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Journal of

MILK and FOOD TECHNOLOGY

Official Publication

International Association of Milk and Food Sanitarians, Inc.

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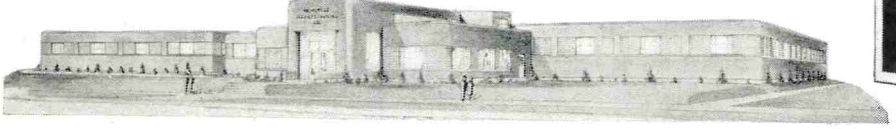

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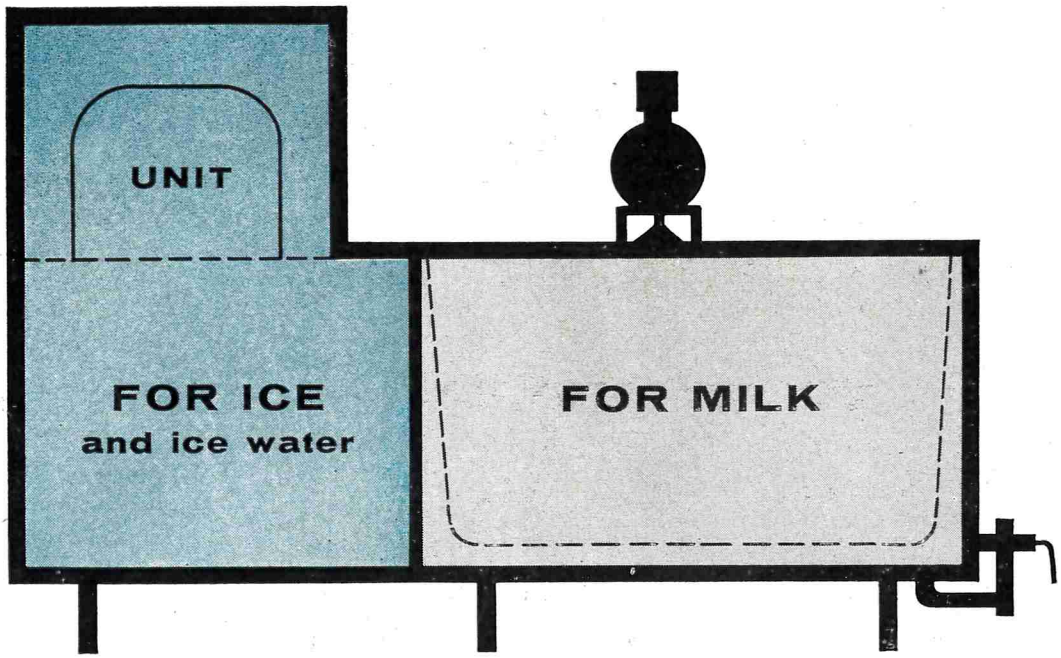

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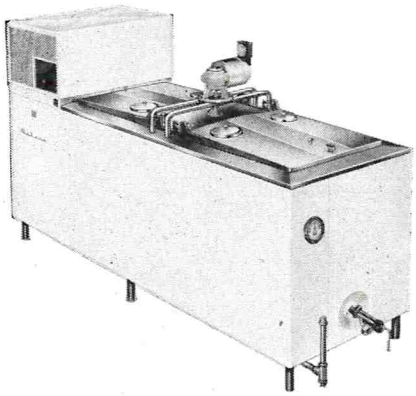

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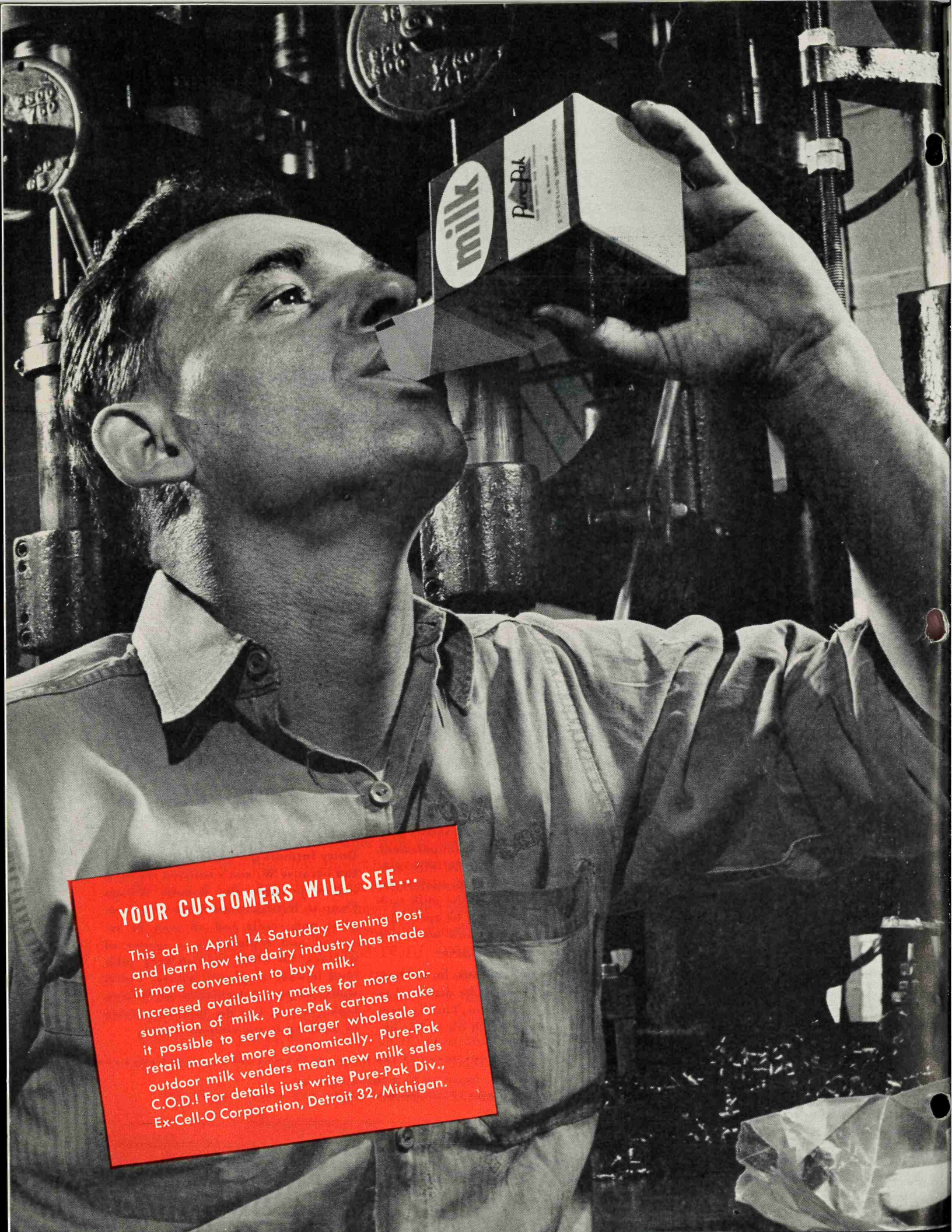

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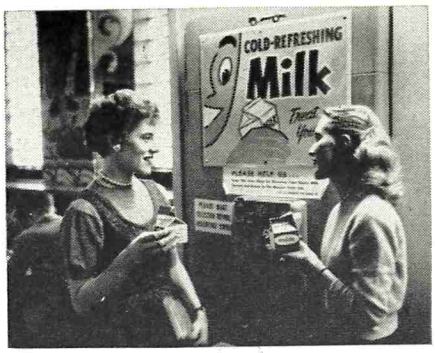

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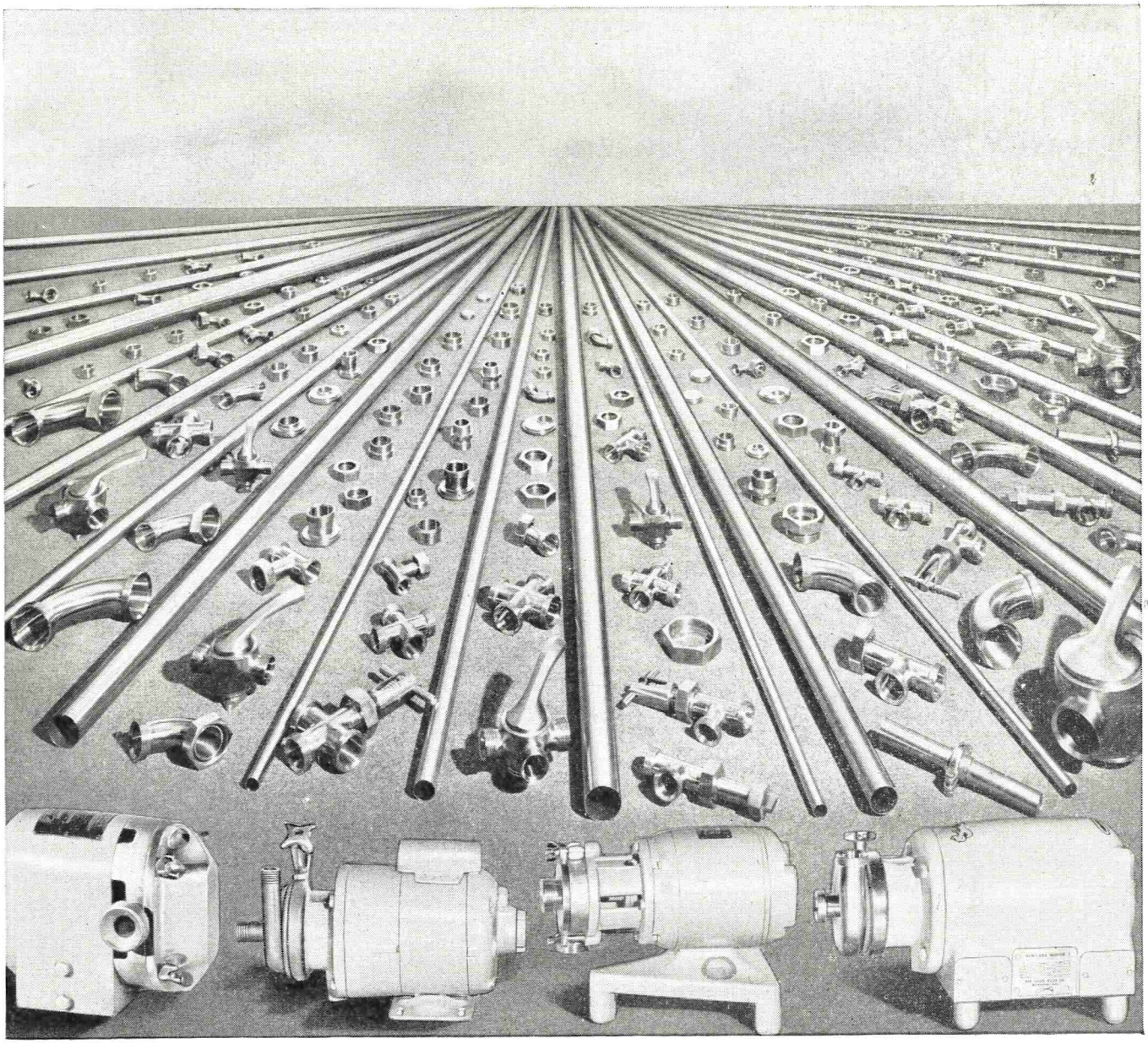

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EFFICACY OF CHLORINE, A QUATERNARY AMMONIUM COMPOUND AND A NEW DISINFECTANT (CHLORHEXIDINE) IN TEAT CUP DECONTAMINATION [1] [2]

J. H. Stewart, G. R. Spencer, Janis Lasmanis and D. M. Holliday

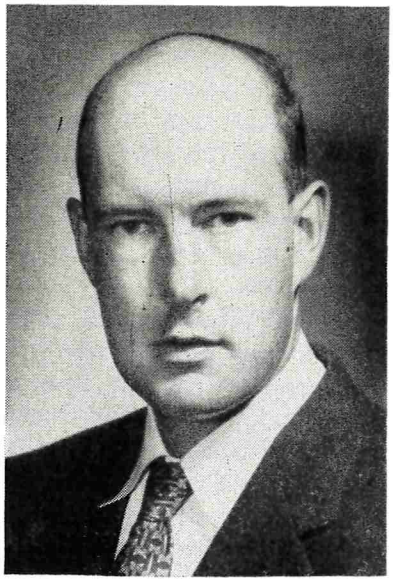
College of Veterinary Medicine, State College of Washington, Pullman

Chronic mastitis due to *Micrococcus pyogenes* probably spreads by the teat cups of the milking machine. Previous investigation by the authors disclosed coagulase-positive micrococci on teat cups after disinfection by two successive dippings in two hypochlorite solutions. *In vitro* studies demonstrated that the micrococci were sensitive to chlorine, but were protected by small amounts of milk in the disinfectant (7).

Hay (6) found that rinsing the teat cups in clear water followed by the chlorine solution was inadequate to free the cups completely from *Streptococcus agalactiae*. Waugh *et al.* (10) demonstrated that *Micrococcus aureus* survived 600 p.p.m. and 475 p.p.m. available chlorine for a period of 20 seconds with one per cent skim milk in the chlorine solution. If skim milk was not present, Waugh found that *M. aureus* was killed by 100 p.p.m., but not by 50 p.p.m., of available chlorine during a 20 second period of exposure. Chodkowski (2) recovered *S. agalactiae* from teat cups after disinfection with 70 per cent methyl alcohol, 2 per cent chorine solution, or flushing with water. Chodkowski also found that S. *agalactiae* was destroyed within three seconds by a quaternary ammonium disinfectant.

In a study of teat cup and teat disinfection Spurgeon *et al.* (9) found that hypochlorites and quaternaries were similar in disinfecting efficiency. They also found that two successive germicidal rinses were better than one water and one germicidal rinse, and longer exposures or higher concentrations of germicides were even more effective. Elliker (5) reported a cold water rinse removed many bacteria from teat cups, and either hypochlorite or quaternary disinfectants killed all but a few streptococci. Dubois and Dibblee (4) demonstrated that a quaternary ammonium disinfectant was not as effective against coliform organisms as against gram positive cocci. Chaplin (1) suggested that gram negative bacteria may possess a lipid that is retained on the cell surface which is capable of withstanding the disruptive surface force of quaternary ammonium disinfectant. Claydon (3) evaluated methods of contaminating and testing teat cups.

In the following study, teat cups were contaminated artificially to compare methods of disinfection and to evaluate a new disinfectant. Factors that were compared in these tests were the degree of contamination, different strains and species of mastitis producing microorganisms, the duration of disinfection, the concentration and type of disinfectant, and direct or enrichment culture of swabs from disinfected teat cups. *In vitro* experiments also were performed to establish the approximate bacteriostatic and bactericidal effects of the disinfectants.



Dr. James H. Stewart, received the B. S. degree at Kansas State College and the Doctor of Veterinary Medicine degree in 1951 at the University of Minnesota. Following graduation he spent three years in veterinary practice at Arcadia, Wisconsin. He then began research on mastitis at Washington State College in the College of Veterinary Medicine in the Department of Veterinary Pathology where he obtained the data for this paper on disinfection.

[1]Scientific Paper No. 1434, Washington Agricultural Experiment Station, Pullman. Project No. 1203. Supported in part by a grant from Fort Dodge Laboratories, Fort Dodge, Iowa.

[2]Presented at the 42nd Annual Meeting of the International Association of Milk and Food Sanitarians, Inc., at Augusta, Georgia, October, 3-6, 1955.

METHODS

Teat Cup Disinfection

A uniform system of artificial contamination, disinfection, and bacteriological culture of teat cup liners was developed to eliminate many of the variables encountered in field studies. In the first trials with artificial contamination, milk from cows infected with *Micrococcus pyogenes* was utilized. Later, milk suspensions of twenty-four milk cultures of streptococci, coliform organisms, *Pseudomonas aeruginosa* and *Corynebacterium pyogenes* were employed. Each teat cup was contaminated with 1 ml. of a bacterial suspension in milk. The number of microorganisms per inoculum was determined by a dilution plate count on the surface of Difco blood agar base containing 6 per cent bovine blood.

Three disinfectants were compared, namely chlorine in the form of sodium hypochlorite, a quaternary ammonium compound[3] and a new disinfectant identified as chlorhexidine[4].

The disinfecting solutions were freshly prepared for each trial by diluting the 5 or 10 per cent stock solutions of the compounds in sterilized tap water to the concentration desired. Two enameled pails, each containing 10 liters of disinfectant or water, were used for each trial. The disinfectant was at a temperature of 60° C. at the beginning of each trial, and it usually cooled to approximately 52° C. by the end of the trial.

Four rubber teat cup liners fastened together to make a unit were sterilized by autoclaving at 121°C. for 30 minutes before each trial. Each of the four teat cups was contaminated with 1 ml. of the milk suspension of bacteria. The teat cups were rotated once after contamination to distribute the milk over their surface and were then dipped into the two pails of disinfectant in succession. The teat cups were lifted and lowered twice in each pail during a given period of time in the range from 15 to 120 seconds. After removal from the disinfectant the teat cups were allowed to drain about 2 seconds, and each was rubbed in succession with a separate sterile cotton swab moistened with sterile skim milk. The swabs were rubbed onto the surface of culture plates for a direct culture and then returned to tubes containing 10 ml. of sterile milk for enrichment culture. After incubation for 24 hours at 37°C. the milk from the tubes containing the swabs was streaked onto the

[3]Roccal (RX) a 10 percent solution of benzalkonium chloride (technical).

[4]Chlorhexidine, a 5 per cent solution of bis-p-chlorophenyldiguanidohexane diacetate. Batch FD/AS12343/53, manufactured by Imperial Chemicals (Pharmaceuticals) Ltd.

TABLE 1 — A COMPARISON OF DISINFECTING ACTIVITY OF THREE DISINFECTANTS ACTING FOR 20 TO 55 SECONDS IN A DILUTION OF 1:5000 AGAINST MICROORGANISMS IMPLICATED IN BOVINE MASTITIS

Organism	No. of strains	Disinfectant	Total No. of cups contaminated	No. of cups positive	% total positives
Micrococcus pyogenes	7	Water	80	80	100.0
		Chlorine	320	199	62.19
		Quaternary	240	37	15.42
		Chlorhexidine	320	58	18.13
Streptococci	5	Water	240	240	100.0
		Chlorine	235	178	75.74
		Quaternary	184	52	28.26
		Chlorhexidine	227	57	25.11
Pseudomonas aeruginosa	3	Water	160	160	100.0
		Chlorine	240	70	29.17
		Quaternary	240	85	35.42
		Chlorhexidine	240	28	11.67
Coliforms	3	Water	80	80	100.0
		Chlorine	240	164	68.33
		Quaternary	240	163	67.92
		Chlorhexidine	240	166	69.17
Corynebacterium pyogenes	2	Water	240	209	87.08
		Chlorine	240	46	19.17
		Quaternary	240	2	0.83
		Chlorhexidine	240	7	2.92

TABLE 2 — EFFECT OF DISINFECTION FOR 20 OR 55 SECONDS ON THE RECOVERY OF BACTERIA FROM ARTIFICIALLY CONTAMINATED TEAT CUPS

Organism	No. of strains	Disinfectant	No. of cups contaminated	% positive (20 seconds)	% positive (55 seconds)
Micrococcus pyogenes	7	Water	40	100	100
		Chlorine	160	71	53
		Quaternary	120	28	12
		Chlorhexidine	160	21	14
Streptococci	5	Water	120	100	100
		Chlorine	118	61	69
		Quaternary	92	24	13
		Chlorhexidine	114	33	7
Pseudomonas aeruginosa	3	Water	80	100	100
		Chlorine	120	33	15
		Quaternary	120	47	22
		Chlorhexidine	120	20	5
Coliforms	3	Water	40	100	100
		Chlorine	120	67	65
		Quaternary	120	82	50
		Chlorhexidine	120	87	43
Corynebacterium pyogenes	2	Water	120	82	82
		Chlorine	120	20	0
		Quaternary	120	3	0
		Chlorhexidine	120	3	1

TABLE 3 — A COMPARISON OF DIFFERENT CONCENTRATIONS OF CHLORHEXIDINE AGAINST *Micrococcus Pyogenes*

Dilution	No. of cups contaminated	No. of cups positive	Per cent positive
1:5000	320	58	18.13
1:10,000	80	38	47.5
1:20,000	160	138	86.25

TABLE 4 — BACTERIOSTATIC CONCENTRATION *In Vitro* OF EACH OF THREE DISINFECTANTS AGAINST STRAINS OF BACTERIA IMPLICATED IN BOVINE MASTITIS

Organism	No. of strains tested	Disinfectant	Number of strains inhibited at concentrations indicated												
			1: 200	1: 400	1: 800	1: 1250	1: 1600	1: 2500	1: 3200	1: 5000	1: 6400	1: 10,000	1: 12,800	1: 20,000	1:40,000 or higher
Micrococcus pyogenes	11	Chlorine			11	8	8	1	1						
		Quaternary										11	3	3	1
		Chlorhexidine												11	8
Streptococcus	6	Chlorine			6	3	3	1	1	1	1				
		Quaternary						6	4	4	2	2	1	1	1
		Chlorhexidine										6	5	5	3
Pseudomonas aeruginosa	4	Chlorine	4												
		Quaternary	a												
		Chlorhexidine	4	3	3	3									
Coliform	4	Chlorine	4	2	1										
		Quaternary	3	1	1	1	1	1	1	1	1	1	1		
		Chlorhexidine						4	3	3	1	1	1	1	
Corynebacterium pyogenes	2	Chlorine		2											
		Quaternary	2												
		Chlorhexidine						2	1	1	1	1			

[a]No inhibition observed at the lowest concentration tested.

surface of Difco blood agar plates. All plate cultures were incubated for 47 hours and the results recorded. In later experiments only enrichment cultures were used because they were positive in most instances when direct cultures were positive. The finding of characteristic microorganisms growing from the swab was taken as evidence that disinfection was incomplete for that teat cup. In most experiments two or three disinfectants were compared with each other and with water as a control using a single strain of bacteria. Each disinfectant was used on 40 individual teat cups to constitute a trial. The same bacterial suspension was held at 5°C for several hours and used in all the trials for a single experiment.

Bacteriostatic and bactericidal effect

To determine the bacteriostatic effect, serial two-fold dilutions of the disinfectants were made in sterile skim milk containing 0.025 per cent brom cresol purple. The inoculum per 5 ml. of disinfectant and milk was 0.2 ml. of a 1:100 dilution of a fresh 24 hour milk culture. The inoculum of microorganisms was enumerated by counting colonies which developed on the surface of agar plates after inoculating the surface and subsequent incubation. Three control tubes with no disinfectant were inoculated for each trial. The mixture of disinfectant and microorganisms was incubated for 48 hours at 37°C. and any alteration in its appearance was recorded. Each culture of milk that failed to show gross changes was streaked onto a Difco blood agar culture plate. These plates were incubated at 37°C. The presence of an increased number of bacteria was considered evidence of failure of bacteriostasis. The bacteriostatic level of the drug was considered to be the minimum concentration that would prevent multiplication in skim milk for 48 hours at 37°C.

The bactericidal experiments were made according to a modified Food and Drug Administration method (8). The medium used was:

Bacto-beef extract	6 gm.
Bacto-peptone	10 gm.
Sodium chloride	5 gm.
Distilled water	1000 cc.

This broth was adjusted to pH 6.8, distributed in 10 ml. amounts into culture tubes and autoclaved at 116°C. for 25 minutes. A 5 per cent standard phenol solution was diluted with sterile physiological saline (0.9%) to make final dilutions of 1:60, 1:70, 1:80, and 1:90. The quaternary ammonium compound and chlorhexidine were also mixed with sterile physiological saline to make dilutions of 1:5,000, 1:10,000, 1:20,000, and 1:40,000.

Twenty-four hour cultures of the various microorganisms grown at 37°C. were thoroughly mixed by gentle agitation before every experiment. One-half ml. of a 24 hour culture was added to each culture tube containing the different dilutions of a disinfectant held in a water bath at a temperature of 36°C. A loopful from each culture tube was transferred at 5, 10, and 15 minute intervals to sterile broth and incubated for 48 hours at 37°C. The tubes were examined for the presence of growth after incubation. Each tube of broth was streaked on a culture plate, and the plate incubated for 24 hours at 37°C. The absence of typical growth on the culture plate was used as evidence of a bactericidal effect for that dilution of the disinfectant at that interval of exposure. Bactericidal activity was thus measured by the survival of

organisms after 5, 10 or 15 minutes' exposure in the disinfectant.

Teat Cup Disinfection

Sixty-three trials each with 40 teat cups contaminated with naturally infected milk gave an indication that all three disinfectants were effective for elimination of most bacteria. A low, irregular, percentage of teat cups remained positive. Therefore, to obtain an adequate comparison of disinfectants it was considered necessary to increase the degree of contamination so that the control teat cups would always be positive and about 50 per cent of the teat cups would be positive after disinfection.

Results of disinfection of teat cups contaminated with various strains of bacteria capable of causing bovine mastitis are presented in Table 1. The results indicate that chlorine was inferior to the quaternary ammonium and chlorhexidine disinfectants against *M. pyogenes* and streptococci. When coliform bacteria were present on teat cups, chlorine was approximately equal to the quaternary ammonium compound and the chlorhexidine disinfectant in decontaminating the teat cups.

Ps. aeruginosa was recovered more frequently from the teat cups disinfected with chlorine or the quaternary ammonium compound than after disinfection with chlorhexidine compound. The two surface acting disinfectants, quaternary ammonium and chlorhexidine did not differ greatly in their germicidal activity with the other species of bacteria used in the experiment.

The effect of the duration of disinfection is presented in Table 2. In the procedure, the microorganisms on teat cup A were exposed to a shorter interval of disinfection as compared with the microorganism on teat cup D. With a few exceptions each experiment disclosed a greater bactericidal activity as the time of exposure to disinfectant was increased. In many instances the longer duration of disinfection was much more effective.

The experimental data indicated that the survival of bacteria was influenced by the number of bacteria used for contamination. It was found that the per cent recovery was much greater when the bacterial numbers were increased.

An effect of various concentrations of chlorhexidine is shown in Table 3. The results indicated that decontamination using 1:10,000 and 1:20,000 dilutions of chlorhexidine was much less effective than 1:5000 under the conditions of the experiment.

The results of the bacteriostatic tests are presented in Table 4. The disinfectant chlorhexidine showed a greater bacteriostatic effect against all microorganisms tested when compared with the other two disinfectants. Chlorine was not so effective in its bacteriostatic action as the quaternary ammonium compound except against *M. pyogenes* and *Ps. aeruginosa*. The quaternary ammonium disinfectant permitted growth of *Ps. aeruginosa* in all concentrations tested. The quaternary ammonium and chlorine disinfectants were greatly inferior to chlorhexidine against *M. pyogenes*.

The data from the bactericidal tests are presented in Tables 5 and 6. The quaternary ammonium and chlorhexidine were very similiar in bactericidal activity against most microorganisms tested with or without the addition of one per cent skim milk in the culture medium. There did appear to be a greater activity of chlorhexidine against some strains of *M. pyogenes*. The presence of skim milk slightly reduced the bactericidal activity of the disinfectants used in the experiment. From the standpoint of dilution, chlorhexidine has 60 to 140 times the activity of phenol against the strains of *M. pyogenes* employed.

DISCUSSION

Chlorine, a quaternary ammonium compound, and chlorhexidine were tested under conditions of contamination much more severe than those found in a dairy operation. All three disinfectants tested in this experiment should be effective for elimination

TABLE 5 — AN *In Vitro* TEST DISCLOSING THE NUMBER OF STRAINS OF BACTERIA DESTROYED IN 5 MINUTES BY SEVERAL CONCENTRATIONS OF THREE DISINFECTANTS

Organism	No. of strains tested	Disinfectant	Number of strains destroyed at dilutions of							
			1:60	1:70	1:80	1:90	1:5000	1:10,000	1:20,000	1:40,000
Micrococcus pyogenes	12	Phenol	8	8	4	5				
		Quaternary					8	3	2	1
		Chlorhexidine					7	8	3	1
Pseudomonas aeruginosa	4	Phenol	3	2	2	1				
		Chlorhexidine					2	1	1	0
Coliforms	4	Phenol	4	3	5	1				
		Quaternary					2	2	1	0
		Chlorhexidine					2	3	1	0
Steptococci	5	Phenol	1	2	3	0				
		Quaternary					4	2	2	0
		Chlorhexidine					2	1	1	1

TABLE 6 — AN *In Vitro* TEST DISCLOSING THE NUMBER OF STRAINS OF BACTERIA DESTROYED IN 5 MINUTES BY SEVERAL CONCENTRATIONS OF THREE DISINFECTANTS WITH THE ADDITION OF 1 PERCENT STERILE SKIM MILK

Organism	No. of strains tested	Disinfectant	Number of strains destroyed at dilutions of							
			1:60	1:70	1:80	1:90	1:5000	1:10,000	1:20,000	1:40,000
Micrococcus pyogenes	13	Phenol	11	9	7	5				
		Quaternary					9	6	3	1
		Chlorhexidine					8	7	6	2
Psuedomonas aeruginosa	4	Phenol	3	1	2	4				
		Quaternary					0	0	0	0
		Chlorhexidine					3	2	0	0
Coliforms	4	Phenol	4	4	4	2				
		Quaternary					2	1	1	1
		Chlorhexidine					1	1	0	0

of teat cup contamination, if properly used. Chlorine in particular might fail in germicidal activity if significant amounts of milk are accumulated in the disinfecting solution.

Several improvements over usual procedures can be suggested:

1. Use of two successive dippings in fresh solutions should help prevent the loss of germicidal activity due to the presence of milk.

2. A fresh mixture of disinfectant for very 8 or 10 cows would help to insure that the germicidal solution has remained at effective concentration.

3. Milking the known infected cows last helps to reduce the degree of contamination and spread of mastitis since no disinfecting procedure can be completely foolproof.

4. The exposure time of disinfection appears to be one of the most important factors in teat cup decontamination procedure.

5. By employing an extra set of teat cups, one set of cups can be in the disinfectant solution while the other sets are being used to milk the cow.

Proper disinfection is important in all types of dairy milking operations, particularly in a parlor type where diseased cows are often milked first. Good disinfection must be accompanied by other control procedures to obtain best results for prevention of mastitis.

The new disinfectant (chlorhexidine) was superior to chlorine in many respects and should be an effective dairy disinfectant, if used in proper concentration. The principal advantages of the new disinfectant are its high activity in the presence of organic matter and its wide range of activity against different species of bacteria. It has an extremely high bacteriostatic activity, even higher than the quaternary with which it was compared. There is a simple colorimetric test available for the detection of residual quantities of the new disinfectant in rinse water or in milk samples.

SUMMARY

Chlorine, a quaternary ammonium compound, and a new disinfectant (chlorhexidine) were compared in activity against microorganisms capable of causing bovine mastitis. Chlorine was inferior to the quaternary ammonium compound and the new disinfectant for teat cup decontamination. The quaternary ammonium compound was similar to the new disinfectant for teat cup decontamination, except against *Ps. aeruginosa* where it exhibited much less effect. The important factors in teat cup decontamination appear to be the concentration of the disinfectant, duration of disinfection, and the degree and type of contamination.

Chlorhexidine had a much higher bacteriostatic effect at the equivalent concentration of sodium hypochlorite. The new disinfectant had a more active *in vitro* bactericidal and bacteriostatic effect than the quaternary against most species tested.

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THE USES OF SILICONES IN THE DAIRY AND FOOD PROCESSING INDUSTRIES[1]

C. W. Todd

Dow Corning Corporation, Midland, Michigan

Silicones as new synthetic materials are rapidly becoming useful for dairy and food processing and for maintenance of plants and equipment. Silicone defoamers are acceptable for food use and are effective in concentrations of 1 to 10 parts per million. Silicone release agents of various types prevent sticking of food to paper, to baking pans or to heating coils. New silicone glass container coatings, applied at the glass factory, preserve the strength of glass to reduce breakage and speed production packing. Maintenance materials include silicones for heat stable paints, silicone electrical insulation for resistance to heat and humidity, silicone rubber for flexible seals and silicone grease for high temperature lubrication.

Silicones as production aids and as maintenance materials have been well accepted in the food and dairy industries. Silicone defoamers, acceptable for food processing, are effective at concentrations of 10 parts of silicone per million parts of foaming material. This small amount of silicone defoamer permits increased production capacity with present equipment, decreases processing time, upgrades the quality of production and permits the saving of material sometimes lost as foam.

Other silicone materials are widely used as release agents for sticky food products. Silicone treated paper, for example, provides clean release for candies, frozen meats, bakery goods and other foods. Silicone resin coatings baked on bread pans facilitate easy removal of bread without the use of grease. Grease-like silicone applied to processing equipment and container surfaces prevents burn-on of foods and makes such equipment more easily cleaned. Odorless and tasteless silicone rubber coated on conveyor belts provides a surface that will release either hot or cold materials without sticking.

Food processors using glass containers should have a real interest in a recently developed silicone coating being applied by some glass manufacturers. This silicone surface coating helps prevent breakage of glass containers by reducing scratching. High speed packing lines run smoothly with fewer interruptions. Profits are increased by reducing breakage in packing, shipping and handling.

Thus far we have only discussed silicones as production aids. Maintenance of a food processing plant can be materially reduced in both cost and effort by proper use of silicones. Silicone paints on ovens, boilers, exhaust stacks and steam lines withstand high temperatures and require minimum maintenance. Silicone electrical insulation provides overload protection and resistance to heat and humidity in essential electrical motors. Silicone rubber provides a heat stable, odor-free, and taste-free gasketing material for sealing cookers and other processing kettles. Silicone greases provide luberication for bearings operating at high temperatures or in the presence of excessive moisture and heat.

Silicones are even used by the dairy farmer as a veterinary medicine to treat frothy bloat. Such medicines are available from most reliable veterinary drug houses. Silicones are also used in medical and cosmetic materials because of their chemical inertness and for the water repellent protective coating they provide the skin.

Mr. Todd received the B. A. degree in chemistry from the University of Kansas in 1947. Before joining Dow Corning Corporation in 1947, he served as a development chemist in the Adhesive Division of the Bordon Company.

Mr. Todd first worked at Dow Corning as a chemist in the Product Development Laboratory. He later served as a technical writer in the Advertising Department. Currently Mr. Todd serves Dow Corning as a technical representative in the Industrial Sales section. He is a member of The American Chemical Society and a Veteran of World War II.

[1]Presented at the 42nd Annual Meeting of the *International Association of Milk and Food Sanitarians, Inc.* at Augusta, Georgia October 3-6, 1955.

WHAT ARE SILICONES?

Silicones are a whole new field (1) of man-made chemical polymers. By varying moleculer structure, they may be produced as fluids, greases, resins, or rubber. All silicones are characterized by unique heat stability, resistance to water, and exceptional anti-stick or release properties. In addition, some have an extremely low order of toxicity and have been found suitable for use in food processing.

FOAM CONTROL WITH SILICONES

The agitation, mixing, and pumping of food and dairy products often creates severe and troublesome foam. Two commercially available silicone defoamers (2) are gaining widespread acceptance for use in controlling such foaming problems. One defoamer is a 100 per cent silicone solids material[2] that may be dispersed on dry solids such as sugar, salt, powdered milk or inert powders and added to the foaming system. A mixture of 5 parts by weight of this silicone properly mixed with 95 parts by weight of salt will result in a dry, free-flowing powder. The 100 per cent silicone defoamer is also wiped on the sides of vessels above normal liquid level to control foam as it rises above the liquid. Other users suspend the defoamer in a gauze sack over systems to contact the foam as it rises. Wiped onto filling nozzles, this defoamer also helps prevent loss of fluids that foam in high-speed filling operations.

The 100 per cent Antifoam Compound has been used in the cooking of jams, jellies and preserves; defoaming maple, cane and corn syrup; processing and fermenting of cattle food; processing grain for vitamin production; and dry mixed with instant coffee powder to prevent foaming when re-constituted.

The second and perhaps more versatile silicone defoamer is a water emulsion containing 30 per cent silicone solids emulsified with acceptable food grade emulsifiers.[3] This defoamer can be diluted with equal parts of water and added to foaming systems from a drip-feed system or can be added to the ingredients with each batch.

The silicone emulsion is particularly useful in defoaming such frozen dairy confections as are molded on stick handles. One user reports the addition of 34 parts of this defoamer per million parts of mix produces less foam in the mix and higher production of uniformly molded bars on the stick. He adds the defoaming emulsion with the ingredients of each batch. In producing dry skim milk, evaporation has been aided by using this silicone defoamer. In evaporating whey from cottage cheese or in pumping whey into storage or drain tanks, this silicone emulsion has been effectively used to control foam.

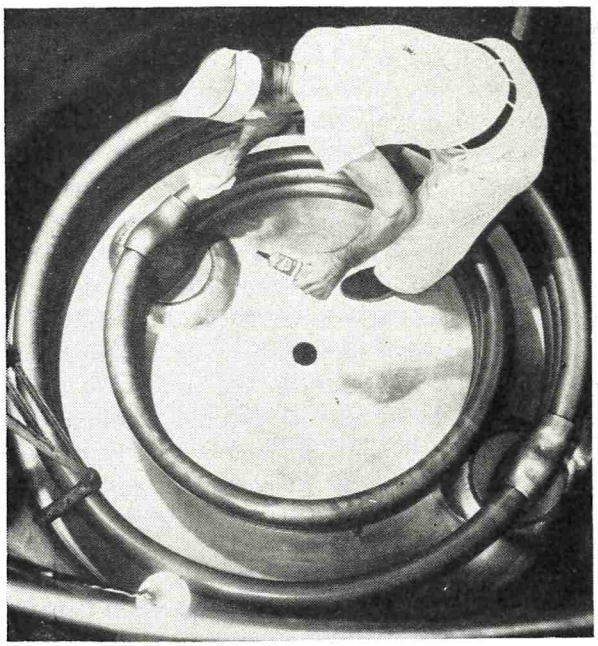

FIGURE 1. Silicone release agents prevent burn-on of food on heating coils. (Courtesy of Muller Canning Company)

Professor S. R. Skaggs, head of the Dairy Department of the New Mexico College of Agriculture and Mechanic Arts, reports that he successfully uses the silicone emulsion to defoam detergents used to clean milk equipment and milk pipe lines. In this application, 1 part of the emulsion is diluted with 2 to 3 parts of water and placed in a small force-feed oil can. As the detergent solution for cleaning is mixed, 1 to 2 squirts from the oil can are added as needed to prevent excessive foaming. Professor Skaggs believes this would be a satisfactory method for applying the defoaming emulsion in dairy plants or on farms.

The 30 per cent silicone emulsion is also used to defoam cooling brine in re-circulating brine systems. Users report that the addition of 2 to 10 parts by weight of the emulsion per million parts of the brine provides efficient defoaming for several months.

Other defoaming applications in the food industry include the use of the emulsion in yeast production, processing tomato sauce, producing flavor concentrates, cooking pickles, processing sauerkraut, defoaming starch extracted from processing green peas, and as an ingredient of ice cream cones.

Both silicone defoamers, the 100 per cent solids and the 30 per cent emulsion, have been used in dairy and food processing for several years. Pre-

[2]Dow Corning Antifoam A
[3]Dow Corning Antifoam AF Emulsion

liminary toxicological studies completed in 1948 (8) indicated that the defoamer was non-toxic. Extensive feeding tests were then run to substantiate this finding. Two-year feeding tests on rats (9) indicate that concentrations 300 times greater than 10 parts per million have no adverse effect. Dr. A. J. Lehman (6) reports, "A methyl polysilicone, also called Dow Corning Antifoam A, is a chemically inert material and, as the name implies, is an antifoaming agent. The toxicological data which have been submitted appear to show that the material is relatively nontoxic by oral administration. We have seen no reason to object to its use to suppress foaming when the quantity employed does not exceed 10 parts per million." This figure of 10 parts per million represents less than 11 ounces in a standard 8,000-gallon railroad tank car.

PREVENTING BURN-ON OR STICKING OF FOOD PARTICLES WITH SILICONES

Silicones are excellent release agents. Several different physical forms have been developed that are particularly useful in food and dairy processing. Silicone treated parchment or paper,[4] treated at the paper mill, provides a clean, low cost, disposable release surface (7). Properly processed silicone treated paper is such a good release surface that even plastic tape will not stick to it. This silicone release paper is widely used as a disposable surface for candy making, for wrapping sticky candy, as a separator for frozen meats, as a baking surface for bakery sweet rolls, and in many other packaging and wrapping operations.

FIGURE 2. A minute amount of silicone preparation effectively eliminates foam in a soap solution.

A silicone resin coating[5] has been widely used on bread pans in commercial bakeries (4, 7). This resin prevents the sticking of bread in the pan during baking. Its use eliminates or reduces the need for pan grease and thus helps to keep bakeries cleaner. The resin is sprayed from a solvent solution onto the clean, dry pan and baked in a high temperature oven. Application of the resin may be done by the pan manufacturer, by the baker, or by companies that specialize in applying such coatings. Properly applied, the resin coating will last for two-hundred bakings before it must be reapplied.

Another silicone release agent[6] has the consistency of a soft paste. This soft grease can be applied to heating surfaces of food processing equipment to prevent foods sticking to the container. For best results, the grease should be rubbed in or buffed onto the surface with a soft buffing wheel. Such a coating makes heating surfaces, steam coils, kettles, and cooking vessels easy to clean and easier to keep clean. It also reduces the amount of material lost on the sides of the kettle. This easy-to-use release agent should be in every plant or factory. This silicone material is also an excellent rubber lubricant for installing tubes or hose on a metal pipe. It is a good valve lubricant for high temperature operation and is also useful for release of hot irons for heat sealing plastic film.

Conveyor belts coated with silicone rubber provide a surface for releasing either hot or cold foods without sticking. The silicone rubber can be used over a temperature range of -70°C. to 250°C. without failure. Another advantage of the silicone rubber coating is that it is also odorless and tasteless and will give the food no odor or off-flavor.

NEW SILICONE COATING FOR GLASS

The newest silicone for food processors is a sili-

[5]Dow Corning Pan Glaze

[6]Slipicone

[4]Kalamazoo Vegetable Parchment, Kalamazoo, Michigan; Minerva Waxed Paper Company, Minerva, Ohio; Riegel Paper Corporation, Milford, New Jersey.

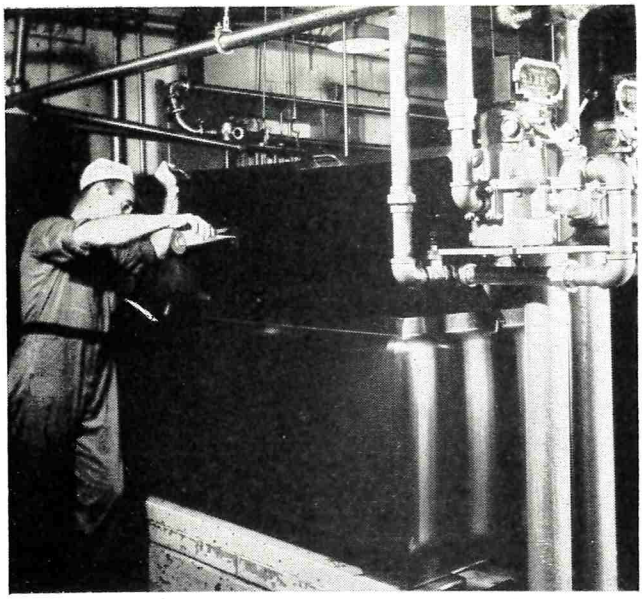

FIGURE 3. Addition of silicone antifoam agent in the preparation of a frozen skimmilk confection reduces foam and assists in uniform filling of the freezing molds.

cone coating for glass containers.[7] Applied by the glass manufacturer in a simple spray operation, the silicone treatment renders glass resistant to scratching and the resulting breakage during handling, packaging and shipping. The use of treated containers indicates that a considerable saving in production time and in material can be achieved. The average cost of the silicone treatment is only a few cents per gross of glass containers.

While the actual strength of the glass is not increased by the silicone coating, the orginal strength is preserved through reduction of abrasion received in normal handling. The following table (12) illustrates typical pressures required to break various types of silicone treated and untreated containers after one trip through a filling line:

Bottle type	Plain	Silicone treated	Per cent improvement
4 oz. Aerosol	456	680	49
24 oz. Juice	185	237	28
12 oz. Beer CB	294	560	87
12 oz. Beer NB	224	278	24
12 oz. Beer Ex	349	429	23
14 oz. Ketchup	308	474	54

Breakage from impact is also decreased for the lubricity of the silicone film converts impact at angles less than 90 degrees into harmless glancing blows. Even on direct impact the breakage level is decreased for there are fewer scratched points of weakness for potential failure.

In tests, 4-ounce silicone treated and untreated Aerosol bottles were dropped 4 feet onto a concrete floor. The silicone treated bottle withstood 5 to 6 more drops onto the concrete than the untreated containers. On pendulum impact tests, the treated bottles withstood 15 per cent more impact than untreated bottles.

In production line tests, 75,000 sulphured beverage bottles were compared to 75,000 silicone treated bottles. The breakage for the sulphured bottles was 0.5 per cent as compared to 0.04 per cent for silicone treated bottles, or 12 times as great.

Glass packing production lines using silicone treated bottles can be run with greater efficiency, less down time and reduced cost from breakage.

SILICONES FOR MAINTENANCE

Silicone paints stand out from ordinary protective finishes for their resistance to heat and to moisture. (5) They have been used as maintenance paints on ovens, boilers, and steam lines. Silicone aluminum paints, for example, have given excellent service at temperatures up to 535°C. (1000°F.). Pigmented silicone paints have slightly lower heat stability. Best adhesion is obtained by sandblasting the surface to bright metal, applying a silicone primer and then

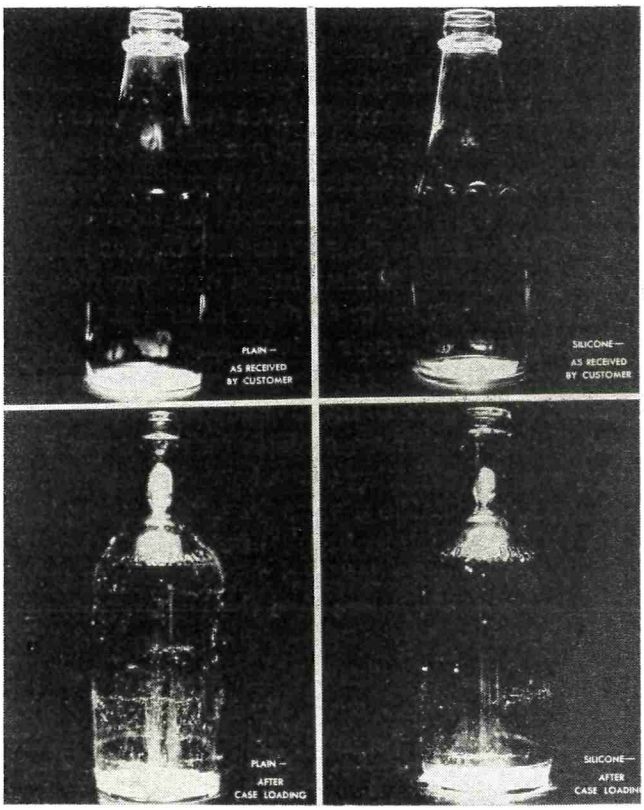

FIGURE 4. Silicone treated glass bottles reduces scratching of the glass and increases life of bottles. (Courtesy of Brockway Glass Company)

[7]Dow Corning EF-4010 — Dow Corning Z-4141

the silicone finish. The finish can normally be baked by operation of the equipment.

Air-drying modified silicone finishes are also being investigated. Such finishes sacrifice some of their heat stability in the modification. Modified silicone finishes are useful at temperatures up to 225°C.

Silicone electrical insulation (10) is being more widely used in food and dairy production plants. Silicone insulated motors can be obtained from several motor manufacturers or standard motors can be rewound with silicone insulation. Silicone insulated motors have a capacity up to 50 per cent higher than the same size motor with standard Class A insulation. Silicone insulated motors are more resistant to heat and moisture than motors insulated with any other class of electrical insulation.

A large baby food manufacturer, insisting on absolute cleanliness, washes off all machines, electrical motors and equipment twice daily. On 3 to 30 horsepower Class A open frame motors they had motor failure in 6 to 8 weeks. These motors were rewound with silicone Class H insulation in 1952. Such excellent results were reported that eleven more motors were rewound with silicone Class H insulation. All of these silicone motors are still in service, resisting the combination of heat and moisture.

Silicone lubricants offer many advantages to food processors. Silicone grease[8] is used in the bearings of food carts or trucks that are exposed to temperatures up to 125°C. in steam autoclaves (3). Reports show that only one to two greasings per season is required to provide good luberication and to prevent corrosion of the wheel bearings. Because of its high temperature stability and usefulness to 250°C., this silicone grease is also used in slow speed conveyor bearings operating near ovens or in other hot spots.

Silicone rubber[9] is now being widely used for oven door gaskets. This heat stable rubber withstands temperatures up to 250°C. for long periods of time. This silicone does not soften at high temperatures. It is being used for gasketing steam kettles and sterilizers. Silicone rubber bottle nipples for baby feeding have been well accepted. In hospital tests where sterilization is rigidly controlled, the silicone nipples lasted more than 5 times longer than the best organic rubber nipple. In this period the silicone nipple did not loose its shape or become discolored from sterilization. There is a good possibility that silicone rubber would be a cost saving replacement for rubber parts of automatic milking machines that must be sterilized.

[8]Dow Corning 41 Grease
[9]Silastic (TM)

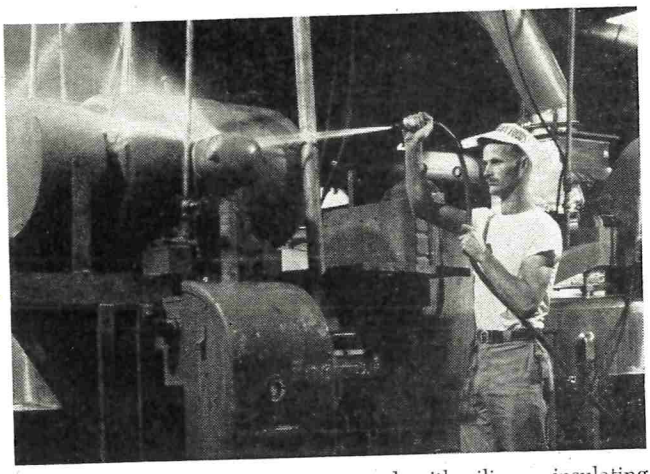

FIGURE 5. Electric motors rewound with silicone insulating material incrtases resistance to effect of heat and moisture. (Courtesy of Gerber Products Company)

For exterior of masonry buildings, clear silicone water repellents are a worthwhile maintenance material. The clear solution is sprayed or flooded onto the clean, dry brick or cement surface. The silicone penetrates the masonry from ⅛ to ¼ inch to provide an invisible water repellent surface. Such a treatment minimizes white staining from leached salts in the mortar. It also protects the masonry from freeze-thaw cracking and helps prevent water seepage through above grade masonry walls. The use of this silicone in milk houses, in dairy plants and in food plants helps to keep above grade walls clean and dry.

Silicones are also used as a water repellent treatment for leather[10]. This silicone treatment is applied to leather at the tannery to produce shoes that are durably water repellant yet permit the leather to breath. Another silicone leather water repellent[11] is supplied for home application to shoes. Either of these treatments helps keep the leather dry and preserve shoes at the same time. The silicone water repellent for leather will not take the place of rubber boots worn while hosing a plant but will insure more foot comfort after the boots are removed and when walking through puddles or rain.

Silicone water repellents for fabrics[12] are also available. A silicone treatment makes textiles soft, resistant to staining and is the most durable water repellent on the market.

Silicones in protective hand creams help protect the hands from water born irritants. Wider use of silcones in cosmetics and protective hand creams

[10]Sylflex
[11]Shoe saver
[12]Sylmer

may help combat problems of skin irritation in the food industry.

SILICONES FOR BLOAT

Silicones as a veterinary bloat treatment (11) help farmers save hundreds of thousands of dollars every year by saving bloated cattle. The silicone medicine is for the treatment of frothy bloat. Normally, the medicine is injected directly into the rumen of the bloated animal; however, it may also be administered by syringe or by drench. Several silicone treatments for bloat are now available from well known veterinary supply houses.

CONCLUSIONS

The silicones are now widely used in the food and dairy industry. Their main usefulness is in controlling unwanted foam, preventing adhesion in processing or packaging, and as heat stable, moisture resistant paints, grease, electrical insulation and rubber. A new application for silicones is as a scratch resistant coating for glassware. The low toxicity of the specific silicones recommended for food use and their unusual properties of heat stability, water repellency and release makes them ideal materials for production aids in food and dairy processing.

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OUR MOST VIGOROUS CRITICS CAN BE YOUR BEST FRIENDS[1]

A. J. Claxton

Meadow Gold Dairies, Inc., Pittsburgh, Pennsylvania

Our most vigorous critics can be our best friends. Another way to say the same thing is "you've got to make a profit," — that is you've got to make a profit if you want to stay in business.

Occasionally you hear someone say with a lot of conviction and an air of considerable importance, "Oh, that's a big company, they can afford to lose money" .... or "That dairyman has made a lot of money in the past, he doesn't have to make a profit now!" Don't you believe it. They both have *got* to make a profit, and so does every food processor and distributor.

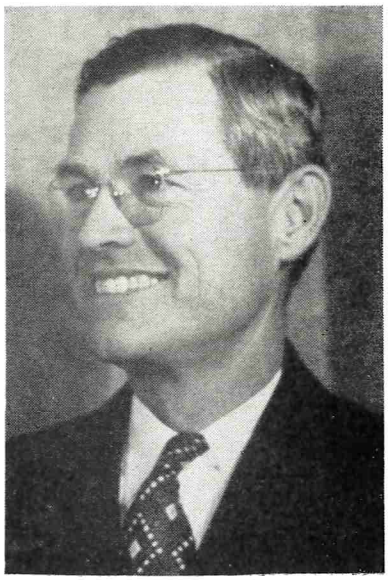
"But wait," says the skeptic, "I own my plant, it's all paid for, I've got a sizeable bank account. I can live even if I don't make a cent of profit for myself!"

And that is just the point, if you own the dairy, it is not YOU that makes the profit so necessary. You, the owner, are not the first reason. You are not even the second reason, you are not the third reason and you are not the fourth reason. *You* are probably the fifth and last reason why you've got to make a profit and why your critics can be your most valuable friends, *IF* you want to stay in business.

The four reasons I have in mind are not something vague, legendary, or the brain-child of some high-falutin philosopher or economist. They are *Real*, they are *Tough*, they are *Authoritative* and they are *Expensive*.

Imagine yourself in the center of a ring like the world's champion prize fighter waiting for the challenger. You realize that you are not in a corner, but in the *center* of the ring. You have no gloves, only your bare hands. The spotlight is right above you with its heat and glare beating down unmercifully, making you uncomfortably conspicuous, and an easy target.

Suddenly the challenger appears, but he is not *one* he is *four*, each one different, each one powerful, each one intent, with his eyes fixed on you. As they bear down on you from all sides, you try to make a quick appraisal and you are amazed as you see their fists. The right hand is open, extended, and friendly ..... but the left is hard clenched, it is jagged, bloody and wearing brass knuckles!



Mr. A. J. Claxton is a graduate of the University of Illinois. He is Vice President, Director and Eastern Manager of Beatrice Foods Co. and President of Meadow Gold Dairies of Pennsylvania. During his 36 years with Beatrice Foods he has served as fieldman, milk driver, plant worker and as plant manager. He has been active in various trade associations and is a member of the American Dairy Science Association and the Institute of Food Technologists.

Who are these towering characters who come in the dual role of friend and foe? What manner of man could appear to be so helpfully friendly and yet so ready to do battle?

I'll name them. I said they are real and tough; they are, but they are also essential to the operation of your business. They are the four critics who can be your best friends, they are the four reasons you've got to make a profit ..... they are

YOUR EMPLOYEES
YOUR PRODUCERS
YOUR CUSTOMERS
YOUR GOVERNMENT

You must have the helpful support of all four if you are going to stay in business, but they will not let you stay in business at a loss. Let's look at them one at a time.

We are all in that pursuit of happiness, which we expect to take the form of better living thru modern science and thru inventions that give us less

[1]Presented at the 42nd Annual Meeting of the International Association Of Milk And Food Sanitarians, Inc. at Augusta, Georgia, October 2-6, 1955.

manual labor, more recreation, and more leisure time. We expect that pursuit to bring us security in our old age with a decent living when we are no longer able to do productive work. "We" means me and my employees, it means you and your employees. Every business must be operated efficiently, and it must make a profit if you are going to keep raising the standard of living of your employees year after year. If you don't, you will lose them to other industries that *do* help them improve their lot in life.

Who do you think I work for? Do I work for a large corporate entity? No sir!! That corporate entity is just a name! I work for a little lady who lives on the north side of our town. Her husband was killed in the war, and she has given her insurance money to me thru the purchase of stock in our company. She is depending upon returns from that money to put her 12-year old boy through school. I work for her. There is a man in the east end of our town who is seventy years old, he has one leg off at the hip. His life savings are invested in my company. He is depending on me to make a profit so he can live. I work for him.

The security in their jobs of every employee in my company depends on my judgment. I work for them just as much as they work for me.

Every business is called upon to provide its employees with added comforts and securities. The demands may be *Sudden, Severe* and *Breath-Taking.* You cannot adjust your operations overnight to take care of these added costs, you must have *earnings* to absorb the shock. You've got to have a profit. Your *employees* will demand it, and they can be most critical.

Your employees are your company, they are your strong right arm, your legs and your back. As loyal partners, they extend that right hand to build your business; but if you don't improve their lot too, they will slug you with those brass knuckles.

The man in the second corner is no slouch either. Besides producing milk, he has also produced on his farm the nation's leading men in government, industry and education. While sending good men into other occupations, his problems at home have been increasing.

When a day's work on the farm was expected to produce a day's food and lodging and little more, it was not difficult to find men, and women too, to work on the farm and in the dairy barn. Now a day's work is expected to provide these things, plus recreation, entertainment, and hobbies, with time and money to enjoy them.

The farmer and his family want the conveniences of city dwellers. His employees will go to the city unless he can offer jobs equally attractive. These things mean higher wages, more taxes, more mechanical equipment - more money for his milk.

The farmer has expert help and advice from the United States Department of Agriculture, the State Department of Agriculture, the State Universities, County Agents and County Farm Advisors. He has bargaining strength thru the Grange, the Farm Bureau, Farm Cooperatives, and Farm Marketing organizations. He will help the dairy plant by producing better milk at the right season. He will work with you on delivery, cooling and meeting quality and legal requirements. His right hand is ever ready to help and support you, but those brass knuckles can swing swift and sure if you fail to meet his growing need and *Stern Demand* for increased returns.

Then that fellow in the third corner - the customer. We coddle him, we baby him, we pamper him - for unless we have *him* along with his friendship and his goodwill - *We Have Nothing!* So, what the customer wants, the customer gets - all other obstacles notwithstanding.

When *glass bottles* came along, they replaced the can and the dipper. When *square* glass bottles appeared, all round bottles became obsolete and were junked. When *paper bottles* appeared duplicate intricate filling machinery costing fabulous thousands of dollars was installed to provide them. When *half-gallon* containers were developed, more mortgages were made. Expensive trucks replaced the slower horses, insulated bodies replaced the open wagon, and refrigerated trucks are moving in, so that today's delivery equipment to serve food store and door step may well cost more in investment and maintenance than the entire milk pasteurizing plant of a few decades ago. These things have been quickly, often painfully provided to serve the customer better.

Consumers want their dairy products conveniently packaged, of high quality and at a fair price; and when she can buy this finest of all foods for 13 cents a pound (26 cents a quart) or a little more, she knows she has the best food bargain for her family.

More improvements in convenience and service can be expected in the future. The critical customer will demand them. It takes earnings to absorb the shock. You've got to make a profit if you want to stay in business. Your customers will demand it.

Then there is that fourth challenger, old Slugger

Government. *Uncle Sam* and his *nephews, State County,* and *City.* Even if Federal taxes do come down a little, State and local taxes are mounting at a terrifying rate. New licenses, new tags, new fees, perhaps a new or higher sales tax, even socialized medicine or pensions under the auspices of a paternalistic administration may suddenly appear.

In a few months time the City Council, the State Legislature, or the National Congress can pass legislation that can mean the survival or the perishing of an otherwise thriving business. Governmental failure to approve expensive processing equipment because of whim or because of real difference of opinion - a State order to build a sewage disposal plant - the condemnation of a building or other major laws, regulations or decisions of inspectors can put you out of business unless you have earnings to absorb the hock.

The lowly milk cow is the source and giver of all things dairy. We need to stick close to the cow. She is a *Humble* animal, a *Peaceful* creature, a *Noble* beast. She give us milk her whole productive life; and when she is ready to die, do we reverently bury her as we do the vaunted human body? No! We violently terminate her existence, we eat her carcass, tan her hide, make glue of her feet, and fertilizer of her bones. Even in death she continues to serve us.

Not only has the cow contributed to man's physical comfort and well-being, but she has also played an important part in the cultural and aesthetic development of America. We are indebted to her for such colorful expletive and invective as "I ain't seen hide nor hair of him." – "He's throwing the bull," and Sucking a hind tit."

Milk is probably the only product in the world produced exclusively as a food for mammals. It has many known properties, all vital to man's life and health, and probably many more as equally vital but as yet undiscovered by science.

Can it be possible that in controlling its handling we make the tail wag the dog? Milk is a sensitive product. It requires careful handling in clean utensils and equipment at proper temperatures. Careful pasteurization makes it safe for human use.

In all our efforts we need to keep a clear cut goal in plain sight – that goal should be safe milk with the least possible amount of regulation and regimentation.

Good, safe milk to the consumer is our goal, our aim, our end, our do-all and be-all. Everything else is fringe, window trimming, a means only to an end, a safeguard, a help, an aid, an assist, but only a help and an aid. It is vital that we do not get so lost in these details that we let them rule our thinking and permit these de-tails of method to wag the more important dog of good safe milk as it reaches the consumer. With the major objective in view we will never lose ourselves in the quicksand of trivia.

Dairy plants are manned by human beings who have human frailties. We can build, design, mechanize and legislate to reduce the danger of these frailties. We cannot forget, however, that THESE SAME FRAIL HUMANS operate these mechanisms. We cannot buy nor build ourselves into absolute safety or security. We must *Operate* ourselves into safety. In the hands of the meticulous operator the finest milk can come out of old equipment, while the careless handler can vend the poorest product from the very best and latest of machinery and structures.

We cannot buy ourselves into safety with fantastic precautions. Our security must come from eternal vigilance. Vigilance in the form of conscientious and painstaking cleanliness on a daily basis. We cannot foresee and fence out every contingency. It is useless and unwise as well as economically unsound to build a Chinese Wall to keep out a stray wolf, for the wall becomes a bigger problem than the wolf, who should be continuously watched for and headed off on those rare occasions when he appears.

The fluid milk industry has been able to remain solvent only because of expanding markets, increased consumption of fresh milk, and alert efficient management which has devised and effected many economies.

Through the years, Federal, State and Local Health Departments, and especially Milk and Food Sanitarians have worked side by side with dairy processors in the development and improvement of the quality of all dairy products. This teamwork has produced for the consuming public milk and other dairy products of superior flavor and palatability with reliable and unquestioned safety.

Food and Dairy Sanitarians and inspectors will continue to be most critical and demanding. These demands cost money, big money. The dairy must be ready for these demands when they come. You've got to make a profit, your Government demands it!

Then in closing, perhaps I should mention, just in passing, the fifth reason why you've got to make a profit.

If you are in business, you don't want to run it for fun alone. You are entitled to something for your efforts and the risks you take. But you can't stay in

business and just break even. *You've got to make a profit !!*

That is the load the manager, the owner must carry. It is his *Problem,* it is his *Task,* it is his *Obligation,* it is his *Opportunity!*

These four critics —

These four challengers —
YOUR EMPLOYEES
YOUR PRODUCERS
YOUR CUSTOMERS
YOUR GOVERNMENT

They *Are* our greatest critics, they can be our *Best Friends.*

HELPFUL INFORMATION

Editorial Note: Listed below are sources of information on a variety of subjects. Requests for any of the material listed may be sent by letter or postcard to the sources indicated.

Ice cream and frozen desserts. A book, $5.00. 1955. J. H. Frandsen, 92 High St., Amherst, Mass.

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Stored grain pests. A bulletin, 25 cents. Includes information on grain weevils, grain bores, flour moths, grain and flour beetles, miscellaneous beetles, book lice, silverfish, cockroaches, flour and grain mites and parasites of grain pests. Superintendent of Documents, Washington 25, D.C.

Radiation sterilization of foods. A bulletin. 58 pages, 20 cents. U.S. Government Printing Office, Washington, D.C.

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Organic peroxides. Their chemistry, decomposition, and role in polymerization. A. V. Tobolsky and R. B. Mesrobian. A book, 197 pages, 1954. Interscience Publishers, Inc., New York, N.Y.

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Food Technology. A booklet. Describes food technology as the study of food and its relationship to man. Foster D. Snell, Inc., 29 W. 15th St., New York 11, N.Y.

Dishwashing dividends. A color movie, 16 mm., sound, 20 minutes. Economics Laboratories, Inc., Guardian Bldg., Dept. J.M.F.T., St. Paul, Minn.

Get rid of rats. A movie, B&W., 16 mm., sound, rental fee $1.50. Emphasizes community rat control. Film Board of Canada, Dept. J.M.F.T., 620 Fifth Ave., New York, N.Y.; or 400 W. Madison St., Chicago, Ill.

Corn starch. A booklet, 44 pages. Discusses how corn starch is made, the various types, the approved handling procedures. Corn Industries Research Foundation, 3 E. 45th St., New York 17, N.Y.

Booklets on food storage service: (1) *Food storage;* (2) *Rat control;* (3) *Good food service;* (4) *Dishwashing.* Ohio Department of Health, Columbus, Ohio.

Price supports and dairy farming. Vol. 26, No. 7, December 1955. A special circular on economic information. Bulletin Room, College of Agriculture, Madison 6, Wisc.

General procedure for manufacturing Swiss cheese. Circular No. 851, revised. U.S. Dept. of Agriculture, Washington, D.C.

The cleaning and maintenance of soft floors. A movie, 16 mm., 22 minutes, sound and color, rental fee $5.00 per day. National Sanitary Supply Association, Dept. J.M.T.F., 139 N. Oak St., Suite 1105, Chicago, Ill.

Triton non-ionic surface-active agents. A booklet. Rohm and Haas Co., Dept. J.M.F.T., Washington Square, Philadelphia, Pa.

Biology of domestic flies. A movie, 16 mm., sound and color, 9 minutes. U.S. Public Health Service, Washington, D.C.

ASTM standards on soaps and other detergents. A book, 176 pages, $2.50. The American Society for Testing Materials, Dept. J.M.F.T., 1916 Race St., Philadelphia 3, Pa.

Get rid of rats. A film, 16 mm., black and white, 10 minutes, rental fee $1.50. Dennis Film Libraries, 2506½ W. 7th St., Los Angeles, Calif.

RECENT DEVELOPMENTS IN FOOD USES FOR ANTIBIOTICS[1]

C. L. Wrenshall and J. R. McMahan

Chas. Pfizer & Co., Inc., 630 Flushing Ave., Brooklyn, New York

The characteristics of antibiotic action and several practical applications of antibiotics in the preservation of foods are discussed. The present status of government regulatory measures and prospects for future developments complete the paper.

About two years ago the possible uses of antibiotics in food preservation were reviewed (3). Although not necessarily complete, that review cited some 34 references which dealt specifically with some aspect of food preservation. An annotated bibliography[2], Antibiotics in the Preservation of Foods, (1) covering 104 references has recently been prepared as a service to interested scientists. This rapid growth of the literature attests the great interest which is developing in the subject.

Since these reviews have been provided, it is not intended now to enter into a detailed discussion of experimental results. Rather, an attempt will be made to appraise the practical possibilities of antibiotics in food preservation and the implications of such use from the standpoint of food sanitation.

Characteristics of Antibiotic Action

Certain chemical compounds, known as antibiotics, derived from or produced by living organisms, are capable in minute concentrations of inhibiting the life processes of micro-organisms. Except in their origin and degree of activity, antibiotics do not differ radically from other chemical preservatives. In general, such compounds display considerable selectivity in their action; they may be highly effective against some species of micro-organisms yet practically without effect on others. The broad spectrum antibiotics, which are of particular interest in food applications, are so named because they are effective against a wide "spectrum" of bacterial species.

Again speaking generally, the antibiotics, at practical concentrations, are not lethal even to the susceptible organisms. They merely inhibit growth and development. Thus they do not sterilize, but merely slow up bacterial spoilage and thereby prolong normal storage life. To some degree they can substitute for refrigeration. Moreover their effect can be super imposed on that of refrigeration. When microbiological deterioration does occur it proclaims itself by common organoleptic signals of spoilage. Antibiotics cannot be used to cover up spoilage that has already accurred or to reclaim food that has become heavily contaminated.

Antibiotics as a class are relatively unstable compounds. Under the conditions of use in foods they lose potency gradually. They are destroyed by heat such as would be encountered in the process of cooking food.

From these considerations it may be seen that there is the prospect of using antibiotics in foods under controlled conditions such that there would be little or no problem from active antibiotic residues. Temporary preservation with antibiotics has the distinct advantage that it cannot be used to cover up damage or inferioriy.

Dr. C. L. Wrenshall was born and educated in Canada and obtained a BS and MS degree in Chemistry from the U. of Saskatchewan and a Ph.D. in Agricultural Chemistry from McGill University. He was Assistant Professor teaching Agriculture Chemistry at McGill for several years.

During the war Dr. Wrenshall joined the Military Explosives Division of the duPont Co. and was Asst. Technical Superintendent at the Alabama Ordinance Works. Later he joined the Southern Research Institute, Birmingham, Ala., where he was head of Organic and Agricultural Chemistry.

From 1947 to 1952 Dr. Wrenshall was Technical Director for Foremost Dairies, Jacksonville, Florida.

He joined the Pfizer staff in April 1952, and is now Associate Director of the Technical Service Department.

[1]Presented at the 42nd Annual Meeting of the International Association of Milk and Food Sanitarians, Inc., at Augusta, Georgia, October 3 - 6, 1955.

[2]Copies of these papers are available upon request from the Technical Service Department of Chas. Pfizer & Co., Inc., Brooklyn 6, New York.

PRACTICAL APPLICATIONS

The numerous researches already reported in the literature demonstrate quite clearly that one can delay the microbiological deterioration of perishable foodstuffs by the application of a few parts per million of suitable antibiotics. This is true of animal products, such as meat and milk, and of vegetable products, such as salad mixes, spinach and potatoes. The evidence at hand indicates that such temporary preservation might be economically feasible for a number of products.

A few examples will serve to indicate the practical uses which are contemplated. A few parts per million of a broad spectrum antibiotic can inhibit the bacterial spoilage of fish. Used in conjunction with refrigeration or icing, antibiotic treatment can extend the fishing period by several days, without loss of the catch by spoilage. The antibiotic can be incorporated in the ice carried by the boat or even added to refrigerated sea water in which the fish are held. Antibiotic ice was used successfully in recent practical-scale tests by Canadian investigators (2).

The spoilage of chilled, unfrozen poultry is a serious distribution problem. Birds usually spoil in approximately one week at commercial storage temperatures. Birds are normally chilled in a slush-ice tank after killing, plucking, and evisceration. Adding 10 parts per million of a broad spectrum antibiotic to the slush-ice increases the time birds can be held without spoilage by fifty to one hundred per cent.

Not only is it possible to delay bacterial spoilage of various cuts of meat and even comminuted meat by dipping or infusion with antibiotic solutions, but whole carasses can be successfully treated. This prevents deep spoilage and leads to the possibility of aging beef at higher temperatures, or of extending the safe handling period in the absence of refrigeration.

Much of the world is denied the use of fresh milk because of poor transportation facilities and lack of refrigeration equipment. If one part per million of a broad spectrum antibiotic is added to the raw milk at the time of milking, the onset of souring is delayed approximately one day at 37°C. If the milk is first pasteurized, antibiotics will preserve the milk for periods ranging from two days to several weeks depending on the storage conditions and concentrations of antibiotics used.

Some vegetables have protective coverings that are resistant to micro-organisms. Others, such as the leafy vegetables, are very vulnerable to bacterial attack. Thus the prepackaged salad mixes which have become increasingly popular in the past few years often deteriorate due to bacterial soft-rot. Dipping a salad mix for five minutes in a solution of oxytetracycline or in a streptomycin solution will double its shelf-life.

REGULATORY PROBLEMS

The above examples indicate that antibiotics are ready for immediate practical use in food preservation applications. However, there are certain regulatory problems that must be resolved. It is fairly widely known that the Food and Drug Administration has banned the use of antibiotic drugs as food preservatives. On the face of it this would appear to cut off any chance of developing this use of antibiotics, at least, in this country. This conservative attitude has been dictated by medical considerations, namely, the possibility of sensitization reactions and the possible emergence of resistant strains of pathogenic micro-organisms. Indications have been obtained that the attitude of regulatory officials is not inflexible in this regard and it seems possible that the stand may be modified as additional information becomes available.

Antibiotics are already being used in two important areas closely related to food applications. Antibiotics are widely used in animal and poultry feeds. Recently there has been increasing use of high levels of antibiotics in so-called therapeutic feeds as well as medication of the drinking water for poultry. Farm animals may at times be treated with repository forms of antibiotic-containing medications. As is well known to milk sanitarians, antibiotics are frequently used to treat mastitis and may on occasion appear in market milk in detectable amounts. Antibiotics have also been found to be practically effective in the control of certain plant diseases.

It has of course been demonstrated that, under proper conditions of use, such practices do not result in appreciable antibiotic levels in food. However, it must be admitted that we are approaching very close to food uses. In fact, there is no clear-cut line between present agricultural and proposed food uses.

It is interesting to note that most of the proposed food uses fall in the category of treatment of raw agricultural commodities. Therefore, these uses are believed to come under the Miller Pesticide Act and administratively under the jurisdiction of the Insecticide, Fungicide, and Rodenticide Division of the U. S. Dept. of Agriculture. No residue tolerances will be established for any antibiotic until suitable toxicity data have been made available to the Food and Drug Administration. Where it is established that no antibiotic residue will result, there is apparently no federal legal bar to the use of antibiotics in processing products shipped in interstate commerce.

In cases where an antibiotic is added to a processed food and retained during interstate shipment, the food would come directly under the jurisdiction of the

Food and Drug Administration. An example might be the use of an antibiotic to prevent the development of food poisoning organisms such as Salmonella species or enterococci. In such a situation it would seem proper to balance the public health advantage of preventing food poisoning against the possible hazard of including minute amounts of antibiotics in the diet. As matters stand now, however, all medical and legal questions will have to be satisfactorily answered before any antibiotics could be used as intentional food additives.

Considerable thought has been given to the possibility of using in food applications antibiotics which are not used as drugs. The trouble with this approach has been that only the antibiotics produced in large scale for drug-use appear economically feasible in food applications. This is a situation which could well change in the future.

OUTLOOK FOR THE FUTURE

As the population continues to grow, not only in the United States but throughout the world, the efficient preservation of our available food supply becomes increasingly imperative. Even in the United States where storage and transportation are well developed, we are faced with monetary losses of 5 to 20 percent on most raw agricultural food products. These losses, due to quality deterioration or outright spoilage, may be significantly reduced by the use of antibiotics.

The average quality of beef animals is expected to fall because of the demands of an increasing population. Antibiotics can permit the economical up-grading of this meat by rapid tenderizing at higher storage temperatures than are now possible.

Food-poisoning organisms as well as other disease producing organisms carried by food may be reduced considerably by antibiotic treatment.

Because of better preservation by antibiotics, foods which have had only local distribution may be transported farther to give more variety and better nutrition to many peoples of the world. Antibiotics may help the armed forces solve some of their many logistics problems in supplying troops with suitable foods.

Antibiotics do not have to be used alone but may be used in combination with older methods of preservation such as pasteurization and refrigeration or with new methods just being developed such as atomic radiation. It seems likely that antibiotics could find important use in the processing of foods prior to final preservation by freezing or canning.

In short, there is good reason to believe that, although antibiotics are not a "cure-all" in food preservation, they will ultimately play an increasingly important role in preventing spoilage losses and giving the world population better, safer, and more varied nutrition at lower cost.

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NEWS AND EVENTS

THE GOLDEN ANNIVERSARY OF THE FOOD AND DRUG ACTS OF 1906

Background Facts I — Food

Throughout 1956, Americans will celebrate the most important birthday in the food industry, a celebration to mark the 50th anniversary of the passage in 1906 of the first Federal Food and Drugs Act. This is the law which has been called the most significant peacetime legislation in the history of our country. It has also been acclaimed as "the strongest national law on its subject in existence."

The Start in 1906

The story which the Golden Anniversary celebration is highlighting began in 1906 with the enactment of the first Federal Food and Drugs Act and the Meat Inspection Act, and proceeds right up to the present time. Into this story is woven the record of the continuing development of food and drug laws in states and cities as well.

A long history of legislation exploration and controversy preceded the passage of the Act of 1906, and this history will be dealt with briefly in these pages. But first let us look at the famous law which we are honoring in a year-long celebration.

Laws on the statute books would be meaningless without judicious administration. Therefore the story must include a word about the inspection and enforcement services which, added to the foundation provided by law, result in workable regulations that benefit all-consumers, producers, processors and retailers alike.

The history of this effort reveals that the regulatory agencies have not acted merely as policemen but have provided other important services to industry as well as to the consumer. Inspection and enforcement service, backed up by the cooperation of a dynamic food industry, resting on the foundation of the 1906 food law, are important stones in the modern day structure from which the American public receives the best and purest foods ever available to any nation.

The now almost universal acceptance of food and drug legislation is evidence that the enforcement groups have done their jobs exceedingly well.

Guide Lines for Industry

The Food and Drug Administration and its counterparts at state and local levels have created guide lines

for use by industry in developing food testing procedures, establishing sanitation programs, improving the nutritional quality of foods and developing research projects. All in direct public interest.

A Law Serving Both Consumer and Manufacturer

It is through public hearings and with the aid of industry that standards of identity, quality, and fill of container for foods are established. The voluntary support accorded these standards by a majority of industry is a powerful factor in making them enforceable and hence in creating confidence on the part of the consumer. Standards thus become important to our entire economy.

Standards not only protect consumers in the marketplace; they also protect honest manufacturers by assuring fair competition. The consumer may select and serve standardized foods with complete confidence in their composition and integrity. The laws' basic requirements for clean handling, informative labeling, and the omission of adulterants, along with the fine processing by the industries, extend this confidence to cover all factors of purity, wholesomeness, nutritious quality and safety. This is true whether the product is canned, frozen, dried, bottled, or processed in another manner.

The Courts

The role of the courts is likewise vital to the effective working of this vast screen of protection against impure food and drugs. In interpreting the statutes and reviewing the standards, the courts have shaped a forward-looking and yet workable body of law to govern food processing and distributing.

Preparation of Food Revolutionized

At the turn of the century, the shift in food preparation from the family kitchen to commercial food plants accelerated. Early pioneers in food processing were not experts in bacteriology or in food technology. And they are to be commended for having done a splendid job with the materials at hand and the limited technology of the day. At this time, in some intsances, food preservatives of questionable safety were used unknowingly to keep products in proper condition while they passed through the marketplace. Later, Government and industry scientists, working together, developed testing procedures which demonstrated the unsuitability of these additives. Other scientists evolved improved methods of preparing and handling foods without these additives.

The tremendous technical advances by the food industry and its suppliers make a big chapter in this story. It is easy for us in observing this significant birthday to draw comparisons between the plants of yesterday and the gleaming, modern processing units of today. In modern establishments, we find equipment made of the best materials and designed for proper cleaning and sanitation, both the result of man's ingenuity and skill.

Boon to the Retailer

The boon to the retailer in these developments can hardly be overestimated. The law of "caveat emptor" no longer applies. The retailer is protected just as is the consumer. He knows what he is buying, and is spared the burden of wrapping and un-wrapping to make sure that he's got the right article and that it is in good condition. Standards protect him.

Atomic Wonders

U. S. colleges and universities as well as scientists in our industry research laboratories have added to the vast store of knowledge in food technology, developing new processes that bid fair to keep pace with — and in fact are themselves among — the wonders of the Atomic Age.

Industry, conscious of its responsibility to consumers and to government — state, national, and local — has voluntarily, through trade associations cooperating with the food and drug agencies, prepared plant sanitation manuals and sanitary standards which are followed by the majority of food processors and in many cases adopted officially by regulatory agencies.

These dynamic fifty years of progress through partnership have brought striking and surprising consumer benefits and have witnessed the growth of the food industry on a stable and expanding basis.

How Did We Get Our Pure Food Laws?

The first thing to remember about this is that there have always been such laws. Even the cave men of prehistoric times had their taboos against eating poisonous berries or spoiled meats and fish.

The ancient Hebrews and Egyptians had dietary laws which applied particularly to the handling of meats. The Romans had laws against the watering of wine.

In the Middle Ages, traders and merchants organized as guilds to establish uniform weights and measures and to prevent the adulteration of spices and other foods in which they dealt.

One of these guilds, the Grocers' Company of England, appointed a corps of food inspectors. King Henry III made them Officers of the Crown and custodians of the official weight standards.

First Law in 1784

The first general food law in the United States was drafted by Massachusetts in 1784. California enacted a pure food and drink law in 1850, one year after the Gold Rush. Most of the states had laws of this type by 1900.

Like the counterfeiting of money, there has always been some traffic in adulterated foods, contrary to the

interest of honest business and the welfare of consumers.

During the nineteenth century, however, some new problems began to arise. Very great changes began to take place in the production and distribution of foods.

Commercial processing and packaging began to take over much of the work formerly done in the home or in the local drug store.

The development of transportation and of advertising made it possible for manufacturers to market their products in all parts of the country.

Crude Early Methods

Early methods of commercial food processing were primitive indeed compared with those of today. Those pioneer manufacturers were trying to adapt the methods and recipes of the home kitchen for mass production and mass distribution. Some of them invented foods which had never been produced in the home. The soda cracker and the packaged breakfast foods were in this class.

Other manufacturers were trying to reproduce home made products in a form which would keep indefinitely and could be shipped for thousands of miles.

The importance of sanitation was not as fully realized as it is today. People who entered the food and drug industries frequently had no previous experience to qualify them. When food products spoiled—sometimes for no apparent reason—the early food processor was often persuaded that a chemical preservative was just what he needed. When the natural colors faded he would add coal-tar dyes which in those days were not certified as to safety.

Scant Medical Knowledge

This was likewise the patent medicine era, with many formulas based only on the lore of the Indian witch doctor, and others reflecting the limited medical knowledge of the period.

This was a day of trial and error, with the consumer sometimes playing the role of the guinea pig.

But this was also a period of great progress—a fact which is becoming clearer today as we review those blundering booming times with the perspective of history.

Great new industries were coming into being; science and technology were beginning to play their part in the improvement of our standard of living.

Scientific Studies

In 1883 an event of great importance to consumers took place. Dr. Harvey W. Wiley came from Purdue University in Indiana to be Chief Chemist of the U. S. Department of Agriculture. Much interested in the composition of foods, Dr. Wiley immediately assigned some of his staff to the problems of food adulteration. Soon a series of Government reports began to come out. These scientific studies documented the case for an effective Federal law. In the next 25 years over 100 such bills were introduced and considered by the Congress.

The first supporters of the legislation were the state chemists. They knew the problems, and that the state laws with their lack of uniformity were inadequate to deal with them. Practices banned in one state might be legal in the adjoining states.

Dr. Wiley took his message to the public. He became a popular speaker to women's clubs and business organizations. A group of crusading newspaper reporters joined in the campaign for a Federal pure food law. Their articles were published in leading national magazines.

Women's organizations rallied to the support of Dr. Wiley. Leaders of the food and drug industries and some of their associations saw that a Federal act would correct harmful practices and be beneficial to business. They, too, supported the bill.

Finally it was passed by an almost unanimous vote of the Congress. On June 30, 1906, President Theodore Roosevelt signed both the Food and Drugs Act and the Meat Inspection Act.

A Landmark of Progress

This year the 50th anniversary of this historic event will be commemorated in many different ways. The food, drug and cosmetic industries of the country will observe it at scores of trade conventions.

It is a landmark of progress in those industries—the beginning of their modern development.

Many women's clubs and civic organizations will likewise mark this anniversary with meetings and programs designed to tell the younger generation of citizens the story of Dr. Wiley and how we got the pure food laws, and how these laws contribute to the public health and welfare.

Passing a law does not automatically solve all the problems. One could say the Wiley law marked only a new beginning. An enforcement organization had to be established and new and better testing methods had to be devised. Thousands of firms had to change their products and labelling so that they would conform in all respects to the new law.

Experts of the Bureau of Chemistry demonstrated how foods could be preserved without chemicals by employing adequate sanitation and suitable raw materials. Processors who adopted these practices found a new, enthusiastic market, and prospered.

Business Advances

Many firms opened their plants to the public and began to encourage people to see how clean and fine they really were.

Most important of all, the growing science of food

technology, plus mass distribution, brought tremendous financial success to progressive firms, proving that what was good for consumers was good also for business.

The Wiley law was a good law for its times — the strongest food law in the world — but in the next quarter-century after its enactment it became outmoded.

The age of packaging arrived and with it the need for more informative labelling. Official standards were needed to define the composition of basic food items. A stronger inspection law, and regulation of cosmetics and medical devices as well as food and drugs, also became desirable. In 1933, another President Roosevelt supported a move to secure a stronger and more inclusive act. Business groups at first opposed the legislation; then, as technical problems were ironed out, they withdrew their opposition and gave their support. In 1938, the present Food, Drugs and Cosmetics Act was passed and it became fully effective in 1940.

Value of Laws Recognized

Today the food, drug and cosmetic industries are vigorous supporters of strong food and drug laws. They recognize that, in addition to protecting the consumer, these laws are good for business because of what they do to insure consumer confidence and satisfaction in manufactured products, and also because these laws restrain unethical competition.

The United States Food, Drug and Cosmetic Act is today the most comprehensive law of its kind in the world.

New Problems

Today American foods, drugs and cosmetics are the finest such products to be found anywhere in the world. But this does not mean that all the problems have been eliminated. In a dynamic, growing economy new problems are constantly arising.

New scientific discoveries must constantly be evaluated before they are released to the public.

Consumer's Interest Comes First

Healthy competition constantly involves the problem of what is fair to the consumer.

New, ready-to-serve food products multiply the steps in processing and increase the work of Food and Drug inspectors.

The public needs to understand the changes that are taking place in the food industries so as to have a better concept of their problems, and likewise of the problems of the officials who are responsible for law enforcement.

Report of Citizens Advisory Committee

During 1955 a Citizens Advisory Committee was appointed by Secretary Oveta Culp Hobby of the Department of Health, Education and Welfare, to study the adequacy of the facilities and programs of the Food and Drug Administration. The Committee was composed of distinguished citizens representing all walks of American life, including experts on the regulated industries.

The report of the Committee was the most comprehensive study ever made of the operations of the Food and Drug Administration. The Committee found that the staff and facilities of FDA have not kept pace with the growth of the food, drug and cosmetic industries and the complex new scientific problems which have accompanied that growth. The report recommended:

1. A three- to four-fold expansion, to be accomplished over a five-to-ten year period.
2. Provision of a modern headquarters and laboratory building to house the Washington offices and research laboratories.
3. A greater emphasis on the use of educational methods to promote law observance and consumer understanding.

This report provides a blueprint for the future of the Food and Drug Administration for perhaps the next quarter century.

3-A SANITARY STANDARDS COMMITTEES PLAN REGULAR SEMI-ANNUAL MEETING, APRIL 23-26, KENWOOD COUNTRY CLUB

A regular semi-annual meeting of the 3-A Sanitary Standards Committees for Dairy Equipment will be held April 23-26 at the Kenwood Golf and Country Club in Bethesda, Md., a suburb of Washington D. C.

Upwards of 150 persons are expected from nearly every section of the United States. Arrangements for the meeting are, by mutual consent, made by E. H. Parfitt, Executive Secretary of Evaporated Milk Association, who serves as Chairman of the Sanitary Standards Sub-committee of Dairy Industry Committee (SSS-DIC).

Besides the SSS-DIC, which represents equipment makers and processors, other participating groups or agencies in the 3-A program are the Committee on Sanitary Procedures of the International Association of Milk and Food Sanitarians, and the U. S. Public Health Service, representing local, State and Federal public health viewpoints.

An agenda of four main points has been drawn up by the Executive Committee of the 3-A Sanitary Standards Committees, and it is expected that this agenda will be strictly adhered to, in order to facilitate the very full load of work the conferees have assigned themselves. The four standards or amendments on the agenda are as follows:

1. Tentative 3-A Sanitary Standards For Fillers and Sealers of Single Service Containers for Milk and Milk Products. (It is expected that final action will be taken on this tentative standard).
2. Amendments to 3-A Sanitary Standards For Holding and/or Cooling Tanks. (It is expected that final action will be taken on these amendments).
3. Tentative 3-A Sanitary Standards For Milk and Milk Products Evaporators and Vacuum Pans.
4. Tentative 3-A Sanitary Standards for Factory Size Separators, Clarifiers and Standardizers for Milk and Milk Products.

Persons interested in any of the above standards, and not fully cognizant of the work of the 3-A Sanitary Standards Committees for Dairy Equipment, may receive full information on the program by writing to the Dairy Industry Committee, Room 519, Barr Building, Washington, D. C.

COMPETITION OPENED FOR SECOND ANNUAL CRUMBINE AWARDS FOR LOCAL PUBLIC HEALTH UNITS

Local health departments have been invited to compete for the Second Annual Samuel J. Crumbine Awards by the Public Health Committee of the Paper Cup and Container Institute, Inc. There are two awards, established last year in memory of Dr. Crumbine, pioneer health officer and consultant to the Institute in his later years, offered to official city, county and similar local health units in the United States. One award will be made for "outstanding achievement in the development of a comprehensive program of environmental sanitation," and the other for "outstanding achievement in the development of a program of eating and drinking sanitation." Any department may submit entries for both awards.

This year's contest will cover programs or activities either in progress or having been completed in 1956. Winners of the 1955 Crumbine awards will not be eligible to compete for an award that they won last year. Entries must be submitted on or before June 1, 1956, and a descriptive brochure and official application forms may be obtained from the Public Health Committee, Paper Cup and Container Institute, Inc., (Samuel J. Crumbine Awards Jury), 250 Park Avenue, New York 17, New York.

Presentation will be made at an appropriate time and place to be determined by the Awards Jury after it has made its selections.

The Award for "outstanding achievement in the development of a comprehensive program of environmental sanitation" is to give recognition to complete programs which embrace all the aspects of modern environmental control. It is intended as a stimulus to encourage local health units to broaden and diversify their activities. All programs submitted for this award will be judged on the basis of the relative emphasis placed on each aspect of sanitation in terms of local needs and expenditures of time and money and personnel.

In the tradition of Dr. Crumbine, special consideration will be given to newly developed activities of a pioneering nature which complement and support the total program. However, award selections will be made on the basis of the completeness and balance of the program rather than on unique or dramatic achievements in any single area.

The award for "outstanding achievement in the development of a program of eating and drinking sanitation" is intended to honor health departments which have originated or developed programs arousing specific public action or participation leading toward better food and beverage sanitation. Programs considered for this award should demonstrate progress of achievement based on team work with the public in sanitation, administration and health education as exemplified by Dr. Crumbine.

Some of the characteristics of an outstanding program in the field of this award might be the degree of public support aroused by the program, the use of resources in the community other than the health department and the involvement of community organizations. Judgment will be based on evidence of specific public action leading to better sanitation in eating and drinking, whether or not measurable results have yet been achieved.

Each winning health unit will receive a bronze medallion and engraved plate mounted on a walnut plaque. In addition, the health officer and the person or persons most directly responsible for the winning program under the department head will receive duplicates of the bronze medal.

Winning programs will be selected by an Awards Jury of prominent public health authorities. Members of the 1956 jury are Dr. Daniel Bergsma, Commissioner of Health, N. J. State Health Department; Dr. Granville Larrimore, Deputy Commissioner of Health, N. Y. State Health Department; Francis B. Elder, Engineer Associate, American Public Health Association; Dr. Mayhew Derryberry, Chief, Division of Public Health Education, U. S. Public Health Service; Harold S. Adams, Director of Sanitary Science, University of Indiana; Mrs. Lucy R. Milligan, Health Chairman, General Federation of Women's Clubs.

In 1955 New York City's Department of Health, under the direction of Dr. Leona Baumgartner, was honered for "outstanding achievement in the development of a comprehensive program of environmental sanita-

tion." The Awards Jury gave special consideration to the department's newly developed pioneering activities which supplemented a well-rounded day-to-day municipal program.

The Cowlitz-Wahkiakum District Health Department at Kelso, Washington, headed by Dr. Donald Champaign, won the 1955 award for "outstanding achievement in the development of a program of eating and drinking sanitation." In this case the jury took particular recognition of the department's efforts to extend the effectiveness of its activities by securing public participation in a number of projects for the improvement of food and beverage sanitation.

Dr. Samuel J. Crumbine, in whose memory these Awards are annually offered, was originally a frontier doctor who became Kansas' noted crusader for better public health practices. He campaigned against the common drinking cup, the germ-carrying roller towel and the housefly. Sanitary precautions which we regard as commonplace today were not even known to millions of Americans when he began his work. A peppery and resourceful campaigner, he devised and popularized many slogans such as "Swat the Fly," "Bat the Rat," Don't Spit on the sidewalk," and "Sleep with Your Windows Open." He died in 1954, active to the end, at the age of 91.

FOOD SERVICE FILMSTRIP LISTED IN NEW DUKANE GUIDE

Sound Slidefilms on the subjects of cooking and food service, refrigeration, and public sanitation are described in a new source book, the Sound Slidefilm Guide, published by the DuKane Corporation, St. Charles, Ill.

The 1,000-title booklet also lists individual sound slidefilms available on the subjects of agriculture, aviation, education, religion, labor, business, health, advertising, art, traffic, history, human relations, construction, and home improvement.

Source of each filmstrip is noted in the guide along with its availibility whether by rental, purchase, or free loan. Priced at $1.00, the Sound Slidefilm Guide can be ordered from the Audio Visual Division, DuKane Corporation, St. Charles, Ill.

MASSACHUSETTS MILK SANITARIANS CELEBRATE THEIR 50th ANNIVERSARY ASSOCIATION HONORS H. L. THOMASSON

The Massachusetts Milk Inspectors' Association held their 50th Annual Conference at Worcester, Massachusetts, January 4 and 5, 1956.

The first day program included a paper by H. L. Thomasson, Executive Secretary, International Association of Milk and Food Sanitarians on the subject, "The Modern Milk Sanitarian." Dr. David Levowitz, Director, New Jersey Dairy Laboratories, New Brunswick, New Jersey, gave a talk on "Dairy Plant Sanitation."

In the evening, the Association members celebrated their 50th Anniversary by staging a gala banquet and dance. Guest speaker of the evening was Lt. Gov. Sumner Whittier. Guests of Honor included: His Excellency Christian A. Herter, Governor of the Commonwealth; Hon. James D. O'Brien, Mayor of the City of Worcester; Hon. C. A. Brennen, Mayor of City of Attleboro; Dr. Alexander Witkow, Commissioner of Health, City of Worcester; and Commissioner Hawes of the Massachusetts State Department of Agriculture. The history of the Association was presented by Prof. R. C. Perriello.

Four men were honored by the Association and received Certificates of Merit from the Association President, William Parsons. The awards went to:

H. L. Thomasson of Indiana, for his outstanding interest in the nationwide improvement and development of the modern public health sanitation program.

Melvin Master of Lowell, Massachusetts, one of the original pioneers of the Association, who with others gave their time and effort to improve the quality and safety of the milk supply in Massachusetts.

Dr. Michael C. O'Connor of Springfield, Massachusetts and John H. Buckley, Lynn, Massachusetts, for their contributions to the Association.

The second day meeting included the following program:

"Egypt and the Dairy Industry," W. D. Barrett, President, Barrett Turner Corporation, Reading Mass.

"The Health Department and Quality Control," Dr. C. Colvin, Assistant Chief, Milk and Restaurant Division, New York State Health Department, Albany, N. Y.

"A Review on Insecticides and Rodenticides," Prof. R. C. Perriello, University of Massachusetts, Amherst, Mass.

Citation Award Nominations Due April 1, 1956

As you know, the Citation Award was created for the purpose of providing recognition to members of the Association who through long and distinguished service have contributed greatly to the professional advancement, growth, and reputation of the IAMFS. Nominations may be submitted by any member of the Association in good standing, by an Affiliate Association, or by members of the Executive Board. The service rendered by each of the persons nominated is reviewed and evaluated by the Committee on Recognition and Awards, who then recommends to the

Executive Board the 2 candidates whose service was rated the highest by the Committee. Selection of the recipient is a function of the Executive Board.

It is extremely important that each nomination be accompanied by a detailed statement of the services rendered to the IAMFS. This should include a list of (1) offices held, if any; (2) the names of the committees on which the candidate served, either as chairman or as a member, and the years of such service; (3) service as an Associate Editor of the Journal of Milk and Food Technology; (4) articles published in the Journal; and (5) other contributions or achievements which enhanced the professional advancement, growth, and reputation of the IAMFS. Services rendered to an Affiliate Association should, also, be listed.

Nominations for the Citation Award should be submitted to Mr. J. D. Faulkner, Division of Sanitary Engineering Services, Public Health Service, Washington 25, D.C.

1956 INTERNATIONAL CONVENTION IN SEATTLE

The Washington Milk Sanitarians Association definitely has thrust the machinery in motion for the 1956 International convention of the Milk and Food Sanitarians Association to be held in Seattle, September 5, 6, & 7. Cameron Adams, General Convention Chairman already has received notice that a number of topflight speakers of national and international authority in their respective fields will appear on the program.

Gene Locke, the convention finance committee chairman states that the response from the dairy industry in the State of Washington has been wonderful as shown by the fact that the established goal of the funds-drive nearly is accomplished and possibly may be exceeded. Other committees are actively functioning in making preparations to receive and entertain delegates from every section of the country with the finest of Western hospitality.

At the last regular meeting of the Oregon Association of Milk Sanitarians, their membership unanimously agreed to pledge their support and cooperation to the Washington Association in the hosting of the annual meeting of the International Milk and Food Sanitarians Association.

The nearly 300 members of the Washington Association, which represents practically all phases of the dairy industry in the State of Washington are making plans for YOU—we cordially hope that many of you will make plans to be in Seattle, September 5, 6, & 7.

KENTUCKY MEETING

More than 160 sanitarians, fieldmen, producers and dairy plant managers attended the Fildmen's and Dairymen's Short Course at the University of Kentucky, February 20, 21 and 22, 1956. The course was sponsored jointly by the University of Kentucky Dairy Section, Kentucky Cream Improvement Association, Kenutcky Manufactured Milk Improvement Association, Kentucky Purebred Cattle Association, and Kentuncky Association of Milk and Food Sanitarians.

One of the features of the program was a panel discussion of bulk tanks. This panel, moderated by Dr. T. R. Freeman, Professor of Dairying at the University, expressed the views of a plant operator, a fieldman, a sanitarian, a hauler and producers. The general agreement of the panel appeared to be that while bulk tanks are a marked improvement in the handling of milk, this method is not a "cure-all" for milk quality problems.

Other problems discussed were those of water supply on dairy farms, various methods of pasture and weed control, and the use of silage in dairy cattle feeding.

The problems of cream grading were discussed by W. T. Robinson, Federal Food and Drug Administration. This was followed by a cream grading school led by Mr. Robinson and Fred Hillig, also with the Federal Food and Drug Administration.

20-MILLION PURE-PAK CARTONS USED DAILY

Use of Pure-Pak milk cartons increased 15.22 per cent in 1955 to reach an all-time peak of nearly seven and a half billion units, the Pure-Pak Division of Ex-Cell-O Corporation announced today.

In 1955 total represented an average usage of 20.8 million cartons a day last year to establish Pure-Pak cartons as the most widely used disposable food containers in the world, George D. Scott, Pure-Pak vice president, reported.

Scott said the 1955 tabulation was supplied by Dairypak Incorporated, International Paper Co., Kieckhefer Container Co., and Fibreboard Products, Inc., licensed suppliers of paper carton blanks to dairies equipped with Pure-Pak milk packaging machines.

Scott estimated the Pure-Pak total as representing approximately 63.3 per cent of all paper milk cartons in this country. He set the year's gain by Pure-Pak at nearly a billion units—a total of 7,446,381,591 in 1955 against the 1954 mark of 6,462,695,748 cartons.

Top month was September, when 715,645,160 Pure-Pak cartons were used for fluid milk.

WILSON INTRODUCES NEW MODEL BULK MILK COOLERS

A new line of bulk milk coolers, combining Wilson's 25 years of farm refrigeration experience with newest

Wilson developments in bulk cooling, was announced by H. E. Wickham, Vice President and General Manager of Wilson Refrigeration, Inc., a Division of Tyler Refrigeration Corporation. Wickham said the new line includes the following cooler capacities: 100, 150, 200, 250, 300, 375, 500, 600 and 700 gallons.

In announcing the redesigned line, Wickham called attention to the fact that there has been no basic change in Wilson's farm-tested drop-in refrigeration unit. He noted that more than 100,000 dairy farms have used and approved the Wilson drop-in unit, which provides exceptionally easy maintenance and insures against milk freezing or tank distortion.

Design changes include new dynamic tension bracing on sidewalls, bottom, and ends of milk storage tanks, providing better protection against bulging or buckling than ever before. Cleaning has been made easier by new increased corner radius in covers and milk tank; and increased tank slope assures faster milk drainage. New lid arrangement and new location of calibrating stick add to convenience and measurement accuracy. Other changes include new agitator supports and new base supports and new manufacturing standards.

WASHINGTON MILK SANITARIANS ANNUAL MEETING

The annual meeting of the Washington Milk Sanitarians Ass'n. was held on the campus of the State College of Washington in Pullman on March 14th with President Bill Oldenberg presiding. The assemblage of members were privileged to hear Mr. E. B. Kellogg, Secretary of the Milk Industry Foundation, Washington, D.C., speak on, "Let's Sell Sanitation".

Included on the business session were the following:

The Washington Milk Sanitarians Ass'n. being the hosts for the International convention, Sept. 5, 6, and 7, in Seattle, a complete report was presented to group. Cameron Adams, the general convention chairman, appointed the necessary committee last fall and since the first of the year a number of meetings and conferences have been held to establish plans, programs and goals. Committee chairmen reported as to the progress of their respective committees. Financial Chrm. Gene Locke reported that the established goal virtually has been achieved due to the wonderful support and cooperation of the dairy industry within the State of Washington. Outlining the entertainment program, Bill Oldenberg stated than an outdoor barbecue had been arranged at the Inglewood Country Club near Seattle, and that plans were being made for a cruise on the waters of the Puget Sound. Sightseeing tours and group gatherings were being planned for the ladies each day. Housing chrm. Ray Carson reported that meeting rooms, and other convention facilities have been secured. A pre-registration program is being planned by Syd Suckling, in charge of registration. M. L. Strommer, reception chairman, stated that plans were being made to provide information and guidance concerning hotel and city facilities for the convenience of the delegates.

Professor C. C. Prouty reported for the Laboratory Advisory Committee stating that this group, under Dr. Frank Crews, chairman, has geen working with dairy laboratories throughout the State in an effort to unify laboratory procedures. An extensive check-testing program involving the standard plate counts and direct microscopic counts of quick-frozen raw milk samples has been carried on with industry laboratories participating in the Laboratory Certification Program.

The annual election of officers for the Washington affiliate was held with the following state officers elected: C. R. O'Connor, Seattle-King Co. Health Dept., President; James Greenway, Carnation Co., Seattle, President-Elect; Frank Logan, Seattle-King Co. Health Dept., Secretary-Treasurer; George Andrews, Washington State Dept. of Agric., Seattle, and Howard Copenhaver, Milky Way Dairy, Pullman, Auditing Committee.

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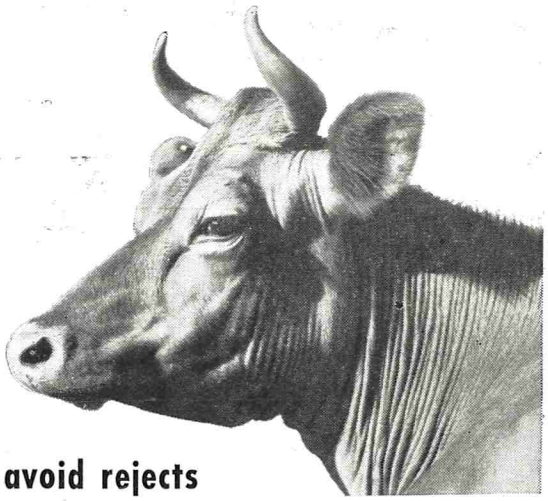
TAKE IT FROM A LEADING MILK PRODUCER



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...to produce high-quality fluid milk

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Fast, positive bacteria kills? ...Lo-Bax chlorine bactericides *assure* them! Many dairymen prefer Lo-Bax Special, the time-tested bactericide containing 50% available chlorine.

Others, who want a bactericide with a wetting agent, specify LoBax-W. But whichever Lo-Bax product is selected, there's complete assurance of the same bactericidal action...the same high quality milk protection.

Both Lo-Bax Special and LoBax-W dissolve quickly, providing the best in chlorine rinse solutions. Both, because of their high chlorine content, give positive assurance that dairy utensils and milking machine parts are kept sanitary and germ-free. Yet both products are extremely gentle to cows' teats and udders, and milkers' hands.

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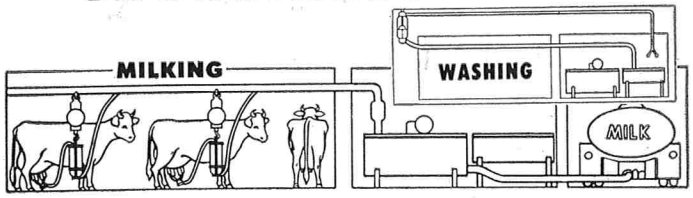

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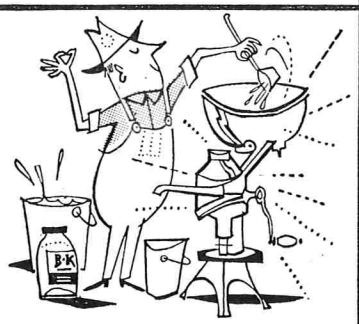

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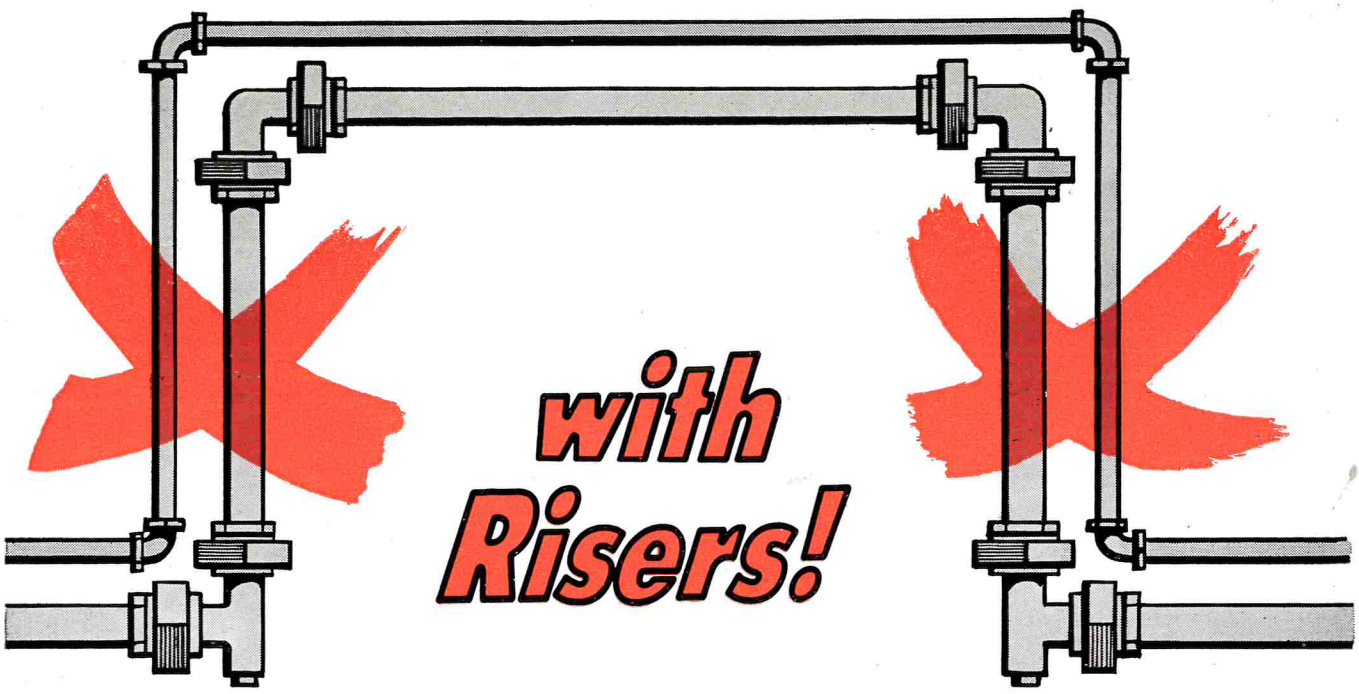

with Risers!

Surge has no trouble with risers because somebody around here was smart enough to write this set of words more than four years ago:

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