We ask our driver to do it. The farmer is not always available." Regardless of who does the rinsing of the farm tank, it is the consensus of opinion of the Committee that the regulatory agency must hold the producer responsible for this operation.

MILK TANK TRUCKS

"What length of hose should the tank truck have for conveying milk from farm tank to truck tank?"

From the 31 replies received, there is an evident lack of standardization on the length of hose required. In general, the total length averages 18 to 20 feet, with some using two sections and others using a single complete unit. Fifteen specified that the hose should be made up of sections, and recommendations for section length varied from 5 to 10 feet. These are typical remarks:

(Calif.) "The hose should be in lengths that can be easily cleaned with brushes available at the plant. This may necessitate the use of two or three lengths of hose coupled together."

(N.Y.) "We definitely feel that because of location of many milk houses, two lengths of 12-foot hose should be used on farm tank trucks."

"What is the recommended type of hose to use on trucks?"

Seventy-five percent of those replying to this question are using plastic hose and "Tygon" was specified in almost every instance. Others are using various types of rubber hose.

"What provisions should be made for the opening in the milk house for the hose?"

The question of providing a special opening in the walls of the milk house for the hose is often presented. In some instances the door is used. Our replies are summarized as follows:

Provision In Milk House for Tank Truck Hose

Special hose opening	23
(6 x 6 in opening	3
8 x 8 in opening	2
10 x 10 in opening	1
dimensions unspecified	17)
Door or special opening	2
Door only	1

Some answers specified varying distances above the floor for the opening and many specified a self-closing trap or flap for fly protection.

"Do you consider every-other-day pickup satisfactory?"

Through necessity many routes have been started on an every-other-day pickup basis. Of 37 answers received, 28 had found the practice satisfactory and had no objection to it; five objected, and thought the quality of the milk would be affected. We quote one answer from New York State as representative of those finding the practice satisfactory: "Yes, we do consider every-other-day pickup satisfactory. Results have been far beyond our expectation." While a majority of the answers raised no objection to this practice, the Committee recognizes that under some circumstances, such as a long haul, this practice may be objectionable. Local conditions should determine the practice to be followed.

"What are the bacteria counts of every-other-day pickups as compared with every-day pickup?"

We did not secure much definite information on this subject: ten reported comparable counts and three reported slightly higher counts on every-other-day pickup. Representative comments are: North Carolina: "We were able to be under 10,000 consistently on either method." New York: "Very satisfactory—not enough difference to estimate." The Committee feels research work should be done to investigate enzyme action, possible growth of psychrophiles, possible development of toxins, staphylococci, etc. as affected by storage, also fat flaking and accurate butterfat testing.

"How should samples of milk for bacteria count purposes be refrigerated on the tank truck?"

The securing and care of samples for bacteria counts from farm tanks has presented a problem. The sample, of necessity, must be taken at the farm, and its care until it reaches the laboratory is of utmost importance. Analyzing the replies to this question, 22 reported that ice in specially constructed containers should be used for keeping samples in good condition; four suggested the use of dry ice; six preferred a refrigerated compartment on the end of the truck. The refrigerated end compartment is coming into more general use on newer trucks, and provides the added advantage of refrigerating the milk pump and the hose located there as well as more efficient cooling of the milk samples.

"What training is needed by the driver of tank trucks for sample taking and detection of off-flavor milk?"

The driver of the tank truck having duties other than the driving of the truck raises questions as to what his qualifications and experience should be. The problem was

recognized by all, 34 persons returning the questionnaire. Twenty-nine felt that the driver should have the same type of training and equal qualifications, and meet the same requirements as that of a receiving man at the receiving or processing plant. Eight of these further stated that the driver also should be required to pass examination and be licensed by the state as a weigher and sampler of milk. Notation was made that some states already require a license for tank truck drivers.

"What procedure do you recommend for cleaning and sanitizing tank trucks?"

The answers reveal by the questionnaire indicate the following to be most commonly used procedure: rinsing with warm water; washing with hot water and detergent; rinsing with hot water and sanitizing by fogging with chlorine 200 ppm. Mention was made by some that the hose should be stored in a lye solution after wash-up. The Committee notes that there are other suitable sanitizing agents in addition to chlorine.

"Should this cleaning be done by employee of the distributor, or by the driver?"

In setting up a tank truck route, the question arises as to who should have responsibility for washing the truck tank. A large majority stated this should be the distributor's responsibility. Of 26 answers received, 19 specified the distributor, 4 said either the distributor or the driver, and two said they thought it should be the driver's responsibility.

"What suggestions do you have for organizing farm tank routes?"

In starting a farm tank pickup route, problems arise which may be kept to a minimum by keeping in mind certain factors. Suggestions received are:

1. The fieldman should lay careful plans to organize the route before operation is begun.
2. Meetings of all interested parties should be held.
3. Tank routes should be organized so as to disturb existing can routes as little as possible.
4. Producers of high quality milk should be selected.
5. Each route should be well organized and operating before another is begun.
6. Cooperation between haulers, dairymen, dealers, and sanitarians must be assured.

As the suggestions emphasize, the greatest care must be taken in setting up a route for bulk handling, and the change-over must not be put into operation until all plans are complete and everyone in readiness.

QUALITY OF MILK

"What is the best arrangement for the handling of off-flavor milk rejected at the farm where tanks are used?"

This question becomes more complicated with tank truck routes because the entire shipment, all of one or possibly two day's milk, must be either rejected or accepted. With can shipments, individual cans of off-flavor milk can be rejected, and unless the entire shipment is rejected, the penalty on the farmer is not as great. We received a variety of opinion on this question: six stated off-flavor milk is the farmer's responsibility; eight stated the milk should be sent to a manufacturing plant; six suggested it be fed to stock; three said the fieldman should decide what to do with the milk, and six simply said the milk should be canned-off and used for other purposes. Some further remarked that the truck should make a return trip for off-flavor milk and take it to a manufacturing plant. As the foregoing breakdown indicates, there is as yet no uniform precedure for dispising of off-flavor milk. However, all agree that the milk must be used for other purposes than Grade A milk and it is therefore imperative for the farmer using a bulk tank to prevent off-flavor milk by exercising the utmost care in feeding and pasturing his cows.

"Are additional precautions for mastitis needed where pipe line milkers are used?"

It is apparent from the answers received that precautions for mastitis are considered essential regardless of the type of equipment used in the handling of milk on the farm. Of 34 answers, 11 stated that additional precautions were necessary, whereas 23 stated that the same precautions should be taken.

"What information do you have on the sediment testing of milk in farm tanks?"

It is apparent from our answers that there is very little available data on this subject. The majority of our correspondents said they had had no experience with sediment testing of milk in farm tanks. Replies indicated that special equipment is needed for taking samples from farm tanks and further that standards for precedure should be established. In response to this question a correspondent from the California area forwarded us a copy of a report, "Sediment Determination in Farm Tanks," by Norval E. Watson, Los Angeles City Health Department, Milk Inspection Section, from which we quote:

> ". . . . an attempt was made to learn how much milk from an agitated supply would have to be put through a standard sediment disc to equal the amount of recovered sediment that would be obtained from one pint drawn off the bottom of a settled 10-gallon can. After many experiments were made it appeared that one gallon of agitated milk would contain approximately the same amount of sediment as would one pint obtained in the regular manner."

This excellent report goes into considerable detail and we recommend it to those who plan to make sediment tests of milk from farm tanks.

"What data do you have comparing the bacteria count of raw milk from the farm before and after installation of the farm tank?"

This was probably the most important question we asked for although there are advantages recognized in the use of a farm tank, if it did not produce good quality milk, we would be compelled to discount them. We summarize the 32 answers received as follows: bacteria count reduced, 19; bacteria count the same, 3; no data, 10. It would appear from this summary that, generally speaking, counts of raw milk are lower after installation of a tank.

We give here some examples of favorable replies received:

"We averaged from 4 to 10 (out of 30 producers) above 20M direct micro. count and an equal number above 5M thermoduric; since farm tank installation it has been reduced to an average of one and sometimes two producers above these counts. Tanks have shown a

very definite improvement."

"Average count before installing tanks was 102,950; average count after installing tanks was 29,875."

"Going over the records of 14 dairies that have changed over to tanks showed the following results: for 3 years prior to the change-over 7 of these dairies had a total of 33 high counts. Since the change-over only 3 dairies had a total of 4 high counts.....33 against 4."

"There is no comparison between the two. In bulk tank pickup between 85 to 90% of the counts are under 10,000 using raw plates count."

In no case did the answers quote an average higher count after installation of a tank.

It was our intention to correlate in the questionnaire the most pressing problems confronting those who have interest in the bulk handling of milk, and we believe that the remarkable variety of answers received to many of our questions is in itself indication of some degree of success. However, it is also gratifying to note a considerable area of agreement on certain problems involved in bulk milk handling. For instance, there is general approval of every-other-day pickup, agreement that the truck driver rightfully has responsibility for rinsing the farm tank, and that the compressor may be located in the milk house.

On many questions however, our answers tell the need for more experience and information. It is apparent that further data is needed concerning the handling of off-flavor milk, sediment testing of milk from farm tanks, the cleaning of pipe lines by vacuum and positive recirculation systems, and training requirements for the tank truck driver.

While problems are created by the introduction of the bulk-handling system, we believe there are three primary factors which have contributed to the phenomenal increase in its use: *first, the installation of such equipment saves labor on the farm; second, it prevents the shipping losses always associated with can shipments, and third, it has produced a high quality of milk, where properly installed and used.*

We hope the foregoing recount of experience with the bulk-handling system will be of some value to new areas adopting it to their use and to health agencies considering regulations for its operation. The Committee notes that this is a new and growing development in dairy farm methods, and changes are constantly taking place; data contained herein may not apply as progress is made.

We reiterate that it is frequently difficult to get adequate short answers to an involved question. A yes or no response will not necessarily tell the entire story and any statistical compilation of answers should bear this in mind.

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Joseph J. Donovan
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Richard S. Guthrie
C. F. Hanger
Milton Held
Russell R. Palmer
C. W. Pegram
L. O. Tucker
Robert Metzer

ACKNOWLEDGEMENTS

The members of the Dairy Farm Methods Committee gratefully acknowledge below all those who filled out and returned the questionnaires sent them. Their contribution made this report possible and we very much appreciate their cooperation.

Keystone Dairy, Reading, Pa.

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Cameron S. Adams, Asst. Supervisor, Division of Dairy & Livestock, Washington State Department of Agriculture

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C. W. Pegram, Chief, Dairy Division, Department of Agriculture, Raleigh, N. C.

Russell R. Palmer, Chief Milk Inspector, Department of Health, Detroit, Mich.

George H. Hopson, The DeLaval Separator Co., Poughkeepsie, N. Y.

W. O. Nelson, University of Illinois, Urbana, Ill.

Milton Held, U. S. Public Health Service, Kansas City 6, Mo.

Washington State Institute of Dairying

The Twenty-third Annual State College of Washington Institute of Dairying, will be held in Pullman, Washington on March 8-11, 1954. The guest speakers are nationally known. There will be dairy products judging and scoring contests with excellent prizes and diplomas. Special sessions for sanitarians and fieldmen will be held. Write H. A. Bendixen, Department of Dairy Science, State College of Washington, Pullman, Washington.

REPORT OF THE ADVISORY COMMITTEE ON ORDINANCES AND REGULATIONS* 1953

Introduction

The Advisory Committee on Ordinances and Regulations reiterates its belief that if we are to have the free movement of milk from surplus to deficit areas that is essential to the health of our Nation and to the welfare of the dairy industry, we must have uniform milk ordinances uniformly enforced.

This year the *Milk Ordinance and Code,* 1953 *Recommendations of the U. S. Public Health Service* and the National Research Council report *Sanitary Milk Control and its Relation to the Sanitary, Nutritive, and Other Qualities of Milk* have become available. We believe that these publications will have a beneficial influence toward unification.

The 1953 Recommendations of the U. S. Public Health Service is a revision of the 1939 edition of the *Milk Ordinance and Code* Recommended by that Service. Significant changes and modifications have been made to keep abreast of advances in the fields of dairy technology, veterinary medicine, and public health. This committee is pleased to report that many of its recommendations were incorporated into the 1953 edition. Some of the most significant changes are strengthening of the provisions relating to brucellosis control of dairy herds, inclusion of methods for the cleaning-in-place of milk plant pipe lines; changes in the requirements for the cooling of milk on dairy farms; and an option that health departments may accept, as a supplement to official control, the results of industry inspection of dairy farms, and the results of industry laboratory tests of raw milk for pasteurization, provided that such results are checked periodically by the official agency and found to be satisfactory. The committee approves the changes and particularly commends those which make possible industry participation, and those making the ordinance a mandatory pasteurization type of ordinance. The ordinance is more practical and, therefore, of greater value than the 1939 edition.

The Report of the National Research Council is based on the most complete and comprehensive study ever undertaken on the subject. The results emphasize simplicity which we believe essential to uniformity. Several recommendations based on this study have been incorporated into the 1953 edition of the *Milk Ordinance and Code.* To emphasize the influence that the National Research Council report may have, we quote the last two paragraphs from an editorial in the May 25 issue of *Hoard's Dairyman*:

> "Health officials, no matter where they may be, have the specific responsibility now of completely reviewing their current requirements for the production of fluid milk. There should be no delay in the revision of outmoded, Topsy-grown ordinances that have, for years, plagued the dairy farmer with unnecessary, arbitrary requirements, having little or no effect on the quality of milk produced and marketed.
>
> "In the past, dairy farmers have been literally helpless to defend themselves against these frivolous, burdensome requirements. There were no independent, scientific papers available to support the producers' contentions. The professional opinion of the health officer, even though it may have had no foundation in fact or evidence, prevailed over the farmer's appeal to reason. Dairymen and their organizations now have support in this the first and only study of its kind ever conducted."

Comments on Ordinance Requirements

This Committee in its 1952 report invited comments on ordinances and regulations and on the advisability of the changes in ordinance requirements reported by the committee at the 1952 meeting. Only a few comments were received. One was to the effect that the officials of a state should not have lowered the bacterial requirement for milk to be pasteurized from 200,000 per ml to 100,000 per ml. This committee is in agreement with the conclusion found in the National Research Council report that there are no public health reasons to increase the severity of satisfactory sanitary milk regulations, making them more detailed and rigid, when the milk industry of any market regularly complies with them. This applies to the regulations affecting milk production processing, and distribution as well as to the standards for the quality of the milk.

The question was raised "where chemical bactericides are employed, is it fair to automatically mark down a producer for 'bacterial treatment' if the equipment is not clean?" Available research data indicates that bactericidal treatment by chemicals cannot be relied upon if the utensils and equipment are dirty, or if accumulations of milk stone are present. The committee believes that further research is needed before this question can be correctly answered.

Frozen Desserts

Because of prevailing interests, the committee has studied our state dairy laws and regulations pertaining to frozen desserts. There is no uniformity of requirements in these regulations and some lack precision and completeness.

Plain Ice Cream.

The 48 states and the District of Columbia have set minimum milk fat requirements for plain ice cream, ranging from 8.0 percent to 14.0 percent. They are shown in table 1.

Table 1—Minimum Milk Fat Requirements for Plain Ice Cream

Number of states (including D.C.)	Milk fat requirement (percent)
4	8
27	10
1	11
14	12
1	13
2	14

Thus, 31 of the 49 require 10 percent or less and 17 require 12 percent or more.

The laws are less specific for other composition requirements

*Presented at the 40th Annual Meeting of the International Association of Milk and Food Sanitarians, Inc., East Lansing, Mich., Sept. 1-3, 1953.

than they are for milkfat. The minimum total milk solids requirement is reported for 22 states. This requirement ranges from 18 percent to 21 percent, the lower being the most prevalent. A total food solids content of 1.6 pounds per gallon is required by 26 states and 1.8 pounds per gallon by one state. Food solids requirements are also expressed by one state as "not less than 30 percent" and by 2 states as "not less than 33 percent." The states having requirements for total food solids are not necessarily the same as those having minimum requirements for total milk solids.

A weight per gallon requirement of 4.25 pounds was reported by 5 states, 4.5 pounds by 27 states, and 4.75 pounds by one state. In addition, one state requires that the overrun shall not exceed 100 percent and another state reported a requirement that the volume when melted shall not be less than ½ the volume when manufactured or sold. Only 28 states report bacterial requirements for plain ice cream. Twelve of these requirements were expressed per gram and ranged from 50,000 to 150,000. Sixteen were reported as per cc or per ml, and ranged from 50,000 to 500,000. A coliform requirement was found in the laws of 3 states. Two stated "no coli" and one "absent in one 1/00 gram portion."

Chocolate, Fruit, and Nut Ice Cream

The 48 states and the District of Columbia also have minimum milk fat requirements ranging from 6 percent to 12 percent for chocolate, fruit, and nut ice creams. These requirements are shown in table 2.

Table 2—Minimum Milk Fat Requirements for Chocolate, Fruit, and Nut Ice Creams

Number of states (including D.C.)	Milk fat requirement (percent)
1	6
22	8
2	9
20	10
1	11
3	12

The requirements for total milk solids vary as greatly as they do for plain ice cream. They range from 14 percent to 20 percent.

Frozen Custard

Thirty-three states reported standards for frozen custard. The minimum milk fat requirement for this product ranges from 6 percent to 13 percent. Of the 33 states, 26 specify the quantity of egg yolk to be used.

Ice Milk

Requirements for ice milk were reported by 27 states. Of these, 14 had both a minimum and maximum milk fat content requirement. The minimum ranging from 2 percent to 4 percent and the maximum ranging from 4 percent to 12 percent. The fat requirement reported by the other 13 states ranged from 2 percent to less than 12 percent. A bacterial standard for this product was reported by only 11 states. Seven were expressed as per gram and ranged from 50,000 to 100,000. Four were expressed as per cc. and the requirement was either 100,000 or 150,000. Requirements identifying the product as ice milk were set by 11 of the states. These requirements were label on the packages, display signs, or both.

State Pasteurization Requirements for Ice Cream

The state pasteurization requirements for ice cream vary widely and for the most part are not adequate. Data covering the 48 states and the District of Columbia show that 14 states have no provisions or regulations for pasteurization. In two of these states, the law enables the department to prescribe pasteurization requirements. The requirements are shown in tables 3 and 4.

Table 3—Pasteurization Requirements for Ice Cream

Temperature	Time (minutes)	Number of states
140°F.	30	1
142°F.	30	8
142.5°F.	30	1
143°F.	30	8
145°F.	30	6
145°F.	25	1
150°F.	30	7
155°F.	30	3
No provisions		14

The U. S. Public Health Service recommends that ice cream be pasteurized by heating to at least 155°F and holding it at such temperature continuously for at least 30 minutes or to at least 175°F and holding it at such temperature continuously for at least 25 seconds. The HTST recommendation is based on the results of a comprehensive study conducted at North Carolina State College.

One of the two states with a HT ST alternate of 175°F for 25 seconds requires holding at 155°F for 30 minutes and the other requires holding at 150°F for 30 minutes. The other two states requiring holding at 155°F for 30 minutes do not have at HTST alternate. Therefore, of the 48 states and the District of Columbia, there are only three that have pasteurization requirements for ice cream that meet the recommendations of the U.S. Public Health Service. The committee re-emphasizes the fact that many of the states do not insure proper pasteurization of ice cream mix.

Table 4—Alternate Pasteurization Requirements for Ice Cream in 16 States

Temperature	Time	Number of states
160°F.	15 sec.	7
160°F.	16 sec.	1
161°F.	15 sec.	1
175°F.	25 sec.	2
160°F.	20 min.	1
160°F.	10 min.	2
150°F.	20 min	1
Decrease holding time 1 min below 30 min for each degree above 145°F.		1

In 8 states, the pasteurization requirements can be set or established by the promulgation of regulations by the Department of Health or by the Department of Agriculture.

Filled Milk and Milk Products

Interest in filled milk and milk products has increased during the year. Review of state laws and regulations show that some could be more explicit in defining these products. They are prohibited by law or regulations in 26 states. The filled milk laws of two of these states, however, do not in the wording of the law prohibit the addition of a foreign fat to a frozen product. The laws of 12 states prohibit the substitution of any ingredient for any natural substance (wholly or in part) of milk or a dairy product; or prohibit the sale of a dairy product that does not conform to promulgated definitions; or prohibit foreign substances from being added. (Such products are deemed adulterated.) In one of these 12 states reference is made only to frozen desserts and in another only to ice cream.

Dairy products in combination with vegetable or other foreign fats are prohibited by the Food and Drug Administration laws of two States.

The laws of six states do not specifically prohibit vegetable fat products, and two states specifically permit such products.

As of July 1, 1953, frozen desserts containing fat other than milk fat were permitted to be sold in Arkansas, California, Illinois, Missouri, Alabama, Nevada, Montana, Oklahoma, Oregon, and Texas. Filled evaporated milk was sold in Illinois, Indiana, Missouri, and Oklahoma. In these states, it is however, illegal to use a blend of milk fat and vegetable fat.

RECOMMENDATIONS

The Advisory Committee on Ordinances and Regulations recommends:

I. That all control officials study the report of the National Research Council on Sanitary Milk Control and Its Relation to the Sanitary, Nutritive, and Other Qualities of Milk, and revise their milk ordinances in accordance with the findings and recommendations reported therein.

II. That all states and municipalities using the U.S. Public Health Service type of milk ordinance take immediate steps to revise their ordinances to agree with the 1953 Recommendations of the U. S. Public Health Service. This is necessary if this ordinance is to continue its leadership toward uniform milk ordinances. Without reflecting criticism on the U. S. Public Health Service, the committee further recommends that the ordinance be revised at more frequent intervals. This is necessary if this ordinance is to fulfill its great potential influence in bringing about uniformity.

III. That control officials review and revise their regulations pertaining to frozen desserts and make them more specific and establish more uniform requirements.

IV. That control officials take immediate steps to revise their ice cream and frozen desserts ordinances to require ice cream to be pasteurized in accordance with the recommendations made by the U. S. Public Health Service.

V. That control officials review their filled milk and filled dairy products laws and regulations and ascertain that they clearly and specifically state their purpose and intent.

In conclusion, the Committee again requests the cooperation of the members of this association in advising it of changes in milk ordinances and of problems that arise in areas under their jurisdiction.

C. J. Babcock, *Chairman*
John Andrews
John D. Faulkner
O. A. Ghiggoile
N. O. Gunderson
William Hoskisson
Steven J. Wolff

FARM MILK PIPELINES

Continued from Page 46

contact test when both were applied to the same pipelines. Both tests could be employed to indicate a generalized unsanitary condition in the pipelines, but only the brush and rinse test could be relied upon to indicate localized unsanitary conditions.

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Vital Recommendations Made at First World Congress For Milk Utilization In Washington, D.C.

Plans for continuing the work started by the First World Congress for Milk Utilization were already underway when the final gavel sounded on this pioneering effort to search into the causes and cures for the world's incongruous dairy products supply-demand situation.

Many new ideas were set forth by the more than 200 persons from 30 countries who participated in the two-day sessions which closed Saturday afternoon, Nov. 21, in the Hotel Statler, Washington, D.C.

The structure for this continuing Congress activity was outlined by Robert Rosenbaum, Executive Committee Chairman of Dairy Industries Society, International, sponsor of the pioneering Congress, and summed up by Lester Olsen, the Society's President, who said:

"This First World Congress has shown the necessity for establishing task forces and continuing committees to carry on the work which is necessary of completion and possible achievement."

Continued on Page 68

Association News

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WORLD CONGRESS FOR MILK UTILIZATION

Continued from Page 66

FOUR DISCUSSION GROUPS SET FORTH PROPOSALS

The necessity for a continuing Congress was graphically illustrated by the reports of the four discussion groups which met throughout the Congress to deliberate the points expressed in the various speeches delivered before the entire international gatherers. These groups were under the general chairmanship of Dr. Harry C. Trelogan, U.S. Department of Agriculture.

One group which discussed Mr. Rosenbaum's recommendations for area development resolved that as a contribution to total efforts toward alleviating nutritional deficiencies found in a large segment of the world's population "the First World Congress for Milk Utilization endorses the concept of an area development program which is defined as:

"Stimulation of the development of local supplies of wholesome milk and milk products wherever needed, awakening of consciousness of the need, and to foster the exchange of experiences between areas facing similar problems while undergoing development."

IMPROVEMENT IN ALL COUNTRIES SEEN

Another group, this one specializing in trade and finance, reported its views to the full Congress as follows:

1. Technical efficiency of agricultural production is capable of rapid and considerable improvement in all countries. Immediate steps should be taken to secure this improvement in the interests of lower costs and development of countries of low food consumption standards.

2. Populations existing primarily on vegetable diets are in countries having low worker efficiency. These conditions would be improved by supplementing diets with proteins of animal origin and, therefore, milk consumption programs in these areas should be encouraged by both government and trade organizations.

3. Real surpluses of dairy products do not exist seriously in countries other than the United States and it is probable that this domestic problem of surplus can be solved through examination of prices and distribution conditions in terms of consumer acceptance.

4. Temporary national surpluses can and should be used for welfare purposes and for development of new by-products—however, these surpluses should not be moved in trade channels that would upset or compete with normal development of a country's existing dairy market or into countries with little or no existing dairy market, unless there is assurance of continuing of supply.

5. If greater attention is paid to present needs of a highly competitive markets in terms of consumer acceptability through quality, packaging, distribution and price, private or cooperative enterprise operating freely through normal trade channels is fully capable of distributing present and future dairy product production.

COORDINATE PLANS OF PUBLIC BODIES

A third group, this one concentrating on technology, health and sanitation, suggested that the Society study all agency-proposals regarding milk utilization to coordinate activities of public bodies. It was suggested that the Society explore in various countries the need for expanding milk production and for improving sanitary handling, processing and marketing of milk and dairy products. DISI also should encourage movement of milk products to deficit areas by helping to establish reconstituting plants or by direct importation, the group reported.

Improvement of human nutrition in many countries and the need for further study of the problem by the World Congress for Milk Utilization were emphasized in the report of a fourth group on food distribution and nutritional and consumer needs. This group also labeled the surplus problem as one of long-range ramifications and pointed to the need for education to change the poor nutritional habits of certain areas and "to change consumer habits of a country you must begin with the children of that country."

Discussion group leaders included A. H. Ward, New Zealand Dairy Board; Dr. Donald E. Hirsch, U.S. Department of Agriculture; John Hancock, International Bank for Reconstruction and Development; G. C. Hallawell, International Dairy Supply Co.; Clayton Whipple, U.S. Department of Agriculture; Monroe McCown, Foreign Operations Administration; Dr. J. M. Sherman, Cornell University; Dr. C. W. England, Dairy Consultant; Dr. Ralph E. Hodgson, U.S. Department of Agriculture; C. J. Babcock, U. S. Department of Agriculture; Col. Richard J. Werner, Milk Industry Foundation.

Resolutions also were passed at the final session of the Congress recommending a study by Dairy Industries Society, International, of the practicability of an international effort to develop dairy product judging standards and thanking the Congress speakers and participants and the Foreign Operations Administration (U. S. A.) for its

"especial collaboration."

Speakers at this First World Congress for Milk Utilization included Senator Alexander Wiley, Chairman of the U.S. Senate Foreign Relations Committee and Honorary Chairman of the Congress; Dr. Jacques May, American Geographic Society; Dr. Egbert deVries, International Bank for Reconstruction and Development; Dr. D. Gale Johnson, University of Chicago; Dr. S. H. Work, United Nations Food and Agriculture Organization; Dr. Karl Brandt, Stanford University's Food Research Institute; Howard H. Gordon, U.S. Department of Agriculture Commodity Credit Corporation; His Execellency Syed Amjad Ali, The Ambassador of Pakistan; Donald R. Sabin, UNICEF; Brig. General Crawford F. Sams, First Army Surgeon; John H. Stambaugh, Foreign Operations Administration.

Many messages were read before the Congress, including the following from the President of the United States:

"I am happy to send greetings to all who are gathered in Washington for the first World Congress for Milk Utilization.

"One of the greatest problems confronting the free world is the finding of ways to increase the flow of international trade. In commodity after commodity, especially in the field of agricultural products, we find, in one part of the world, surpluses which inhibit commerce; and, elsewhere in the world, acute shortages which create human and social maladjustments hurtful to the cause of freedom. I understand that one-third of the world's population has a surplus of milk products; the balance, a shortage of them. The issues before your congress are therefore symptomatic of the general problem. For us it is at once a challenge and an opportunity, both of epochal proportions. I am glad to know you have it under consideration, and I wish you success in your deliberations."

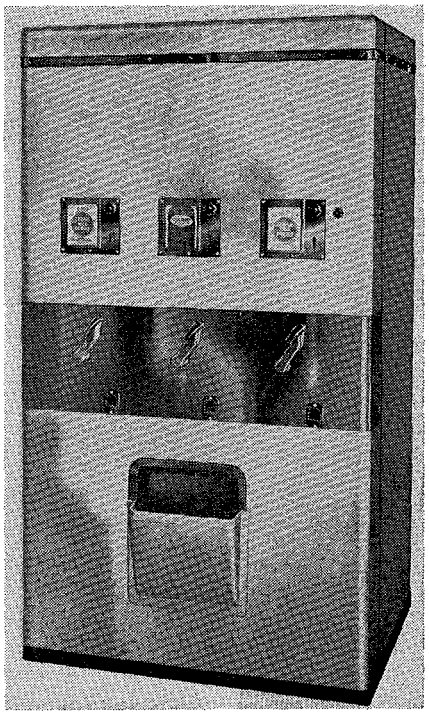
Other messages were received from Dr. P. V. Cardon, President of the Sixth International Grasslands Congress, who was in Rome; J. Findlay Russell, Larbert, Scotland, Past President of the Society; and K. L. Wallace Executive Board Vice Chairman, who sent best wishes from Toronto.

Wilbur G. Carlson, who has his headquarters at the Society's office at 1108 16th Street, N.W., was Secretary-General of the Congress. The Society is a non-profit, non-commercial, non-political international educational and consulting organization.

The First World Congress for Milk Utilization was followed by the Annual Business Meeting of its sponsor. The Society's President, Lester Olsen, closed the Congress by saying:

"We know there are no easy solutions. But we are confident. We are united. We will do the job.

". . . I have said this many times, but in closing I say it again—two-thirds of the world are starving. There is no need to say more."



Newest Model Dairi-Mart Milk Dispenser

Cedar Hill Farms, Inc., largest independent milk dealer in Cincinnati, Ohio, is announcing the newest model of its Dairi-Mart milk dispenser.

This model embodies numerous new and unusual features which will be welcomed by all dairies and other operators of dispensers. The result of practical experience, it was designed and is marketed by Cedar Hill Farms, which has had 27 years' experience as a dairy operator, and has been selling milk through dispensing machines for 12 years.

Experimental work on the new Dairi-Mart has been underway during the last three years, and tests in a wide variety of key locations have demonstrated its trouble-free operation, ease of loading and cleaning, and elimination of container damage or tampering.

The new Dairi-Mart is the first milk dispenser to use a simple, fool-proof and positive hydraulic action that is certain, steady and cost-cutting. It eliminates metal wear and minimizes repair and maintenance expenses.

In operation, a coin is inserted, a lever is pressed, and the selection drops out instantly. The three racks hold from 120 to 156 containers (depending on make), but should any of the racks be sold out between loadings, a red light so indicates, and an automatic sold-out mechanism returns coins, thus maintaining good customer relations. There also is a large reserve capacity.

The new Dairi-Mart dispenses three different dairy drinks to attract and satisfy more customers. Sales statistics show a consistent increase of 20 percent in sales when a third flavor is available, and this extra profit amortizes equipment costs much more quickly.

Containers can be of either Pure Pac, Canco or Sealking, and of either 1/2 pint, 1/3 quart or pint quantities. Separate coin control for each flavor assures continued operation, even when one or two racks are sold out — a feature that eliminates dependency on one control.

With the new Dairi-Mart it is easy to change make, size, or price of cartons on location, without the use of special tools or equipment.

The all-enclosed construction prevents handling of cartons, eliminates return of damaged packages, resists tampering and prevents manipulation. Removable racks are easily lifted out for interior cleaning, the refrigeration is sealed, and defrosting is not required. Thus, the new Dairi-Mart conforms to rigid health department requirements.

Because of its handsome, streamlined exterior appearance, the new Dairi-Mart is suitable for installation in any location, such as manu-

facturing plants, schools, office buildings, theaters, bowling alleys, bus and railroad stations, or wherever else there is sufficient traffic flow. Its compact size, only 64" high, 34¾" wide and 28¾" deep, requires only a minimum of floor space, and eliminates any problem on this score.

Queries to Cedar Hill Farms, Inc., Cincinnati 27, Ohio, will receive prompt attention.

Florida Sanitarian Receives Good Government Award

B. G. Tennant, director, division of sanitation for Escambia County Health Department, Florida, was awarded the Good Government Award for 1953 at the meeting of the Junior Chamber of Commerce held January 12, 1954.

Tenant, who resides at Marine Drive, Warrington, Florida, was presented the Good Government plaque by Joe J. Harrell. chairman of the Jaycee Committee, in recognition of "his outstanding service in the field of government in Escambia County."

Harrell, in making the presentation said the winner was born in Atmore, Ala., and completed his high school education at Flomaton. He served 39 months in the Navy as an enlisted man during World War II.

Tennant was employed by the Escambia County Health Department as junior sanitarian on Feb. 1, 1946. He studied in a short course at the University of Florida at Gainesville in January, 1947, and won the honor of making highest grades of any in the class.

He was made supervisor of the division of sanitation in 1948. State officials have reported that Tennant's untiring efforts and constant study of better methods of sanitation from every phase of the work have established for Escambia County one of the finest divisions of sanitation in the State of Florida, Harrell said.

"These accomplishments have not been attained by being just an eight hour a day man," Harrell said. "He has devoted his entire time, both day and night to the service of his community. At any time his advice or service is needed in the community he has been ready and willing to go. People from all walks of life have found his integrity beyond reproach. The Golden Rule has been his measuring stick for all problems confronting him, and this means satisfied people on both sides of any question."

MINIATURE DRAINAGE AND STORAGE RACKS

WENDELL C. WEAVER

Dairy Inspector
Bureau of Dairy Service California Department of Agriculture
Route 4, Box 106B, Turlock, California

While making routine inspections of dairies producing manufacturing milk, I recognized that there was need for further improvement in the storage and drainage of milking utensils.

The lack of progress, in my opinion, was due to the dairyman not having a visual demonstration of what the storage rack looked like, and how the milk utensils would appear when placed on the sanitary metal storage rack.

With this thought in mind I constructed a miniature storage rack made from ¼" steel rod, 12" long, 9" high, and 6" wide at the base. Most dairymen upon viewing this rack are impressed with its usefulness, and many commented that they could now see why their past methods of storing utensils were not satisfactory.

Inspectors in the Bureau of Dairy Service are now using this miniature model as a visual sales aid and are securing excellent results.

The Author holding miniature model of drainage rack.

We have found that this type of visual aid in dairy inspection activities simplifies the work of the regulatory officials, and makes it easier to obtain desired results.

New Oakite Handbook on Dairy Cleaning

"What to Use for Dairy Cleaning" is the title of a new, completely revised handbook on dairy sanitation recently published by Oakite Products, Inc., manufacturers of specialized cleaning and allied materials.

This compact, well illustrated, 28 page booklet discusses such recent developments as in-place cleaning and hot spray cleaning. It describes such new equipment as the Oakite Rotary Sprayer, which, placed on the tank floor or suspended from the tank dome, delivers cleaning spray under pressure through six carefully positioned nozzles on a rotating head—and the Oakite Foam Unit, which converts truckwashing solution into a lather and delivers it to the truck surface through a long-handled gun.

The handbook also discusses widely-used Oakite methods of cleaning processing equipment, removing milkstone, sanitizing equipment, conditioning cans, lubricating conveyor chains, washing bottles, cleaning vacuum pans, descaling bottle washers and heat exchangers, and steam cleaning cases, conveyors, and machinery.

Copies of the booklet are available without charge. Request should be made on company letterhead to Oakite Products, Inc., 138C Rector Street, New York 6, N. Y.

RESULTS OF MAIL BALLOT ON CONSTITUTION AND BY-LAWS

Yes	267
No	5
Total Votes Cast	272

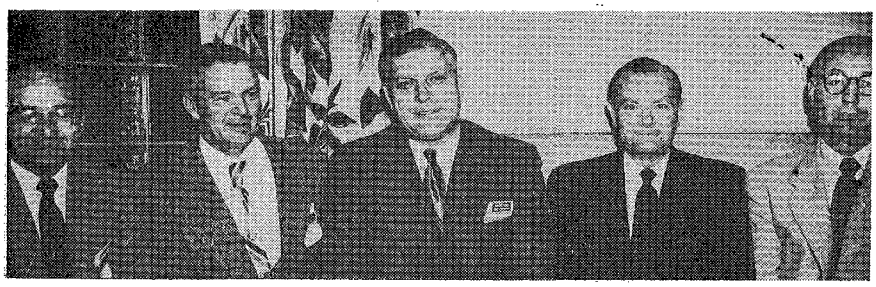
Tellers: John M. Schlegel, Karl Jones.

Revised Constitution and By-laws declared passed by Executive Board as of Jan. 15th, 1954.

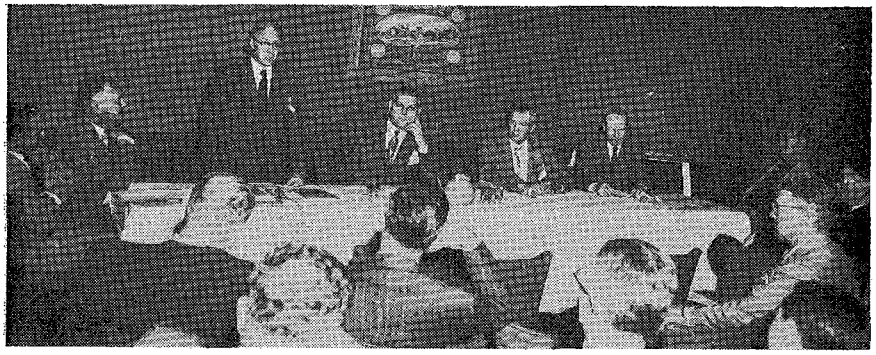
Rocky Mountain Association of Milk and Food Sanitarians Holds Joint Meeting

Rocky Mountain Association of Milk and Food Sanitarians held a joint meeting with the Western States Dairy Convention on December 6, 7, and 8, 1953, at the Cosmopolitan Hotel, Denver. The Rocky Mountain section of the International Association of Milk and Food Sanitarians held their annual meeting on December 7, at 3:00 p.m. in the Cosmopolitan Hotel. Eugene "Gene" Tuttle, of Utah, was Acting Chairman in the absence of Jim Doughty, Jr., of New Mexico, who was unable to attend the meeting. Representatives were present from Utah, New Mexico, Wyoming, Nebraska, and Colorado.

The program was designed by the committee in charge to present problems common to the members in this area. A panel discussion moderated by Gene Tuttle, and comprising the following members: Ray Iiams, Wyoming, Bill Hickey, Utah, Frank Fiske, Colorado, Wayne Stell, New Mexico, W. E. Harrisberger, Montana, and Oscar Wiberg, Nebraska, discussed "Answers to Mutual Milk and Food Problems."



Sec.-Treas. Peter G. Stevenson, Pres.-Elect. Ray Iams, Pres. Gene Tuttle, First Vice-Pres. William Hoskisson, Sec. Vice-Pres. Wayne Stell.



Panel Discussion.

Banquet.

An interesting talk was given by Carl Yaeger, field man for Beatrice Food Products. His subject was "Are Your Field Calls Paying?"

The business meeting and election of officers followed on the program. The Secretary-Treasurer gave his report and the finances of the organization are solid. In other words we are in the black. The following men were elected to office: President: Gene Tuttle, Utah. President Elect: Ray Iams, Wyoming. First Vice President: William Hoskisson, Utah. Second Vice President: Wayne Stell, New Mexico. Secretary-Treasurer: Peter G. Stevenson, Colorado. Auditors: Hugh Templeton, Nebraska, and Warren E. Harrisberger, Montana.

After the business meeting a dinner meeting was held at the Old Hickery Dining Room. Fifty-five members and guests were in attendance.

"Red" Thomasson gave us an interesting talk on the activities of the International Association. Our main speaker was Doctor Kenneth G. Weckel, who gave us a very interesting talk on "Making the Most of Yourself as a Sanitarian."

After the dinner meeting the group retired to the Century Room of the Cosmopolitan Hotel where the Rocky Mountain Canariês played host to us in a Bingo game. The main prize of the evening which was an end table and a lamp, was won by our guest speaker, Doctor Kenneth G. Weckel. "Red" Thomasson won an electric pop corn popper.

Next year's meeting is being planned for the month of September in our neighboring city of Salt Lake City, Utah. A very good meeting and a very good time was had by all.

Peter G. Stevenson, Sec.-Treas.
Rocky Mountain Association of
Milk and Food Sanitarians

"DOCTOR JONES" SAYS:*

PAUL B. BROOKS, M.D.

Trichinosis from pork—you know, I've wondered sometimes whether Moses, when he included a ban on pork in his dietary regulations, had any reason to suspect a connection between pork and the sickness that, nowadays, we call trichinosis. Not very likely, I guess. At least I was reading it's rare in most oriental countries.

While, in some of 'em, they eat raw fish, it seems to've always been their custom to cook animal muscle meat thoroughly. A Japanese doctor, an authority on parasites, was over here some years ago. He'd seen most everything in the parasite line but he'd never seen trichina. Our Jewish people, today, that don't eat pork, I've never seen any statistics on it but they shouldn't have trichinosis.

In Moses' day and for many hundreds of years after that, trichinosis wasn't recognized as a disease. So the name hadn't been invented. In fact, it wasn't until about a hundred years ago a German doctor saw the trichina worm for the first time, and it got its name. "A worm?" That's right. It's a minute, cork-screw-shaped affair, a member of the round worm family. (I read that just recently.) It's place of business, when it gets located, is in the muscles of man and other mammalian animals. Due to the nature and sources of their diets, it's commonest in porkers and rats.

The number of human cases reported to the U.S. Public Health Service every year, 3 to 5 thousand, more or less, it's probably only a fraction of what actually occur. Autopsy studies, over several years, indicated that something like one out of every six people have had it. Mostly it don't get recognized.

Feeding raw garbage is what, chiefly, keeps it going in hogs. Eating their meat, whether it's loin roast or in sausage or what not, without adequate cooking, accounts for it in man. "Adequate" means cooked all through. The best government regulation and inspection can't insure pork being safe. The one sure preventive is thorough cooking. Not as many die from it as used to. But, even if it don't kill us, who wants to be wormy?

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

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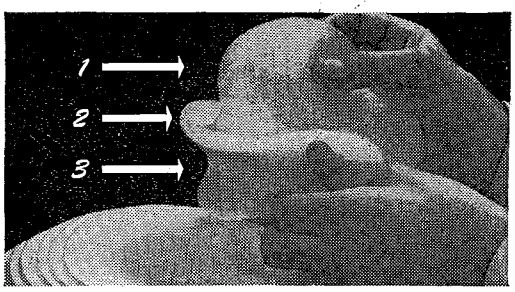

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