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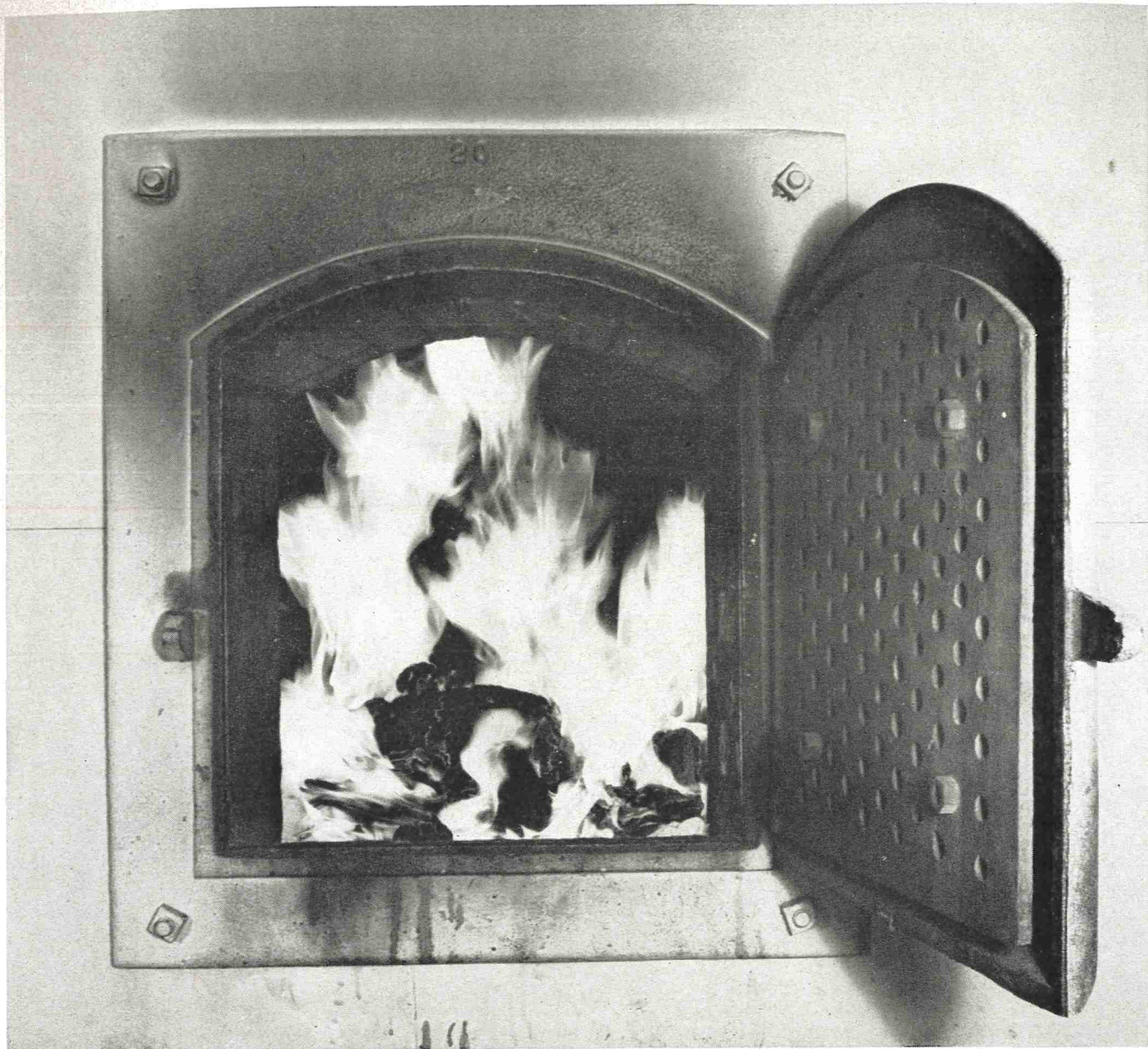
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4. Wipe the cow's udder and teats with the sanitizing solution, using a separate towel

for each cow. Put used towels in a separate bucket (Fig. B).

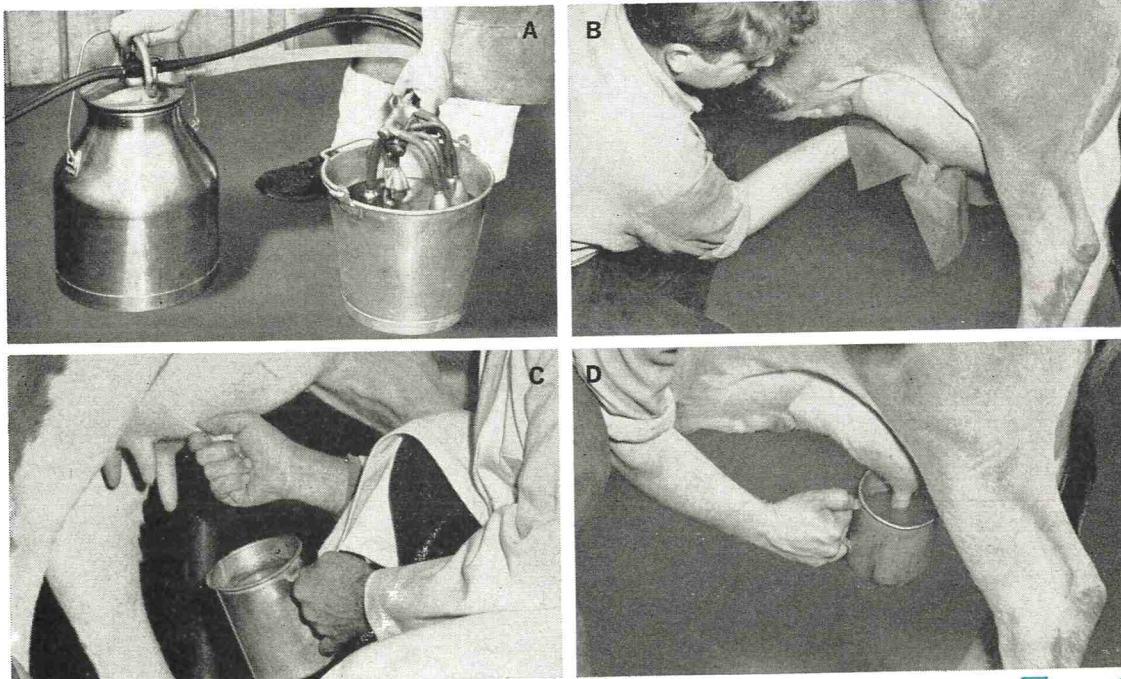
5. Milk a few streams from each quarter into a strip cup or black strip plate and check for mastitis. If the milk is clotted, flaky or shows signs of being abnormal, milk that cow last, separate her from the others and notify the veterinarian (Fig. C).

6. Between milkings, dip the milking machine teat cups first in a pail of clean water, then in a pail of sanitizing solution.

7. Dip all teats in fresh sanitizing solution as shown in Fig. D. Fill the cup or dipper from a separate pail (not one used for milking machine teat cups) and pour out the used solution.

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The Executive Board of the International Association of Milk, Food and Environmental Sanitarians, Inc., is seeking qualified persons to apply for a position as Assistant Executive Secretary. The Association publishes a monthly journal — The Journal of Milk and Food Technology — and other technical papers and bulletins in this general field. The primary responsibilities of the Assistant Executive Secretary would be that of managing and editing the Journal of Milk and Food Technology.

The Association has a membership of about 4000, has thirty affiliated associations throughout the United States and Canada, and is the largest association of its kind in the country.

The Association has its headquarters in Shelbyville, Indiana.

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The beginning salary is between \$5500.00 - \$6500.00 per year. There is provision of annual vacation and sick leave after six months of service.

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1. A Sanitarian holding a Bachelor's degree from an accredited college or university or a person holding a Bachelor's degree in Journalism.
2. Preferably one year of successful professional experience in the journalistic field in technical, trade or scientific writing, or in the field of Milk, Food, or Environmental Sanitation. Person should have had experience in technical writing and in public relations.

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1. To be the editor of a professional publication in the field of milk and food control, environmental sanitation, and public health.
2. Compose and organize the News and Events Section of the Journal of Milk and Food Technology and stimulate communication and contact with affiliates and with other organizations having parallel interests.
3. Edit auxiliary publications of the Association including Committee Reports, special reports and develop promotional materials.
4. Do literature research in terms of articles dealing with newer technical developments within the areas of interests; keep abreast of legislative and regulatory matters of interest to the Association. Contribute articles, abstracts and summaries.
5. Write editorials in the field of environmental sanitation or in areas of related interests; enlist the services of others as guests editorial contributors, or both.
6. Attend meetings, conferences, affiliate meetings and the annual meeting of the Association to gather news and to represent the Journal and the Association.
7. Become acquainted with the managerial and other duties of the office of the Executive Secretary, assist him, and, in his absence, assume his duties.
8. Continue the improvement of the format, contents, appearance of the Journal and suggest such improvements as may enhance the publication and its acceptance among members and subscribers.

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The Development Of A Sanitarian

As we look over the personnel who constitute the professional sanitarian, we find men from many different fields: physicians, veterinarians, engineers, chemists, bacteriologists, and others. Not only the physical sciences and the biological sciences but also in many cases the social sciences have their application. The engineer is well trained in the physical sciences and is accustomed to think in terms of measurements and preciseness. The veterinarian has had more training in biology and microbiology and their relation to disease and many aspects of sanitation, but he may be short in the physical sciences, especially in the field of materials and their use. Likewise, the bacteriologists and the chemists who have graduated from first-class schools have had training in biology and biological chemistry, which gives good background for work in sanitation. In short, the engineer and the chemist have been trained more in the physical sciences whereas the physician, the veterinarian, and the bacteriologist have been trained primarily in the biological sciences.

Now sanitation may be likened to a gem of many facets. It utilizes knowledge from a wide variety of fields. Consequently, we find the engineer and chemist (who engage in sanitation work) learning biology as they advance through the years; and the physician, veterinarian, and the chemist-bacteriologist learning engineering and more chemistry; with both groups learning more and more about the social sciences—if they are smart and have progressive minds—until, lo and behold, some day we have a full-fledged SANITARIAN who is of some value to his community. This is not because he was an engineer, a veterinarian, a bacteriologist, or what have you, but because he has applied what little he learned in college and then added to that knowledge by everyday experience. He has added so much judgment and common sense and “knowledge of the eternal fitness of things” to his training and experience that after fifteen or twenty years you ask him whether he is an engineer, a veterinarian or any other such specialty, he will reply that “my college training was such-and-such but I soon found that I had to use my head and knowledge from various fields and much common sense, until now I am more than an engineer or a veterinarian or some other such professional. I am a sanitarian.”

When a man attains this state of ability, he has reached the qualifications of a “Fellow”. The American Public Health Association defines this classification as follows:

- a. A graduate degree in public health or equivalent degrees and acceptable service for two years in responsible public health position;
- b. An academic degree including training in public health and meritorious responsible service in public health for at least five years;
- c. Notable original work in public health or preventive medicine giving recognized standing;
- d. Employment in public health for at least five years, with special proficiency and recognized standing;
- e. Teaching of public health or a constituent science for at least five years with attainment of distinction;
- f. Substantial contributions to public health and attainment of recognized standing.

The appellation “sanitarian” is now generally understood to include any one who works in the field of sanitation. The use of the word “fellow” indicates that such high attainment of professional quality has been reached that a responsible organization sponsors the worker as being among the top-ranking persons in the field. It ignores the route but acknowledges the excellence of the performance. It rises above collegiate degrees and recognizes only the ability of the incumbent—degree or no degree.

(Sanitarians would you agree that this editorial is a fair estimation of the situation as it exists today? It was written by J. H. Shrader in the *Journal of Milk and Food Technology* Vol. 13, No. 5, September-October, 1950.) H. L. T.

SUGGESTED MODIFICATIONS OF THE CALCIUM ALGINATE SWAB TECHNIQUE

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University of California, Los Angeles*

(Received for publication October 25, 1963)

SUMMARY

Modifications of the calcium alginate swab technique recommended as an alternative to cotton swabs in *Standard Methods for the Examination of Dairy Products*, American Public Health Association, 1960 are presented. The modifications are based on observed lysis of some gram negative bacteria during dissolution of the swab with sodium hexametaphosphate (HEX) and inhibition of some gram positive bacteria when the solvent is included in certain plating media. Since NaCl protects cells against lysis, Ringers' solution is suggested as the swab buffer for sample collecting. During dissolution of the swab HEX concentration should be 2% or less in order to minimize carry-over to the plating medium. Several plating media were studied and trypticase soy agar or its equivalent as determined with a sensitive gram positive organism such as *Sarcina lutea* is recommended. It is also recommended that contact time between cells and HEX be as short as possible and that 20 ml of plating medium be used for each ml of HEX-alginate-Ringers' sample.

Although considerable variation in results has been reported by many authors (3) substitution of calcium alginate for cotton in the surface swab technique has been recommended as an alternative method in "Standard Methods" (1) based primarily on the work of O'Neill and Reed (2). The standard technique requires moistening the alginate swab with 5 ml of 0.0044% KH_2PO_4 buffer water, swabbing the surface and replacing the swab in the buffer. One ml of a 10% solution of sodium hexametaphosphate (HEX) is then added to dissolve the swab and a portion of sample is plated in nutrient agar. The variation in results reported by many authors and the fact that the solute is a chelating water softener suggested possible toxic effects to some bacteria. These toxic effects have been reported in an earlier paper (3). During the course of this earlier work it was discovered that inhibition of sensitive bacteria could be eliminated by proper choice of buffer and plating medium. The purpose of the following report is to present evidence for modification of the existing method of the alginate swab technique.

MATERIALS AND METHODS

Organisms

Wild populations were obtained from the activated sludge tank of a sewage treatment plant. *Sarcina lutea* was used in this study since it had been previously shown to be extremely sensitive to small

amounts of HEX included in solid media and *Pseudomonas fluorescens* was used since it exhibited considerable lysis in the presence of HEX during dissolution of the swab. These pure cultures are maintained as stock in our laboratory.

Chemicals

Sodium hexametaphosphate (HEX) is a product of Fisher Scientific Co., New York, New York. Calcium alginate was obtained from Splain and Lloyd, Inc., Milford, Ohio.

Inhibition effects of HEX in solid media

To determine the most effective final plating medium, HEX was incorporated into commercially prepared media or combinations of the ingredients of commercial media before sterilization or sterilized separately and added to the medium at the time of pouring plates as is done in the "Standard Methods." In some experiments 50 mg of calcium alginate (the approximate weight of a swab) were dissolved in an amount of 2% HEX simulating that of "Standard Methods" and then incorporated into the medium. At later stages various sterile buffers were used, to which sterile calcium alginate and sterile HEX were added and portions of this added to the solid medium. Survival of known numbers of bacteria was determined by modification of the drop plate technique as reported in the previous work (3) and by standard pour plate technique. This step was considered important since many gram positive bacteria are inhibited in the final medium by the slight carry over of HEX. In most of these studies *S. lutea* was the test organism. Colonial size was also used as an indicator of inhibition in some experiments.

Dissolution of the swab

Also of considerable importance is the buffer to which the swab and HEX are added. *P. fluorescens* exhibits considerable lysis at this stage and was the primary test organism. Various buffers were used with known numbers of cells and variable times of exposure to the HEX. Determination of survival was by the drop plate technique and pour plate techniques using the most effective solid medium as determined in the preceding section. Appropriate controls were used in all experiments.

TABLE 1. INHIBITION OF ACTIVATED SLUDGE BACTERIA ON VARIOUS ENRICHMENT MEDIA CONTAINING HEX

Medium	% HEX in medium					
	0	0.01	0.05	0.1	0.5	1.0
TSA (BBL)	+	+	+	+	+	-
TGE (Difco)	+	+	-	-	-	-
BHIA (BBL)	+	+	+	+	-	-
BHIA (Difco)	+	+	+	+	-	-
NA (Difco)	+	-	-	-	-	-

+ = Normal growth; - = Inhibition (smaller number than control); TSA = trypticase soy agar; TGE = tryptone glucose yeast extract agar; BHIA = Brain heart infusion agar.

RESULTS

Solid media

Four enrichment media in addition to nutrient agar (NA) (Difco)-trypticase soy agar (TSA) (BBL), tryptone glucose yeast extract agar (TGE) (Difco), and two brainheart infusion agars (BHIA) (Difco and BBL) were studied for their capacity to counteract at various levels of HEX using wild populations and *S. lutea* as indices of inhibition. Results will be found in Tables 1, 2 and 3. When colony size is taken into account as well as number of cells recovered (Table 3), TSA appears to be slightly better than the other media. A further study of this medium is given in Tables 3 and 4. Table 3 indicates variation in colony size relative to HEX concentration and to number of cells recovered. Colony size appears to be directly related to HEX concentration while number of cells recovered is not so closely re-

lated. Table 4 illustrates that exposure time to HEX is not important while the plating medium is. These results were identical whether drop plate or pour plate techniques were used.

An attempt to improve recoverability of NA by including meat extract, calcium and magnesium salts, sodium chloride and a vitamin mixture containing pyridoxine, pyridoxamine, pyridoxal, calcium pantothenate, riboflavin, nicotinic acid, para aminobenzoic acid, and folic acid did little to improve the

TABLE 2. INHIBITION OF *Sarcina lutea* ON VARIOUS MEDIA CONTAINING HEX

Medium	% HEX in medium					
	0	0.01	0.05	0.1	0.2	0.5
NA	+	+	-	-	-	-
NA + 0.5% phytone	+	+	+	-	-	-
NA + 0.5% phytone + 0.5% NaCl	+	+	+	-	-	-
NA + 1.5% typticase	+	+	+	-	-	-
TSA Lot 90567	+	+	+	+	+	-
TSA Lot 211615	+	+	+	+	+	-
TSA made from ingredients	+	+	+	+	*	-

+ = Normal growth; - = Total inhibition; * = Partial inhibition; NA = nutrient agar (Difco); TSA = trypticase soy agar (BBL); Trypticase and phytone (BBL).

TABLE 3. NUMBER AND SIZE OF *Sarcina lutea* COLONIES WHEN GROWN ON THE SURFACE OF NA OR TSA CONTAINING HEX

Medium	Conditions ^a		% HEX in medium					
			0	0.01	0.05	0.1	0.2	0.5
NA	HEX alone	Colonies ^b	14	14	1.2	- ^d	-	-
		Diameter ^c	372	428	84			
TSA	HEX + algininate	Colonies:	14	17	0.001	-	-	-
		Diameter:	372	359	64			
TSA	HEX alone	Colonies:	11	25	18	13	17	-
		Diameter:	386	414	372	263	166	-
TSA	HEX + algininate	Colonies:	11	22	14	19	11	-
		Diameter:	386	469	331	276	152	-

^aBacterial count determined by drop plate on plates with number of colonies between 15 and 150.

^bNumber per ml x 10⁶.

^cDiameter in microns; average of six representative colonies.

^dNo growth.

growth of *S. lutea*. The individual ingredients of TSA, however, added separately to NA did improve growth somewhat but not as much as the combination of TSA ingredients (Table 2). Only the inclusion of yeast extract (Difco) improved this medium. Table 5 shows that the concentration of yeast extract required for reversal is directly related to the HEX concentration.

Solute

P. fluorescens, which lyses readily on exposure to HEX during dissolution of the alginate swab has been previously shown (3) to be protected by the addition of NaCl or MgSO₄ but not KH₂PO₄ to the solution. Ringers' solution has been used by many investigators and since this contains 0.9% NaCl was studied as a replacement for the "Standard Methods" buffer. Results of this experiment are given in Table 6.

DISCUSSION AND CONCLUSIONS

HEX has been demonstrated to markedly inhibit many species of gram positive bacteria when included in media at concentration levels encountered in the recommended procedure (1). The most sensitive organisms so far discovered to the small amounts of HEX carried over into the plating medium is *S. lutea* (3). The reason for this inhibition is not completely clear but very likely involves magnesium metabolism and cell division since MgSO₄ can partially reverse the observed inhibition. Enriched media represented in this study by TSA eliminate inhibition at HEX levels normally encountered in the standard test and to a greater extent than MgSO₄ alone. This inhibition is also reversible by high concentrations of yeast extract in nutrient agar.

The reversal by yeast extract suggested the possibility that vitamins could be substituted; however, the inclusion of a vitamin mixture in nutrient agar had little or no reversal effect. The possibility still remains that the proper vitamins or the proper form of one of the vitamins was not used. Also of interest is the fact that the ingredients of TSA (phytone, trypticase, and sodium chloride) provided only partial reversal of *S. lutea* inhibition when used separately in nutrient agar, yet when together gave nearly the same results as commercial TSA. When measured in terms of recoverable numbers of cells, TSA and yeast extract show reversal of inhibition up to 0.2% HEX i.e., every cell grows. However, if one looks instead at the colony diameter at 24 hours as a measure of growth rate it is also clear that HEX affects the growth rate even when all cells are recovered. This effect is directly related to the HEX concentration and may support somewhat the inference that HEX interferes with cellular division of

TABLE 4. EFFECT OF *Sarcina lutea* EXPOSURE TO 2% HEX ON PLATE COUNT WITH NA AND TSA

Time of exposure to 2% HEX or water prior to planting	Colonies ml x 10 ⁶		
	NA ^a	TSA	Water exposed control
15 min	1.5	18	22
3 hr	1.8	20	20
6 hr	1.7	18	20

^aColonies were considerably smaller than the control.

TABLE 5. REVERSAL OF HEX INHIBITION BY YEAST EXTRACT

	% HEX in the medium			
	0.01	0.05	0.1	0.2
% yeast extract giving uninhibited growth:	<0.01	1.0	5.0	>5.0

TABLE 6. EFFECT OF HEX ON *Pseudomonas fluorescens* WITH AND WITHOUT RINGERS' SOLUTION AS THE BUFFER

Colonies bacteria per ml x 10 ⁷ :	15 minute exposure to:				
	2% HEX Plated on		2% HEX + alginate + Ringers' plated on		
	NA	TSA	NA	TSA	Control
	17	22	56	66	70

gram positive bacteria, possibly through the agency of magnesium.

Another reaction to HEX characteristic of some gram negative bacteria is given by *P. fluorescens* which promptly lyses on exposure to HEX during dissolution of the alginate swab. This effect no doubt has some relation to cell wall integrity but can be completely negated by inclusion of NaCl or MgSO₄ in the solute. Ringers' solution represents a useful buffer for use in this technique.

Ultimate success of the procedure lies in complete or consistent recovery of organisms from a wild population of cells. Wild populations, however, differ markedly in composition. Activated sludge for example has a high component of gram negative bacteria which appear to be a group showing considerable lysis during swab dissolution. The use of an adequate buffer i.e. high in NaCl is thus quite important with such populations. The earlier report of the authors indicates that such a population also contains a large number of organisms inhibited by the mere presence of HEX in the plating medium. Some of those are gram negative organisms.

On surfaces, presumably a large proportion of the bacterial population are gram positive bacteria which as a group are grossly inhibited by the presence of HEX in the plating medium. The choice of buffer for the solute and the medium for plating thus become extremely important. Tests on the wild population of activated sludge indicate that TSA gives virtually the same results with HEX present as TSA does without HEX. However, the technique modification proposed here presumes that the most sensitive organisms were used. If more sensitive strains are discovered a reevaluation of the technique will be warranted.

CONCLUSION

On the basis of the results presented in this report the following modifications of the alginate swab technique are suggested:

Buffer:

Ringers' solution- to 960 ml of 0.154 M NaCl solution add 20 ml 0.154 M KCL solution and 20 ml 0.11 M CaCl₂ solution.

HEX:

No more than a 2% solution during swab dissolution and should be added only at the time of plating. Reduction of HEX to less than 1%, while operationally possible incurs the risk of incomplete dissolution of a 50-mg swab (a common weight) and should be avoided. Exposure to HEX should be as short a time as practical for dissolution of the swab.

Medium:

Trypticase soy agar (BBL) or equivalent as determined by test against a sensitive organism such as *S. lutea*. The quantity of medium used to pour plates should be at least 20 ml per ml of sample to permit a final concentration of less than 0.1% HEX in the agar.

Procedure:

Ringers' solution is dispensed in 5-ml amounts in screw capped vials with 25-50-mg alginate swabs and sterilized. Swab is moistened with the solution, excess pressed out and the surface swabbed. The swab is returned to the vial and transported to the laboratory. Just prior to plating, 1 ml of a sterile 10% HEX solution is added to the vial and vigorously shaken until the swab is dissolved (this is 1.6% HEX in the vial). One-ml samples are withdrawn and placed in petri dishes. Twenty ml of TSA or equivalent are poured into each plate (this is 0.08% HEX in the medium) and incubated as usual.

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NOTICE

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RINSING MILK RESIDUES FROM STAINLESS STEEL, GLASS, AND TYGON PIPELINES WITH COLD AND WARM WATER

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Because the dairy industry deals with highly perishable food products which are excellent foods for microorganisms as well as man, an early interest developed in the cleaning and sanitizing of milk-contact surfaces. Today the dairy industry is recognized as the leader in the field of in-place cleaning. Recommendations for rinsing—the first step in an over-all cleaning procedure—usually state that it should be done by flushing the pipeline or parts with cold or warm water until it runs clear. This unfortunately gives little idea as to the amount of water required to flush out a given length of pipeline. There are two different kinds of operations involved in rinsing and in detergent circulation. The loose adhering film of milk can be flushed out with cold or warm water. The hard film or soil deposits which cannot be removed by water during rinsing are taken care of by the circulation of detergents. Although there are numerous references dealing with the effectiveness of various circulation cleaning methods, there are no data available in the literature concerning rinsing alone.

In this study laboratory experiments were conducted to gain information on the comparative amounts of rinse water needed per foot of length and per square foot of inside surface area of stainless steel, glass, and Tygon pipelines under similar conditions of slope and at two different water temperatures. In all cases a slope of 1 inch per 10 feet of length of pipeline was kept constant. The total lengths of the several pipelines were different. The study dealt with the rinsing of skim milk, whole milk, ice-cream mix, and heavy cream from stainless steel pipes. Only skim milk and whole milk were used in the glass and Tygon pipelines.

The rinsing was done by a batch method as well as by continuous pumping. Two different temperatures of water were used: cold water varying from 38 to 58 F and warm water at a constant temperature of 110 F. Water of 7 grain hardness from Cornell University water supply was used throughout the study. All products on which rinsing studies were made were cold. The setup of a pipeline was such that most of it was in the form of straight lengths with elbows used where necessary to form return bends. One Tygon line located at a commercial dairy

farm was coiled on a vertical circular rack during rinsing.

EXPERIMENTAL

Forced Circulation Rinsing

Milk products for soiling the pipeline were placed in a stainless steel tank and were then recirculated through the pipeline for 15 min by a 1/4-hp sanitary centrifugal pump. All connecting pipe to the recirculation unit was of 1/2-inch stainless steel. The discharge line from the pump contained a sanitary diaphragm valve used for regulating the flow in the pipes. After soiling, a pipeline was disconnected from the circulating unit and allowed to drain free of liquid. The pump and tank were washed thoroughly before being reconnected for circulation of rinse water. This procedure insured that only milk residues from the pipeline itself would appear in the rinse-water effluent which was sampled at 5-sec intervals during the test. Sampling time began when water first started to discharge to waste from the pipeline. The quantity of water required to fill each line was known and has been included in the tabulated values of water required for rinsing. Blank samples were obtained from the water in the circulation tank and rinsing was considered complete when a rinse sample appeared the same as the blank by means of spectrophotometer analysis.

Batch Rinsing

After draining the pipeline free of milk product, it was filled completely with rinse water. One minute later the batch of rinse water was drained into a milk can, a representative sample taken, and the entire process repeated until the transmission of the sample reached that of the blank.

After each test the entire system was cleaned by an appropriate CIP procedure, sanitized, and allowed to air dry before reuse. Residual water was removed from the Tygon line by a dart forced through it by compressed air.

Analytical Method

In 1913 Kober (1) recommended the use of 3% sulfosalicylic acid as a good precipitating agent in the nephelometric determination of casein, globulin, and albumin. A modification of the test was used

in this study to detect traces of milk remaining in the rinse water. Fat globules in the rinse water caused some turbidity. However, greater turbidity and hence greater sensitivity was obtained by precipitating the protein with sulfosalicylic acid.

Measurement of turbidity or the light transmittance was used as the basis of distinction between clear water and a sample containing milk. The instrument used to measure light transmittance was a Coleman spectrophotometer at 600 $m\mu$ wavelength and at 35 $m\mu$ band width. The sensitivity of the test in terms of ppm of product was determined by comparing the percentage transmission of various known dilutions of skim milk, whole milk, ice-cream mix, and heavy cream to that of a water blank. The lowest detectable concentration of a product was the one just giving 100% transmission when compared to the water blank. The procedure followed for skim, whole milk,

TABLE 1. LOWEST CONCENTRATION OF MILK PRODUCT DETECTABLE BY SPECTROPHOTOMETER TEST

Product	Concentration ppm
Skim milk (pasteurized)	150
Whole milk (pasteurized, homogenized)	100
Ice-cream mix (Pasteurized, homogenized)	20
Heavy cream (pasteurized)	45

and ice-cream mix was: mix 5 ml of known diluted sample with 5 ml of 3% sulfosalicylic acid. The blank sample was given a similar treatment. With heavy cream, 10 ml of diluted sample were mixed with 1 ml of 3% sulfosalicylic acid. Table 1 shows the lowest detectable concentration in water of each of the milk products.

TABLE 2. FLOWING WATER RINSE OF 88.9 FEET OF 1 1/2-INCH STAINLESS STEEL PIPE (CAPACITY = 6.7 GAL, TOTAL INSIDE SURFACE = 32.8 FT²)

Product	Temp. of rinse water	Flow rate of water gal/min	Time required for rinsing (sec)	Average amount of water needed (gal)	Amount of water per foot length of pipeline (gal)	Amount of water per ft ² area of inside wall of pipeline (gal)	Ratio of cold to warm water
Skim milk	42	11.7	30	12.6	0.14	0.38	1.13
	110	10.4	25	11.1	0.12	0.34	
Homogenized whole milk	58	10.8	60	17.5	0.20	0.53	1.32
	110	10.4	37	13.1	0.15	0.40	
Plain ice-cream mix	58	12.3	120	31.3	0.35	0.96	1.71
	110	10.7	65	18.3	0.21	0.55	
Heavy cream	38	11.9	609	126.7	1.42	3.86	4.73
	110	11.7	102	26.6	0.30	0.81	

TABLE 3. BATCH RINSING OF 86.9 FEET OF 1 1/2-INCH STAINLESS STEEL PIPE (CAPACITY = 6.8 GAL, TOTAL INSIDE SURFACE = 31.9 FT²)

Product	Temp. of rinse water (°F)	Number of rinsings required	Total amount water needed (gal)	Amount water per foot length of pipeline (gal)	Amount water per ft ² inside area (gal)	Ratio cold to warm water
Pasteurized skim milk	47	3	20.4	0.23	0.64	1.50
	110	2	13.6	0.16	0.43	
Pasteurized homogenized whole milk	59	3	20.4	0.23	0.64	1.50
	110	2	13.6	0.16	0.43	
Pasteurized homogenized plain ice-cream mix	48	5	34.0	0.39	1.06	1.67
	110	3	20.4	0.23	0.64	
Pasteurized heavy cream	42	7	47.6	0.55	1.49	2.33
	110	3	20.4	0.23	0.64	

TABLE 4. CONTINUOUS FLOW RINSING OF STAINLESS STEEL, GLASS, AND TYGON PIPELINES

Pipeline	Product	Temp. of water	Gal water per ft ² inside	Ratio cold to warm water
1½" stainless steel Length - 88.93' Inside surface - 32.80 ft ²	Skim milk	Cold	0.38	1.13
		Warm	0.34	
1 1/2" glass Length - 45.67' Inside surface - 18.0 ft ²	Homogenized whole milk	Cold	0.53	1.32
		Warm	0.40	
1 1/2" glass Length - 45.67' Inside surface - 18.0 ft ²	Skim milk	Cold	0.46	1.15
		Warm	0.40	
Tygon - 5/8" Length - 85' Inside surface - 13.9 ft ²	Homogenized whole milk	Cold	0.63	1.40
		Warm	0.45	
Tygon - 5/8" Length - 85' Inside surface - 13.9 ft ²	Skim milk	Cold	0.15	1.14
		Warm	0.13	
Same Tygon line except dart pushed through before rinsing	Raw whole milk	Cold	0.15	1.14
		Warm	0.13	
Same Tygon line except dart pushed through before rinsing	Skim milk	Cold	0.09	1
		Warm	0.09	
3/4" Tygon - Length - 120' Condition - coiled Inside surface area = 23.6 ft ²	Raw whole milk	Cold	0.09	1
		Warm	0.09	
3/4" Tygon - Length - 120' Condition - coiled Inside surface area = 23.6 ft ²	Raw whole milk	Cold	0.15	1
		Warm	0.15	

RESULTS AND CONCLUSIONS

Table 2 shows the results of rinsing a 1½-inch stainless steel line with flowing cold and warm water. Results of rinsing by the batch method are given in Table 3.

Similar experiments using only skim milk and whole milk were conducted on lines of 1½-inch glass pipe, and 5/8-inch and 3/4-inch Tygon tubing. The results, along with those for the stainless steel pipe with the same products, are summarized in Tables 4 and 5.

The amount of water, either warm or cold, required to rinse milk-solids residues from a drained pipeline increased with the total solids content of the dairy product that had been in the line. The data show that the amount of fat is more important than the amount of solids-not-fat and that the condition of the fat is also important in determining the amount of water required. The required amount of cold water increased significantly with the fat content of the dairy product. With warm water rinsing, the increase with the fat content was considerably less.

On the basis of each square foot of surface area, Tygon required the least rinse water, followed by glass and stainless steel which required comparable amounts. Pushing a dart through the plastic line before rinsing permitted thorough rinsing with about one-half the usual amount of water.

TABLE 5. BATCH RINSING OF STAINLESS STEEL, GLASS, AND TYGON PIPELINES

Pipeline	Product	Temp. of water	Gal water per ft ² inside	Ratio cold to warm water
1½" stainless steel Length - 86.93' Surface area - 31.97 ft ²	Skim milk	Cold	0.64	1.5
		Warm	0.43	
1½" stainless steel Length - 86.93' Surface area - 31.97 ft ²	Homogenized whole milk	Cold	0.64	1.5
		Warm	0.43	
1½" glass Length - 45' Surface area - 17.7 ft ²	Skim milk	Cold	0.43	1
		Warm	0.43	
1½" glass Length - 45' Surface area - 17.7 ft ²	Homogenized whole milk	Cold	0.43	1
		Warm	0.43	
5/8" Tygon Length - 85' Surface area - 13.9 ft ²	Skim milk	Cold	0.14	1
		Warm	0.14	
5/8" Tygon Length - 85' Surface area - 13.9 ft ²	Raw whole milk	Cold	0.14	1
		Warm	0.14	

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PSYCHROPHILIC BACTERIA AND KEEPING QUALITY OF PASTEURIZED DAIRY PRODUCTS^{1, 2}

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SUMMARY

A study was made showing relationship between post-pasteurization contamination of milk and cream and increase in bacterial count of bottled and paper carton products during storage at 45 F for 5 days. A survey indicated extensive post-pasteurization contamination in plants not employing this type of keeping quality test. The 5-day at 45 F test was more sensitive than the coliform test in detecting post pasteurization contamination. Excessive numbers of thermotolerant bacteria in the raw supply also were detected by this method when plant equipment was properly cleaned and sanitized.

Special in-line sampling techniques were developed to determine source of contamination. One procedure employed sterile disposable hypodermic syringes inserted through rubber stoppered nipples welded into lines at different locations in the system. Another technique involved removal of samples by insertion of sterile disposable hypodermic syringes through rubber or neoprene gaskets between joints in different locations in the plant.

Bottle and paper carton filler equipment offered special cleaning and sanitizing problems and suggestions were made on steps to minimize contamination from these sources.

Application of the 5-day at 45 F keeping quality test followed by careful study of contamination sources has greatly improved shelf life of pasteurized fluid milk and cream and has represented a real economic advantage to plants adopting the program.

The growth of bacteria during marketing and use of pasteurized milk and cream continues to be a serious problem for the dairy industry. The most important source of such organisms is contaminated equipment between the pasteurizer and the final container. The result of such growth is definite flavor deterioration and often excessively high bacterial counts in the finished product as it is used by the consumer. The situation is more common than generally realized; in fact it may qualify as the number one sanitation problem in the dairy industry today. Often plants are unaware of this condition until they have run bacterial counts following a

keeping quality test. Another circumstance associated with this condition is that bacterial plate counts, both standard and psychrophilic, and even coliform tests on the freshly processed product provide little prediction of its subsequent bacterial condition as it is consumed.

The purpose of this discussion is to emphasize the importance of regular combined use of keeping quality tests and bacterial plate counts of pasteurized fluid milk and cream products. The idea of such a keeping quality program was originated several years ago by W. K. Moseley, Indianapolis, Indiana. Recent observations on application of this approach have indicated marked improvement in both flavor and bacterial content of milk and cream after transportation and storage with definite extension of storage life and consequent financial gain to the processor. The same principles and approach can be applied to ice cream mix and cottage cheese although equipment and handling procedures for the latter are somewhat different.

PRODUCT DEFECTS INVOLVED

In milk and cream the first evidence of poor keeping quality is development of off-odors and flavors like unclean, fruity, stale, rancid, bitter and cheesy. In cottage cheese such defects are followed by physical changes such as gelatinous or tapioca curd (3, 5, 6). Odor and flavor defects are preceded usually by growth of bacteria which, within 5 to 7 days after processing, may number in the millions in a product stored at an average temperature of 45 F. It is common for the flavor to change from the fifth to tenth day after processing from normal or fresh to decidedly undesirable. The serious aspect of this is that the product then is in the hands of the consumer. The large number of organisms consumed in the product at this stage are not disease-producing, but their over-all effect is to depress future sales and shorten handling and market life of the product.

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²Presented at the 50th Annual Meeting of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., October 22-25, 1963, at Toronto, Canada.

SOURCES AND TYPES OF BACTERIA ASSOCIATED WITH POOR KEEPING QUALITY

Genera of bacteria most frequently involved in keeping quality problems in pasteurized milk and cream include *Pseudomonas*, *Achromobacter*, *Chromobacterium*, *Alcaligenes*, *Proteus*, *Escherichia* and *Aerobacter*. The gelatinous curd and flavor defects of cottage cheese produced by *Pseudomonas viscosa*, *Pseudomonas fragi* and *Alcaligenes metalcaligenes* are well known. In milk and cream as well as cottage cheese *P. viscosa* produces bitter, rancid and rotten flavors while that produced by *P. fragi* is the fairly common fruity defect. These organisms probably are not true psychrophiles but rather should be considered as a group of bacteria that grow well at temperatures of 45 to 90 F. An example of a true psychrophile is one isolated in our laboratories recently by R. Y. Morita and associates. This organism, a gram negative rod, grows at 30 F and is killed by brief holding at 68 F.

Common sources from which psychrophilic type bacteria enter milk and establish themselves on farm and plant equipment include soil, water, dust, and, in the case of cottage cheese, vegetables that may be incorporated with the product. The organisms grow well in milk and in milk deposits on equipment. Thorough cleaning and effective sanitizing will eliminate them from processing equipment and this is of importance for equipment following pasteurization.

Water supplies so frequently carry psychrophilic type spoilage bacteria that cottage cheese wash water should be routinely treated with additional chlorine (5 to 10 ppm), just as insurance against contamination from this source. Where growth in such water is excessive or the water is alkaline, it may be acidified before chlorine treatment in order to accelerate destructive action of the chlorine (2, 4). The acidification may bring the pH down to levels such as pH 5.0 to 7.0. Treatment at this pH with 5 to 10 ppm chlorine may be quite effective in eliminating spoilage bacteria from the water on a continuous basis where retention time is no more than 15 to 60 seconds.

MOSELEY KEEPING QUALITY TEST

The procedure originally developed for this test consists of storing a container of milk or cream, preferably unopened, at 45 F for 5 days and then subjecting the product to a standard plate count with incubation of plates at 90 F (1) or, if desired, at room temperature (77 F). A bacterial count on the fresh product provides a useful control especially when beginning such an improvement program. Coli-

form counts can be run also on the fresh and stored samples although they become less useful as sanitation improves through application of the keeping quality test. Some plants have developed variations on this test but observations indicate that incubation at 45 F generally provides conditions more closely approximating those during marketing and use of the product.

The basis of the Moseley Keeping Quality Test is that practically all of the bacteria that grow well in milk in 5 days at 45 F are destroyed by pasteurization. Since these organisms gain entrance to the product from contaminated equipment, the test becomes a means of establishing sanitary condition of equipment or containers which contact the product following pasteurization. Organisms that grow well at 45 F in milk or cream almost invariably are found on poorly cleaned and sanitized equipment. A marked increase in bacterial numbers during the 5-day test period suggests a plant inspection and this usually reveals poorly cleaned and sanitized equipment. Subsequent cleanup of this equipment usually results in marked improvement of keeping quality and bacterial condition of stored samples.

Recent observations also have emphasized that unless a plant has been conscientiously engaged in such a combined keeping quality test and bacterial count program, it frequently is harboring false illusions regarding the sanitary condition of its plant and bacterial condition of the finished product.

By making a plate count on fresh samples and on a sample of the same batch of product after 5 days at 45 F, two important types of information can be obtained: First, if the bacterial numbers increase appreciably during storage, the evidence is strong that post-pasteurization contamination has occurred. If the plate count on the fresh sample is high, that suggests thermophilic bacteria in the raw product which is a situation that occurs less frequently.

SPECIAL SAMPLING PROCEDURES

To obtain specific information relating to sources of contamination it is often necessary to aseptically sample at any given point in a post-pasteurization system. These areas may be at the pasteurizer, in the network of lines or valves, at pasteurized surge tanks, at filler bowls or at the filler itself. A number of sampling procedures can be employed incorporating the use of special devices, sampling cocks or sterile pipettes and dippers. One of these special line sampling techniques involves the use of a disposable plastic hypodermic syringe. This is inserted into a pipe line and the sample removed through a previously sanitized neoprene gasket joint

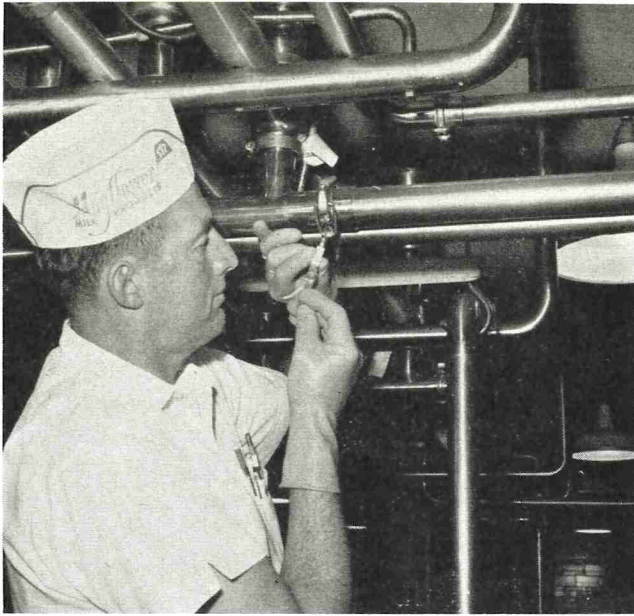


Figure 1. In-line sampling using sterile plastic syringe through sanitized neoprene gasket between pipe joints.

as shown in Figure 1.

Another arrangement that has proven useful is a stainless nipple, fitted with a sterile rubber serum cap, welded onto a standard line fitting, which can be clamped in or permanently located at any area desired (see Figure 2). Repeated samplings using sterile plastic hypodermic syringes can be taken at these locations by inserting the needle through the serum cap and withdrawing a sample. Samples can be transferred to sterile tubes or left in the disposable hypodermic syringe for immediate use or incubation.

In Europe another method of line sampling has been observed. This involves drilling a pin hole in any particular line at any given location and using this as a sampling port. The drilled hole is conveniently covered with a small rubber or plastic disc which is held in place with a spring clamp.

More conventional methods of sampling also may be employed. Sampling through appropriately sanitized sampling cocks or using sterile dippers or pipettes all may be satisfactory. If condensate droplets are to be collected, sterile swabs, sterile bacteriological loops, sterile syringes or medicine droppers can be used.

RESULTS WITH KEEPING QUALITY TEST

Table 1 illustrates typical results obtained by a plant that considered its sanitation program satisfactory. One coliform count suggested the possibility of a sanitation problem but not to the degree brought out by the plate count on the stored sample. Many of the samples tested in this series exhibited serious

off-flavor by the fifth or sixth day of storage. Numerous customers must have experienced off-flavor development in these products.

This type of situation also emphasizes a paradox in our supervision of milk supplies. Consider the great effort to provide a raw milk that frequently stays under a 25,000 plate count entering the processing plant; yet, after processing, the consumer may drink a pasteurized product that runs into millions per ml. This condition is not uncommon except where plants are using a test such as this one to evaluate suitability of plant sanitation procedures.

Table 2 illustrates a different situation where contamination is apparently not as excessive. Note that the coliform test is negative in every sample. This emphasizes an important point, namely, that the keeping quality test with plate counts after 5 days at 45 F is a more sensitive and reliable indicator of plant contamination than the coliform test. Also, the standard plate count on freshly processed samples understandably provides no indication whatsoever of the keeping quality of the milk. There might be so few psychrophilic types of bacteria picked up from such equipment that even though plates of the

TABLE 1. PLATE COUNTS ON FRESH AND STORED SAMPLES WITH PLANT ON REGULAR SANITATION PROCEDURES

Product	Fresh		Stored 5 days at 45 F
	Plate count	Coli- form	
Skim	<3,000	0	25,600,000
Homo	<3,000	0	24,800,000
M.V. ^a	<3,000	1	26,400,000
H.H. ^b	14,100	0	2,700,000
W.C. ^c	<3,000	0	7,500,000

^aMultivitamin; ^bhalf and half; ^cwhipping cream.

TABLE 2. PLATE COUNTS ON FRESH AND STORED SAMPLES WITH PLANT ON IMPROVED SANITATION PROCEDURES

Product	Fresh		Stored 5 days at 45 F
	Plate count	Coli- form	
Homo	400	0	2,100,000
M.V. ^a	600	0	9,100,000
H.H. ^b	900	0	3,000,000
W.C. ^c	100	0	17,000,000
Skim	700	0	9,200,000

^aMultivitamin; ^bhalf and half; ^cwhipping cream.

TABLE 3. PLATE COUNTS ON FRESH AND STORED SAMPLES WITH PLANT ON IMPROVED SANITATION PROCEDURES

Product	Fresh		Stored 5 days at 45 F
	Plate count	Coli- form	
Homo	400	0	700
M.V. ^a	700	0	3,300
H.H. ^b	300	0	300
W.C. ^c	500	0	100
Skim	800	0	6,000

^aMultivitamin; ^bhalf and half; ^cwhipping cream.

TABLE 4. PLATE COUNTS OF STORED SAMPLES SHOWING INADEQUATE POST-PASTEURIZATION CLEANING AND SANITIZING

Product	At HTST	Plate counts after storage 5 days at 45 F		
		At filler bowl	In carton	Empty carton
Homo	22,000	26,000	30,000	0
Skim	<3,000	10,000	60,000	0
M.V. ^a	<3,000	520,000	1,300,000	0
2%	<3,000	8,000	1,300,000	0

^aMultivitamin.

TABLE 5. PLATE COUNTS OF STORED SAMPLES SHOWING FILLING AREA AS SOURCE OF CONTAMINATION

Product	At HTST	Plate counts after storage 5 days at 45 F		
		At filler bowl	In carton	Empty carton
Homo	<3,000	<3,000	150,000	0
Skim	<3,000	<3,000	3,600,000	0
H.H. ^a	<3,000	<3,000	29,000	0
Whip	<3,000	<3,000	130,000	0
M.V. ^b	<3,000	<3,000	52,000	0

^ahalf and half; ^bmultivitamin.

TABLE 6. PLATE COUNTS OF STORED SAMPLES OF GLASS PRODUCTS SHOWING BOTTLE FILLER AS SOURCE OF CONTAMINATION

Product	At HTST	Plate counts after storage 5 days at 45 F		
		Above filler	Bottled product	Empty bottle
Homo	<3,000	<3,000	460,000	0
Stand ^a	<3,000	5,000	840,000	0
M.V. ^b	<3,000	<3,000	59,000	0
Skim	<3,000	<3,000	310,000	0

^astandard milk; ^bmultivitamin.

TABLE 7. PLATE COUNTS OF STORED SAMPLES TAKEN AFTER IMPROVED SANITATION

Product	At HTST	Plate counts after storage 5 days at 45 F		
		At filler bowl	In carton	Empty carton
Homo	<3,000	<3,000	4,000	0
Skim	<3,000	<3,000	<3,000	0
H.H. ^a	<3,000	<3,000	<3,000	0
Whip	<3,000	<3,000	<3,000	0
M.V. ^b	<3,000	<3,000	6,000	0

^ahalf and half; ^bmultivitamin.

TABLE 8. PLATE COUNTS SHOWING A PROBLEM WITH CREAM PRODUCTS AND THERMODURIC BACTERIA

Sample	Plate counts after storage 5 days at 45 F	
	Fresh	After storage
Regular	22,000	23,000
Homo	12,000	16,000
Skim	6,000	6,300
H.H. ^a	5,300	12,000,000
C.C. ^b	<3,000	6,000,000
W.C. ^c	3,400	10,000,000

^ahalf and half; ^bcoffee cream; ^cwhipping cream

fresh sample are incubated at low temperatures such as 41 F, little indication of numbers of such bacteria that develop during storage at 45 F can be obtained from this count. This emphasizes the limited sanitary significance of the standard plate count on a fresh, processed sample.

Table 3 shows results obtained in the same plant and provides an indication of what can be expected after results of the keeping quality test have been followed by a conscientious effort to eliminate all deposits and effectively sanitize the equipment. This may include equipment such as valves, pipelines, tanks (including surge tanks), and especially fillers.

Tables 4 and 5 illustrate how an in-line sampling method provides information on source of contamination. Samples were removed with a sterile hypodermic syringe through sterile rubber serum caps at different locations in the system. In one instance in Table 4, contamination in the line is indicated. In Table 5 low counts at the filler bowl and sterile cartons place the difficulty at the paper filling machine. Table 6 illustrates the same situation for the glass bottle filler. Paper machines sometimes offer special problems with such items as contaminated mandrels or other surfaces, excessive condensate that drips or is blown into clean cartons, and contaminated lubricants. Such equipment may have to be studied carefully to locate possible contamination sources.

Carton counts were obtained by rinsing cartons with 10 ml of sterile water and plating this out. As a further check on the bacteriological condition of the containers, sterile milk was added to a considerable number of both paper cartons and glass bottles and a count made of the milk after 5 days of storage at 45 F. Neither paper cartons nor glass bottles yielded organisms capable of increasing in the milk at 45 F.

Table 7 provides an example of excellent control over the sanitary condition of the entire system. This can be accomplished by careful analysis of the cleaning and sanitizing of all surfaces that come in contact with product or which might drip condensate into the product. Special precautions particularly with the glass and paper fillers are necessary to consistently produce results such as these. However, with such a product there is a vast improvement in keeping quality in the home and restaurant. Return date has been extended at least three days and freshness in flavor often several more.

Table 8 illustrates a situation often occurring in smaller plants that may place their cream in cans to be later dumped into the filler for packaging cream products. Cans in a dairy plant are a common source of such bacteria because they frequently are not as well cleaned and sanitized as regular process-

TABLE 9. PLATE COUNTS SHOWING A CLEAN PLANT WITH EVIDENCE OF THERMODURIC BACTERIA IN RAW SUPPLY

Sample	Fresh	After storage 5 days at 45 F
Regular	5,300	4,400
Homo	16,000	10,000
H.H. ^a	3,100	<3,000
W.C. ^b	3,100	<3,000

^ahalf and half; ^bwhipping cream.

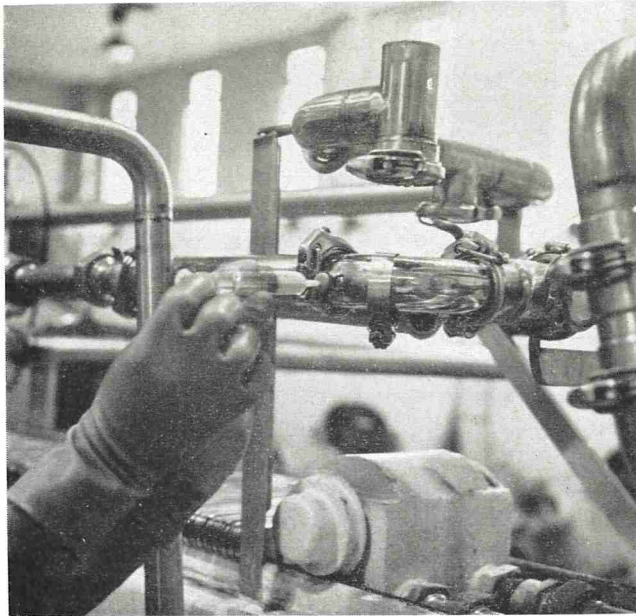


Figure 2. Sampling at HTST pasteurizer using plastic hypodermic syringe. Sample is removed through rubber serum cap inserted on nipple welded onto elbow. Metal clamp at right is placed over nipple when not sampling to maintain pressure on serum cap.

ing equipment. Any product going through such cans may thereby pick up such contamination. The first 3 products shown in Table 8 and those shown in Table 9 indicate another interesting type of information provided by the keeping quality test when counts are run on both the freshly processed product and that stored at 45 F for 5 days. The numbers in the freshly processed samples appear high, presumably due to the excessive numbers of thermophilic bacteria in the raw supply. However, the plant systems handling these products are clean as

evidenced by the lack of increase in numbers during the keeping quality test.

APPLICATION OF METHOD TO ICE CREAM MIX

Long transportation and extended storage periods now employed for ice cream mix pose a real problem in bacterial control. Widespread use of counter freezers under a variety of conditions provides ample opportunity for bacteria to develop in the mix before freezing. This emphasizes importance of keeping quality tests on pasteurized mix as well. Table 10 shows results on various mix samples in an attempt to pin point sources of contamination. Careful attention to various cleaning and sanitizing steps has demonstrated that mix can be improved in keeping quality also as shown by the 12% product in Table 10.

APPLICATION OF METHOD TO COTTAGE CHEESE

Considerable information on sanitary condition of cottage cheese equipment or wash water can be obtained by applying the same type of test to this product. Excessive bacterial counts in cottage cheese after 5 days of storage at 45 F usually indicate unsanitary plant conditions assuming culture organisms are not added to the dressing.

SUGGESTIONS FOR IMPROVING SANITARY CONDITION OF POST-PASTEURIZATION EQUIPMENT

Following are some of the fine points which will make the difference between a successful or unsuccessful keeping quality program:

1. Insure an adequate cleaning system regardless of whether it is manual or CIP. The index of cleanliness is best determined by visual inspection using a strong flash light supplemented by the use of the black light. A program for periodic checking of valves and gaskets is strongly recommended in automated systems or disassembly systems. Often-times automated systems need to be checked thoroughly by local or factory representatives.

2. Manual valves and gaskets on take down lines are extremely critical areas. These should be individually washed or circulated and sanitized just prior to assembly. Care should be taken to sanitize

TABLE 10. PLATE COUNTS OF STORED ICE CREAM MIX SHOWING INADEQUATE POST-PASTEURIZATION CLEANING AND SANITIZING

Product	Plate counts after storage 5 days at 45 F				
	At past.	At cooler	At surge tank	At Filler	In can
12%	<3,000	<3,000	<3,000	<3,000	<3,000
4%	<3,000	15,000	18,000	9,000,000	TNC
6%	<3,000	6,000	2,000,000	3,000,000	TNC
Shake	<3,000	<3,000	4,000,000	4,000,000	4,000,000
Choc. shake	<3,000	<3,000	19,000	400,000	TNC

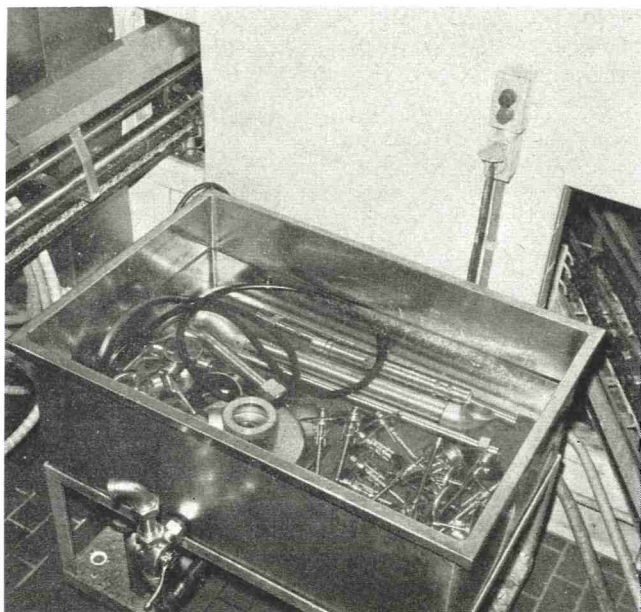


Figure 3. Immersion tank with 200 ppm chlorine solution for glass filler parts.

the contact surfaces also.

3. Sanitize with a product that will provide effective destruction of all types of bacteria. Use of proper concentrations and time intervals for bactericidal action are also important. The sanitizers most widely used due to their effectiveness and low cost are the chlorine-containing products. A 200 ppm solution of chlorine allowed to react for at least 30 sec is an adequate general sanitizer. Application of sanitizers by spraying a solution may offer better wetting action resulting in greater bactericidal efficiency than fogging.

4. Personal hygiene cannot be overemphasized. Avoid human contact, especially hands, on sanitized equipment. This particularly applies to filling machines. If it is necessary to make adjustments, be sure to wash and sanitize hands before performing an operation. In some plants operators wear rubber gloves, especially when assembling or manipulating filling machine parts.

5. Paper and bottle filling machines have many vulnerable areas that can contaminate the product before or during filling. The filling assembly is perhaps the most vulnerable. All removable parts should be thoroughly cleaned by recirculation if possible and left disassembled in an orderly fashion. Just prior to use, all parts should be sanitized individually by immersion or spraying before assembly to the previously sanitized body of the machine (Figure 3). All gaskets and "O" rings should be sanitized by immersion. Surfaces which they contact should also be sanitized. Wearing rubber gloves is a good practice to avoid contact with bare hands and also to protect hands from irritation by sanitizer solutions.

The remaining body of the machine should also be sanitized by fogging or spraying with an appropriate sanitizer. Glass machines having multiple filling heads should be assembled in the same fashion described. It is also desirable to spray sanitizing solution at intervals over filler parts during assembly (Figure 4). Lubricants used should be sterile. Where detailed assembly instructions are necessary, it may be helpful to provide printed instructions listing specific operations in their order of execution.

Additional thought needs to be given to design and construction of filler assemblies to simplify and reduce contamination from other sources such as condensate.

6. Most large dairy plants will operate their fillers for long periods of time resulting in the accumulation of milk solids, fat and condensate on machine parts. These areas become ideal vehicles for contamination by psychrophilic types. Therefore, it is equally important to flush them down with sanitizing spray. A convenient time to do this is between products or while changing to a different tank. Starting with the uppermost portions such as the filler bowl and working down, spray the entire filling area (Figure 5). Condensate on some machines gathers on the carton forming mandrels. This area can also be sanitized by spraying with a sanitizer.

7. Seeking out the source of contamination may save time and expense in the long run. By utilizing various sampling techniques such as those described earlier, one can trace back and obtain information relating, for instance to: the failure of automated CIP systems, build-up in tanks or crossover lines, non-functioning or dirty valves, dirty pumps, broken

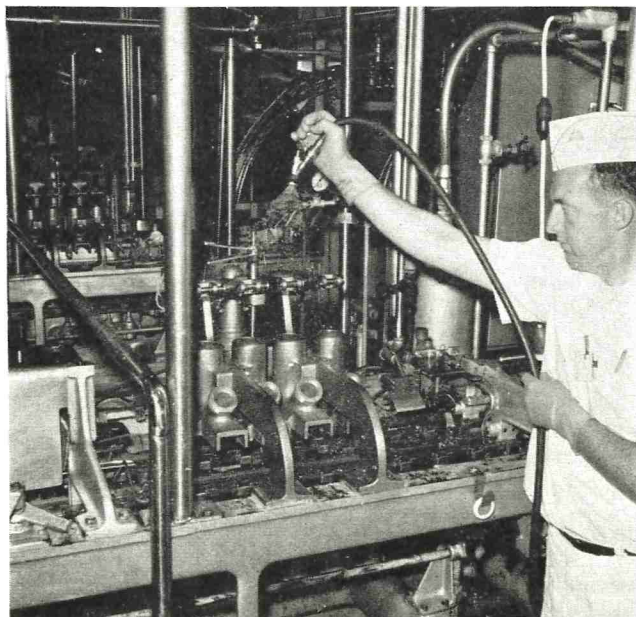


Figure 4. Spraying partially assembled filling area of paper carton machine with 200 ppm chlorine solution.

plates of HTST and numerous other sources.

8. Pride of workmanship helps in many ways to maintain high standards and to stay on top of the keeping quality problem. Once the approach and objectives of such a program are explained to plant workers, they seem to follow it with great interest and willingness to cooperate. Management has a responsibility in recognizing such cooperation on the part of employees.

RESPONSIBILITIES FOR SANITARY CONDITION OF PLANT EQUIPMENT

The keeping quality test should be considered a useful tool that must be applied in order to provide a product that will remain in satisfactory condition through the longer marketing and consumption period encountered today. It should be utilized by the plant crew to eliminate important trouble spots. In some cases it may be necessary to call in paper carton machine representatives or sanitation automation representatives to analyze their installations for possible faulty construction or operation.

One fact graphically emphasized by application of this yardstick is that ultra-high pasteurization processes and similar improvements are not practical until the keeping quality problem is worked out. A careful study of the problem of post-pasteurization contamination has demonstrated that a satisfactory degree of cleanliness can be accomplished with very little extra effort and no more expense on the part of the plant crew. Results have further demonstrated that the improved keeping quality attained pays dividends in a longer marketing period, fewer returns and fewer customer complaints. Milk as used in restaurants, schools and the home is greatly improved; return date has been increased from 5 or 6 days to 9 or more days with product still comparatively fresh. Plants on this program are enthusiastic about it.

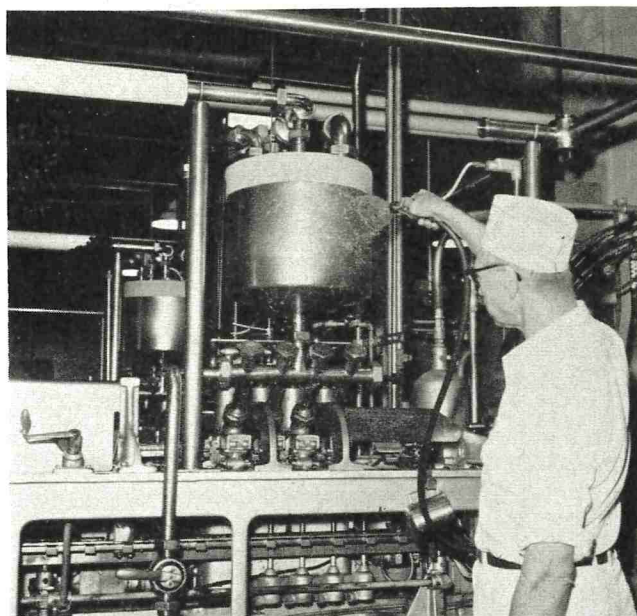


Figure 5. Flushing off filling area of paper carton machine between products with 200 ppm chlorine solution. Purpose is to remove and sanitize condensate and flush off accumulated milk solids.

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PROBLEMS ASSOCIATED WITH THE EVALUATION OF ULTRA-HIGH-TEMPERATURE PROCESSES FOR THE PASTEURIZATION OF MILK AND MILK PRODUCTS¹

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Several developments in the dairy industry have created interest in thermal processes that permit greater lethality to bacteria than conventional pasteurization processes, yet minimize deleterious chemical changes in the milk being processed. The shelf life of milk has been of concern to processors for many years; in fact, the heating of milk to prevent its souring before it reaches the consumer was carried out secretly by dairies prior to the general acceptance of pasteurization. Accordingly, a heating process, or what is today a pasteurization process, has been recognized for many years as being of economic importance to the processor because, in addition to its public health function of inactivating pathogenic microorganisms that may be present in the raw milk supply, it increases the shelf life of the product.

With the pasteurization of cream-line milk, significant increases in either time or temperature over the legal pasteurization standard could not be used successfully because of impairment of cream line. The development and wide acceptance of homogenized milk led to rapid deemphasis of cream line, permitting pasteurization above the temperatures required for public health reasons. With the consolidation of dairy plants in the United States and the attendant increase in distances required for distribution of the pasteurized product, processors have generally increased the temperature for pasteurizing homogenized milk above the minimum legal standard to gain a greater bacterial kill as well as other desirable chemical changes and, by doing this, to increase the shelf life of the product. With the vat and high-temperature short-time process, the upper limit of temperatures and/or times that can be used is governed by the production of off-flavors caused by overheating the product. Research on pasteurization times and temperatures has shown that bacteria are more sensitive to relatively high temperatures for times of a few seconds or less than are the chemical changes that produce an objectionable heated flavor in milk. Accordingly, interest has arisen in the pasteurization of milk by processes that use relatively high temperatures for short periods of time. These

processes have been given the general label of ultra-high-temperature (UHT) pasteurization. Although many definitions have been suggested for UHT pasteurization, only processes involving final heating temperatures from 190° to 270°F with holding times shorter than 2 seconds should be considered UHT processes. The upper limit of 270°F was selected because, in general, thermal processes for milk involving final heating temperatures higher than 270°F are designed not to pasteurize but to sterilize.

Although many time-temperature combinations in the UHT range of pasteurization are unquestionably as effective from a public health standpoint as the time-temperature combinations used for existing pasteurization processes, a few problems must be solved before UHT processes can be generally accepted. Pasteurization at 194 F in the Vacreator, although a UHT process, will be excepted from consideration because standards have been set for pasteurization with this equipment.

Several general types of equipment are available to the dairy industry for operation in the UHT range. Of these, most interest appears to be centered on plate heat exchange similar to that used for high-temperature short-time pasteurization (HTST) and on steam injection. The problems associated with the evaluation of these two processes are somewhat different and for this reason will be discussed separately.

PROBLEMS ASSOCIATED WITH THE EVALUATION OF UHT PASTEURIZATION BY PLATE HEAT EXCHANGE

In plate-type pasteurizers operated in the UHT range of times and temperatures, evaluation problems include (a) selection of a time-temperature combination or combinations for UHT pasteurization, (b) development of a control system so that the lag time in the flow-diversion valve, temperature-sensing element and controller combined is not greater than the holding time of the process, (c) determination of the effect that flow conditions at the holding tube entrance have on holding time, and (d) development of suitable procedures for determining the response speed of the flow-diversion valve and controller in the field.

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Time-temperature combinations for UHT

Pasteurization is practiced, at least in part, to ensure that viable pathogenic microorganisms in dairy products will not reach the consumer. Accordingly, when new processes are proposed one of the first considerations must be of time-temperature combinations that will satisfy public health requirements. When the data on thermal inactivation of bacteria, rickettsiae, viruses, and molds, are reviewed, it is apparent that virtually no data exist on thermal inactivation with heating times shorter than 2 seconds.

When standards of time and temperature for UHT are considered, it appears that two approaches are possible. The first would be to wait until satisfactory data are available and then designate time-temperature combinations. This is objectionable since it is believed that a number of years will elapse before thermal inactivation data are available for the majority of the pathogenic microorganisms that may be in milk. The second approach is to extrapolate the existing data and add a wide margin of safety so that it would be inconceivable for any microorganism to be inactivated by an existing process and to survive the new process. This approach has the advantage of temporarily circumventing the "data hurdle", but may be disadvantageous to some processors in that the selected time-temperature combinations cannot be applied to all products because of product damage from high heat processing. Also implicit in the latter approach would be a continuing reappraisal of the time-temperature combinations for UHT pasteurization as more data on the thermal inactivation of microorganisms become available.

Review and extrapolation of existing data indicate that a time-temperature combination selected from the semi-logarithmic extrapolation of the existing time-temperature combinations for ice cream mix (155 F, 30 min; 175 F, 25 sec) appear to meet the criteria for the second approach to the data problem for processes involving plate-type heat exchangers. An infinite number of times and temperatures can be selected in this way, but this is undesirable since a large number of time-temperature combinations for UHT would cause confusion in the field. Two combinations of time and temperature for UHT pasteurization extrapolated from the combinations for ice cream mix (155 F, 30 min; 175 F, 25 sec) are 191 F for 1-second hold and 201 F for a 0.1-second hold. Interest has been expressed in a temperature standard for a 3-second process. If the foregoing criteria are used, a holding temperature of 185 F is indicated for a 3-second holding time. These combinations of time and temperature would be applicable to all products (milk, chocolate milk and drink, skim milk, cream, and ice cream mix) pasteurized in plate-type heat exchangers. Sufficient data may, however,

prove that these combinations of times and temperatures are more severe than necessary for public health reasons. Available data on heated flavor in milk indicate that no serious problems should be experienced by UHT processors.

It has been suggested that the extrapolated line formed on semi-logarithmic paper by connecting the existing time-temperature combinations for milk (145 F, 30 min; 161 F, 15 sec) be used to determine the UHT time-temperature combinations for milk pasteurization. This line has a "slope" (z value) of 7.7 F, however, vegetative cells of bacteria have been shown to have higher z values than 7.7 F. As a result, the existing milk pasteurization times and temperatures cannot be extrapolated into the UHT pasteurization range and used for time temperature combinations for these processes.

Control response time

In a plate heat exchanger pasteurization process, the total response time of the flow diversion valve and its controller cannot exceed the holding time of the process. For example, for a process with a holding time of 1 second and with the temperature-sensing element of the flow diversion valve located at the inlet of the holding tube, the flow diversion valve and its controller must react in a total time of 1 second or less to prevent the forward flow of underheated milk. For modern instrumentation, a 1-second response time should not be difficult to meet; however, no commercial controller and flow-diversion-valve system designed for milk and milk products is known that has a response time of 1 second or less. If the system has a faster response time than the holding time of the process, a time delay relay will have to be used to prevent the flow diversion valve from going from the diverted to the forward flow position until the product passing through the valve is adequately pasteurized.

Timing the holding tube

For processes with holding times of a minimum of 3 seconds, it is believed that the existing techniques of timing the holding tube can be used if the timing device is modern and has an integral timer. With holding times of 1 second or less, attempting to measure holding times in the field appears impractical because of the limitations of existing instrumentation for this purpose. Accordingly, for the shorter holding times, holding tube lengths must be calculated. If industry practice in regard to sizing holding tubes for the various HTST heat exchanger capacities is continued, the approximate length of the holding tube for the typical plate heat exchanger will be 8 inches for each second of holding time. Actual conditions for an individual heat exchanger can produce large variations from this generalization.

For a 1-second holding time, the length of the holding tube will be extremely short and, from a practical standpoint, probably will be the length of tube required to go from the bottom part of a terminal block to a flow diversion valve connected to the top part of the same terminal block. With such a short holding tube, perturbations in flow caused by an elbow or reducer at the inlet of the holding tube can produce significant alterations in flow conditions and, from this, changes in holding time. With entrance perturbations, the residence time of the fastest particle may be less than a calculated value; in fact, the residence time may be less than a measured value if the timing probes are located at the center of the holding tube.

PROBLEMS ASSOCIATED WITH THE EVALUATION OF UHT PASTEURIZATION BY STEAM INJECTION

As with UHT pasteurization by plate heat exchange, steam injection can be used to produce a satisfactory pasteurization process. Most designs for steam injection include a plate heat exchanger for preheating the product and possibly for regeneration purposes, plus a steam injector, holding tube, and vacuum chamber(s) for removing the water injected as steam and for cooling the product. The vacuum chambers are usually followed by a plate cooler to complete the cooling of the pasteurized product. Before this process can be universally accepted, several problems must be resolved. One of the first is to establish the general sequence of types of equipment that will be used for the process. Once the process is identified in terms of sequence of general types of equipment and procedures for processing milk and milk products, then the public health significance of each of the steps used in the process can be more specifically evaluated. At this time some general problems can be identified that pertain to most of the equipment proposed for UHT pasteurization by steam injection. Some of these are (a) satisfactory controls for the flow diversion valve or flow stop used in the process, (b) determination of mixing length after steam injection, (c) prevention of vapor formation in the holding tube, (d) selection of proper controllers and location of sensing elements for these controllers, and (e) time-temperature standards for UHT by steam injection.

Controls for flow diversion or flow stop

The problems of flow diversion or flow stop controls with steam injection are somewhat similar to those of UHT by plate heat exchange except that with steam injection a more precipitous drop in temperature can be anticipated upon steam failure because of the difference in the mass of a steam injector and that of the heating section of a UHT plate

heat exchanger. Response times have been determined by measuring time required for the controlling device to traverse 63% of a step change. With plate heat exchangers, step changes in temperature do not occur and the 63% requirement appears realistic for plate heat exchange processes. With steam injection, a step change in temperature can occur so that a controller and flow-diversion-valve system that meets the speed of response requirements of the testing procedure in current usage will not necessarily guarantee the prevention of forward flow of underheated products. Accordingly, response time requirements for the sensing-element controller, and flow-diversion-valve system used on steam injection equipment may have to be more rigorous than those similarly used in plate heat exchangers.

Mixing length

By definition, pasteurization is a process of heating every particle of milk or milk product to a given temperature and holding it at that temperature for a given time. To identify the holding time, the time required for every particle of milk or milk product to reach the holding temperature must be determined. To do this, the mixing length required by the various designs of steam injectors must be known for a range of operating conditions. Instrumentation is available to obtain these data, and studies are underway in at least one laboratory in this country.

Prevention of vapor formation in the holding tube

With holding temperatures over the boiling point of the product, the holding tube must be under pressure to prevent product vapor formation with partial displacement of the holding tube and a reduction in holding time. With these processes, the holding tube can be kept under pressure by a valve at the discharge end. Since the setting of this valve can affect flow rates in the holding tube, this represents another potential problem in controlling processes.

Selection of proper controller for UHT pasteurization by steam injection

The location of the steam-controller sensing bulb for the steam injection unit is of considerable importance in the satisfactory control of this process. The bulb must be located so that control of the process results with minimum oscillation of the setting of the steam inlet valve. Severe cycling of this valve will result in slugs of product heated to different temperatures and create severe mixing problems in order to give a uniform product temperature at the inlet of the holding tube. Vacuum chambers must be controlled to prevent dilution or extensive concentration of the product being processed, however, controls for vacuum chambers are in extensive use today

in connection with HTST equipment and appear directly applicable to UHT by steam injection.

Time-temperature standards for UHT by steam injection

The major portion of lethality to microorganisms in the steam injection UHT process is in the holding period since heating and cooling are effected in extremely short periods of time. Accordingly, when UHT by steam injection and UHT by plate heat exchange are evaluated in terms of microbial lethality, these two processes, although running at the same holding temperatures and holding times, may give substantially different results. As discussed in the section on UHT by plate heat exchange, very few directly applicable data are available on thermal inactivation of microorganisms, and therefore, any standards that could be considered at this time must contain what appears to be wide margins of safety.

Before time-temperature standards can be considered for UHT by steam injection, data must be available on the times and temperatures experienced by a particle of milk or milk product as it passes through a UHT steam injection system. From these

data, lethality to microorganisms can be calculated and compared with the data available on the thermal inactivation of microorganisms. Once this is done, a judgement can be made whether the proposed UHT processes by steam injection produce only marginal microbial inactivation or contain a wide degree of safety over requirements indicated by the extrapolation of existing microbial inactivation data. As with UHT by plate heat exchange, any tentative time-temperature combinations for pasteurization must be subject to revision when more data are available.

In summation, the problems associated with the evaluation of UHT pasteurization by either plate heat exchange or steam injection appear superable. Of the two types of processes, UHT pasteurization by plate heat exchange with measurable holding times has fewer problems associated with process evaluation and control. It is hoped that if the UHT pasteurization process is of value to the dairy industry the problems associated with the control and evaluation of these processes can be resolved in the near future so that recommendations can be made for UHT pasteurization of milk and milk products.

THE NEXT 50 YEARS WITH IAMFES¹

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One of the most promising ways to chart the character, the make-up, the objectives and the achievements of IAMFES in the next 50 years is to take bearings on the history of the organization in the past 50 years, and plot a course. It must be presumed the objectives of the Association and its members will be similar to those already stipulated in the Constitution of the Association. It can be easily surmised, however, that the methods of achieving the objectives of the professional members and the Association may be radically changed in the next several decades.

The life and survival of any nation, history shows us, are inevitably tied to the burden of taxes, however derived, whether by internal assessment or in military defeat. It is no secret there is now in this country a tremendously heavy burden of taxes which citizens of the present and the future must carry. There are two aspects of taxes the professional sanitarian of the future must conjure with: the first is

whether services rendered to the citizen are desired or essential, and the second is whether the basically essential services are being done at the very least possible cost. There will be forced consideration of these two aspects as the pressures for necessary services and budgetary funds increase with population pressures projected for the future. Problems of environmental sanitation are bound to increase in the future, and activities, services, procedures and methods now considered essential and effective will be considered unnecessary and ineffective and will be replaced.

It is probable the techniques of routine regular inspection of products and premises, parts and pieces will give way to a system of surveillance through statistical sampling and monitoring equipment useful in providing information of a broad nature rather than about minutiae.

The concept of aesthetic evaluation plays an important though imponderable part in present day routine sanitation inspection work. The understanding of the profit effectiveness of aesthetic sanitation in modern food production of the future probably

¹Presented at the 50th Annual Meeting of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., October 22-25, 1963 at Toronto, Canada.

will be widespread because competition of large-scale operations will provide it. Sanitarians will devote their efforts to other and perhaps more restricted fields or problems affecting public health. The emphasis will shift from regular enforcement of food and milk programs as we now know them to more generalized enforcement of programs in fields such as air pollution, water pollution, public housing, waste disposal, and environments involving food operation and utilization. There is evidence of a trend in this direction today; institutional foods are preprocessed, prepackaged, and quickly served in selected portions in the majority of restaurants; the institutional vending of prepared, prepackaged hot and cold foods is destined for much greater utilization.

In the recent decade there has been much consolidation and enlargement of food production facilities, and food distribution facilities. Marginal farms have been absorbed or abandoned; marginal or inefficient process units likewise have been and are being consolidated into larger operations. New systems of distribution have been developed so that new and varied forms of products have become available. The total number of farms operated in 1962 was about 2,000,000 less than in 1950; present numbers are about 3,688,000. It appears that such consolidation and development will continue for a significant period. The capital investments in replacement of equipment in industry have varied from 718 to 1,053 million dollars annually in the past 15 years. From 1941 to 1961, the manhour input required for production of foods decreased 14%, while product output increased 35%; the productivity per manhour thus rose 56% (5). This change implies greater volume production and greater mechanization of operations, which in turn have minimized the variable of human management.

One of the cause-and-effect aspects of this industrial change going on in the food industry is the cost of food and the amount of food consumed per capita. Consumers spent \$319 per person for food in 1947-1949 and \$392 in 1961, representing an increase in cash outlay of 23%. In this interim the disposable income increased 59%, from \$1,248 to \$1,987. The proportion of income spent for food declined from 25.6% in 1947-49 to 19.7% in 1961. This is but part of the story, because the revolution in food engineering and food technology in the past decade or so has made available a greater selection of better quality foods. It is estimated that the quantity and type of foods purchased in 1935-39 would cost only 14.5% of the current disposable income. These observations are of great importance in assaying tolerance to taxes, and it should be obvious that competitive practices will give continued

stress to this type of change.

This leads directly to an examination of the potentials in some areas of production. In some phases of food production, such as poultry, there has been and can be tremendous consolidation of operations. It has been suggested that shortly some 90% of the nation's poultry requirements could be produced on 50 commercial poultry farms; that in each of coadjacent selected plants process rates of 10,000 birds or 27,000 pounds ready-to-cook poultry per hour are feasible. Bird ranches already are in operation, handling 200,000 to 500,000 continuously. This is in a sense looking forward to the picture portrayed about 1890, in the book "Looking Backwards 2,000 Years," by Edward Bellamy (1). The potentials of consolidation of operations of this type are great and do have a direct bearing on the nature of sanitation work to be done in the future.

Thus, most certainly we may look forward to a fewer number of plants used in production and processing of food. Automation will be an essential part of such operations. The successful operation of these plants will require managers with advanced technical training. The larger plants, with large-scale automated equipment, will require fewer employees per unit of product, thus altering the sanitation supervisory problem. The operations will be controlled and monitored by integrated, continuously operating, automatic, analytic techniques that will depict desired measurements of sanitary quality.

The managers of such operations, in all probability, will have intense basic scientific training plus technical training, along commodity lines. These men conceivably and necessarily will be trained as sanitarians because of the economic necessity of sanitary control in large-scale process operations. Sanitary practices now considered on a recommended basis will be incorporated as mandatory procedures inherent to the process. The management will attend, more frequently, technical refresher courses to keep abreast of food engineering developments.

Although food production has kept pace, and even better, with the rate of population increase, there is no biological precedent by which to believe it will always be so. The necessity of producing food will become intense with the years, particularly in the light of declining soil and water resources. The food industry can look forward to the necessity of use of more fertilizers, pesticides, preservatives, functional components, and modified forms of foods. Thus, present day concepts on the margins of safety necessary for the protection of health must give way to newer concepts in order to have food. Assuredly, greater emphasis will be given to environmental factors, but much more will be known about them; there should be available rapid monitoring tech-

niques by which hazards to safety can be more quickly assayed.

During the past decade it has become more apparent state and local governments are incapable of dealing with the complexities of modern society, especially as they relate to public health. Herbert Hoover once described the social security of his day as the larder in the cellar. Dietary has changed from bread, meat and potatoes (from the local grist mill and family acres) to food complexes made of ingredients derived from many and, frequently, far distant sources. Whereas travel by horseback was a 30 mile per day rate, today travelers cover thousands of miles and sometimes stop in several political domains en route. Food is no longer processed in the kitchen and consumed principally on the family table, but in ever-increasing amounts through the work of commercial vendors. Water supplies are often derived from multiple-use systems, in vast drainage areas. Waste disposal is a problem of similar vast drainage systems. The effects of these are complexities of health hazards, not controllable only by the individual effort of local area regulatory groups. Efforts to solve such problems will require crushing financial burdens and inevitably must be considered on a federal level. The trend in the demise of local government in solving such problems is provocatively discussed by Lundberg in the book, "The Coming World Transformation" (4). It has been evident for a considerable period that much long-range projected research in public health is financially supported by federal funds assigned to research centers where facilities and personnel can be directed to specific problems. In 1962 the federal government spent \$14 billion for research, which represents 75% of all research spending in the nation. Some 70% of the nation's research and development personnel are working on government sponsored projects. The government currently is supporting some 60% of research work done in industrial laboratories, and a greater percentage of that done in universities (2).

There is a woeful lack of uniformity and an archaic inadequacy in the monitoring of food-borne illness in the United States (3). Real evaluation of the impact of contaminated food cannot now be properly evaluated. Few individuals escape occasional intestinal upset; the migrant habits of a large percentage of the population make tracing of significant outbreaks difficult. The classical point source origin of outbreaks is no longer typical. Yet there is reported evidence that the number of food-borne epidemics has at least doubled in the past 10 years. This problem of proper surveillance of the status of food-borne illness is related to the inadequacy of surveillance of the consumer food supply. The Gross

Committee report (3) makes clear that much useful factual information is obtained regularly by a large number of public and private organizations, but that at the present time no mechanism exists for the collection, processing and analysis of these data. There is great need for a focal point of comparative data on the microbiological, chemical, nutritional, toxicological and related qualities of principal food items. This is a vast area problem in consolidation of information, voluntary and otherwise, from industry and government sources, for eliminating food-borne illness outbreaks. The need for this development becomes greater with the complexity of foods and food processes and the magnitude scale of process operations.

Food supplies are of world-wide origin. Many food organizations deal extensively with raw materials from distant places; few individuals consume a diet without some imported component. Significantly too, multiprocessing of components or functional materials in the preparation of blended consumable products is becoming increasingly common. Thus, there exists a tremendous need for bilateral standards in methods of handling and processing, and in the evaluation of imported as well as exported food components and products. While the finger may readily be pointed at problems on the international scale, it is necessary to point out there is a tremendous need for consolidation of effort on problems at the interstate and intercommunity levels, including terminology, composition description and methodology of acceptance appraisal.

It has been indicated in educational fields that few things are as backwards as educational processes; books, examinations, blackboards are standard fare. There has been relatively little development and utilization of new teaching tools, of models, films and devices to better translate the newer and increasingly complex knowledge of both arts and sciences. This will become necessary in the near day of large-scale food production, processing and distribution where management personnel must be better and more positively informed about the significance of their individual actions. It is not unreasonable to assume that a major work of sanitarians will be devoted to monitoring and training employees and employee organizations in their responsibilities. It is certain that much educational work needs to be done: procedures should include better established courses, more frequent workshops and specific training, and greater emphasis on environmental factors relating to foods. Industry is reducing amortization of much equipment to 10 years because of rapid technical changes. It is imperative the sanitarian be prepared to amortize the knowledge stores, likewise.

There has been a noticeable lag in the rate of development of sanitary standards in many foods industries, in comparison with those in the past decade in the dairy industry. This has been due, possibly, to three causes: (a) the want of a biological yardstick with which to make acceptance evaluations (b) the great diversity of type and of origin of materials in foods; and (c) the continuing process of invention in process and in product. There is not much justification for two sets of standards, one for milk and one for other foods, in the light of complexity and diversity of foods on one hand and the evident reported food epidemics on the other. The educational processes to correct the lag are greatly needed.

The standardization of systems of coding of foods similar to that now proposed for milk would be of estimable benefit to sanitarians. There have been several outbreaks involving several state areas in this country, classified by epidemiologists as from a common source but without positive identification.

SUMMARY

On the basis of these observations, it seems that the future of the IAMFES will involve activities of the following order:

1. Evaluation of the necessity, effectiveness and cost of the work done in its professional service.
2. A modernization of the procedures by which to

attain food sanitation from specific to general programs, with greater utilization of more rapid monitoring techniques and statistical procedures.

3. Greater participation in research and surveillance services at a national, rather than a local level.

4. Professional participation in improved surveillance procedures for food-related illness and in acceptability of consumer food supplies.

5. Professional participation in the development of international standards for import and export food materials and in the development of improved food process and product standards geared to large-scale operations.

6. Professional participation in greater educational activities designed to meet the modernized scope and level of foods processing and of its management personnel.

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REPORT ON THE SANITARIAN'S 1963 JOINT COUNCIL¹

H. S. ADAMS

Delegate from International

Introduction

This report is prepared for presentation to the Association members at the annual business meeting.

Composition of Council

The Sanitarian's Joint Council has continued its original participant membership since its founding in 1956. Present participant associations are the American Public Health Association through the Engineering and Sanitation Section, the National Association of Sanitarians and the International Association of Environmental Sanitation (general), Milk and Food

¹The Executive Board took favorable action on this report at the 1963 annual meeting at Toronto, Canada, and approved the plan in principle. Furthermore, the Board advised its delegates to take whatever reasonable action was deemed necessary to implement this Plan for Certification of Sanitarians and to fulfill the other objectives of the Sanitarians Joint Council.

ation. Each is represented by two delegates and an alternate. A roster of delegates is attached.

The Council's Current Program

While the Council has a number of projects under consideration, the project of consuming importance at this time is a *Plan for the Establishment of the American Intersociety Board for the Certification of Sanitarians*. The purposes of such a Board are as follows:

1. To improve the practice, elevate the standards, and advance the professional functions of the sanitarian in the various fields of environmental health.

2. To grant and issue to qualified sanitarians certificates indicating special knowledge and competence in various fields of environmental health. The fields in which certification may be granted are En-Sanitation, Vector Control, Industrial Hygiene, In-

stitutional Sanitation, Water Supply and Waste Disposal, Housing Hygiene and Environmental Health Administration.

The plan now under study by the Council would establish a Board not unlike the American Sanitary Engineering Intersociety Board or the American Board of Industrial Hygiene. In such cases, the purpose of these Boards is to give recognition to persons who have demonstrated a high degree of professional attainment and have made significant contributions to the field of environmental health.

1963 Annual Meeting

The Council will hold its 1963 annual meeting at Kansas City, Missouri on November 12, 1963, at which time all suggestions from the three Associations represented will be carefully considered. It is expected that the *Plan for the American Intersociety Board for Certification of Sanitarians* will be put in final form at Kansas City.

Action of International and Future Action

It is believed your delegates have kept International's officers and membership well informed of the progress made on past projects and in the current one. However, it is necessary that your delegates know, prior to November 12, 1963, whether the Executive Board and the membership have suggestions to make regarding the *Plan* under consideration.

Since the initial suggestion for such a *Board of Certification for Sanitarians* originated with International, it is presumed that the *Plan* has the associations approval. As a matter of fact at previous annual meetings, your delegates were instructed to proceed with its implementation and this they have done.

Financing the Plan

While the details of financing have not as yet been dealt with by the Council, these will be under discussion at the Kansas City meeting.

In the case of one other similar Board which began operations in 1960, two sponsoring associations loaned \$500.00 each to get their program started. Within three years the loan was repaid and the

current balance of this Board, in 1963, is \$14,000.00. With this experience as an example, it would seem that any monies appropriated by International in the form of a loan, would be paid back rather promptly.

As soon as the Sanitarian's Joint Council has prepared a budget for the Board's anticipated needs for the first year or two of operation, this will be submitted to the Executive Board for decision. The same, will of course, be done for the American Public Health Association and the National Association of Sanitarians since each participant will be asked to finance its proportionate share.

Conclusion

The action the Executive Board and/or the Association should take at this time should be to approve, in principle with certain recommendations for changes, or disapprove the *Plan* which was submitted to you for study several months ago.

Your Sanitarian's Joint Council delegates should be advised of your action as soon as possible but not later than November 6, 1963, so any recommendations made by the IAMFES can be reported to the Council at the annual meeting, November 12, 1963.

Respectfully Submitted,
HAROLD S. ADAMS
Delegate from IAMFES

ROSTER OF DELEGATES

Representing the American Public Health Association

A. Harry Bliss
Berkeley, California
A. F. Parrish
Decatur, Georgia
B. Russell Franklin
(Alternate Member)
Philadelphia, Pa.

Representing the National Association of Sanitarians

Emil T. Chanlett
Chapel Hill, N. Carolina
Edwin L. Ruppert
(Alternate Member)
Washington, D. C.
Larry Gordon
Albuquerque, N. Mexico

Representing the International Association of Milk, Food and Environmental Sanitarians

H. S. Adams
Indianapolis, Indiana
William C. Miller, Jr.
Washington, D. C.
William V. Hickey,
(Alternate Member)
New York City

DISPOSABLE REFUSE CONTAINERS¹

A. B. ROEBUCK

*International Paper Company
New York, New York*

The use of a heavy duty, weather resistant, disposable paper bag for storage and collection of refuse was first introduced commercially in the Scandinavian countries with the initial introduction in Sweden some ten years ago. We, in America, consider refuse to be waste, something to be dumped or burned promptly, and at least cost. Throughout Europe, refuse is considered a conglomerate material from which several valuable components can be extracted. Because of this basic difference, European research work is more extensive and their conservation concepts and operating practices are in many respects, further advanced and superior to ours.

After the initial introduction in Sweden, the use of paper garbage bags became extensive in Western Europe. Today, besides Sweden, they are used in Belgium, Finland, Denmark, Western Germany, France, Great Britain, Ireland, Scotland. Just recently, in Sydney, Australia — a city of 2,000,000 persons, an extensive trial test involving some 2000 residential homes was initiated. The popularity of the paper bags has spread to include some parts of South Africa, where they are used on a limited basis.

While all initial tests were focused primarily on residential use, much work has been done in the adaptation of these bags to institutions, hospitals, restaurants, factories and public service utilities.

Perhaps the greatest user of paper garbage bags is England. Latest information indicates that 87 communities have adopted this system on a limited scale and 154 trials are now in progress.

For the past 3½ years, we in America have been exploring the application of the paper bag for refuse collection. One major manufacturer has been most active, and to date has converted one eastern city to the use of paper bags by means of an enforced ordinance, and there are several other areas under extended test at this time.

In an attempt to evaluate the paper bag application, major paper manufacturers consolidated their efforts, through the Kraft Paper Association, to pioneer this development. Believing this new idea would be an appealing improvement in refuse collection, we solicited the guidance and cooperation of the American Public Works Association, and through joint efforts, 4 test cities were selected. In each city, a

60-day actual test of the paper bags was made. These cities were chosen in various areas of the country for reasons of climate differences, method of collection and disposal, size of city and means of financing the refuse collection operation. The new system was evaluated as a direct replacement for the conventional refuse can under existing collection practices. Of the 1281 families who participated in these tests, over 70% were noticeably in favor of the paper bag system being adopted in their city.

In substance the findings in all four cities were:

1. In each city a substantial majority of the residents who participated voluntarily in the program reported improvement in household storage in terms of sanitation, convenience, and appearance as well as reduction of both noise and spillage during collection.
2. In each city local public works officials (or supervisory personnel) noted an improvement in sanitation and in materials handling during collection and disposal and in some cases collection crews were enthusiastic in their endorsement of it.
3. Under all extremes of weather, from torrential subtropical spring rainfall to sub-zero cold and deep winter snow, the kraft bags performed their function well. It was evident that such few malfunctions as did occur could have been prevented by changes in refuse storage and collection practices, protection from marauding animals or modification of the holder mechanism from which the sack was suspended.

In developing the test program, comparison of the use of disposable bags with conventional metal cans was based on several criteria: sanitation, noise, esthetics, climatic factors, and convenience to both users and collectors. Cost investigations were also attempted but it was found that it was not possible to draw reliable conclusions in this series of tests. Cost factors and collection practices vary widely from community to community. Time, motion and tonnage studies made under these conditions were of limited value. Furthermore, cost of hardware and bags, now produced only in pilot quantities, would not necessarily reflect costs were production and competition at full scale. Public acceptance was another significant factor covered in the study.

As stated in the original proposal form, the aim of the program was to evaluate possible contributions of the disposable bag system in terms of, ". . . better sanitation, public convenience and economy. . ." In viewing the program in operation in the four

¹Presented at the 50th Annual Meeting of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., October 22-25, 1963, at Toronto, Canada.

cities the steering committee noted the following with regard to the original criteria.

1. Overall, the disposable paper bag system appears to be more sanitary. Spillage is virtually eliminated. Even where open trucks are used, there is practically no wind-blown debris. At land-fill sites, the unsanitary (and unsightly) effect of wind is likewise largely eliminated. Although only limited tests were made on combustion characteristics, no adverse effect on incinerator operation was noticed, and it would appear that the use of paper bags would not be detrimental.

2. Bags appear to have an advantage in cleanliness. Unlike cans, after collection there is a new clean container on-site. How much cleaner cannot be determined since there is no way of measuring how regularly or how well the average householder cleans the metal refuse container.

3. During the tests, some reluctance was noted on the part of householders to use a second bag when needed, and excess refuse was placed in miscellaneous containers, some satisfactory and some not. If a bag system were adopted, some means for overcoming this practice would have to be found.

4. Experience during the test with insect and fly control was not entirely satisfactory. This was largely attributable to inadequacy of hardware design. Lids, which should fit tightly over the holder, were occasionally bent so they did not entirely close, or were left open altogether. Design of the cover should be sturdier so that it would resist distortion should hinges become stiff because of corrosion or freezing. In this regard, it should be noted that the tops and lids of metal cans are also frequently damaged in handling and under average conditions provide an inadequate seal against flies and insects.

5. Exposed bags are more vulnerable to animal attack and vandalism than metal cans, particularly where grease penetration occurs. Introduction of a grease resistant compound to the bag and animal guards seemed to partially resolve the problem however. (The problem was significant only where garbage was unwrapped.) In the overall tests, animal and rodent attack was a minor problem.

6. The strength of the bags used in the tests was adequate and little spillage was encountered because of bags tearing, even during wet periods. In the first test which involved unwrapped garbage, bags not treated with grease resistant compounds and a collection process which involved dragging bags for some distance, there was a slightly higher incidence of spillage due to tearing. Also an early model holder had prongs which induced tearing. This condition was improved in the last three tests.

If public acceptance is directly proportional to public convenience, the four-to-one approval indi-

cated in post-test surveys, indicate the system to be more convenient. Some positive factors noted are:

1. In curb-service systems, a bag is easier for the householder to handle than a can and does not have to be returned to its place after collection. (It is likewise easier for the collector to handle in all systems.)
2. There is less noise involved in the collection of bags.
3. There was some indication that users felt odor was reduced.
4. There was strong agreement that appearance was improved.

Through the basis of the test conducted, conclusions as to the economy of the disposable bag system as compared to the conventional system were not found feasible. Too many variables make any generalization invalid. What may be a cost advantage in one community may be the reverse in another.

The general conclusion within our industry is that the use of bags will save 20-40% of the collection time required under conventional methods. This will however vary from city to city, dependent upon the system of collection used.

The nature of this vital activity in our cities is such that it involves a great many factors which vary widely from place to place. Such variables are prevailing weather, point of storage, point of collection, class of living units, requirements for preparation, method and frequency of collection and others.

No solution for the problem of refuse disposal is likely ever to be devised which will be completely satisfactory from the viewpoints of all involved — the user, the collector, the disposer, the municipality. However, the system under consideration here is certainly a contribution to the art, a step in the right direction and worthy of serious consideration.

The benefits derived from using paper bags can be listed as follows:

1. A more attractive, cleaner city.
2. Less spillage at point of collection: refuse completely contained in bag.
3. No unsightly garbage cans at the curb, when curbside collection is used.
4. Less rats, flies or other disease-carrying insects or rodents.
5. Improved sanitation—A new clean bag is used after each collection.
6. Faster collection—No time lost in emptying cans and replacing.
7. Reduction in noise level . . . No clanging cans.
8. Possible use of open bodied trucks instead of the noisier compactor type.

In order to realize the above benefits, we believe that many practices which are common today will need to be modified or changed. We certainly do not believe that simply to substitute a metal frame holder and bag for the present garbage can, utilizing

the same collection equipment and procedures, one could expect to attain maximum benefits.

It is entirely possible that complete systems especially engineered to the use of paper bags, will be required to realize all of these benefits. It is cer-

tain that an educational program will be required to acquaint the users with the different handling techniques required by the paper bag, when changing from the metal garbage can. Preparation and handling of the refuse will also be an important factor.

NEWS AND EVENTS

National Restaurant Association Presents An Educational Bulletin On Foodborne Illnesses To Membership

Recognizing the importance of a better understanding of foodborne illnesses on the part of restaurant operators, the National Restaurant Association has taken an important step toward educating their membership in prevention of these illnesses.

The first step to accomplish their objective was in the form of a letter to all association members pointing out that many people, particularly employes in the Food Service Industry, are not familiar with the "why" and "how" of food contamination. Many operators become too complacent with this important management responsibility, because the food poisoning cases they read about in the newspapers always seem to occur elsewhere. The more food service personnel understand about the problem, the better prepared they are to control it.

Along with the letter a technical bulletin entitled, "Foodborne Illnesses" was enclosed. This bulletin, contained a chart which lists foodborne illnesses known to occur in food service establishments, their causes, the foods involved, how contamination is introduced into the foods, and the preventative or corrective procedures. The chart is designed so that it can be posted, or otherwise used as instructional material for employees. Such material helps employees to become aware of their responsibilities in food protection during preparation and service.

The second step towards safer food service was in the form of a letter to all Directors of Public Health in which the Board of Directors of the National Restaurant Association put themselves on record as strongly urging food service operators to work cooperatively with their local health officials in planning and accomplishing effective food protection programs. Representatives of the National Restaurant Association served on the Industry Advisory

Committee to the U. S. Public Health Service during the revision of the Food Service Sanitation Manual and its ordinance and code. As a result of their service on this committee the Association has recommended the adoption of the ordinance and code by states and municipalities in the interest of improved restaurant sanitation and more uniform country-wide application of food service sanitation regulations and inspection systems. The letter points out, also, that while most of the members recognize the importance of employee hygiene and food service sanitation, many do not realize that the food protection program is a management problem affecting public confidence in their establishments and, therefore; directly related to their business success.

The National Restaurant Association, working to bring about a better realization of the problems involved, is also interested in keeping the public informed of the joint planning and cooperative efforts of the Health Officer-Food Service Operator Team to assure the public of clean, wholesome places to eat. Further, it believes that the public should be kept informed of advances in refrigeration, restaurant equipment, food processing and preservation and in food preparation and serving techniques which insure better food protection.

The "Foodborne Illness" chart is streamlined and does not include many of the illnesses contained in other publications but this is done purposefully in order to make it more useful to a food service operator. The chart will be revised as new data indicates a need for such revision.

Further information may be obtained from Vernon E. Cordell, Director, Public Health and Safety, National Restaurant Association, 1530 North Lake Shore Drive, Chicago, Illinois 60610.

LYLE BEAMISH PRESIDENT OF THE MINNESOTA ASSOCIATION OF SANITARIANS DIES

On January 19th, cancer took the life of Lyle Beamish, 55, affiliated for 35 years with the Fergus Dairy at Fergus Falls, Minnesota as superintendent of the market milk and cream departments and as director of field services. At the time of Lyles passing he was president of the Minnesota Sanitarians Association. For many years he had been active in the dairy industry of Minnesota, having served as president and secretary-treasurer of District 12 of the Minnesota Creamery Operators and Manufacturers Association. He also was a loyal member of the Pioneer Buttermakers Club of America. Funeral services were held on January 22nd. Besides his beloved wife, Marian, Lyle is survived by four daughters, Sandra, Julie, Kathy and Mary Lou, and by one son, Richard.

DANISH SCIENTIST JOINS CALIFORNIA FOOD TECHNOLOGY STAFF

Dr. Hans Riemann, former Director of Research of the Danish Meat Research Institute, has joined the Davis faculty of the University of California as a specialist in food science and veterinary public health.

Dr. Riemann brings to Davis some 20 years of combined experience rarely found in a single individual—as both a food scientist and a veterinarian. Dr. Riemann holds degrees in veterinary medicine and microbial biochemistry from Danish institutions, and he has studied at Cambridge University in England, and the University of Illinois.

Dr. Riemann's native Denmark, where he has spent most of his professional years, has developed a highly advanced technology in food processing, particularly in meats. In his work as inspector, researcher, and teacher with various Danish institutions, Dr. Riemann has been closely associated with these developments.

Since late 1961 he has been Director of Research for the Danish Meat Research Institute in Copenhagen as well as a lecturer in food technology at the Royal Veterinary and Agricultural College and a consultant in food technology to the Danish Meat Production Laboratory. Prior to that he was chief microbiologist and chief veterinarian with the Institute.

Earlier in his career Dr. Riemann was head of the microbiology laboratory of the Danish Ministry of Fisheries, a teacher in food preservation at the Technical University in Copenhagen, an inspector of milk

and meat products for the Danish Public Health Service, and a practicing veterinarian.

He has studied first hand the food processing methods in other European countries, Canada, and the United States. He was a research assistant in the Department of Food Technology at the University of Illinois from 1959-61. Dr. Riemann attended the first International Congress of Food Science and Technology, which was held in London in 1962, and participated that same year in the International Symposium on Food Protection held at Iowa State University. His paper on anaerobe toxins was published in the *Proceedings* of the Symposium. Dr. Riemann also has some 30 other publications to his credit.

During the next few months Dr. Riemann will visit meat processing plants here to become acquainted with our industry. He will also be available for advice on technical problems. Dr. Riemann's research and teaching activities at Davis will involve problems related to meat-borne diseases, animal products, and food processing technology.

14 CANDIDATES VIE FOR 7 VACANCIES ON SUPPLIERS' BOARD

A slate of 14 candidates for seven positions due to be vacated on the Board of Directors of Dairy and Food Industries Supply Association has been announced by the Washington headquarters of the national trade association of firms which furnish supplies, equipment or services to the dairy and food processing industries.

The election will occur April 2, 1964, at Scottsdale, Arizona, at the association's 45th Annual Meeting, and its first meeting since it adopted its new name (until last November, it was known as Dairy Industries Supply Association).

The association is governed by an 18-man Board of Directors, six of whom are normally elected every year for three-year terms. This year, in addition to the six expiring directorships, a seventh directorship must be filled because of the resignation from the Board of the Director-at-Large for the Western Area, Sherman C. Little, Sr., Weber Showcase & Fixture Co., Inc., who unexpectedly retired from his company. His term had two more years to run.

The following are the nominees for the directoral posts:

For Director-at-Large for the Western Area (one to be elected for a two-year term): P. W. Lampman, Vitafreze Equipment, Inc.; and Jack W. White, Fibreboard Paper Products Corporation.

For Directors-at-Large (three to be elected): George A. M. Anderson, The King Company; John H. Bullen, Burry Biscuit division of The Quaker Oats Company; J. D. Catlin, Dixie Cup Division of Amer-

ican Can Company; Paul K. Girton, Girton Manufacturing Company; Peter P. Weidenbruch, Damrow Brothers Company; and Russell B. Wilhelm, Owens-Illinois.

For Chemicals and Refrigerants Commodity Director (one to be elected): George Armstrong, Olin Mathieson Chemical Corporation, Chemicals Division; and F. M. King, Wyandotte Chemicals Corporation.

For Containers Commodity Director (one to be elected): R. M. Lamb, Jr., The Lamb Glass Company; and M. C. Strickland, Smith-Lee Co., Inc.

For Point-of-Sale Commodity Director (one to be elected): D. H. Carter, Kelvinator Division, American Motors Corporation; and Harold R. Rubin, Silver King, Division of the Stevens-Lee Company.

The slate was drawn up by a Nominating Committee, on which the following executives served: John J. Weldon, Bessire & Co., Inc., chairman; E. C. Herr, Universal Cabinet Division Universal Metal Products Co.; Webb C. Jennings, Sun Industries Inc.; R. M. Lamb, Jr., The Lamb Glass Company; S. K. Mahood, Klenszade Products; and Walter Z. Meyer, Paul Mueller Company.

NEW OFFICERS ELECTED AT ANNUAL MEETING OF EVAPORATED MILK ASSOCIATION

Lawrence G. Butler, Executive Vice President, Borden Foods Company (New York) was elected President of the Evaporated Milk Association at its annual meeting in Chicago February 6, Fred J. Greiner, Executive Secretary, announced today. Butler succeeds Gordon Ellis, Executive Vice President, Operations, Pet Milk Company, St. Louis.

Elected to the post of Vice President was William N. Harsha, President of Milk Products Division, Pet Milk Company, St. Louis. George J. Hoffman, Vice President, Dean Foods Company, Franklin Park, Ill. was re-elected Treasurer.

Re-elected to the Board of Directors for a one-year term were: J. D. Anderson, President, The United Company, St. Clairesville, Ohio, Ralph R. Brubaker, Vice President, Carnation Company, Los Angeles, George B. Page, President, The Page Milk Company, Merrill, Wisconsin, and William A. Diehl, President, The Defiance Milk Products Company, Defiance, Ohio.

Organized in 1923, the Evaporated Milk Association is active in nutrition research, education, promotion and public relations programs. Member-service programs include quality control, technological research distribution, and marketing service.

VESICULAR STOMATITIS — PUBLIC HEALTH AND ECONOMIC HAZARD

Two noted veterinarians have reported that vesicular stomatitis, a disease causing teat lesions in dairy cattle, can be transmitted to humans, and can also result in substantial economic loss to dairy farmers.

In an article appearing in the current issue (Feb. 15) of the *Journal of the American Veterinary Medical Association*, Dr. E. M. Ellis of the National Animal Disease Laboratory, Ames, Iowa, and Dr. H. E. Kendall, supervisory veterinarian, Animal Disease Eradication Division, U. S. Department of Agriculture, report that vesicular stomatitis contracted by humans causes symptoms such as chills, fever, and congestion which may last from 3 to 4 days.

The *Journal* article is based on the investigation conducted by the Animal Disease Eradication Division on a dairy herd in November of 1962.

At the beginning of the investigation, the herd numbered 109 cows, 5 of which had vesicular lesions. Eventually 105 cows, 96% of the herd, contracted the disease.

The *Journal* pointed out that the disease was transmitted from cow to cow by milking machines and by the hands of milkers. Four men working in the dairy at the time contracted vesicular stomatitis.

Total economic loss resulting from the disease was nearly \$40,000 the article indicated. "In addition to the loss due to the slaughter of high-producing dairy cows, those that recovered produced only approximately 66% of their original milk volume prior to the infection with vesicular stomatitis," the report said.

28TH ANNUAL MEETING NATIONAL ASSOCIATION OF SANITARIANS

"The National Association of Sanitarians will hold its 28th Annual Educational Conference in Philadelphia, Pennsylvania, June 28 to July 3, 1964, headquarters—Benjamin Franklin Hotel."

OREGON'S CHAMPION DAIRY FOOD MAKERS ANNOUNCED AT OSU

Dairy food manufacturers from Portland, Tillamook and Eugene shared sweepstakes honors in the 1964 Oregon Dairy Products contest. Contest results were announced February 18 at Oregon State University.

Entries of butter, cheddar cheese, ice cream, milk, cream, buttermilk and sour cream from all parts of Oregon were judged on the OSU campus.

Top awards for manufactured milk products were also garnered by dairy processors from Salem, As-

toria, Toledo, Longview, Corvallis, Roseburg and McMinnville. Awards were presented during the Oregon Dairy Industries 53rd annual conference at Oregon State.

Francis Morrill, Mayflower Farms, Portland, took first place in both sweet cream butter and cultured cream butter classes and won the sweepstakes in the butter division. Second place in both butter categories went to Neal McInnis, Mayflower Farms, while Ole Titland, Stanard Dairy, Longview, and James Cooper, Tillamook County Creamery Assn., Tillamook, were awarded the two third place spots in the division. Honorable mention went to McInnis.

In the cheddar cheese division, Gene Allison of Mayflower Farms won the sweepstakes with firsts in both classes and John Haedinger, Mayflower Farms, won honorable mention with two seconds. Bud Etzwiler, Tillamook Cheese and Dairy Association won third in both classes.

Ice cream division sweepstakes honors went to Roy McMahon, Tillamook Cheese and Dairy Association, with honorable mention going to Herbert Lovgren, Kitsap-Mason Dairymen's Association, Shelton, Washington.

First place in vanilla ice cream went to Marvin Mikkelsen, Darigold Farms, Eugene, with second place win to James H. Dunlop, Medo-Land Creamery, Eugene, and third place to Lovgren.

First place winner in both chocolate ice cream and strawberry ice cream classes was J. C. Schmidtkofer, Mayflower Farms, Portland. Matt Vetsch, Matt Vetsch Ice Cream at Portland, placed second in chocolate ice cream; Roy Schlesselman, Darigold Farms, Portland, third.

In strawberry ice cream, Myrle H. Lee, Dutch Girl Ice Cream, Eugene, placed second, and Rodger Long, Dutch Ice Cream, Eugene, third.

First place in the cottage cheese division went to Dale Thomas, Echo Spring Dairy, Eugene, with second to Robert Carson, Mayflower Farms, Portland third to Allen Guthrie, Fred Meyer Inc., Portland.

Medo-Land Creamery at Eugene captured the sweepstakes in the fluid milks products division. Honorable mention was won by Darigold Farms, Astoria.

Gold medal diplomas went to Curly's Dairy, Inc., Salem; Darigold Farms, Eugene; Darigold Farms, Astoria; Darigold Farms, Portland; Mayflower Farms, Salem; Fred Meyer, Inc., Portland; Lincoln Dairy, Toledo; Medo-Land Creamery, Eugene; Standard Dairy, Longview; Sunny Brook Dairy, Corvallis; Umpqua Dairy Products Company, Roseburg, and Echo Spring Dairy, Eugene.

Silver medal diplomas for fluid milk products were won by Darigold Farms, Astoria; Klamath Falls

Creamery, Klamath Falls; Lincoln Dairy, Toledo; Medo-Land Creamery, Eugene; Standard Dairy, Longview; Coos Bay Mutual Creamery, Coos Bay; Curly's Dairy, Salem; Echo Springs Dairy, Eugene; Safeway Stores, Portland, and Sunny Brook Dairy, Corvallis.

Bronze medal diploma winners were Echo Springs Dairy, Eugene; Umpqua Dairy Product Company, Roseburg; Darigold Farms, Eugene; Mayflower Farms, Portland; Sunny Brook Dairy; Corvallis; Sunshine Dairy, Portland; Klamath Falls Creamery, Klamath Falls; Oregon State University Dairy Products Laboratory, Corvallis; Sunshine Dairy, Portland, and Darigold Farms, Astoria.

In the cultured milk products division, Fred Meyer, Inc. of Portland was the sweepstakes winner. Medo-Land Creamery, Eugene, was awarded honorable mention.

Gold metal diplomas in the division went to Darigold Farms, Portland; Echo Springs Dairy, Eugene; Fred Meyer, Portland; Mayflower Farms, Portland; Medo-Land Creamery, Eugene; Safeway Stores, Inc., Portland; Standard Dairy, Longview; Sunshine Dairy, Portland; Tillamook Cheese and Dairy Products Association; Umpqua Dairy Products Company, Roseburg; Curly's Dairy, Inc., Salem; Darigold Farms, McMinnville, and Medo-Land Creamery, Portland.

In the cultured milk products division, silver medal diplomas were awarded to Curly's Dairy, Salem; Darigold Farms, Astoria; Klamath Falls Creamery, and Umpqua Dairy Products Company, Roseburg. Bronze diplomas went to Darigold Farms, Eugene; Kitsap-Mason Dairymen's Association, Bremerton; Northwestern Creamery, Ltd., Victoria, B. C.; Mayflower Farms, Portland; Standard Dairy, Longview; Sunny Brook Dairy, Corvallis, and Tillamook Cheese and Dairy Association.

SAFETY VEST GIVEAWAY ANNOUNCED

A luminous safety vest, visible over great distances for protection along highways at dusk is being presented to fieldmen by Johnson & Johnson, Chicago milk filter manufacturer.

To receive his safety vest, a fieldman need only to arrange an on-the-farm demonstration of the new Western FUL FLO[®] Filter Holder and its use with ROLSTRIP[®] milk filters.

The vest, said to be very popular with hunters for its safety features, can be obtained along with details on arranging the demonstration by writing: Filter Products Division, Johnson & Johnson, 4949 West 65th Street, Chicago, Illinois 60638.

3-A STANDARDS FOR SILO TANKS SIGNED, TO TAKE EFFECT IN '65

3-A Sanitary Standards for Silo-Type Storage Tanks for Milk and Milk Products received their final validating signatures from the 3-A Sanitary Standard Committees on February 10, 1964. The effective date of the new standards, thus, will be February 10, 1965. Publication will take place in the Journal of Milk & Food Technology for October or November, 1964.

The new standards provide cleanability criteria in the fabrication, installation and use of tall storage tanks for milk and milk products, referred to in the trade as "silo"-type tanks.

These new 3-A Standards are completely separate from the 3-A Standards for conventional storage tanks. The 3-A Standards for Silo Tanks are limited to those tanks in excess of 10 feet inside height.

On and after February 10, 1965, authorization may be issued by the 3-A Symbol Council for the use of the 3-A Symbol on tanks which are in compliance with the new standards.

DAIRY EXHIBIT PLANNED FOR VENEZUELA FAIR; CAMENGA, ADA OF N. Y. IS DIS REPRESENTATIVE

The first international trade fairs demonstration in which Dairy Society International will participate in 1964 is scheduled for the National Agricultural and Livestock Exhibition in Valencia, Venezuela, March 14-19. This is a first, also for the Exhibition, for a precedent was set this year by inviting the United States and Canada to participate in what has hitherto been a national Fair.

In charge of the demonstration for DSI and the U. S. Foreign Agricultural Service, with whom DSI is cooperating in this Fair, will be Carl C. Camenga, business manager of American Dairy Association and Dairy Council of New York. Mr. Camenga, who is a native of Brookfield, New York, and who lives at Syracuse, has had wide experience in promoting the use of milk as well as on the technical and managerial sides of the dairy industry.

Emphasis in the exhibit will be on market testing the use of instant products as supplements to regular milk supplies. Three products will be highlighted—"instant" nonfat dry milk, "instant" chocolate drink, and, for the first time in these exhibits, a new "instant" low fat milk, with approximately 1½ percent fat in its reconstituted state. Small size consumer packages, starting with packets which will reconstitute to a quart, will be on sale.

The Dairy Society International exhibit will be the largest in this show which also features wheat, feed grains, soybeans, livestock and livestock products.

The Valencia Exhibition, one of the traditional great fairs of South America, yearly attracts from 250,000 to 400,000 visitors. It has permanent exhibition buildings on the edge of Valencia, Venezuela's third largest city. Eighty or ninety miles west of Caracas, the city is surrounded by good dairy and cattle country.

Mr. Camenga, who was raised on a dairy farm, studied at the New York State Agricultural and Technical Institute of Alfred, N. Y., and at Michigan University. He early worked in a cheese plant, and was assistant farm manager in charge of marketing for a Rhode Island farm. For six years he was in charge of the Dairy Industry Department of the N. Y. State School of Agriculture at Alfred, and for 12 years was on the staff of Dairymen's League Co-op Association in New York. He served as manager of manufacturing plants and as division manager in charge of membership programs. After a war-time interlude with the War Finance Division of the U. S. Treasury Department, as Deputy Administrator in charge of Agriculture Department war bond sales in New York, he joined ADA of New York.

W. L. Phillipsen, assistant administrator of DSI, who flew to Valencia to arrange for the exhibit, said, "We are concentrating our efforts here in showing the Venezuelan housewife how she can use these instant products to supplement her regular supply of fluid milk. We will show her how she can keep instant products on the kitchen shelf for emergencies, and how convenient they are to use. We believe she will be interested."

MEDICAL ASSOCIATION OFFICIAL REVIEWS HEART DISEASE ISSUE

In a speech before the Manitoba Dairy Association annual meeting February 17, Dr. Philip L. White, director of the Department of Foods and Nutrition, American Medical Society, summarized his remarks on "Diet and Heart Disease—Current Concepts" with five conclusions:

"1. If the diet is a factor (in heart disease), it is only one of a number of factors that lead to atherosclerosis and coronary artery disease.

"2. No conclusions can be drawn about the specific role of fats in disease development without reference to other nutrients which are consumed and digested.

"3. Over-nutrition as exemplified by obesity is often associated with cardio-vascular disease.

"4. Medical programs designed to reduce blood lipid levels in patients are still of hypothetical merit only; conclusive clinical evidence of resulting benefit is not yet available.

"5. Finally, until it has been demonstrated that

there is a cause and effect relationship between fat intake and coronary artery disease, after allowing for all other variables, no change in the American diet is recommended. This is true so long as people consume a balanced, varied diet that supplies the required nutrients and is calorically equivalent to needs.

"How do these conclusions relate to the dairy industry?" Dr. White went on. "In this case, the picture is not clear. The information that has related (milk fat) to these diseases has come largely from epidemiological studies, that is, studies of populations and the results for the most part must be considered as generalizations or as circumstantial evidence. Before this information can be properly evaluated, it must be subjected to the experimental approach. Here the dairy industry can help. We need to know more about the effects of (milk fat) in adult nutrition at the levels normally consumed. . . ."

"There are at least two major problem areas in nutrition in this country. Poor nutrition in some of our teen-agers and over-nutrition as demonstrated by obesity in our adults. Both of these problems can be solved by strict adherence to the fundamentals of adequate nutrition—by the achievement of balance in the diet. Balance in the diet is vital to the maintenance of health. It means feeding children in the optimum range of requirements and feeding adults near the minimum range of requirements. Food requirements for growth of the child are quite different from food requirements for the maintenance of weight in the adult. Growth requirements cannot be superimposed on maintenance requirements in the adult. The hopeful result of the extensive research stimulated by and focused on diet and heart disease will be a better understanding of the nutrient requirements at the various age levels.

"The dairy industry is in an especially advantageous position in this regard. *Dairy products are basic foods and when you talk about improving diets you have to talk about the basic foods. For example, we depend upon dairy foods to supply, in particular, calcium, protein, Vitamins A and D, and riboflavin.* But these are very often the nutrients that are found to be limited in the diets of the adolescent. From this it would seem that the dairy industry has an opportunity, perhaps an obligation, to direct educational efforts toward the teen-agers, to help them select more and better foods such as those produced by the dairy industry."

"In conclusion, the industry should make every effort to keep informed on research developments, and it should continue and even increase its contributions in support of research in the general field of nutrition and in the cause of coronary artery disease.

"We do not anticipate any major change in the American way of eating other than might naturally

occur when the public finally becomes convinced of the desirability of maintaining proper body weights.

Dr. White also made this comment in his talk:

"About a year ago, there was some confusion in the public press about the position of the American Medical Association regarding dietary fat regulation. In official lingo, the following is the position:

"The Council on Foods and Nutrition believes that properly instituted diet therapy can significantly and safely alter the serum cholesterol and lipoprotein concentrations of most hyper-cholesteremic human subjects.

"The Council recommends that when this diet therapy is carried out it should be under the supervision of the physician with adequate follow-up procedures, including laboratory studies.

"The Council recognizes the importance of epidemiological studies which have shown an association between low serum cholesterol values and low mortality rates for arteriosclerotic heart disease, although it believes that a causative relationship has not yet been proved.

"The Council supports and encourages investigations of American population groups to test the effect properly supervised diet therapy as a means of prevention of coronary disease. Finally, the Council believes that, despite the promise of the diet in therapy, there is not sufficient information available at the present time to warrant a change in the American diet aimed at preventing heart disease in the general population."

SURGE STAINLESS STEEL VALVE IS READY FOR PIPELINE DAIRYMEN

A new stainless steel milk valve, for the pipeline dairyman who wants lasting construction with a minimum of parts, plus full sanitary protection, is announced by Babson Bros. Co.

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AMERICAN DRY MILK INSTITUTE 39TH ANNUAL MEETING

The American Dry Milk Institute will hold its 39th Annual Meeting at the Edgewater Beach Hotel, Chicago, on April 16-17. John T. Walsh, Executive Director, reports an expected attendance of 700 at the annual event.

Included in the program agenda are informed speakers from industry, government, university, and

Institute staff. Program topics will cover markets, sales, packaging, ADMI research, nonfat dry milk overseas, government considerations and programs, foreign trade and a look to the future. Dr. Earl L. Butz, Dean of the College of Agriculture, Purdue University, Lafayette, Indiana, will be the guest speaker at the Annual Luncheon on Friday, April 17.



Recipients of scholarships provided by the Connecticut Association of Dairy and Food Sanitarians, Inc. Left to right: Lawrence H. Britton, R. Peter Grady and Louis Lovieno, Jr.

ERRATUM

Sanitarians Award Contest announced page 41, February 1964 issue, second paragraph, last two lines should read, "The next presentation will be at the Annual Meeting of the Association in Portland, Oregon next August."

FISKE CRYSCOPE Mark Three

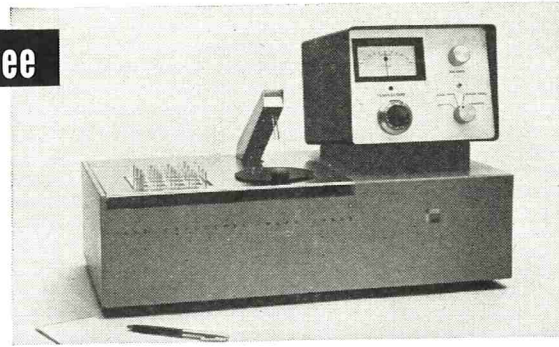
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32° CENTIGRADE TO BE RECOMMENDED FOR STANDARD PLATE COUNT IN THE TWELFTH EDITION OF "STANDARD METHODS"

The publication "Standard Methods for the Examination of Dairy Products" is essentially a method manual, which has — over the years — attained official stature to the point where many ordinances, regulatory agencies, etc., refer to it as the final word in determining proper procedures for laboratory analysis of dairy products.

The name of the book implies it contains "standard" methods for a variety of procedures for the analysis of dairy products, but a casual study of the text indicates this is not entirely true, as it is a collection of several alternate methods for achieving a given result. In several cases, the method chosen may — to some extent — influence the results obtained, which is highly undesirable from a control point of view, and can lead to many complications.

Research on the subject of incubation temperature for bacterial plates has been going on for many years, and has been done by a number of reputable investigators. Published results indicate that 32°C. generally yields a higher count than 35°C. Also, in order to insure that all groups are obtaining standard, comparable results, it is important that a single temperature be decided upon.

The committee charged with the responsibilities for revising Chapter Three of the manual have dis-

cussed the use of alternate incubation temperatures and have studied the available literature. They have reached the conclusion that in order to provide a standard procedure that will aid in the production of uniform results, a single temperature of incubation is imperative, and propose that this temperature be set at 32°C.

The committee is well aware of the variety of reactions that will result from standardizing on a single temperature, as someone will certainly be caused to change present practices — which is never popular. The committee would appreciate hearing from all



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persons who may have specific research information which may indicate that the selection of 32°C. is or is not the proper temperature for the incubation of plates for the standard plate count.

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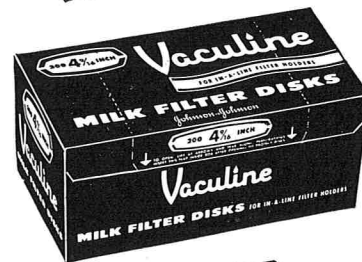
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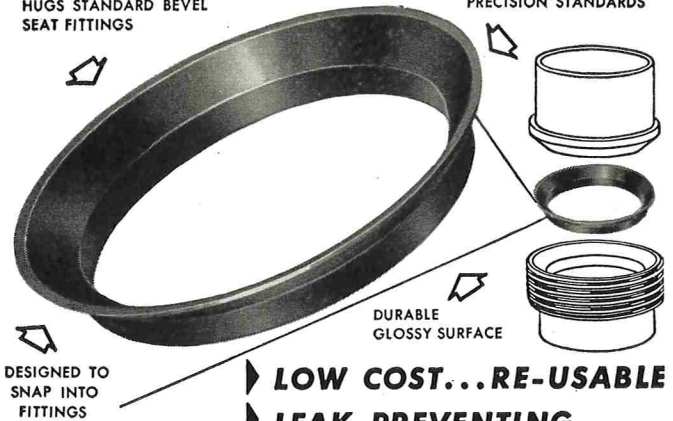
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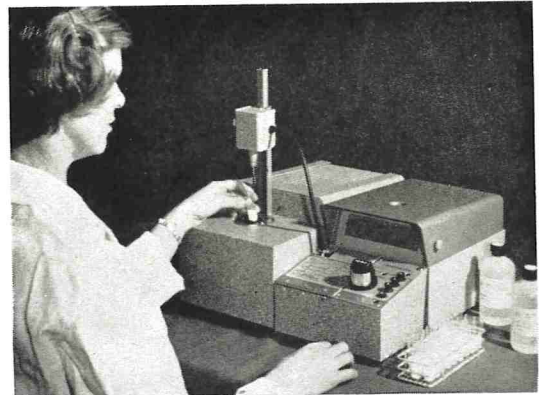
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