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Journal of

MILK and FOOD TECHNOLOGY

Official Publication

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

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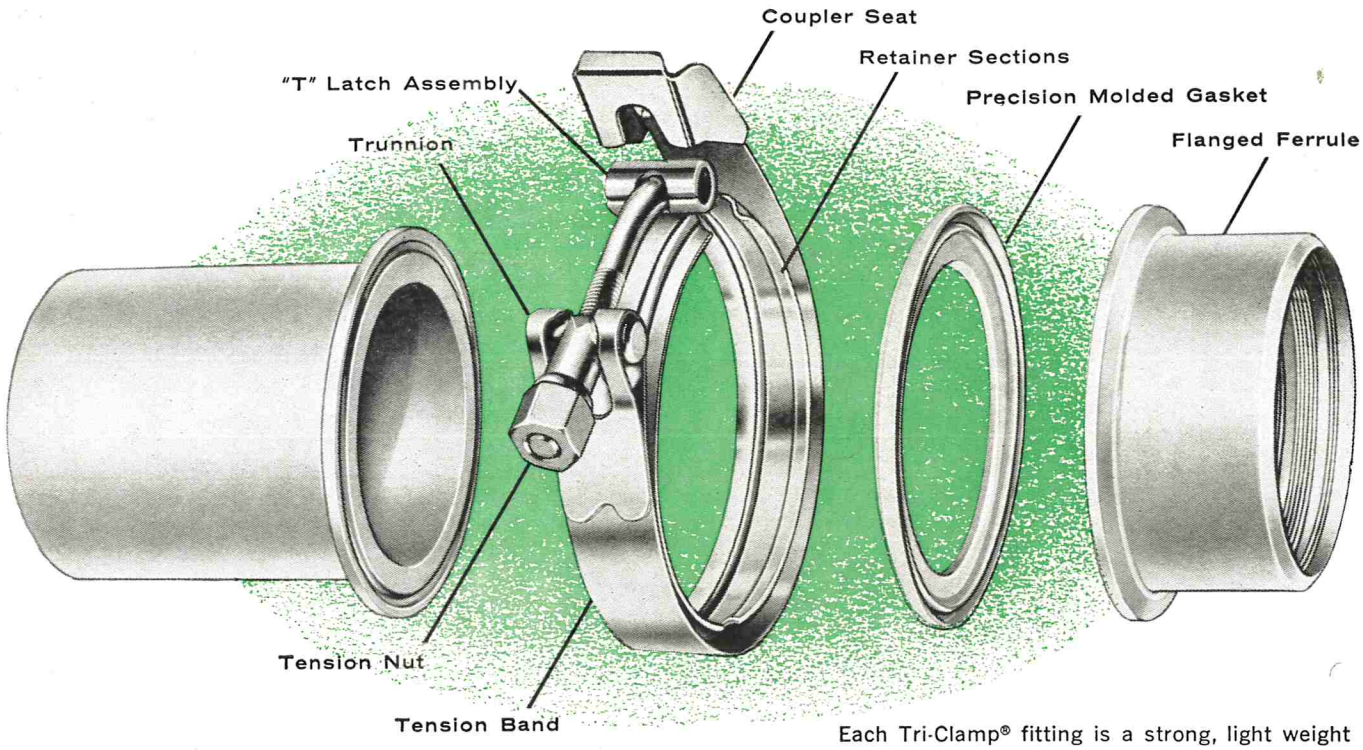

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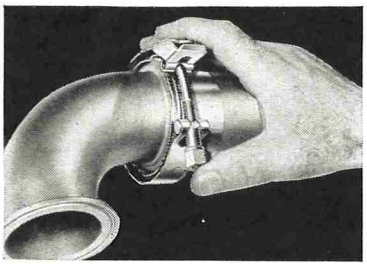

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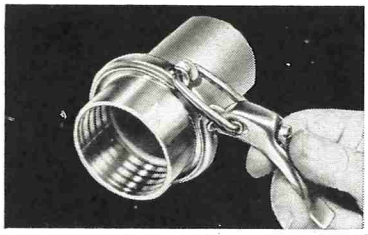

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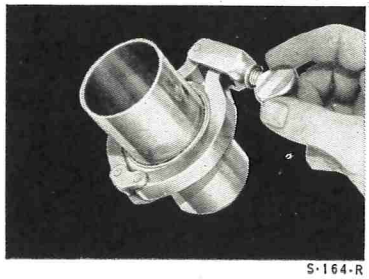

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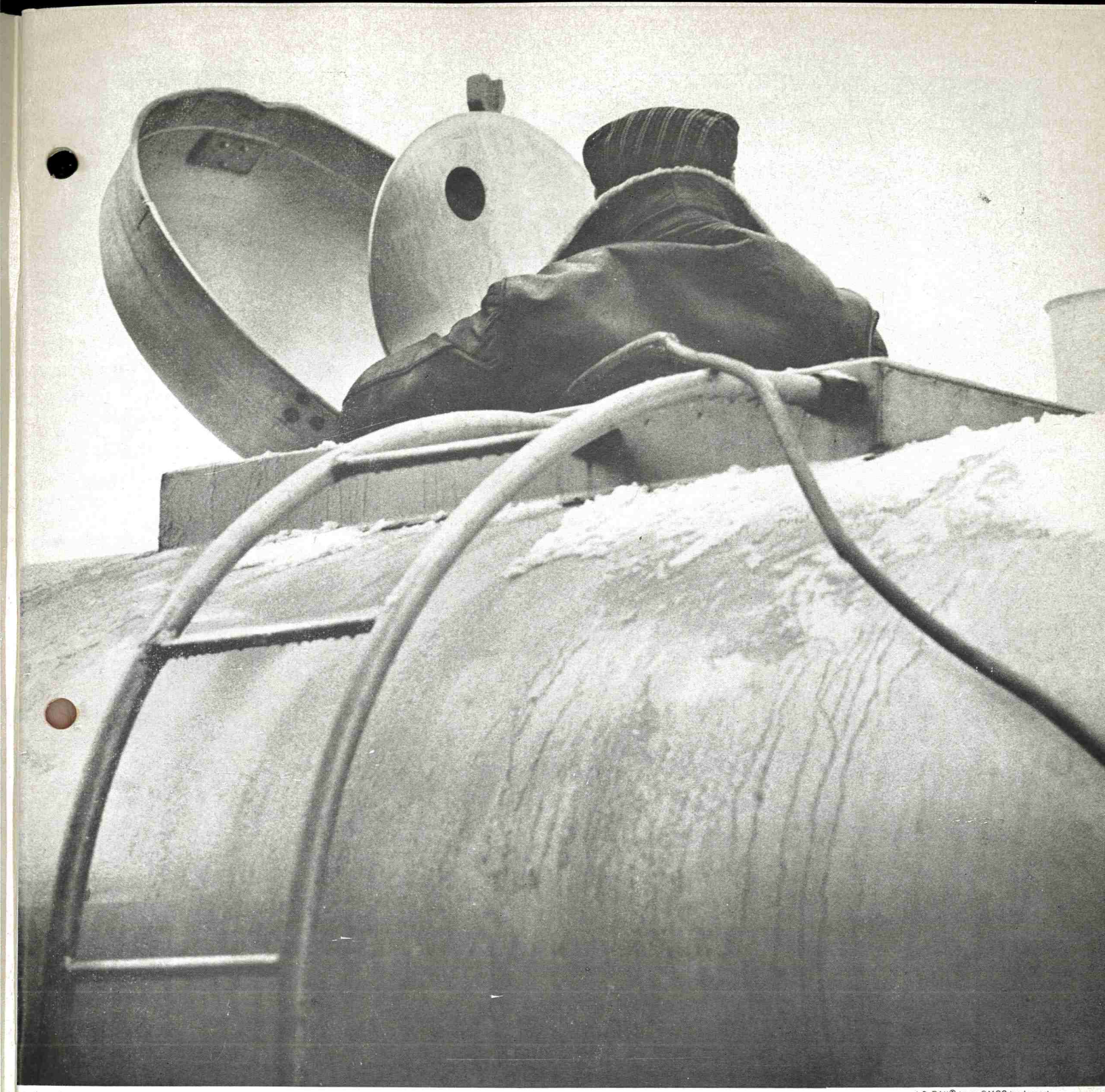

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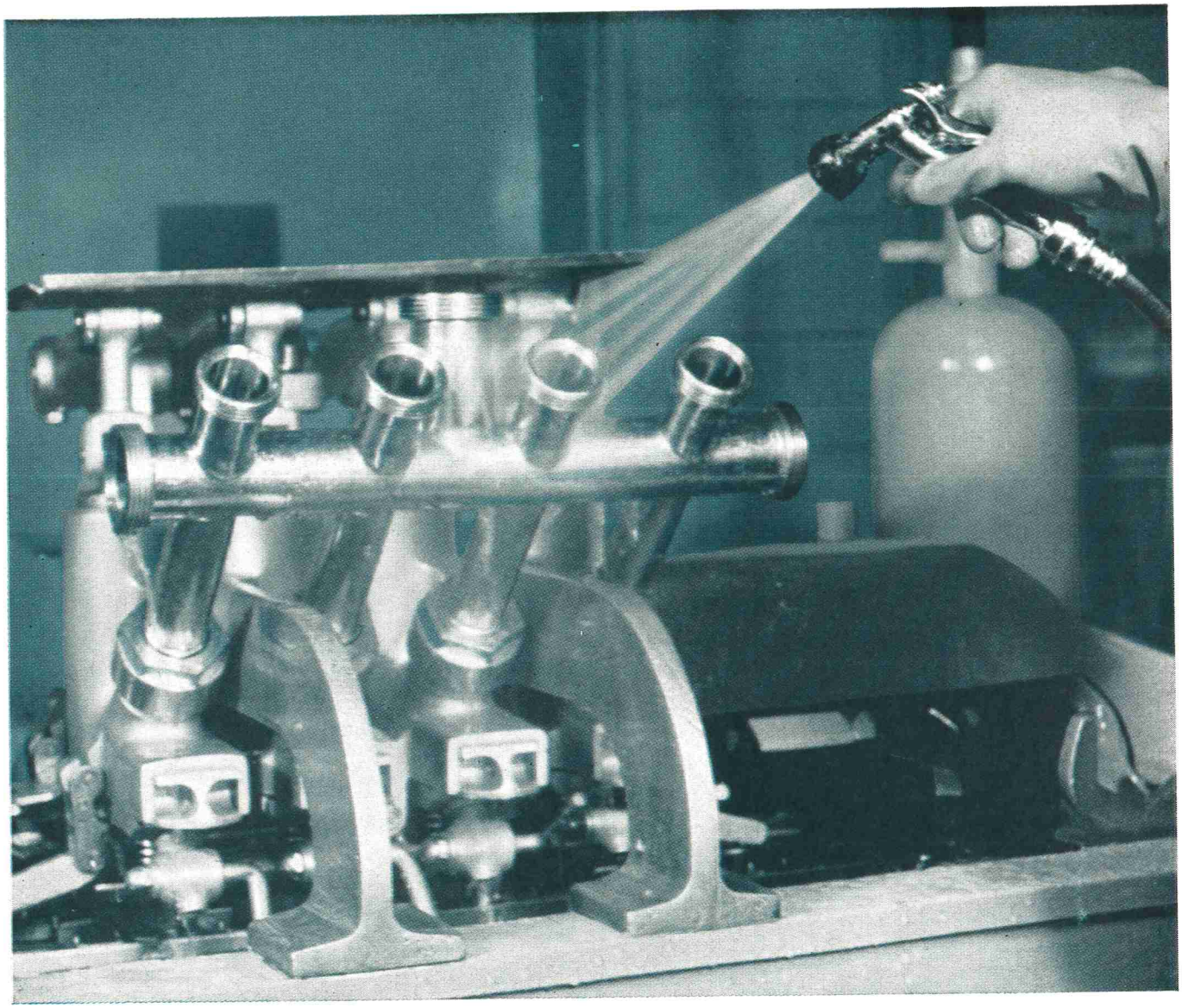

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Product	Fresh		Stored 5 days at 45° F.
	Plate Count	Coliform	
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Homo	3000	0	24,800,000
M. Vitamin	3000	1	26,400,000
Half & Half	3000	0	2,700,000
Whip. C.	3000	0	7,500,000

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	Plate Count	Coliform	
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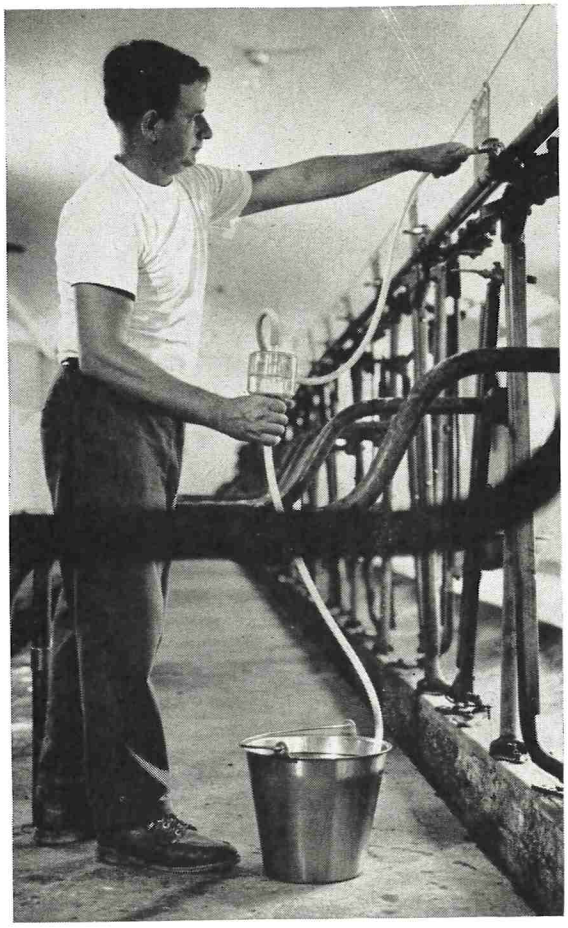

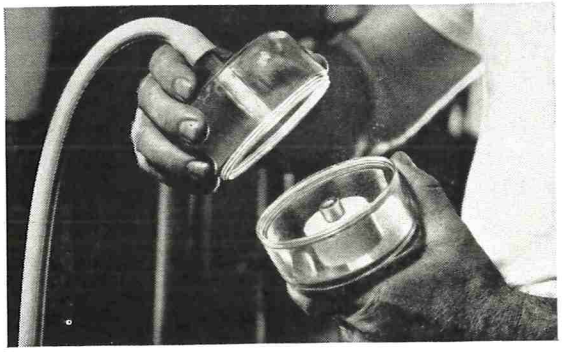

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SANITARY STATUS OF SOME PRECOOKED, FROZEN, DESSERT-TYPE FOODS[1]

N. N. S. VERMA[2], V. D. FOLTZ[3] AND ROSS MICKELSEN[4]
Kansas State University, Manhattan, Kansas
(Received for publication July 20, 1964)

SUMMARY

Sanitary status of 102 samples of precooked, frozen, dessert-type foods available in the local market (Manhattan, Kansas) was determined. Foods were studied for total bacterial population, densities of coliform bacilli, *Escherichia coli* and staphylococci.

All samples except two showed standard plate counts fewer than 100,000 per g, and the majority (90%) had counts below, 41,000 per g. Thirty-nine (38.2%) of the specimens showed evidences of coliform contamination and 8 (7.8%) were contaminated with *E. coli* of probable fecal origin. Coliform counts in 24 (23.32%) samples varied from 10 to 275 per g. Twenty-eight (27.45%) of the specimens showed contamination by staphylococci though no isolate proved to be coagulase-positive. Some problems of analysis and interpretation that arose are discussed.

Precooked frozen foods are highly popular; consequently, numerous varieties are available to consumers. Their soft-cooked constituents make them an excellent substrate for microorganism multiplication. Several varieties of these foods, such as creamed fish and meat products, have been found highly contaminated *(6, 9, 11)*.

Many of these foods are heated before being served, which may destroy a majority of the microorganisms present, but sterility is seldom achieved. Ross and Thatcher *(11)* reported survival of staphylococci and enterococci in 10% of the specimens cooked according to manufacturers' specification, though reduction in bacterial numbers, as expressed by standard plate count, ranged from 57.5% to 100%. However, poisoning from heat-stable enterotoxin remains a possibility even when staphylococci are destroyed. The chances of destroying food-poisoning organisms or their toxins from dessert-type foods are remote because they are usually served frozen or after thawing a short time. The importance of the contaminated frozen, dessert-type foods as a possible public health hazard prompted this investigation. The study comprised bacteriological analyses for the total bacterial population, densities of coliform, *E. coli* and staphylococci in various types of the foods available to consumers.

MATERIALS AND METHODS

A total of 102 samples of 15 different varieties under five brand names available in local markets were examined. The samples were randomly selected and purchased in different lots. Immediately after purchase they were transferred to the laboratory and kept in a freezer cabinet at 0 F until examined. Bacterial examinations were carried out within one week from date of purchase.

To facilitate sampling of frozen products, specimens were transferred to a refrigerator at 5 to 8 C for about 3 to 4 hr. Exactly 11 g of the material were aseptically removed from a representative mid-portion of the packaged material and transferred into screw capped, flat bottomed 350-ml bottles containing 99 ml sterile distilled water chilled to 4 to 5 C. A homogeneous 1:10 suspension of the material was made by vigorously agitating in a shaking machine at an oscillation of 250 ($\pm$ 10) per minute for 5 to 6 min. From this, further serial dilutions of 1:100 and 1:1000 were prepared in sterile distilled water.

Plate count agar (Difco) was used to estimate bacterial populations. One ml inoculum of 1:100 and 1:1000 dilutions of the samples were used per plate, and for each dilution duplicate plates were poured. The plates were incubated at 37 C for 48 hr, then colonies were counted with the aid of a Quebec colony counter; results were interpreted as in Standard Methods *(13)*.

Violet red bile agar (Difco) was used for the coliform count. An uninoculated layer of the medium was everlayed to facilitate development of typical colonies. Incubation of the plates was at 37 C for 20 to 25 hr. The typical purplish-red colonies surrounded by a reddish zone of precipitated bile were counted and streaked onto eosin methylene blue agar (Difco). The isolates were later confirmed and differentiated into different species on the basis of lactose fermentation and the interpretation of IMViC reactions given in *Standard Methods for the Examination of Water and Waste-water (14)*.

One ml of a 1:10 dilution of the material was transferred to each of two solidified poured plates of Staphylococcus Medium No. 110 (Difco) (S-110),

[1]Contribution no. 412, Department of Bacteriology, and Contribution no. 327, Department of Dairy Science, Kansas Agricultural Experiment Station, Manhattan; supported in part by research grant EF-129 (C_2) from the National Institutes of Health and the Public Health Service.

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[3]Department of Bacteriology.

[4]Department of Dairy Science.

which were incubated at 37 C for 48 hr. Typical colonies resembling staphylococci were examined microscopically on Gram's stained smears. Colonies that yielded Gram positive spherical cells arranged in irregular clusters, the typical morphological characters of staphylococci, were counted and isolated onto proteose peptone agar slants. The isolates were purified and tested for anaerobic growth in 0.1% glucose yeast extract agar. Cultures showing uniform growth throughout the depth of the glucose yeast extract agar "shake" culture tubes were further tested for anaerobic fermentation of mannitol, hemolysis reaction on 5% sheep blood agar, coagulase production, gelatinolytic reaction and pigment production as described by Mickelson *et al. (10)* and Lord *(8)*.

RESULTS AND DISCUSSION

Of 102 samples examined, only 2 (1.96%) had standard plate counts above 100,000 and fewer than 200,000 per g. The largest percentage (90.20%) of samples had counts below 41,000 per g and 8 (7.84%) of these had counts varying from 41,000 to 100,000 per g (Table 1).

Table 2 presents ranges and average standard plate counts, coliform counts and staphylococci counts per g of the different varieties of pies and desserts examined. Not much variation in plate count data was observed among samples of different brands but variations existed to a certain extent among samples of different foods tested. No appreciable correlation appeared among the three determinations made. However, comparatively closer correlations existed between standard plate counts and coliform counts.

Thirty-nine (38.2%) of the specimens showed evidences of coliform contamination and 8 (7.84%) of these were contaminated with *E. coli.* Coliform counts in 24 (23.32%) of the specimens varied from 10 to 275 per g, far above the limits generally accepted as satisfactory; the remainder had fewer than 10 per g. Presence of staphylococci was observed in 28 (27.45%) of the samples varying up to 100 per g.

TABLE 1. STANDARD PLATE COUNT FROM PRECOOKED FROZEN PIES AND DESSERTS

No. of specimens examined	No. of samples showing SPC/g (000 omitted)						
	<3	3-20	21-40	41-60	61-80	81-100	101-200
102	5	76	11	2	2	4	2
% of total	4.90	74.51	10.79	1.96	1.96	3.92	1.96
Cumulative %	4.90	79.41	90.20	92.12	94.12	98.04	100.00

TABLE 2. BACTERIOLOGICAL CONTENT OF FROZEN PIES AND DESSERTS EXAMINED

Product	No. of samples tested	S.P.C./g		Coliform/g		Staphylococci/g	
		Range (thousands)	Average (thousands)	Range	Average	Range	Average
Strawberry cream pie	16	2.0- 94.0	19.18	0- 15	5.30	0- 50	4.4
Banana cream pie	12	4.0-191.0	34.41	0-275	34.60	0- 30	7.5
Lemon cream pie	12	1.5- 23.0	5.62	0- 45	3.75	0- 40	4.17
Coconut cream pie	11	4.0- 59.0	16.81	0- 45	14.09	9- 80	19.0
Coconut custard pie	10	2.0- 19.0	10.0	0- 5	2.0	0-100	14.0
Chocolate cream pie	9	7.0- 55.0	20.33	0- 60	10.0	0- 10	1.1
Pecan pie	8	2.0- 40.0	13.87	0- 0	0.0	0- 50	6.25
Neapolitan cream pie	7	2.0- 16.0	7.85	0- 10	3.56	0- 30	10.0
Caramel cream pie	5	3.0- 20.0	11.00	0- 5	2.0	0- 80	30.0
Cream cheese cake	5	33.0-184.0	92.00	0	0	0	0
Pumpkin pie	2	3.0	3.0	0	0	0	0
Pineapple cheese cake	2	23.0- 37.0	30.0	0	0	0	0
Southern pecan pie	1	3.0	3.0	0	0	0	0
Mince pie	1	5.0	5.0	0	0	40	40.0
Apple crisp	1	4.0	4.0	10	10	50	50.0

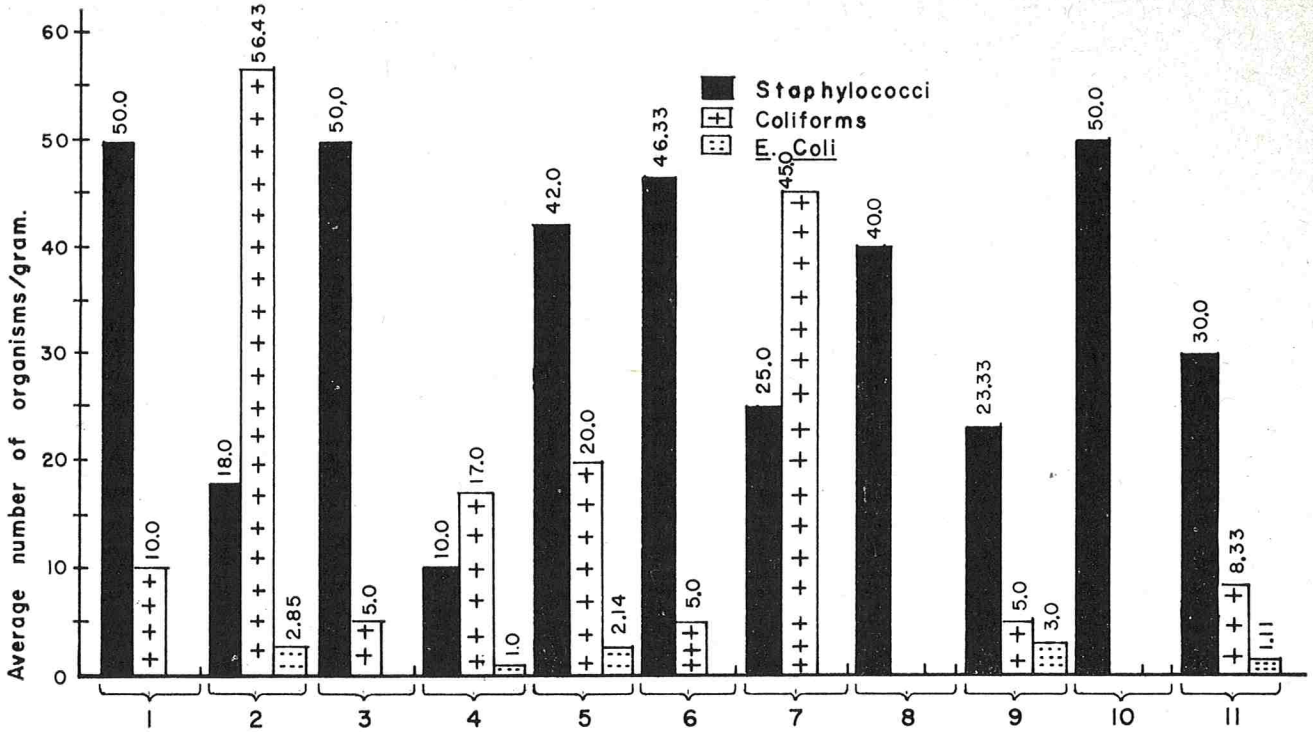

Figure 1. Average number of staphylococci, coliforms and *E. coli* per gram of positive samples of different varieties of precooked, frozen, dessert-type foods. 1.Apple crisp. 2. Banana cream pie. 3. Caramel cream pie. 4. Chocolate cream pie. 5 Coconut cream pie. 6. Coconut custard pie. 7. Lemon cream pie. 8. Mince pie. 9. Neapolitan cream pie. 10. Pecan pie. 11. Strawberry cream pie.

Average numbers of staphylococci, coliform and *E. coli* per g of the positive samples of the different varieties of food examined are presented in Figure 1.

From the positive samples 101 coliform group organisms were isolated; one isolate proved to be *E. coli* var I, and 10 were *E. coli* var. II; whereas, the remainder were *E. freundii* (intermediates) and Aerobacter species.

Altogether 76 strains of staphylococci were isolated. Of these, 5 fermented mannitol anaerobically, 19 produced Beta hemolysis and 2 Alpha hemolysis on sheep blood agar, 39 hydrolysed gelatin and 16 were orange pigmented, but no isolate was found to be coagulase positive. Since most enterotoxigenic staphylococci have been found to be members of the coagulase positive group *(2, 3)*, coagulase activity has been considered probably the most reliable diagnostic test for detecting potential food-poisoning type of staphylococci *(12)*. The necessary level of enterotoxin was produced only after the growth of staphylococci to a population level of several millions *(4, 15)* and that food products with above half a million coagulase positive staphylococci per gram should be considered a public health hazard *(12)*. The presence of coagulase negative strains of staphylococci in these foods in numbers varying up to 100 per g may not, therefore, be of much significance so far as food poisoning is concerned. However, this may not preclude the possibility of enterotoxigenic strains of staphylococci in these foods nor does it eliminate the possibility of enterotoxin, which might have been formed before the foods were cooked and frozen.

Goresline *(5)* stated that the presence of pathogens in precooked frozen meals was only remotely possible, if the standard aerobic plate count of 100,000 per g and coliform level of 10 g were enforced. However, several workers *(7, 9)* have questioned the usefulness of the coliform group as an indicator of sanitation or contamination unless the coliform are of fecal origin or from some other source considered "dangerous." Among normal inhabitants of the intestinal tract, *E. coli* has been considered the most characteristic organisms of human *(16)* as well as of animal origin *(1)*.

Evidence from these studies suggests that although the foods had fairly low total bacterial populations, they were not only associated with high coliform contaminations but also some evidences indicated fecal pollution too, which is undesirable both from an aesthetic and a public health viewpoint. Moreover, their presence also suggests the possibility of contamination with other enteric pathogens (like salmonellae), enterococci, clostridia and staphylococci, which demands an exploratory search for such organisms.

REFERENCES

1. Briggs, C. A. E., Willingale, J. M., Braude, R., and Mitchell, K. G. The Normal intestinal flora of the pig. I. Bacteriological methods for quantitative studies. Vet. Rec. 66:241-242. 1954.

2. Clark, W. S., Moore, T. D., and Nelson, F. E. Characterization of coagulase positive staphylococci isolated from milk. Appl. Microbiol. 9:195-199. 1961.

3. Evans, T. B., and Niven (Jr), C. F. A comparative study of known food-poisoning staphylococci and related varieties. J. Bacteriol 59:545-550. 1950.

4. Frazier, W. C. Food microbiology. McGraw-Hill Book Company, Inc., New York. 1958.

5. Goresline, H. E. Obtaining precooked frozen foods of high sanitary quality for the armed forces. Assoc. Food and Drug Officials. U. S. Quart. Bull. 23:135-139. 1959.

6. Gunderson, M. F., and Rose, K. D. Survival of bacteria in a precooked fresh-frozen food. Food Res. 13:254-263. 1948.

7. Hartman, P. A. Further studies on the selectivity of violet-red-bile-agar. J. Milk and Food Technol. 23:45-48. 1960.

8. Lord, T. H. Determinative bacteriology. Laboratory Manual. Burgess Publishing Co., Minneapolis, Minn. 1959.

9. Machala, W. E. A bacteriological investigation of frozen foods in the Oklahoma City area. J. Milk and Food Technol. 24:323-327. 1961.

10. Mickelson, Ross, Foltz, V. D., Martin, W. H., and Hunter, C. A. Staphylococci in Cottage Cheese. J. Milk and Food Technol. 26:74-77. 1963.

11. Ross-Doreen, A., and Thatcher, F. S. Bacteriological content of marketed precooked frozen foods in relation to Public Health. Food Technol. 12:369-371. 1958.

12. American Public Health Association. Recommended methods for the microbiological examination of foods. New York, New York. 1958.

13. American Public Health Association. Standard Methods for the Examination of Dairy Products, 11th ed. New York, New York. 1960.

14. American Public Health Association. Standard Methods for the examination of water and waste water. 11th ed. New York, New York. 1960.

15. Tanner, F. W., and Tanner, L. P. Food born infections and intoxications. 2nd. ed. Garrard Press, Champaign, Ill. 1953.

16. Thomason, S. The numbers of pathogenic bacilli in faeces in intestinal diseases. J. Hyg. Camb. 53:217-224. 1955.

WHY NOT ENCOURAGE THE COMPETENT PRODUCER?[1]

C. K. JOHNS

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Lazarus Laboratories Division, West Chemical Products, Inc.
Long Island City, New York

It has been estimated that around 25% of milk producers are producing the highest quality milk they know how to. This milk is low in bacteria, leucocytes and sediment. A much higher percentage know how to produce such milk but are not doing their best. They see incompetent, indifferent neighbors cutting corners in the care of their milk-handling equipment, yet still meeting current bacteriological standards and getting as much money for their milk. Thus the middle group have become discouraged and just aim to get by. Perhaps if we did more to encourage the competent producer and to discourage the poor one we would make greater progress in improving milk quality.

HAVE BULK TANKS IMPROVED QUALITY?

Since bulk tanks have become standard equipment for fluid milk shippers in North America, there have been many reports that milk quality has improved. The basis for such statements has been the lower bacterial counts. But do these lower counts really represent more sanitary milk production? My own guess is that in most cases they merely reflect the effectiveness of bulk tank cooling in inhibiting bacterial growth, and that frequently the milking equipment has received less case than formerly. While it is much easier to persuade a producer to install better cooling facilities than to do a better job of cleaning his equipment, I wonder whether the substitution of better cooling for better cleaning can be regarded as progress. In my opinion, only milk from clean, healthy cows, handled in equipment in good sanitary condition, can be regarded as being of top quality. Is this not what we should be working toward?

Why is neglected equipment not being detected by routine bacterial counts of milk? With bulk cooling, growth is practically eliminated, so the answer must lie in the huge dilution factor, which few people have recognized. If we assume that 110 lbs (50 liters) of milk pass through a milker unit at one milking, this means that 50,000 bacteria washed from the surfaces of the unit would only add one organism per ml to the milk! As the count on milk aseptically drawn from a healthy udder is normally less than 1,000/ml, a dirty milker unit could contribute up to 450,000,000 bacteria at a milking and not raise the count on the milk to over 10,000/ml. Thus it should

[1]Based upon papers presented at the 32nd Institute of Dairying, Washington State University, Pullman, Wash., March 25, 1964.

be obvious that current and contemplated standards in many areas are no longer meaningful in terms of detecting equipment in insanitary condition — and this is the only reason I can see for running bacteriological tests on bulk-cooled milk.

If current standards are no longer meaningful, where should they be placed? As shown in the above example, even a limit as low as 10,000/ml, which most sanitarians would consider very stiff, would fail to detect an appreciable number of cases where milking equipment had been neglected. In our collaborative studies at three Canadian centers (Edmonton, Winnipeg and Guelph) it was found that 23% of the samples with initial standard plate counts (SPCs) not over 10,000/ml were from farms where milking equipment was reported as "unsatisfactory" on inspection. Nevertheless, it goes without saying that such a standard would require much better care of the milking equipment than is the case with the very lenient standards now in force.

Is a standard of 10,000/ml unreasonably stiff? Back in 1959 I queried my good friend Bill Moseley of Indianapolis on this point. Moseley operates a large commercial testing laboratory and probably gets onto as many farms in a year as anyone I know. He replied: "I will agree with you that a 10,000 count can be maintained easily if the equipment is clean. I have thought that our public health service, state sanitarians and others have been a little "nutty" in requiring a cooling temperature of 50 F or below; the cooling temperature becomes less significant if we actually have cleanliness" *(3)*. Again, in Aberdeen, Scotland, they have established a standard for bulk milk of 10,000/ml with no coliforms in 1 ml *(1)*. Finally, in our collaborative studies I have been impressed with the number of producers who were able to meet this standard. As even this standard permits appreciable contamination from insanitary equipment I can see no justification for any more lenient one.

DETECTING INSANITARY EQUIPMENT

In view of the dilution effect, there is a question in my mind as to whether a lower count limit such as 10,000/ml is the surest way to promote cleaner milking equipment. For this reason I have advocated *(2)* preincubation (PI) of raw milk samples before testing. A temperature of 55 F has been recommended, for at this temperature the udder flora do not multiply, while a significant proportion of the contaminating bacteria do. Thus a number of samples with SPCs of 10,000/ml or less when examined before PI "blow up" on PI. Experimental studies have shown that milk drawn with clean equipment shows little or no increase in count on PI, so it seems reasonable to conclude that where a low count milk "blows up" on PI it has been contaminated by the milk-handling equipment. In our studies at Ottawa *(2)* 20% of the samples meeting a 10,000/ml standard before PI gave counts over 100,000/ml after PI, while at another center this held true for 60% of the samples. These are the type of samples with which fieldmen are familiar. They often come from farms with neglected equipment, but where the producer refuses to clean up because his bacteria counts are far below that permitted for Grade A milk. Where PI has been instituted, however, the story appears to be different. The producers usually get very much higher counts. They know only too well they have been neglecting their equipment, so they clean it up, replace worn rubberware, and down come their counts. Thus in these areas milk counts are lowered[2] and even more important, equipment is cleaner. And this is surely what we should be aiming at.

For some years I have been inclined to agree with Moseley that if equipment is really clean, sanitizing is scarcely necessary. However, during my recent travels I have heard reports in several areas that producers who failed to sanitize their equipment had trouble getting their counts down when PI was used. However, in each case, when an adequate sanitizing procedure was carried out, the counts fell well below the limit. Incidentally, several plants were using a standard of 50,000/ml with PI. This is very much harder to meet than 10,000/ml without PI, yet their producers were having little difficulty in meeting it.

It has been contended that PI is of questionable value because it relies upon bacterial growth at 55 F, and some species will not grow at that temperature in milk. However, if there is a substantial percentage of Gram-negative rods, including coliforms, there will usually be rapid growth and the sample will "blow up" on PI. If coccus types predominate, there will be little or no increase in count, and this type of contamination would not be detected by PI unless the count was unusually high. Our collaborative studies suggest that the Gram-negative rods are more likely to be associated with insanitary conditions. At one center the average percentage of these bacteria isolated from milk samples rose from 13.8 where milker rubberware was reported as "clean" to 31.4 where it was reported as "fair". Welsh investigators *(5)* have also shown that the percentage of Gram-negative rods increases sharply as the count level (without PI) increases, suggesting that these types are associated with poor sanitary conditions. Thus while it is possible that some farms with neglected

[2]For example, after PI had been in force for 10 months, the average count on tankers received in Seattle from the Whatcomb County Dairymen's Association, Lynden, Wash., dropped from 39,000 in February 1963 to 21,000 in February, 1964.

equipment may escape detection when PI is used, it seems likely that these will be in the minority. Even if PI should only succeed in showing up 10% of the cases where insanitary conditions are not being reflected by the initial count, it would appear to be worth while. Judging from the enthusiastic comments of fieldmen from Vermont to Washington who have tried it, PI is proving very effective in directing attention to those farms where equipment has been neglected.

In the collaborative studies at Edmonton, Winnipeg and Guelph, we had hoped to get a definite answer concerning the relative value of the various bacteriological tests, both with and without PI, in reflecting the condition of milking equipment. Much to our surprise, the results failed to show the expected advantage for PI. Only much later was it suspected that the age of the sample played an important part. In this work, milk samples were taken from the bulk tank when it contained two milkings, whereas the usual practice is to sample from the tank when it contains four milkings. Recent studies have shown that when two-milking samples were held refrigerated for an additional 24 hours (to make them the same age as ordinary commercial samples) before testing, four times as many "blew up" on PI as when they were testing before this additional holding period. Further comparisons are being carried out this summer using four-milking samples to establish more definitely the value of PI in reflecting neglected milking equipment. These will be reported in due course.

OTHER EFFECTIVE MEASURES

What other possibilities are there for increasing the effectiveness of our quality control operations? Probably the most valuable of all would be frequent, careful inspection by a well-trained person to determine the sanitary condition of the milk-handling equipment. Inspection after the evening milking is often most illuminating, as few producers do as thorough a job of washing the milking equipment then as after the morning milking. Inspection at milking time also frequently proves to be an eye-opener. While farm inspection has largely fallen out of fashion in many areas, where almost complete reliance has been placed upon the results of bacteriological tests, it is beginning to be realized that proper farm inspection is necessary as a supplement to laboratory tests. In fact, people with a wealth of experience have asserted that if they had to choose between the laboratory and a well-trained fieldman to operate a quality control program, they would be much better off with the fieldman.

If we are really interested in sanitary milk production, then, it would appear that more emphasis must be placed on farm inspection as a supplement to laboratory testing. Not only will careful inspection provide increased assurance that methods and equipment are satisfactory, but it will also afford opportunities to stress to the producer the esthetic aspects of milk production. These include clean, healthy cows, clean stables or parlors, and a generally attractive air about the farmstead. During my recent travels in the United States and Canada I am sorry to say that in many areas a significant percentage of the farms fell short of the above specifications. This could not be said of the farms I saw in Scandinavia and in Britain in 1962. It would seem that we have a job on our hands convincing the farmer that he is operating a food factory, where a very delicate food product is being produced twice a day. Like any other food factory, it should appeal to the consumer as a place she would like to have her food (milk and dairy products) come from. We should all be doing more to encourage producers to set their sights higher in this respect, as well as in cleaning their milk-handling equipment. While it may be argued that milk production is so unprofitable that the producer cannot afford to make his premises attractive, with well-painted buildings, etc., I was impressed with the numerous attractive set-ups in Wisconsin and Minnesota, where milk prices are among the lowest on this continent.

CLEAN MILK MAINTAINS ITS QUALITY

One aspect of sanitary milk production which many appear to have been lost sight of is that milk produced under sanitary conditions can take a lot of punishment. This was referred to by Moseley in his letter, from which I quoted. Such milk does not need to be cooled immediately to a low temperature, for the few bacteria present come mainly from the udder, and these grow very slowly for many hours. This was particularly evident from the results obtained in the clean milk competitions conducted in Britain during the 1920's. Many samples not cooled below 60 F, and which were 24 hr old when tested gave counts of 5,000/ml or less. Again, I have seen records of producers shipping milk in cans to plants in Denmark and in Scotland; none of these farms had mechanical refrigeration, yet their counts rarely exceeded 10,000/ml. When I asked how this was possible, I was told, "The producers know how to clean their equipment." In the light of these facts, I seriously question the desirability of setting maximum permissible temperatures for fluid milk. To do so puts too much emphasis upon cooling, and the producer soon learns that efficient cooling can be substituted for good cleaning. Surely this is not the right road to sanitary milk production!

Mention might also be made of another aspect of

milk quality control. It has been estimated that probably 90% of a fieldman's time is spent in field calls on 10% of the producers – the ones who seem unable to stay out of trouble. Such calls are expensive; John Dean, of Dean Foods, who addressed the IAMFES at the Toronto meeting, estimated each call cost $7.05 while Nielsen *(4)* estimated an average of $5.00 per visit. These costs, as well as those for the extra sampling, bookkeeping, etc., for producers with sub-standard milk, are really coming out of the pockets of the good producers. The sooner the latter recognize this, the sooner they will urge stiffer standards to eliminate the unsatisfactory producers. Then the fieldman can spend more of his time on such worth-while activities as a flavor improvement program, which can be expected to lead to increased milk consumption and a better return to the producer.

How to Encourage Competent Producers

What can be done to encourage the competent producer? In addition to more meaningful standards, much could be accomplished by making a deduction of, say 50 cents per cwt from the 20% of shippers with the poorest quality record for the month, and distributing this as a bonus to the best 20%. This would act as both "a stick and a carrot", spurring on the indifferent producer and giving recognition and reward to the best producer. Setting up an annual Honor Roll, and awarding certificates to the top rank of producers, preferably at a banquet or similar gathering, might also be helpful. Perhaps a plaque awarded for an extra good record, such as I found on milkhouse doors around Helsinki, Finland, would encourage greater effort. Finally, a roadside sign awarded annually could act as good advertising for the plant receiving the milk as well as giving the producer a pat on the back for a job well done.

Stricter Sanitation Standards Indicated?

Dairymen in several areas I visited are beginning to urge stiffer standards. One of the most interesting observations I encountered during my travels came from a young dairyman who holds a high office in the Northwestern Dairymen's Association. In his talks with dairy farmers he had been impressed to hear good producers express their strong dislike at having the milk of a careless producer put into the tanker to contaminate their milk. Likewise, opposition has been voiced by good producers to the practice of "Paul Revering" when an inspection, official or unofficial, is about to take place; this gives the careless producer ample time to clean up his equipment and premises before the inspection takes place. These instances indicate that many competent dairymen do take a real pride in producing the best quality of milk they are capable of. We should be doing all we can to give them suitable recognition, and also to encourage others who can do better. As it is, one would suspect that many of our standards were purposely made so lenient that even the indifferent producer can meet them. Surely the time has come to reverse this attitude and put the emphasis on encouraging, in every possible way, the practice of really sanitary milk production.

In conclusion, I should like to urge a re-appraisal of our ideas on sanitary milk production and control. With well-cooled milk, current standards are far too lenient to detect neglected milking equipment. We need more meaningful standards to challenge the competent producer, and to cause the indifferent producer to mend his way or drop out of milk production.

References

1. Anonymous. Bulk collection progress in five marketing areas. Dairy Engineering, 78:406, 411. 1961.

2. Johns, C. K. Appraisal of methods for assessing the sanitary quality of milk. Publ. 1084. Canada Dept. Agr., Ottawa. 1960.

3. Moseley, W. K. (Moseley Laboratories, Indianapolis, Indiana) Personal communication, Jan. 7, 1959.

4. Nielsen, V. H. Results justify fieldman's costs. Am. Milk Review, 23 (12) 34, 36. 1961.

5. Thomas, S. B., Hobson, P. M., Bird, E. R., Wing, K. P., Druce, R. G. and Cox, D. R. The microflora of raw milk as determined by platings on yeastrel-milk agar incubated at 30°C. J. Appl. Bacteriol. 25:107-115. 1962.

MANUAL OF SANITATION STANDARDS FOR CERTAIN PRODUCTS OF PAPER, PAPERBOARD, OR MOLDED PULP[1]

MICROBIOLOGICAL AND BIOCHEMICAL CENTER,
SYRACUSE UNIVERSITY RESEARCH CORPORATION,
SYRACUSE, NEW YORK

This Manual of Sanitary Standards for Certain Products of Paper, Paperboard, or Molded Pulp has been compiled by the Microbiological-Biochemical Center of Syracuse University Research Corporation as a result of prolonged conferences and studies by several groups working together for the purpose of ascertaining sanitation standards to guide manufacturers of certain paper products that are used for packaging or serving foods and beverages for human consumption. The three groups which cooperated on this were *(a)* federal, state and local health officials, *(b)* members of the Syracuse University Research Corporation, and *(c)* representatives of the manufacturers concerned. The advice, counsel, and cooperation of several public health officials in various parts of the country have been received through conference and correspondence.

Syracuse University Research Corporation provides facilities to the manufacturers of these products for the testing of their raw materials and finished products and to determine whether or not they meet the test and plant inspection requirements of this Manual. The results of these tests and inspections are available to appropriate health officials.

This Manual is subject to amendment and revision to meet changing conditions and to reflect benefits to be gained from experience, research, and investigation.

DEFINITIONS

The following definitions shall be employed in the application and interpretation of these *Sanitation Standards*:

1. *Sanitation standards* is a statement of objectives in the interest of public health, patterned after regulations and standards promulgated by official agencies.

2. The term *these products* shall mean the following products constructed in whole or in part from paper, paperboard, or molded pulp used for packaging or serving foods and beverages for human consumption:

(a) Milk containers.
(b) Milk bottle caps, hoods, and closures.
(c) Round, nested paper cups, containers and closures therefor.
(d) Spirally wound, cylindrical liquid-tight containers and closures therefor.

3. The term *Foods and Beverages for Human Consumption* includes but is not limited to the following:

(a) *Milk and milk products* which shall mean and include the following: whole milk, cream, sour cream, skimmed milk, milk beverages, skimmed milk beverages, reconstituted or recombined cream, buttermilk, cultured buttermilk, vitamin D milk, homogenized milk, soft curd milk, goat milk, cottage cheese, pot cheese, processed cream cheese, and similar foods which are within the purview of ordinances relating to milk products.
(b) *Frozen desserts* which shall mean and include the following: ice cream, frozen custard, frozen milk, frozen cream, ice milk, milk sherbet, and ices.
(c) *Other foods and beverages* when packaged or served.

4. *Clean, sanitary stock* shall mean any paper and paperboard made from clean, sanitary virgin chemical or mechanical pulp or from broke, waste or cuttings of such paper and paperboard, provided they have been handled, treated and stored in a clean, sanitary manner.

5. *Broke and waste or cuttings* are paper and paperboard that have been discarded anywhere in the process of manufacture, such as on the paper-making machine and in the form of trim. Similar products in converting plants are called trim waste or cuttings.

6. The term *slime spots* means the defects in paper and paperboard due to microbial growths and products of growth.

7. *Bacteriological Examination.* All bacteriological examinations carried out under these "Standards" shall be made and reported in conformity with the latest edition of "Standard Methods for the Examination of Dairy Products" published by the American Public Health Association and/or other applicable standard methods.

MANUFACTURING OPERATIONS

Item I. *Poisonous and Deleterious Substances Prohibited.* All materials used in the manufacture of "these products" shall be free from substances which may render their contents injurious to health or which

[1]Supersedes the Manual of Sanitation Standards for Certain Products of Paper, Paperboard, or Molded Pulp, as published in J. Milk and Food Technol., 11:31. 1948.

may impair the flavor, odor, composition, or bacteriological quality of the contents.

All components of these products shall meet the requirements and conform to the sanitary and food additive standards required for them as set forth in the Federal Food, Drug, and Cosmetic Act as amended and regulations issued thereunder.

Item II. *Fabrication from Clean, Sanitary Stock.* "These products" shall be made from clean, sanitary stock properly protected from contamination and free from slime spots.

Item III. *Adhesives and Forming Lubricants Free from Poisonous, Malodorous, or Injurious Substances.* Adhesives and forming lubricants employed in fabricating "these products" shall not impart objectionable odor, and shall not contaminate the contents of "these products" with microorganisms or any poisonous or injurious substances. Adhesives and forming lubricants shall be stored, handled and used in a sanitary manner, and kept free from objectionable substances.

Item IV. *Moisture-Resistant Materials.* Moisture-resistant materials when used for "these products" shall be free from substances which may render the contents injurious to health or impart an objectionable odor or taste. Moisture-resistant materials, when used, shall render "these products" adequately impervious to the transmission of liquids through the package under normal conditions of use. Moisture-resistant materials shall not crack open, slough off, flake, nor pull away from treated surfaces to a degree which would render the contents injurious to health.

Item V. *Protection from Contamination.* While in the possession and control of the manufacturer "these products" shall be handled, wrapped, packaged, transported, and stored in such manner as to protect them from contamination.

All surfaces of "these products" which in normal use could come in contact with their contents shall be protected from damage and exposure to contamination and shall be handled in a sanitary manner. For protection from contamination during shipping and storage, well constructed shipping containers which can be tightly closed and sealed shall be used.

Item VI. *Bacteriological Standards.* "These products" shall comply with the following standards:

(a) "These products" and materials used in their manufacture shall be free from coliform bacteria.

(b) By disintegration test, the stock used in "these products" shall yield not more than 250 colonies per gram.

(c) By rinse or contact tests, product contact surfaces of "these products" shall yield not more than one colony per one square centimeter.

(d) When "these products" are used for the packaging of milk or "milk products" as defined in the "Milk Ordinance and Code" recommended by the U. S. Public Health Service ("Public Health Bulletin" No. 229, 1953 Edition, as amended), "these products" shall conform to the bacteriological standards specified in that Code.

Item VII. *Plant Sanitation.* "These products" shall be manufactured, wrapped, packaged and stored in a fabricating plant which is maintained and operated in a clean and sanitary manner, in clean and sanitary surroundings under adequate insect, rodent, and vermin control.

"These products" shall be protected from contamination by microorganisms, dirt, grease, splashing water, refuse, food residues, insects, rodents and other animals, and insanitary handling by the manufacturers. Fabricating plants shall meet the following requirements:

(a) *Plant Surroundings.* The immediate surroundings of plants shall be kept in a clean and sanitary condition.

(b) *Buildings and Rooms.* The buildings and rooms in which "these products" are fabricated, handled, packed and stored shall be clean, well lighted (natural or artificial) and ventilated, and free from dirt, insects, rodents and other animals. Where fumes are present as a result of the manufacturing process, rooms shall be equipped with a suitable exhaust system or be so ventilated as to satisfactorily eliminate or control such fumes.

(c) *Water Supply.* The water supply shall be easily accessible, adequate, and of safe sanitary quality. There shall be no cross connection between a safe water supply and an unsafe water supply. Bacteriologically, water used in the manufacturing process shall meet United States Public Health Service Standards for water used on interstate carriers or the requirements of the province (Dominion of Canada) wherein the plant is located.

(d) *Floors and Corners.* Floors and corners shall be kept clean and free from accumulation of scrap and waste materials. Trim, converter waste, and cuttings which are intended to be re-used as defined in paragraphs 4 and 5, shall be collected in clean receptacles or conveyed automatically to a

room suitable for baling stock of high sanitary quality. Clean metal guards or other suitable devices shall be used to prevent contamination of in-process materials by contact with floors. Floors shall be kept in good repair and accessible for cleaning.

(e) *Machines and Other Mechanical Equipment.* Machines, units and appurtenances with which paper, blanks, materials, and packaging come in contact shall not contaminate "these products." Machines, units and parts thereof shall be kept reasonably free from accumulations of fiber. Contamination of materials used and "these products" by dirt, grease, and oil shall be prevented. Temporary makeshift devices that may contaminate the product shall not be used. Where feasible, unnecessary overhead structures shall not be permitted.

(f) *Hand-Washing Facilities.* Hand-washing facilities shall be conveniently located and readily accessible, shall be provided with lavatories equipped with hot and cold or tempered running water, hand-cleansing soap or detergent, paper towels or other approved sanitary towels or hand-drying devices. The use of the common towel is prohibited. Such facilities shall be kept clean and in good repair.

Clearly legible signs shall be posted conspicuously in each toilet room instructing employees to wash their hands before returning to work and after using toilet. The common drinking glass and insanitary drinking facilities will not be permitted.

(g) *Toilet Facilities.* Toilet facilities shall comply with local or state ordinances, be adequate in number and shall be kept clean, well-ventilated, and in good repair.

(1) Toilet rooms shall be free from flies and shall not open directly into rooms where paper or paperboard products are fabricated, handled, or stored.

(2) Toilet room doors shall be self-closing; a room or enclosure open at the top is not satisfactory.

(3) Toilet rooms shall not be used for storage of clothing, shoes, or lunches.

(4) Toilet rooms shall be used only by personnel for whom the facilities are intended.

(h) *Lunching Facilities and Disposal of Food Residues.* Lunching at machines, in washrooms, or wherever materials used in the manufacture of "these products" are held, fabricated, and stored shall not be permitted. Adequate containers or facilities shall be maintained for disposal of food scraps and bottles containing residues of milk and other drinks. Distribution and accumulation about plant of food residues, bottles, and other containers of food and drink shall be prohibited.

Item VIII. *Personnel, Cleanliness and Health.* All persons employed in the fabricating plant who come in contact with materials used and "these products" shall handle them in a clean and sanitary manner; all such persons shall, *(a)* wear clean outer garments, *(b)* wash hands thoroughly with soap and dry them on a clean towel before commencing work, *(c)* wash hands thoroughly with soap and water and dry them on a clean towel before resuming work after visiting the toilet, and *(d)* keep the hands clean at all times while engaged in this work. Female employees shall confine the hair by means of a cap, net or other effective hair restraint. Any person with acute contagious or infectious disease, receiving medication and/or requiring bandaging of fingers shall be promptly relieved of any direct connection with the manufacture of "these products" until, under advice of physician, all public health and sanitation hazards have been removed.

Item IX. *Compliance.* Compliance with "sanitation standards" shall be determined by bacteriological examination of "these products" at least once every three months and by annual inspection of manufacturing operations by the Syracuse University Research Corporation.

PLANT INSPECTION REPORT

NAME OF PLANT _____

ADDRESS _____

INSPECTION NO. _____ DATE _____

DATE OF LAST INSPECTION _____

Sir: An inspection of your plant has this day been made and your attention is called to the items marked below with a cross (X).

ITEM NO.

1. *Poisonous and Deleterious Substances Prohibited.*
(1a) Manufacturing materials free from substances which may render the contents injurious to health or impair contents as to flavor ( ), odor ( ), composition ( ), bacteriological quality ( ) _____( )
(1b) "These products" comply with the Federal Food, Drug and Cosmetic Act as amended and regulations thereunder. _____( )
2. *Paper and Paperboard.* Made from clean, sanitary, virgin stock only ( ), free from slime spots ( ), properly protected from contamination during transportation and storage ( ), outside sheets discarded immediately prior to fabrication ( ) _____( )

3. *Adhesives and Forming Lubricants.* Do not contaminate food ( ), resistant to decomposition ( ) and leaching ( ), stored, handled and used in sanitary manner ( ), dried films odorless and tasteless ( ) ----------( )
4. *Moisture-Resistant Materials.* Materials are impervious to liquids ( ), are odorless ( ), tasteless ( ), non-poisonous ( ), do not crack open ( ), slough-off ( ), flake-off ( ), pull away ( ), ----------( )
5. *Protection from Contamination.*
   (5a) Product contact surfaces protected at all times from damage ( ) and from exposure to contamination ( )
   (5b) Fabricated products protected during shipping and storage — by well constructed shipping containers ( ), tightly closed ( ), sealed ( ), ----------( )
6. *Bacteriological Standards.*
   Free from coliform bacteria ( ), not more than one colony per one sq. centimeter ( ), conforms to bacteriological standards in U.S.P.H.S. Milk Ordinance and Code where applicable ( ) ----------( )
7. *Plant Sanitation.*
   (7a) Plant surroundings — immediate surroundings clean and sanitary ----------( )
   (7b) Buildings and rooms — clean ( ), well lighted and ventilated ( ), free from dirt, insects and vermin ( ), devices used for removal of fumes and dust ( ) ----------( )
   (7c) Water supply — easily accessible ( ) adequate ( ), of safe sanitary quality ( ), no cross connections ----------( )
   (7d) Floors and corners — kept clean ( ), cuttings handled and baled in sanitary manner ( ), stock protected from contact with floors ( ), floors tight and kept in good repair ( ), accessible for cleaning ( ), ----------( )
   (7e) Machines and units — accessible for cleaning ( ), are kept clean ( ), maintained and operated without objectionable make-shift devices ( ), products handled mechanically where possible ( ), ----------( )
   (7f) Hand-washing facilities — convenient, accessible and clean ( ), warm running water ( ), soap, liquid or powder ( ), individual towels and suitable disposal receptacles ( ), washing signs ( ), ----------( )
   (7g) Toilet facilities — conform to local or State ordinances ( ), clean ( ), ventilated ( ), good repair ( ), free of flies ( ), doors self-closing ( ), no direct opening ( ), no storage ( ), for persons intended ( ), ----------( )
   (7h) Lunching facilities — room suitable for purpose ( ), kept clean and sanitary ( ), no food in machine or storage areas ( ), prompt disposal of food residues, waste, etc. ( ), ----------( )
8. *Personnel, Cleanliness and Health.*
   No person with infectious disease, infection of hands, skin or scalp ( ), wear clean, washable outer garments ( ), hands clean ( ), hair confined by cap or net ( ), ----------( )
9. *Compliance.*
   Laboratory test findings for previous four quarters ( )
   Date ----------

Remarks: ----------

Manager of Plant ----------

Inspector ----------

3-A SANITARY STANDARDS FOR NON-COIL TYPE BATCH PASTEURIZERS

Serial #2400

Formulated by

International Association of Milk, Food and Environmental Sanitarians

United States Public Health Service

The Dairy Industry Committee

It is the purpose of the IAMFES, USPHS, and DIC in connection with the development of 3-A Sanitary Standards, to allow and encourage full freedom for inventive genius or new developments. Batch Pasteurizer specifications heretofore and hereafter developed which so differ in technique, design, material and construction or otherwise, so as not to conform to the following standards but which are, in the opinion of the manufacturer or fabricator, equivalent or better, may be submitted at any time for consideration by IAMFES, USPHS, and DIC.

A. *SCOPE*

These standards cover sanitary aspects of non-coil type batch pasteurizers used to pasteurize milk, fluid milk products, or frozen dessert mixes, including those appurtenances necessary to meet pasteurization requirements. Batch pasteurizers may be either of the atmospheric or closed type. The latter may be operated at pressures from below to above that of the atmosphere.

In order to conform with these 3-A Sanitary Standards, Non-Coil Type Batch Pasteurizers shall comply with the following in design, material, and fabrication criteria.

B. *DEFINITIONS*

(1) *Product*: Shall mean milk, fluid milk products or frozen dessert mixes.

(2) *Surfaces*:

(a) *Product Contact Surfaces*: Shall mean all surfaces which are exposed to the product and surfaces from which liquids may drain, drop, or be drawn into the product.

(b) *Non-Product Contact Surfaces*: Shall mean all other exposed surfaces.

(3) *Lining*: Shall mean all surfaces used to contain the product including the ends, sides, bottom and top.

(4) *Shell*: Shall mean the material covering the exterior of the insulation and/or heat exchange jacket.

(5) *Breast*: Shall mean that portion of the metal used to join the top of the lining to the top of the shell on an atmospheric pasteurizer.

C. *MATERIALS*

(1) All product contact surfaces, including the breast, shall be of 18-8 stainless steel with a carbon content of not more than 0.12 percent, or equally corrosion resistant metal that is nontoxic and non-absorbent, except that:

(a) Rubber and rubber-like materials may be used for measuring devices (except measuring sticks), slinger or drip shields, agitator seals on vacuum and/or pressure pasteurizers, agitator bearings, protective caps for openings (other than manhole) and/or sanitary fittings, scraper blades, gaskets, seals and parts used in similar applications. These materials shall comply with the applicable provisions of the "3-A Sanitary Standards for Multiple-Use Rubber and Rubber-Like Materials Used as Product Contact Surfaces in Dairy Equipment, Serial #1800."

(b) Plastic materials may be used for bearings, measuring devices (except measuring sticks), slinger or drip shields, agitator seals on vacuum and/or pressure pasteurizers, agitator bearings, protective caps for openings (other than manhole) and/or sanitary fittings, sight and light parts, scraper blades, gaskets, seals and parts used in similar applications. These materials shall comply with the applicable provisions of the "3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment, Serial #2000."

(c) Where functional properties are required for specific applications, such as bearing surfaces and rotary seals where dissimilar materials are necessary, metal equal in corrosion resistance to 18-8 stainless steel with a carbon content of not more than 0.12 percent, carbon and ceramics may be used. Ceramic materials shall be inert,

non-absorbent, non-porous, non-toxic, insoluble, resistant to scratching scoring, and distortion by the temperature, chemicals, and methods to which they are normally subjected in operation, or cleaning and bactericidal treatment.

(d) *Glass*: If a sight and/or light glass(s) is provided, it shall be of clear heat resistant glass.

(2) All non-product contact surfaces shall be of corrosion-resistant material, or material that is rendered corrosion-resistant. If painted, the paint used shall adhere. Non-product contact surfaces shall be relatively non-absorbent, cleanable and durable. Parts removable for cleaning having both product contact and non-product contact surfaces shall not be painted.

D. *FABRICATION*

(1) All product contact surfaces, covers, fittings and appurtenances shall be easily accessible, and readily cleanable either when in operating position or when removed. Metallic surfaces shall be at least as smooth as No. 4 mill finish on stainless steel sheets or 120 grit finish properly applied. All permanent joints shall be welded, and all weld areas of product contact surfaces shall be at least as smooth as the adjoining surfaces.

(2) *Lining*: The lining shall remain in a relatively fixed position within the shell or body of the pasteurizer and shall be so constructed that it does not sag, buckle or become distorted in normal use. The bottom of the lining shall have a minimum pitch of 1/4 inch per foot toward the outlet. All corners in the lining having inside angles of less than 135 degrees shall have radii of not less than 1/2 inch. All corners in accessories, bridges, or appurtenances which are welded to the lining, and have inside angles of less than 135 degrees, shall have minimum radii of 1/4 inch. The design of the outlet shall conform to D. (9).

(3) *Shell*: All seams and openings in the shell shall be effectively sealed against moisture and vermin.

(4) *Breast*: The breast shall be integral with or welded to the lining, and shall be sloped so that drainage is away from the lining. The junction of the breast and the shell shall be welded or effectively sealed.

(5) *Main Covers and Bridges for Atmospheric Type Pasteurizers*;

(a) The main cover(s) shall be of a type which can be opened and maintained in an open position, shall be sufficiently rigid to prevent buckling, shall be self-draining in the closed position, shall be close fitting, and all edges shall have downward flanges of not less than 3/8 inch. The inside corners of the cover(s) shall have 1/4 inch minimum radii. The design shall be such that when raising the the cover(s), any liquid on the top will not enter the pasteurizer. When the cover(s) is in its fully opened position, the drops of condensate formed on the underside of the cover(s) shall not drain into the pasteurizer. The cover(s) shall be provided with an adequate, conveniently located and durable handle(s) of sanitary design, which is welded in place or formed into the cover material.

(b) The bridge(s) and/or the fixed cover(s) shall pitch to the outside edge(s) of the pasteurizer for complete drainage, and shall have a raised flange not less than 3/8 inch in height where the edge(s) meet the main cover(s). The bridge(s) and/or the fixed cover(s) shall be integral with or welded to the lining, and shall be installed so the underside is accessible for cleaning and inspection without completely entering the pasteurizer.

(6) *Manhole Covers for Closed Type Pasteurizers*: The cover for a manhole in the side wall shall be either the inside or outside swing type. If the cover swings inside, it shall also swing outside, away from the opening. Threads or ball joints employed to attach the manhole cover(s) and its appendages shall not be located within the lining. If mounted on top of the pasteurizer, the manhole cover(s) shall be of the outside swing type.

(7) *Gaskets and Gasket Grooves for Manhole Covers, Sight and Light Glasses*: Gaskets shall be removable or permanently bonded. Gasket retaining grooves for removable gaskets shall be no deeper than their width. The minimum radius of any internal angle in a gasket retaining groove shall be not less than 1/8 inch, except that a 3/32 inch radius is permissible where a standard 1/4 inch O-Ring is to be used.

Grooves in gaskets shall be no deeper than their width and the minimum radius of any internal angle shall be not less than 1/8 inch unless the gasket is readily reversible for cleaning.

(8) *Openings*: The edges of all openings in the top enclosure, main cover(s) or the bridge(s) shall be extended upwards at least 3/8 inch. All openings into the lining not continually in use shall be provided with removable covers, which are designed to make close contact with the upper edges of the opening or cover surface, and when in the main cover, the removable covers shall remain in position when the main cover is in an open position.

(a) *Thermometer openings*: Connections and/or openings, which will accommodate indicating, recording and air space thermometers shall be provided. The connections and/or openings shall be located in the top enclosure, cover, bridge, or through the side wall. Thermometer wells may be used. When installed thru the side wall, the location shall be such that the thermometer(s) is easily readable. Thermometer connections and/or openings shall be located so that the thermometer is not influenced by the heating or cooling medium. All connections and/or openings shall conform to applicable parts of 3-A "Sanitary Standards for Thermometer Fittings and Connections Used on Milk and Milk Products Equipment", Serial #0900 and Supplements thereto.

(b) *Agitator openings*: The agitator shaft opening through the bridge or top enclosure shall have a minimum diameter of one inch on pasteurizers which require removal of the agitator shaft for cleaning, or be of a diameter that will provide a 1-inch minimum annular cleaning space between the agitator shaft and the inside surface of the flanged opening on pasteurizers which do not require removal of the agitator for cleaning. A shield that can be raised or dismantled, to permit the cleaning of all its surfaces, shall be provided to protect against the entrance of dust, oil, insects and other contaminants into the pasteurizer through the annular space around the agitator shaft.

(c) *Openings for Sanitary Piping*: The edges of the inlet openings shall extend upward at least 3/8 inch or be fitted with a permanently attached sanitary fitting conforming to 3-A "Sanitary Standards for Fittings Used on Milk and Milk Products Equipment and Used on Sanitary Lines Conducting Milk and Milk Products", Serial #0800, and Supplements thereto. If fitted with a permanently attached sanitary fitting, the inlet opening may extend outward horizontally.

(d) *Manhole Opening*: The dimensions of a manhole opening shall not be less than 15" x 20" oval, 12" x 27" elliptical, or 18" diameter, except that pasteurizers with a capacity of 300 gallons or less may have top opening manholes having a diameter of not less than 16".

(e) *Sight and Light Glass Openings*: When provided, the opening(s) shall be of such design and construction that the inner surface of the glass will be relatively flush with the lining and the glass may be removed for cleaning. The diameter of the opening(s) into the lining shall be not less than 3 3/4 inches. The opening(s) shall be of such design and construction that there will be adequate agitation and circulation in all areas.

(f) *Air Space Heater Openings*: An air space heater opening(s) shall be provided and shall extend upward at least 3/8 inch or be fitted with a permanently attached sanitary fitting conforming to 3-A "Sanitary Standards for Fittings Used on Milk and Milk Products Equipment and Used on Sanitary Lines Conducting Milk and Milk Products", Serial #0800, and Supplements thereto.

(g) *Opening for Mechanical Cleaning*: An opening and connection(s) for mechanical cleaning shall be provided in pasteurizers, the inside height of which exceeds 96 inches. The opening shall extend upward at least 3/8 inch or be fitted with a permanently attached sanitary fitting conforming to 3-A "Sanitary Standards for Fittings Used on Milk and Milk Products Equipment and Used on Sanitary Lines Conducting Milk and Milk Products", Serial #0800, and Supplements thereto.

(9) *Outlet and Outlet Valve*: The outlet, flare, and the outlet valve shall conform to the design and construction provisions of the "3-A Sanitary Standards for Inlet and Outlet Leak Protector Plug Valves for Batch Pasteurizers", Serial #1400.

The inside diameter of the outlet passage on pasteurizers with a capacity of 20-gallons or less shall not be less than the inside diameter of 1-inch sanitary pipe (.902 in.), or on pasteurizers of greater capacity, not less than 1.25 inch. The outlet opening shall be located at the lowest point of the lining.

The outlet and the outlet valve shall be so designed that either a single service or a

multiple use gasket can be used.
The outlet valve shall be removable for cleaning. The valve shall be considered removable when secured by not more than four hex nuts.

(10) *Agitators*: The agitator shall be of sufficient size and powered to provide uniformity of composition and temperature throughout the product during the holding period to the extent that the simultaneous temperature difference between the product at the center of the pasteurizer and the coldest product in the pasteurizer will not exceed 1°F. at any time during the holding period. This shall be deemed to be satisfied if the agitator is so designed as to sweep the product current effectively through all zones occupied by the product, including the outlet flare, but excluding inlet pipes surrounded by product in the process of pasteurization and open to the pasteurizer at the bottom.
The inside angles of portions of the agitator having product contact surfaces shall have minimum radii of 1/4 inch.
The agitator shall be readily cleanable and shall be one of the following types:
(a) *Top Entering Non-Removable Type*: The top entering non-removable agitator shall be readily accessible and cleanable. There shall be at least a 1/2 inch space between the non-removable agitator and the bottom of the lining, unless the agitator is mounted on a hinged type cover.
(b) *Top Entering Removable or Demountable Type*: The top entering removable or demountable agitator shall be provided with an easily accessible, readily demountable coupling of either a sanitary type located within the lining or a coupling located outside of the lining provided that it is above the shield provided to protect the annular space around the shaft. All product contact surfaces of the agitator shall be visible when the agitator is removed. A bottom support or guide, if used, shall be welded to the lining, shall not interfere with drainage of the pasteurizer and the inside angles shall have minimum radii of 1/8 inch. When the agitator shaft has a bearing cavity, the diameter of the cavity shall be greater than the depth. The agitator shall be easily demountable for cleaning of the bearing and any shaft cavity.
(c) *Side or Bottom Entering*: The side or bottom agitator and shaft, including the complete seal, shall be readily demountable for cleaning. Non-removable parts having product contact surfaces shall be designed so that the product contact surfaces are readily cleanable from the inside of the pasteurizer.
Seals for the agitator shaft shall be of a packless type, sanitary in design, with all parts readily accessible for cleaning.

(11) *Agitator Mounting*: The driving mechanism shall be securely mounted in a position that will provide a minimum distance of 4 inches measured vertically downward from the bottom of the driving mechanism housing, excluding bearing bosses and mounting bosses, to the nearest surface of the pasteurizer; and in such a manner that all surfaces of the pasteurizer under or adjacent to the driving mechanism shall be readily accessible for cleaning and inspection.

(12) *Supports*: Adjustable legs, if provided, shall be of sufficient number and strength and so spaced that the filled pasteurizer will be adequately supported. Legs shall have closed bases. Exteriors of legs and leg sockets shall be readily cleanable. Supports shall be such that a 6 inch minimum clearance will be provided between the floor and the bottom of a pasteurizer 72 inches or less in diameter or width or an 8 inch minimum clearance for a pasteurizer more than 72 inches in diameter or width. On pasteurizers having bottom entering agitators, the clearance from the floor to the lowest point of the agitator or agitator drive shall conform to these dimensions.

(13) Non-product contact surfaces shall have a smooth finish, be free of pockets and crevices and be readily cleanable.

(14) Non-product contact surfaces to be painted shall be effectively prepared for painting.

(15) *Air Space Heater*: Means shall be provided in pasteurizers to keep the atmosphere above the product at a temperature not less than 5°F. higher than the product temperature during the heating period, and not less than 5°F. higher than the required temperature of pasteurization during the holding period.
The air space heater(s) shall be mounted within the space between the top enclosure, cover or bridge of the pasteurizer and the level of the product when the pasteurizer is filled to its rated capacity.
The air space heater(s) shall be easily demountable for cleaning.
The air space heater(s) shall be installed

through the cover, bridge, or top enclosure of the pasteurizer, and sanitary fittings conforming to the design and construction provisions of the 3-A "Sanitary Standards for Fittings Used in Milk and Milk Products Equipment and Used on Sanitary Lines Conducting Milk and Milk Products", Serial #0800, and Supplements thereto shall be used.

(16) A warning plate, furnished and permanently affixed by the manufacturer, shall be provided for closed-type pasteurizers which shall indicate the maximum operating pressure and/or vacuum under which the pasteurizer may be safely operated.

(17) Vessels made in conformance to these standards shall have a statement on the name plate or on the warning plate, or on a plate furnished and permanently affixed by the manufacturer that the vessel is a pasteurizer.

APPENDIX

A. *AIR SPACE HEATING FACILITIES*

Steam for Product Contact: Culinary steam should be provided for air space heaters.

The following procedures for providing steam of culinary quality are recommended:

SOURCE OF BOILER FEED WATER. Potable water or water supplies acceptable to the regulatory agency having jurisdiction shall be used. Water containing organic materials such as leaves, algae, detergents, etc., should not be used for boiler feed water without adequate pretreatment.

FEED WATER TREATMENT. Feed waters must be treated if necessary for proper boiler care and operation. Boiler feed water treatment and control should be under the supervision of trained personnel or a firm specializing in industrial water conditioning. Such personnel should be informed that the steam is to be used for culinary purposes. Pre-treatment of feed waters for boilers or steam generating systems to reduce water hardness before entering the boiler or steam generator by ion exchange or other acceptable procedures is preferable to addition of conditioning compounds to boiler waters.

A number of compounds are used to prevent corrosion and scale in boilers or to facilitate sludge removal. On February 6, 1963 a list of boiler water additives for the preparation of steam in contact with food was published in the Federal Register which conform to the Food Additives Amendment of the Food, Drug and Cosmetic Act. The substances listed are:

Ammonium alginate
Cobalt sulfate (as catalyst)
Lignosulfonic acid
Monobutyl ether of polyoxyethylene glycol[1]
Monobutyl ether of polyoxypropylene glycol[1]
Polyoxyethylene glycol[2]
Polyoxypropylene glycol[2]
Potassum carbonate
Sodium acetate
Sodium alginate
Sodium aluminate
Sodium carbonate
Sodium hexametaphosphate
Sodium humate
Sodium hydroxide
Sodium lignosulfonate
Sodium metasilicate
Sodium nitrate
Sodium phosphate (mono-, di-, tri-)
Sodium silicate
Sodium sulfate
Sodium sulfite (neutral or alkaline)
Sodium tripolyphosphate
Tannin (including quebracho extract)
Tetrasodium pyrophosphate

[1]Minimum molecular weight 1,500.
[2]Minimum molecular weight 1,000.

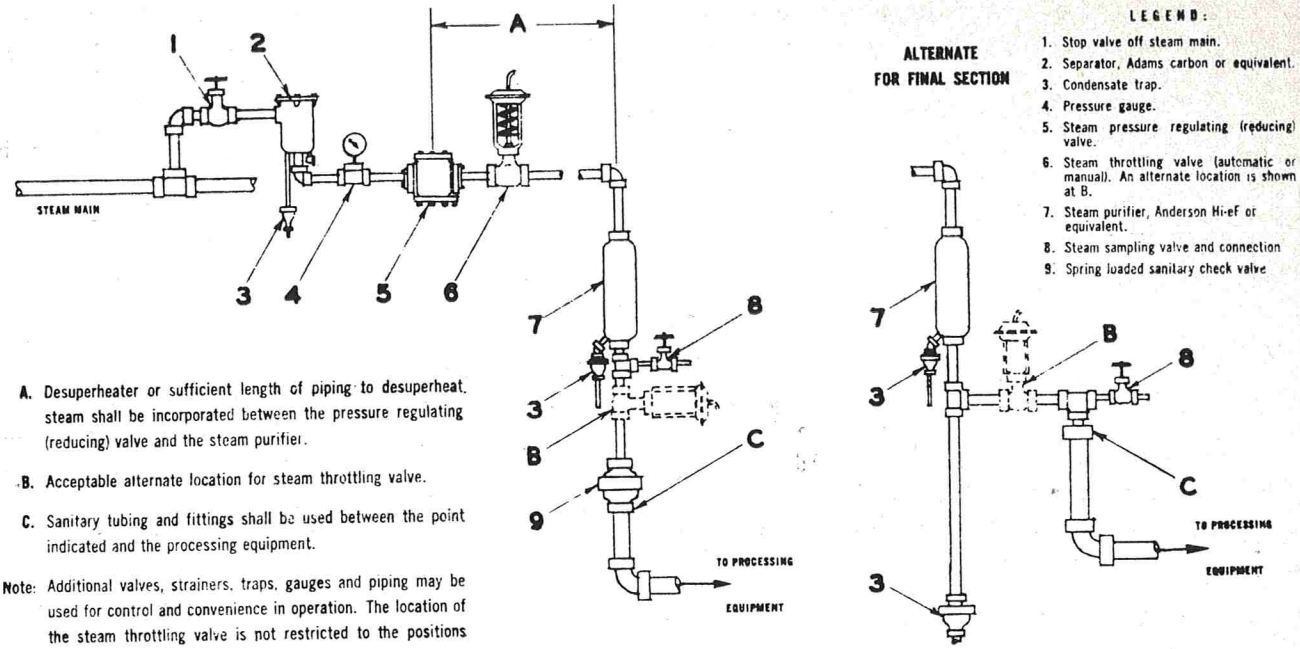
No greater amount of the above boiler water treatment compounds should be used than the minimum necessary for controlling boiler scale or other boiler water treatment purposes and no greater amount of steam should be used than necessary.

Tannin is also frequently added to boiled water to facilitate sludge removal during boiler blow-down. This product, although included in the above list of approved boiler additives, has been reported to give rise to odor problems, and for this reason should be used with caution.

Boiler compounds containing cyclohexylamine, morpholine, octadecylamine, chromium and hydrazine are *not permitted* for use in steam in contact with milk and milk products.

BOILER OPERATION. A supply of clean, dry and saturated steam is necessary for proper equipment operation, therefore, boilers and steam generation equipment should be operated in such a manner as to prevent foaming, priming, carry-over and excessive entrainment of boiler water into the steam. Carry-over of boiler water additives can result in the production of milk off-flavors. Manufacturers instructions regarding recommended water level and blow-down should be consulted and rigorously followed. The blow-down of the boiler should be carefully watched, so that over-concentration of the boiler water solids and foaming are avoided. It is recommended that periodic analyses be made of condensate samples. Such samples should be taken from the line between the final steam separating equipment and the point of the introduction of steam into the product.

CULINARY STEAM SUPPLY LINE. The steam pipe line between the steam main and the point of introduction of steam into the pasteurizer should be equipped with at least the following depicted units of adequate size for control and safety purposes as shown on the following drawings.



A. Desuperheater or sufficient length of piping to desuperheat steam shall be incorporated between the pressure regulating (reducing) valve and the steam purifier.

B. Acceptable alternate location for steam throttling valve.

C. Sanitary tubing and fittings shall be used between the point indicated and the processing equipment.

Note: Additional valves, strainers, traps, gauges and piping may be used for control and convenience in operation. The location of the steam throttling valve is not restricted to the positions indicated on the drawing.

Procedures and drawings by courtesy of the National Association of Dairy Equipment Manufacturers, 1012 Fourteenth Street, N. W., Washington, D. C. 20035

B. *THERMOMETERS*

The ranges and degree of accuracy listed apply to milk and milk products and those in parentheses only to frozen desserts mix.

(1) *Indicating Thermometers for Batch Pasteurizers*:

(a) Type—Mercury—actuated, direct-reading, contained in a corrosion-resistant case which protects against breakage and permits easy observation of column and scale; reference line etched on tube at 145°F., (155°F., for frozen dessert mix), with other markings permissible; filling above mercury, nitrogen, or equally suitable gas.

(b) Magnification of Mercury Column—To apparent width of not less than one-sixteenth of an inch.

(c) Scale—Range of 130° to 210°F., extension either side permitted; graduated in division of not more than 1° between 130° and 165°F., with not more than 16° per inch of scale; protected against damage at 220°F.

(d) Accuracy—Within 0.5°F., plus or minus, between 144° and 147°F., (154° and 157°F., for frozen dessert mix).

(e) Stem Fitting should fit one of the connections or fittings described in 3-A "Sanitary Standards for Thermometers and Connections Used on Milk and Milk Products Equipment", Serial #0900 and Supplements thereto.

(f) Bulb—Corning normal, or equally suitable thermometric glass.

(2) *Air Space Indicating Thermometers for Batch Pasteurizers*:

(a) Type—Mercury—actuated; direct-reading, contained in a corrosion resistant case which protects against breakage and permits easy observation of column and scale; bottom of bulb chamber not less than 2 inches, and not more than 3 1/2 inches, below under side of top enclosure, cover or bridge; filling above mercury, nitrogen, or equally suitable gas.

(b) Magnification of Mercury Column—To apparent width of not less than one-sixteenth of an inch.

(c) Scale—Range of 130° to 210°F., extension either side permitted; graduated in not more than 2° divisions, with not more than 16° per inch of scale; protected against damage at 220°F.

(d) Accuracy—Within 1°F., plus or minus, throughout the specified scale range.

(e) Stem Fitting—Fitting should fit one of the connections described in 3-A "Sanitary Standards for Thermometers and Connec-

tions Used on Milk and Milk Products Equipment", Serial #0900 and Supplements thereto.

(f) Bulb—Corning normal or equally suitable thermometric glass.

(3) *Recording Thermometers for Batch Pasteurizers*:

(a) Case—Moisture-proof under operating conditions obtaining in pasteurization plants.

(b) Scale—Range of 130° to 165°F., with extension of scale on either side permitted; graduated in temperature-scale division of 1°F., spaced not less than 1/16 of an inch apart between 144° and 147°F., (154° and 157°F., for frozen dessert mix); graduated in time-scale divisions of not more than 10-minutes; having a chord or straight-line length of not less than 1/4 inch between 144° and 147°F., (154° and 157°F., for frozen dessert mix); provided that on pasteurizers used solely for pasteurization of milk products (including frozen dessert mix) at temperatures above 150°F., (160°F., for frozen dessert mix), 2 degree divisions may be used one-sixteenth of an inch apart, with temperature accuracy within 2°F., plus or minus.

(c) Temperature Accuracy—Within 1°F., plus or minus, between 144° and 147°F., (154° and 157°F. for frozen dessert mix).

(d) Time Accuracy—The recorded elapsed time as indicated by the chart rotation, shall not exceed the true elapsed time, as shown by an accurate watch, over a period of at least 30-minutes at pasteurization temperature. All recorders shall be equipped with spring-operated or electrically-wound clocks.

(e) Pen-Arm Setting Device—Easily accessible; simple to adjust.

(f) Pen and Chart Paper—Designed to give a line not over one-fortieth of an inch thick when in proper adjustment; easy to maintain.

(g) Pressure System (Bulb, Tube, Spring, etc.) —Protected against damage at bulb temperature of 220°F.

(h) Stem Fitting—Should fit one of the connections or fittings described in the 3-A "Sanitary Standards for Thermometers and Connections used on Milk and Milk Products Equipment", Serial #0900 and Supplements thereto.

(i) Chart Speed—The Chart should make one revolution in not more than 12 hours, and should be graduated for a maximum record of 12 hours. The rotating chart-support should be provided with a pin which will puncture the chart to prevent its fraudulent rotation.

C. Means should be provided for access to the manhole and/or sight glass.

These standards shall become effective March 23, 1965.

3-A SANITARY STANDARDS FOR NON-COIL TYPE BATCH PROCESSORS FOR MILK AND MILK PRODUCTS

Serial #2500

Formulated by

International Association of Milk, Food and Environmental Sanitarians
United States Public Health Service
The Dairy Industry Committee

It is the purpose of the IAMFES, USPHS, and DIC in connection with the development of 3-A Sanitary Standards, to allow and encourage full freedom for inventive genius or new developments. Batch Processor specifications heretofore and hereafter developed which so differ in technique, design, material and construction or otherwise, so as not to conform to the following standards, but which are, in the opinion of the manufacturer or fabricator, equivalent or better, may be submitted at any time for consideration by IAMFES, USPHS, and DIC.

A. *SCOPE*

These standards cover sanitary aspects of non-coil type batch processors used to process milk, fluid milk products, or frozen dessert mixes. Batch processors may be either of the atmospheric or closed type. The latter may be operated at pressures from below to above that of the atmosphere.

In order to conform with these 3-A Sanitary Standards, non-coil type batch processors shall comply with the following in design, material, and fabrication criteria.

B. *DEFINITIONS*

(1) *Processor*: Shall mean a jacketed tank or vat provided with a heating and/or cooling medium and agitation for the mixing and heat processing of milk, fluid milk products, or frozen dessert mixes.

(2) *Product*: Shall mean milk, fluid milk products and frozen dessert mixes.

(3) *Surfaces*:

(a) *Product Contact Surfaces*: Shall mean all surfaces which are exposed to the product and surfaces from which liquids may drain, drop, or be drawn into the product.

(b) *Non-Product Contact Surfaces*: Shall mean all other exposed surfaces.

(4) *Lining*: Shall mean all surfaces used to contain the product, including the ends, sides, bottom and top.

(5) *Shell*: Shall mean the material covering the exterior of the insulation and/or heat exchange jacket.

(6) *Breast*: Shall mean that portion of the metal used to join the top of the lining to the top of the shell on an atmospheric processor.

C. *MATERIALS*

(1) All product contact surfaces, including the breast, shall be of 18-8 stainless steel with a carbon content of not more than 0.12 percent, or equally corrosion resistant metal that is non-toxic and non-absorbent, except that:

(a) Rubber and rubber-like materials may be used for measuring devices (except measuring sticks), slinger or drip shields, agitator seals on vacuum and/or pressure processors, agitator bearings, protective caps for openings (other than manhole) and/or sanitary fittings, scraper blades, gaskets, seals and parts used in similar applications. These materials shall comply with the applicable provisions of the "3-A Sanitary Standards for Multiple-Use Rubber and Rubber-Like Materials Used as Product Contact Surfaces in Dairy Equipment, Serial #1800."

(b) Plastic materials may be used for bearings, measuring devices (except measuring sticks), slinger or drip shields, agitator seals on vacuum and/or pressure processors, agitator bearings, protective caps for openings (other than manhole) and/or sanitary fittings, sight and light parts, scraper blades, gaskets, seals and parts used in similar applications. These materials shall comply with the applicable provisions of the "3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment, Serial #2000."

(c) Where functional properties are required for specific applications, such as bearing surfaces and rotary seals where dissimilar materials are necessary, metal equal in corrosion resistance to 18-8 stainless steel with a carbon content of not more than 0.12%, carbon, and ceramics may be used.

Ceramic materials shall be inert, non-absorbent, non-porous, non-toxic, insoluble, resistant to scratching, scoring, and distortion by the temperature, chemicals, and methods to which they are normally subjected in operation, or cleaning and bactericidal treatment.

(d) *Glass*: Clear heat resistant glass may be used for sight and/or light glass(es).

(2) All non-product contact surfaces shall be of corrosion-resistant material, or material that is rendered corrosion-resistant. If painted, the paint used shall adhere. Non-product contact surfaces shall be relatively non-absorbent, cleanable and durable. Parts removable for cleaning having both product contact and non-product contact surfaces shall not be painted.

D. *FABRICATION*

(1) All product contact surfaces, covers, fittings and appurtenances shall be easily accessible, and readily cleanable either when in operating position or when removed. Metallic surfaces shall be at least as smooth as No. 4 mill finish on stainless steel sheets or 120 grit finish properly applied. All permanent joints shall be welded, and all weld areas of product contact surfaces shall be at least as smooth as the adjoining surfaces.

(2) *Lining*: The lining shall remain in a relatively fixed position within the shell or body of the processor and shall be so constructed that it does not sag, buckle or become distorted in normal use. The bottom of the lining shall have a minimum pitch of 1/4 inch per foot toward the outlet. All corners in the lining having inside angles of less than 135 degrees shall have radii of not less than 1/2 inch. All corners in accessories, bridges, or appurtenances which are welded to the lining, and have inside angles of less than 135 degrees, shall have minimum radii of 1/4 inch. The design of the outlet shall conform to D. (9).

(3) *Shell*: All seams and openings in the shell shall be effectively sealed against moisture and vermin.

(4) *Breasts*: The breast shall be integral with or welded to the lining, and shall be sloped so that drainage is away from the lining. The junction of the breast and the shell shall be welded or effectively sealed.

(5) *Main Covers and Bridges for Atmospheric Type Processors*:

(a) The main cover(s) shall be of a type which can be opened and maintained in an open position, shall be sufficiently rigid to prevent buckling, shall be self-draining in the closed position, shall be close fitting, and all edges shall have downward flanges of not less than 3/8 inch. The inside corners of the cover(s) shall have 1/4 inch minimum radii. The design shall be such that when raising the cover(s), any liquid on the top will not enter the processor. When the cover (s) is in its fully opened position, the drops of condensate formed on the underside of the cover(s) shall not drain into the processor. The cover(s) shall be provided with an adequate, conveniently located and durable handles(s) of sanitary design, which is welded in place or formed into the cover material.

(b) The bridge(s) and/or the fixed cover(s) shall pitch to the outside edge(s) of the processor for complete drainage, and shall have a raised flange not less than 3/8 inch in height where the edge(s) meets the main cover(s). The bridge(s) and/or the fixed cover(s) shall be integral with or welded to the lining, and shall be installed so the underside is accessible for cleaning and inspection without completely entering the processor.

(6) *Manhole Covers for Closed Type Processors*: The cover for a manhole in the side wall shall be either the inside or outside swing type. If the cover swings inside, it shall also swing outside, away from the opening. Threads or ball joints employed to attach the manhole cover(s) and its appendages shall not be located within the lining. If mounted on top of the processor, the manhole cover(s) shall be of the outside swing type.

(7) *Gaskets and Gasket Grooves for Manhole Covers, Sight and Light Glasses*: Gaskets shall be removable or permanently bonded. Gasket retaining grooves for removable gaskets shall be no deeper than their width. The minimum radius of any internal angle in a gasket retaining groove shall be not less than 1/8 inch, except that a 3/32 inch radius is permissable where a standard 1/4 inch O-Ring is to be used.

Grooves in gaskets shall be no deeper than their width and the minimum radius of any internal angle shall be not less than 1/8 inch unless the gasket is readily reversible for cleaning.

(8) *Openings*: The edges of all openings in the top enclosure, main cover(s) or the bridge(s) shall be extended upwards at least 3/8 inch.

All openings into the lining not continually in use shall be provided with removable covers, which are designed to make close contact with the upper edges of the opening or cover surface, and when in the main cover the removable cover(s) shall remain in position when the main cover is in an open position.

(a) *Thermometer openings*: When connections and/or openings are provided to accommodate indicating and/or recording thermometers, the connections and/or openings shall be located in the top enclosure, cover, bridge, or the side wall. Thermometer wells may be used. All connections and/or openings provided shall conform to the applicable provisions of 3-A "Sanitary Standards for Thermometer Fittings and Connections Used on Milk and Milk Products Equipment", Serial #0900 and Supplement thereto.

(b) *Agitator openings:* Agitator shaft openings through the bridge or top enclosure shall have a minimum diameter of one inch on processors which require removal of the agitator shaft for cleaning, or be of a diameter that will provide a 1-inch minimum annular cleaning space between the agitator shaft and the inside surface of the flanged opening on processors which do not require removal of the agitator for cleaning. A shield that can be raised or dismantled, to permit the cleaning of all its surfaces, shall be provided to protect against the entrance of dust, oil, insects and other contaminants into the processor through the annular space around the agitator shaft.

(c) *Openings for sanitary piping*: The edges of the inlet openings shall extend upward at least 3/8 inch or be fitted with a permanently attached sanitary fitting conforming to 3-A "Sanitary Standards for Fittings Used on Milk and Milk Products Equipment and Used on Sanitary Lines Conducting Milk and Milk Products," Serial #0800 and Supplements thereto. If fitted with a permanently attached sanitary fitting, the inlet opening may extend outward horizontally.

(d) *Manhole opening*: The dimensions of a manhole opening shall not be less than 15" x 20" oval, 12" x 27" elliptical, or 18" diameter, except that processors with a capacity of 300 gallons or less may have top opening manholes having a diameter of not less than 16".

(e) *Sight and light glass openings*: When provided, the opening(s) shall be of such design and construction that the inner surface of the glass will be relatively flush with the lining and the glass may be removed for cleaning. The diameter of the opening(s) into the lining shall be not less than 3 3/4 inches. The opening(s) shall be of such design and construction that there will be adequate agitation and circulation in all areas.

(f) *Opening for mechanical cleaning*: An opening and connection(s) for mechanical cleaning shall be provided in processors, the inside height of which exceeds 96 inches. The opening shall extend upward at least 3/8 inch or be fitted with a permanently attached sanitary fitting conforming to 3-A "Sanitary Standards for Fittings Used on Milk and Milk Products Equipment and Used on Sanitary Lines Conducting Milk and Milk Products", Serial #0800, and Supplements thereto.

(9) *Outlet and Outlet Valve*: The outlet valve shall conform to the design and construction provisions of the 3-A "Sanitary Standards for Fittings Used on Milk and Milk Products Equipment and Used on Sanitary Lines Conducting Milk and Milk Products," Serial #0800, and Supplements thereto.

The outlet and the outlet valve shall be of such design and construction that the combined length of the inlet passage in the body of the valve and of any passage of corresponding diameter in the processor lining does not exceed the diameter of the passage in the valve. (See "3-A Sanitary Standards for Inlet and Outlet Leak Protector Plug Valves for Batch Pasteurizers", Serial #1400 for illustrative drawings.)

The inside diameter of the outlet passage on processors with a capacity of 20-gallons or less shall not be less than the inside diameter of 1-inch sanitary pipe (.902 in.), or on processors of greater capacity, not less than 1.25 inch. The outlet opening shall be located at the lowest point of the lining. The outlet and the outlet valve shall be so designed that either a single service or a multiple use gasket can be used. The outlet valve shall be removable for cleaning. The valve shall be considered removable when secured by not more than four hex nuts.

(10) *Agitators*: The agitator shall be of sufficient size and powered to provide uniformity of composition and temperature throughout the

product to the extent that the simultaneous temperature difference between the product at the center of the processor and the coldest product in the processor will not exceed 1°F. at any time when the agitator has been in operation not more than five minutes. This shall be deemed to be satisfied if the agitator is so designed as to sweep the product current effectively through all zones occupied by the product, including the outlet, flare, and the outlet passage through the shell, but excluding inlet pipes surrounded by product during processing and open to the processor at the bottom.

The inside angles of portions of the agitator having product contact surfaces shall have minimum radii of 1/4 inch.

The agitating device shall be readily cleanable and shall be one of the following types:

(a) *Top Entering Non-Removable Type*: The top entering non-removable agitator shall be readily accessible and cleanable. There shall be at least a 1/2 inch space between the non-removable agitator and the bottom of the lining, unless the agitator is mounted on a hinged type cover.

(b) *Top Entering Removable or Demountable Type*: The top entering removable or demountable agitator shall be provided with an easily accessible, readily demountable coupling of either a sanitary type located within the lining or a coupling located outside of the lining provided that it is above the shield provided to protect the annular space around the shaft. All product contact surfaces of the agitator shall be visible when the agitator is removed. A bottom support or guide, if used, shall be welded to the lining, shall not interfere with drainage of the processor and the inside angles shall have minimum radii of 1/8". When the agitator shaft has a bearing cavity, the diameter of the cavity shall be greater than the depth. The agitator shall be easily demountable for cleaning of the bearing and any shaft cavity.

(c) *Side or Bottom Entering*: The side or bottom agitator and shaft, including the complete seal, shall be readily demountable for cleaning. Non-removable parts having product contact surfaces shall be designed so that the product contact surfaces are readily cleanable from the inside of the processor.

Seals for the agitator shaft shall be of a packless type, sanitary in design, with all parts readily accessible for cleaning.

(11) *Agitator Mounting*: The driving mechanism shall be securely mounted in a position that will provide a minimum distance of 4 inches measured vertically downward from the bottom of the driving mechanism housing, excluding bearing bosses and mounting bosses to the nearest surface of the processor; and in such a manner that all surfaces of the processor under or adjacent to the driving mechanism shall be readily accessible for cleaning and inspection.

(12) *Supports*: Adjustable legs, if provided, shall be of sufficient number and strength and so spaced that the filled processor will be adequately supported. Legs shall have closed bases. Exteriors of legs and leg sockets shall be readily cleanable. Supports shall be such that a 6 inch minimum clearance will be provided between the floor and the bottom of a processor 72 inches or less in diameter or width or an 8 inch minimum clearance for a processor more than 72 inches in diameter or width. On processors having bottom entering agitators, the clearance from the floor to the lowest point of the agitator or agitator drive shall conform to these dimensions.

(13) Non-product contact surfaces shall have a smooth finish, be free of pockets and crevices and be readily cleanable.

(14) Non-product contact surfaces to be painted shall be effectively prepared for painting.

(15) A warning plate furnished and permanently affixed by the manufacturer, shall be provided for closed type processors which shall indicate the maximum operating pressure and/or vacuum under which the processor may be safely operated.

(16) Vessels made in conformance to these standards shall have a statement on the name plate, or on the warning plate, or on a plate furnished and permanently affixed by the manufacturer that the vessel is a processor.

APPENDIX

A. *ACCESS*: Means should be provided for access to manhole and/or sight glass.

B. *THERMOMETERS*: When installed through the side wall, the location should be such that the thermometer(s) is easily readable. Thermometer connections and/or openings should be located so that the thermometer is not influenced by the heating or cooling medium.

These standards shall become effective March 23, 1965.

NEWS AND EVENTS

Editorial note: The Editorial Staff of the Journal feels that the following account would interest many. Other accounts of interesting and worthwhile programs would be welcomed at the editorial office of the Journal.

"EDUCATING THE EDUCATORS"

SAUL GAVURIN

Milk and Dairy Inspection
Los Angeles City Health Department, California

A workshop course for credit relating to human nutrition and sanitation designed for practicing teachers and school nurses has now concluded its fourth year in the Los Angeles area. To date four 2-unit courses have been given: one at California State College, Los Angeles, under the direction of Professor Saxon C. Elliot, Chairman, Health Education Department; and three at San Fernando Valley State College, under the direction of Dr. Gladys Stevenson, Chairman, Home Economics Department and Dr. Claude T. Cook, Chairman, Health Science Department. The courses consisted of ten sessions, 4 hours each, extending over a 2-week period. They were scheduled during the summer months. The curriculum was developed by dairy industry representatives, college staff members, and the Los Angeles City Health Department. Course fee was $25.00, with the dairy foods industry contributing a number of scholarships. Southern California Fish Industry Assn. participated for the first time in this summer's program.

Impetus for the development of the course was the need to answer fully the questions raised about milk and dairy foods in the minds of consumers as a result of the adverse publicity during the past several years about atomic fallout, pesticides, and cholesterol. An avalanche of letters and phone calls came to our Health Department from people frightened and confused by the frequently inaccurate, incomplete, or exaggerated reports on these developments. It was soon apparent that a letter or a phone call giving information and reassurances was not enough. There were too many letters, too many phone calls, and too much information to be given on an individual basis. It became apparent that a more effective and positive program would have to be initiated in order to satisfy the public. It had to be one which would eventually reach into every community in our state. The approach, we felt, would have to be channeled through the field of education.

It developed that the need for "educating the educators" was real. We received full cooperation from the local college staffs. Dr. Stevenson of San Fernando Valley State College has evaluated the course contribution in the following ways: "Today's teachers and school nurses are being asked to teach subject matter which they never had as a part of an organized course during their training. Any person who has had a college education should be able to read and acquire the necessary knowledge, provided they have the ability to recognize authoritative information. When teachers are not given this type of information we find that they may not choose the most factual but rather the most forceful. This may result in the teaching of misconceptions."

The course curriculum for "Advances in Human Nutrition and Sanitation" was made up of material presented by nationally recognized and qualified individuals and covered subjects such as: Current Consumer Trends; Responsibilities of Health Departments in Nutrition Education; Advances in Nutrition Education for Dental Health; Nutrition and Disease; Teen Age Nutrition; Public Education in Nutrition (a panel of newspaper food editors and home economists); Recent Developments in the Relationship of Nutrition to the Growth Problem of Children; Resource Materials in Nutrition Education; Implementing Nutrition Education in Schools; Food and Drug Controls for Public Nutrition; State Program for School Lunches; Foods, Fads and Fallacies; and Responsibilities of Milk Inspections by Health Department Personnel. In addition, field trips to a dairy farm and a milk processing plant were made, with classroom implementation observations included to supplement in the course. The material was recorded and printed. Each student received a copy of the proceedings, and copies were mailed to local school libraries.

The advantage of conducting this form of instruction in local areas are that it is a community project involving local organizations: schools, health departments, home economists, nutritionists, the dairy producers and the distributors.

The program is presently being expanded in the school system with in-service training program for personnel, thus providing teachers and nurses the opportunity for continuous professional growth. It is operated on credit basis through the University of California. Personnel may earn one salary point for satisfactory participation in a 16-hour project. Credit also may eventually be obtained through public service programs for teachers on television; classroom instruction programs on the same subject matter may also be presented for Institute credit which enables teachers to be paid for Easter vacation. Program expansion to private and parochial schools is anticipated.

In addition to the "Educate the Educators" program, in 1963 a nutrition symposium titled "Nutrition

for a Lifetime" was sponsored by the Departments of Health Science and Home Economics of the San Fernando Valley State College in cooperation with the San Fernando Valley Dairy Council and the Milk & Dairy Inspection Division of the Los Angeles City Health Department. Designed and presented primarily for the homemaker, but open to the public, the four 2-hour sessions were scheduled once a week for four weeks. No charge was made for registration. Programs printed by the San Fernando Valley Dairy Council were distributed by its members. The April-May 1963 Nutrition Symposium held in the college cafeteria had an attendance of 500.

Program planning committee for the homemaker course included Dr. Gladys Stevenson, Dr. Claude T. Cook, San Fernando Valley State College; Vincent Jessup, D.V.M., Jessup Farms; and Steven G. Weller, Jr., Manfull Dairy. The latter two are president and secretary, respectively, of the San Fernando Valley Dairy Council. The author also was a member of the committee, as well as coordinator of the program.

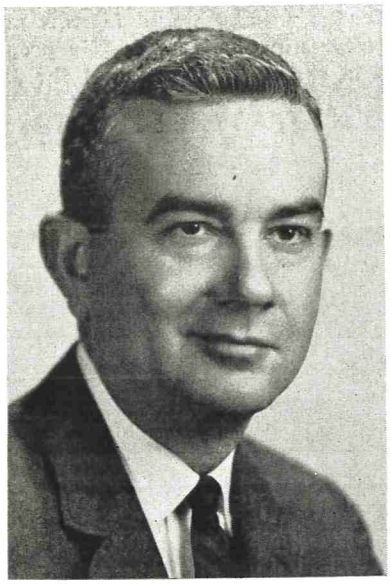
Those of us who have developed this new educational public health program in sanitation and nutrition — members of the dairy and fish industries, educators of the school and college staffs, and health department personnel — recognize that it holds a great potential for imparting knowledge and requires a relatively small financial investment. The need for the progrm is evident, and the facilities in terms of universities, colleges, and schools to carry it forward are available. Know-how and cooperation have been demonstrated, and many of us would like to see its expansion to include the four basic branches of the food industry; milk and dairy products, meat and fish, fruit and vegetables, and cereals.

NEW BEVEL SEAT FITTINGS CATALOG ANNOUNCED BY TRI-CLOVER

Over 100 different sanitary type stainless steel bevel seat fittings and valves in four sizes are illustrated and described in this 40-page catalog.

Dimension data and specifications for elbows, bends, tees, crosses, ferrules, adapters and reducers in 1-inch through 4-inch tube OD sizes are shown. A valve section includes specification data on the full Tri-Clover line of plug, check, compression, relief, tank truck and service valves. In addition to fittings, a 7-page section in the catalog gives ordering data and instructions for using Tri-Clover's *Super-Speed* line of expanding tools for preparing bevel and gasket seat joints.

COMMENDATION MEDAL RECEIVED BY WINSTON M. DECKER



Winston M. Decker, of 506 Venice Street, Falls Church, Va., a Veterinary Officer Director with the U. S. Public Health Service, received the Commendation Medal of the Service of his work over the past several years.

The citation, which recognizes sustained outstanding performance and professional competence, was awarded by Dr. Luther L. Terry, Surgeon General of the Public Health Service, on November 16, 1964, for Dr. Decker's work in milk and food protection, particularly radionuclide contamination.

Dr. Decker is a graduate of Michigan State University at East Lansing, with the degree of D.V.M. in 1946. He also did graduate work in public administration at Wayne State University in Detroit, and was with the Michigan Department of Health from 1950 until he joined the Public Health since 1960. He is currently Chief of the Special Projects Section, Milk and Food Branch, Division of Environmental Engineering and Food Protection. He is married to the former Bettie J. Pardun of Dowagac, Michigan, and they have two children, John, age 8 and, Katherine, age 6.

COMMERCIAL PREPARATION OF BABY FORMULAS

The commercial preparation of baby formulas in prepackaged "nurser units" could pose a potential danger to infants unless there are sanitary controls which are carefully observed.

Edwin L. Ruppert of the Public Health Service's Division of Environmental Engineering and Food

Protection, speaking before the American Public Health Association in New York City said that the use of baby food formulas packaged in nurser units is a significant new pattern in baby feeding estimated to be used in providing nourishment to more than three-quarters of a million babies in hospitals this year alone.

While firms which process these formulas cite greater variety and formula choice as well as freedom from the trouble of formula prepartion advantages, Mr. Ruppert declared that mass production of such liquids, if controls were lacking or inadequate, could possibly result in widespread infection or poisoning episodes.

Mr. Ruppert pointed out that a number of communities had developed control measures but added that standardization of such controls by the issuance of a Federal recommended standard of operation is necessary and will be forthcoming after a study of current infant feeding services and systems is made by the Public Health Service.

The studies are now underway, he said, in cooperation with the American Academy of Pediatrics, the American Medical Association and other interested organizations including the baby formula manufacturing industry. A standard of operations would provide uniform guides for State and local health agencies just as do the Public Health Service recommended Milk Ordinance and Code, the Food Service Sanitation Manual and the Frozen Desserts Ordinance and Code.

KAB ANNOUNCES INDEX TO MEASURE ACTIVITY OF NATION'S LITTERBUGS

Keep America Beautiful at its 11th annual meeting November 12 announced formation of a National Litter Index to measure litterbug activity in the years ahead.

Allen H. Seed Jr., KAB's executive vice president, told the organization's trustees and directors that "litter is a continuing problem, and the potential of this menace will grow in the years ahead because there will be more people, more cars, more drivers, more travel, a higher standard of living and more leisure time."

He added that there has long been a need for a "barometer" to help the thousands of litter fighters throughout America keep track of the progress they are making in the face of the growing litter potential.

The Index, he explained, is based on the annual cost of removing litter from primary state highways in the 50 states and the number of miles traveled in the same year by vehicles on these highways.

$22 Million Cost In 1963

A KAB survey of state highway departments showed that in 1963 some $22 million was spent by the states cleaning up their primary highway systems. The Bureau of Public Roads reported that vehicles in 1963 traveled about 324 billion miles on the same primary roads.

"The annual mileage figure divided into the annual clean-up cost gives us the basis for our new Index," Mr. Seed explained. "It comes out to about seven-thousandths of a cent per mile for 1963. This becomes our starting base figure — "100" on the Index.

"Each year we will calculate the index number for that year. If annual state clean-up costs rise more slowly than the increase in number of miles traveled the index reading will drop below 100 and we'll know the litterbugs are in retreat. But if the clean-up figures rise faster than the travel milage the Index will rise and show that the litterbugs are winning their war on civilization."

Another feature of the KAB meeting was introduction of the world's first live "litterbug family," consisting of mother, father and daughter. The family wore evening clothes liberally draped with common litter, such as old rags, paper, cans, bottles, cigarette packages, candy wrappers and the like.

Costumes for the family were created by Mrs. Harriet Thomas of Melvin Village, N. H., national litterbug chairman of the National Council of State Garden Clubs, to "dramatize the national litter problem."

Anti-Litter Awards

The state of Maine, New York City, three individuals and a corporation were cited by KAB at an Awards Luncheon held in connection with the meeting for "distinguished service" in the anti-litter movement.

The Maine award was accepted by Gov. John H. Reed. Mayor Robert F. Wagner received the award to New York City.

Individuals honored were: Mrs. Thomas; Jack Sullivan, chairman of New Jersey's Boat Regulation Commission of the State Department of Conservation and Economic Development; and Mrs. Constance Brewer, chairman for anti-litter projects of the Massachusetts Roadside Council.

The honored corporation was Sears, Roebuck and Co.

Officers Elected

Reuben L. Pern, vice-chairman of the board, Continental Can Company, was re-elected for his second

term as president of Keep America Beautiful.

Other officers re-elected were: vice presidents, Fen K. Doscher, vice president of marketing, Lily-Tulip Cup Corporation, John P. Moser, vice president, Lever Brothers Company, Charles S. Jones, chairman, Richfield Oil Company, and Richard F. Sentner, executive vice president, U. S. Steel Corporation; treasurer, H. W. Kuni, secretary-treasurer, Glass Container Manufacturers Institute; and secretary, John R. Henry, vice president and general counsel, American Can Company.

C. R. Gutermuth, vice president of the Wildlife Management Institute, Washington, D. C., was elected chairman of KAB's 78-member National Advisory Council. He had previously been chairman of the Council's steering committee.

CHARLES F. CHRISMAN

Charles F. Chrisman, Jackson Heights, New York, widely known public relations representative of Sealright Corporation, passed away in the New York Polyclinic Hospital, November 16, 1964.

"Charlie" was a sanitarian with the U. S. Public Health Service prior to his association with Sealright. He was a long time loyal member of International Association and he will be greatly missed by his many friends throughout the country.

NATIONAL ADVISORY, FOOD AND DRUG COUNCIL APPOINTED

Appointment of a National Advisory Food and Drug Council to consult with the Food and Drug Administration, has been announced by Secretary of Health, Education, and Welfare Anthony J. Celebrezze.

The Council consists of 18 members appointed for terms of one to three years, allowing for a rotation of membership. The initial meeting of the Council was held in Washington, D. C. on December 1.

Commenting on the action, Secretary Celebrezze said: "This Council fulfills a major recommendation of the Second Citizens Advisory Committee on FDA organization and policies. It will make available to the Department and the Food and Drug Administration the knowledge and experience of an outstanding group of citizens. Their advice and counsel should contribute substantially to FDA's effectiveness in discharging its many and growing responsibilities for consumer protection."

FDA Commissioner George P. Larrick pointed out that the Council broadly represents the public, including such elements as consumer groups, science, industry, law, medicine, pharmacy, veterinary medicine, education, agriculture, communications, labor, government, voluntary health organizations, and women's organizations.

"This Council will be especially helpful in our planning for the future. We look forward with interest and pleasure to receiving their views and suggestions on how the FDA can best utilize its resources," Mr. Larrick said.

The FDA Commissioner will serve as Chairman of the Council, ex officio. Kenneth L. Milstead, Ph.D., Special Assistant to the Commissioner for the Advisory Council, will serve as liaison officer between the Council and FDA. Regular meetings will be held twice each year with ad hoc meetings to deal with special problems to be called at the discretion of the Commissioner.

The Council members are:

George L. Arnold
Attorney at Law
Arnold, Smith & Schwartz
1725 West 6th Street
Los Angeles, California

Eugene N. Beesley
President, Eli Lilly & Co.
740 S. Alabama Street
Indianapolis, Indiana

Alfred M. Boyce, Ph.D.
Dean, College of Agriculture
University of California
Riverside, California

Mrs. Theodore S. Chapman
Honorary Chairman, General Federation of Women's Clubs
906 S. Garfield
Hinsdale, Illinois

Stanley E. Cohen
Vice President
Advertising Publications
995 National Press Building
Washington, D. C.

Chauncey W. W. Cook
President, General Foods Corp.
250 North Street
White Plains, New York

Harold S. Diehl, M.D.
Deputy Executive Vice-President
American Cancer Society, Inc.
219 East 42nd Street
New York, New York

James P. Dixon, Jr., M.D.
President, Antioch College
Glen Helen House
Yellow Springs, Ohio

Attilio R. Frassinelli
Commissioner, Connecticut Department of Consumer Protection
State Office Building
Hartford, Connecticut

Charles G. King, Ph.D.
Associate Director, Institute of Nutrition Sciences, School of Public Health and Administrative Medicine
Columbia University
562 West 168th Street
New York, New York

Harry E. Kingman, Jr., D.V.M.
Executive Secretary
American Veterinary Medical Association
600 S. Michigan Avenue
Chicago, Illinois

Frederick D. Lascoff, PharD.
President
J. Leon Lascoff & Son Apothecaries
1209 Lexington Avenue
New York, New York

Elizabeth B. Raushenbush, Ph.D.
Professor, Labor Economics
University of Wisconsin
Madison, Wisconsin

Dickinson W. Richards, M.D.
Lambert Professor of Medicine
Department of Medicine
College of Physicians & Surgeons
Columbia University
630 West 168th Street
New York, N. Y.

Miss Anne Draper
Research Associate
AFL-CIO
815 16th Street, N.W.
Washington, D. C.

Kenneth B. Willson
President, National Better Business Bureau, Inc.
230 Park Avenue
New York, New York

Clarence C. Ferguson, Jr.
Dean, School of Law
Howard University
Washington, D. C.

James Harvey Young, Ph.D.
Professor of History
Emory University
Atlanta, Georgia

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Single Service milk sample tubes. For further information and a catalogue please write, Dairy Technology, Inc., P. O. Box 101, Eugene, Oregon.

SUPPLIERS-EQUIPPERS SET 1965 GATHERING IN CLEARWATER, FLA.

The 46th Annual Meeting of Dairy and Food Industries Supply Association will take place March 25-26, 1965, at the Jack Tar Hotel in Clearwater, Florida.

Dairy and Food Industries Supply Association is a national trade association whose member firms furnish supplies, equipment, and services to the dairy and food processing industries.

In announcing the meeting dates, DFISA President Fred M. King, Wyandotte Chemicals Corporation, named Joe Larson, Sparta Brush Company, Inc., to head the Annual Meeting Committee.

Meeting highlights will include the election of seven men to fill positions on the association's 18-man Board of Directors, motion pictures of the 1964 Dairy and Food Industrial Exposition, the annual presidential report of Mr. King, and a display of pictures taken at the exposition by industrial photographer John Burwell. Further program details will be announced at a later date.

Serving with Mr. Larson on the Annual Meeting Committee are: George A. M. Anderson, The King Company; Dean Girton, Girton Manufacturing Company; James H. Manning, Cowles Chemical Company; Anthony T. Rossi, Tropicana Products, Inc.; and Worth Weed, Foote & Jenks Incorporated.

BIOGRAMS NOW AVAILABLE

Biographics, Inc., Princeton, New Jersey, announce that Biograms are now available, beginning January 1965. Biograms are consolidated uniform reports of new data on the basic toxicity, or biological activity of the older, widely used chemicals. Since much of the available information on these chemicals were published prior to World War II, there is little basis for making a valid comparison with these and the newer compounds now available. Biograms are designed to fill this need.

Chemicals are selected by a Technical Advisory Committee composed of experts in the chemical fields, and the toxicology studies are done at AME Associates, Princeton, New Jersey. The present delivery schedule is six per month. Biograms are available only on annual subscription at a nominal cost per chemical; they have been reported as time-saving devises for the busy researcher and will constitute a valuable addition to the technical library as the volumes grow.

For further information, contact: Dr. R. W. Fogleman, President, 3-288 Province Line Road, Princeton, New Jersey, 609-924-9658.

PUBLIC HEALTH SERVICE TRAINING COURSE FEBRUARY 24-26

The Public Health Service will conduct a 3-day training course, Milk Pasteurization Controls and Tests, February 24-26, 1965, at the Robert A. Taft Sanitary Engineering Center in Cincinnati, for sanitarians engaged in milk sanitation programs. Instruction covers the principles of pasteurization control operation and includes laboratory practice in the procedures for effective pasteurization. The course is conducted by personnel of the Division of Environmental Engineering and Food Protection.

For more complete information concerning the course, see the new *Bulletin of Courses* which is available on request. Applications or requests for information should be sent to the Director, Training Program, Robert A. Taft Sanitary Engineering Center, 4676 Columbia Parkway, Cincinnati, Ohio, 45226, or to an appropriate PHS Regional Office. No tuition or registration fee is required.

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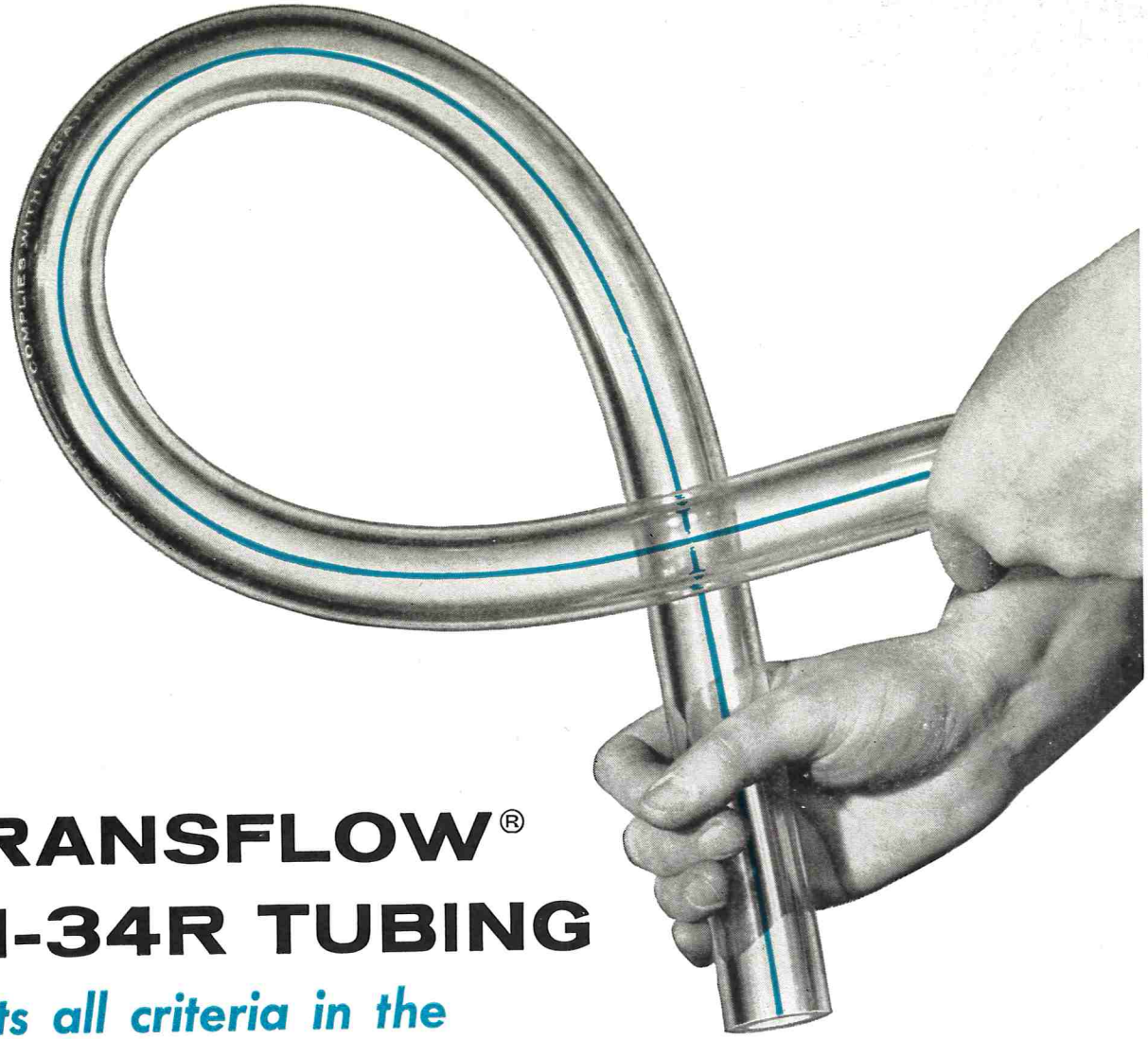

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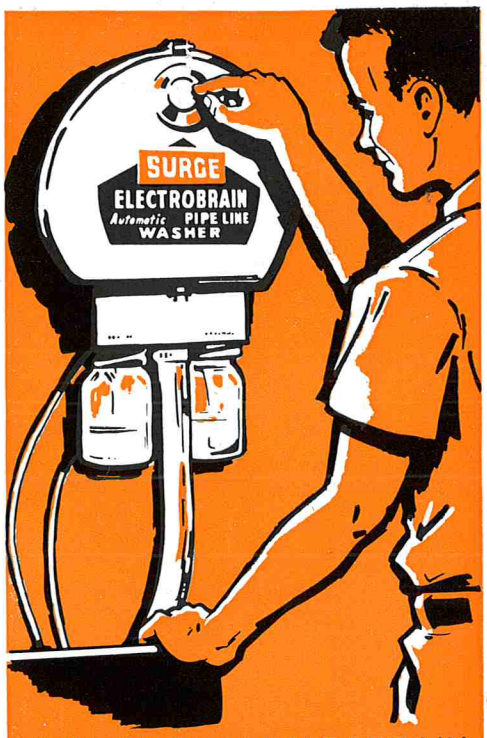

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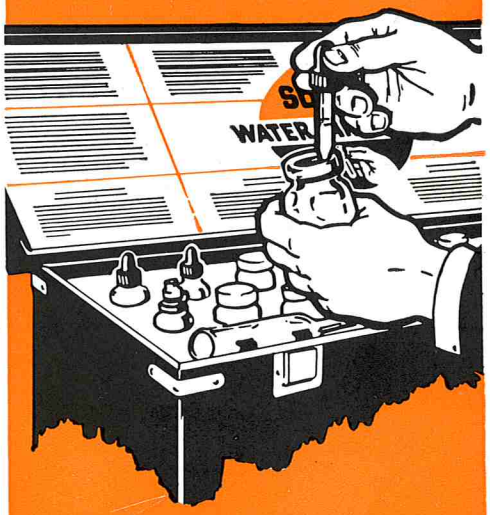

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