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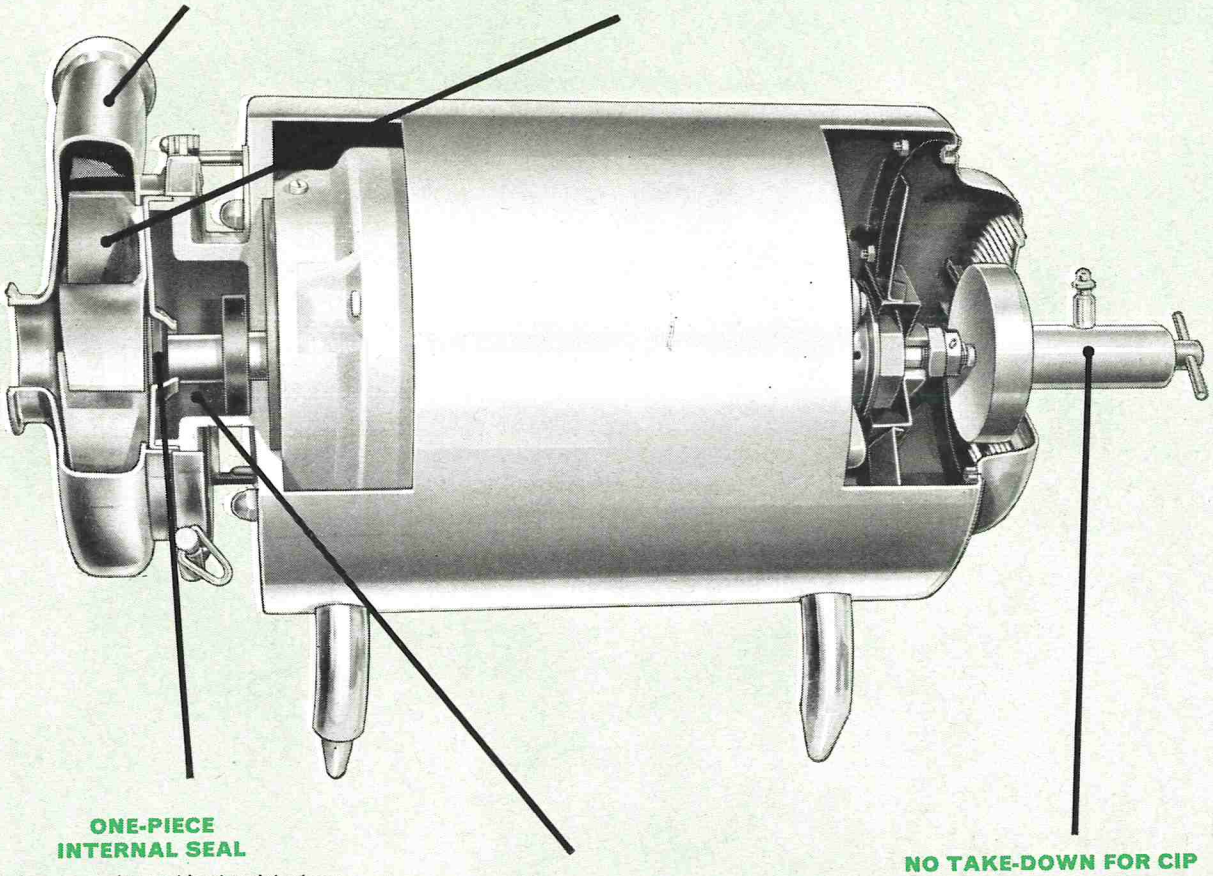

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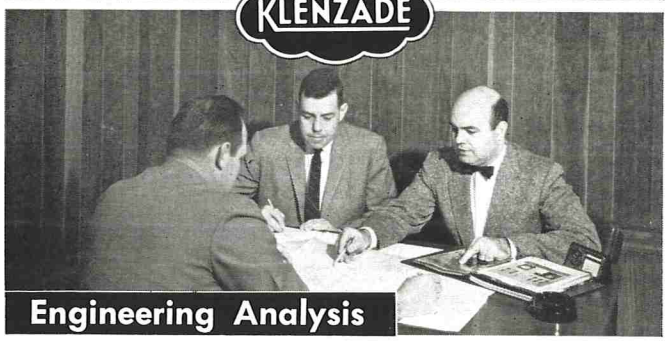

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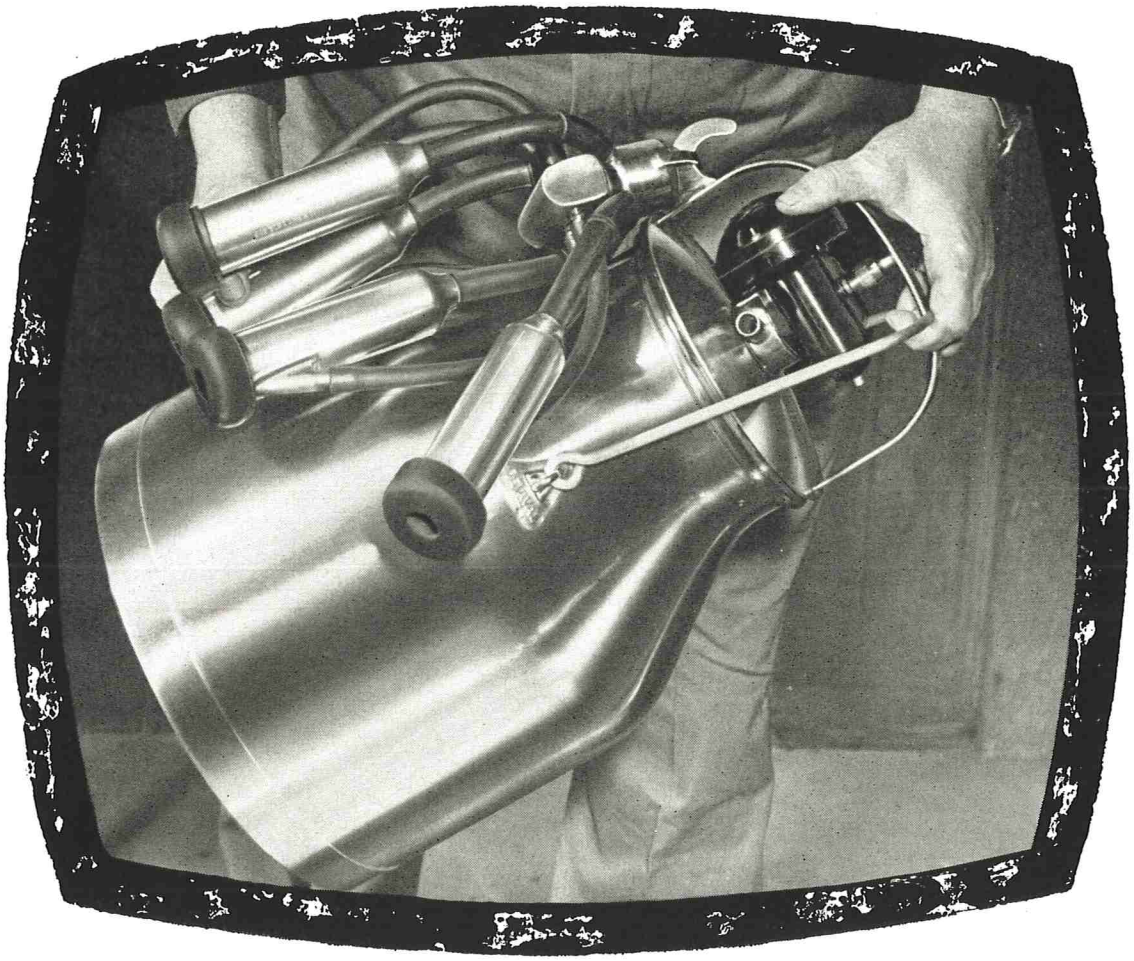

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Test #3: Hypochlorite and acid cleanser

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	Hardness	*Milkstone Deposit*
B-K Powder with cleanser	0	6 mg.
B-K Powder with cleanser	150	14 mg.
B-K Powder with cleanser	300	35 mg.

Thus, the tests clearly demonstrate that, though the choice of a good hard water cleanser is important, the most responsible factor in the formation of milkstone is the degree of water hardness.

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EDITORIAL

Is Federal Milk Regulation The Answer?

In the October 1960 issue of the Journal of Milk and Food Technology, Dr. J. C. Olson, Jr., raised and answered affirmatively the question: "Are We Ready for a Nation-wide System of Effective Milk Control." There is, however, another aspect of this problem which raises the question whether it is desirable to have Federal laws governing the sanitary aspects of milk control of the type introduced into the 86th Congress under the title, "The National Milk Sanitation Act."

The basic justification presented by proponents of Federal control is that some local regulations are designed as trade barriers to protect the local dairy interests. Certainly it is not our purpose here to defend this type of regulation. However, to impute such motives generally to all states and municipalities which have regulations different from the United States Public Health Service Milk Ordinance and Code or different from those of other jurisdictions, is a completely unworthy indictment of numerous Boards of Health and other local and state legislative bodies which have enacted their own milk sanitation regulations.

The Public Health Service Ordinance and Code which would presumably be the basis of any Federal milk regulation is an admirable instrument and serves an excellent purpose. It is designed to give guidance to local and state authorities in their formulation of milk regulations and wherever desired, it provides a complete code. The Code, however, was never designed or intended to be forced upon any community against its will.

Giving full recognition to the merit of the Code does not mean, however, that it has the infallability of the Ten Commandments, that it takes care of all eventualities in the best possible manner or that it is heretical to believe that other milk regulations may also have their proper place. It would be the sheerest arrogance to assume this, to contend that there can be no honest difference of opinion regarding milk regulations, or that there may not be a peculiar need for a certain type of regulation in one area as against another. Our country is vast and the variations in our environmental, social and economic conditions cover wide extremes. It is obviously unreasonable to maintain, for example, that a town of 500 people in the arid southwest requires the same type of milk control program as a city of 8,000,000 people in the northeast. Yet the effect of the National Milk Sanitation Act would be to impose the same milk regulations over both localities.

It should be remembered that the application of the proposed National Milk Sanitation Act is not restricted to the regulation of raw milk supplies but is applicable as well to the interstate shipment of pasteurized milk. The requirements of the Public Health Service Milk Ordinance and Code are satisfied if the control agency makes a minimum of two inspections per year of each pasteurizing plant. No one experienced in large municipal control could possibly feel safe with such limited supervision in the light of the many things which can go wrong in the operation of a pasteurizing plant. Most large cities make far more frequent inspections to assure the safety of the milk supply. Yet, under the proposed law, a city or state would be required to accept shipments of pasteurized milk from any approved plant outside the state provided, it was subject to a meagre two inspections per year. It may be well to point out here that the right given the receiving areas to make tests is virtually a meaningless gesture. The milk would be consumed before the results of bacterial determinations were completed and a negative phosphatase test result would not be an adequate indication of proper pasteurization if the HTST process was used.

The argument that the law would not be applicable to intrastate milk control is obviously unrealistic because most states and large cities obtain some milk supplies from both intra and interstate sources and economic necessity would force the adoption of the Federal Code since it would obviously be impossible for a state to operate under two different codes.

Is there any person with a wide experience in the field of milk sanitation brash enough to insist that there is only one proper way to regulate the sanitary aspects of milk control? The answer to this question is obviously "no", and yet, if the National Milk Sanitation Act were to be adopted, the entire country would have forced upon it a single set of procedures and requirements which conceivably might not meet all of the particular needs of a given locality.

Nobody will deny the merit of a certain degree of uniformity but there is also great danger of making a fetish of this concept and placing our control programs in a straight-jacket of mediocrity. Progress in milk control, as in every other endeavor, has been made by people who were not shackled by conformity and were able to strike out in new directions.

The objection to the use of milk regulations for trade barrier purposes is completely valid and such regulations should not be tolerated. Fortunately, there are highly effective remedies available to deal with this problem without the need of imposing upon the country a national milk control law. The record is replete with cases where both State and Federal Courts have stricken down milk control statutes which were held to be arbitrary and in restraint of the free flow of commerce. Boards of Health are generally aware by now that there must be bona fide reasoning behind their legal actions and it would indeed be a hardy Board that would attempt a trade barrier type of regulation in this day and age.

It is interesting to note that a very recent decision by the Supreme Court of the State of Kansas held that the United States Public Health Service Milk Ordinance and Code which was in vogue in that State, was in itself a type of trade barrier regulation because the court held in part that . . . . "if it becomes apparent that the statute, under the guise of a police regulation, does not tend to preserve the public health safety or welfare but tends more to stifle legitimate business by creating a monopoly or trade barrier, it is unconstitutional as an invasion of the property rights of the individual."*

While the proponents of a National Milk Sanitation Act argue the need for improving the public health as the foundation for their position, perfect frankness compels the recognition that they are primarily interested in economic considerations. The mid-western producer groups who market so much of their milk at relatively low manufacturing prices, visualize the sale of their supplies at eastern fluid milk prices and this prospect looks very pleasing. However, the trade barrier argument seems to lose some of its potency when the proponents are perfectly willing to coerce the rest of the country by imposing an unneeded and undesired law to obtain an economic advantage. Any state or local jurisdiction which desires to obtain milk supplies from distant areas may voluntarily avail itself of the facilities provided under the Interstate Milk Shipment Program. The wrongs of trade barrier legislation are not neutralized by the greater wrong of the proposed coercive National Milk Sanitation Act.

Paul Corash
City of New York Department of Health

*Nebraska Supreme Court. Lincoln Dairy Co. Vs. Finigan 7/15/60.

COMPETITION OF *STAPHYLOCOCCUS AUREUS* WITH OTHER ORGANISMS

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University of Wisconsin, Madison

(Received for publication December 10, 1960)

Sixty-six cultures of food microorganisms were screened by spot-plate tests on their ability to influence the growth of four strains of *Staphylococcus aureus*, two enterotoxigenic and two not. The six test media were selected for differences in complexity and to simulate natural foods. The most consistently inhibitory cultures for *S. aureus* were: *Streptococcus faecium*, *Streptococcus faecalis*, *S. faecalis* var. *liquefaciens*, a nisin-producing *Streptococcus lactis*, and various meat lactobacilli. Other cultures were less consistently inhibitory, and many were not inhibitory or were even stimulatory.

Growth of two enterotoxigenic strains of *S. aureus* in meat infusion broth at 15°, 30° and 44°C. was only moderately reduced by simultaneous growth of *Escherichia coli* strain Gratia, but was markedly reduced by growth of *E. coli* H52, especially at 15°C. and 44°C.

The frequency of outbreaks of staphylococcal food poisoning has stimulated interest in the factors that influence the growth of staphylococci in foods and the production of enterotoxin. One factor that has received comparatively little attention is the effect of simultaneous growth of other competing microorganisms.

Regnier and Lambin (7) reported antagonism of *Escherichia coli* toward *Staphylococcus aureus* in nutrient broth at 37°C., although the coccus attained 319 million cells per ml. in eight hours according to a direct microscopic count. Decreasing inocula of *E. coli* lessened the inhibition of the staphylococcus. Heinemann (5) found that three strains of S. *aureus* added to raw milk grew poorly at 80°F. or lower, and at 110°F., where the staphylococcus grew best, it still was quickly overgrown by the natural flora of the milk. Takahashi and Johns (8) observed a negative correlation between the initial standard plate count of milk and the extent of multiplication of staphylococci. Gibson and Abd-El-Malek (3) found that of all the organisms present in raw milk held between 10° and 20°C., the staphylococci showed the smallest increase in numbers. Mattick, Neave and Chapman (6) reported that in more acid cheeses made with more starter culture, added S. *aureus* died out more rapidly than in sweeter cheeses with less starter.

An attempt has been made to explore by rough screening tests the effects of a number of food microorganisms upon the growth of S. *aureus*. Also a study has been made of the effect of one of these organisms, the commonly occurring *Escherichia coli*, upon the growth of enterotoxigenic cultures of S. *aureus* at different temperatures. *E. coli* was selected because it caused no evident inhibition of S. *aureus* on spot plates and it therefore probably competed without production of appreciable amounts of antibiotic products.

Methods

Sixty-six cultures of important food microorganisms were utilized in agar plate screening tests for their effects on strains of S. *aureus* on different culture media. Four strains of S. *aureus* were employed, two

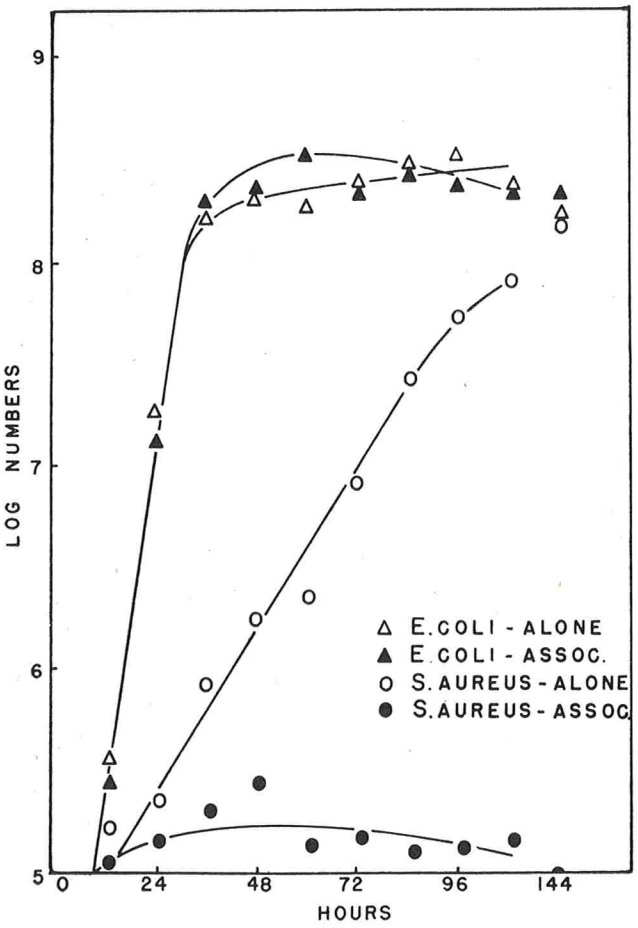

Figure 1. Growth and maximum numbers of *E. coli* H-52 and S. *aureus* 255 in pure culture and in association at 15°C. in meat infusion broth. Direct microscopic counts through 108 hours; plate counts at 144 hours.

enterotoxigenic ones (strains 255 and 261), and two which were not enterotoxigenic (strains W1 and 54B). For studies on competitive growth in broth cultures the two enterotoxigenic strains of *S. aureus* were grown with two strains of *E. coli*, a typically active strain, H-52, and an *Aerobacter*-like strain, Gratia.

The culture media used for screening tests were: (*a*) a vegetable medium, V-8 agar (*1*); (*b*) a meat medium, meat infusion agar (*1*); (*c*) a simple medium, nutrient agar; (*d*) dextrose-tryptone agar (*1*); (*e*) trypticase-soy agar; and (*f*) Evans' and Niven's APT agar (*4*). The medium for growth of *S. aureus* and *E. coli* alone and together was meat infusion broth, which supports good growth of each.

The method of screening was a modification of the "simultaneous antagonism" technique of Gratia (*4*). Agar for plates was seeded with an 18-hr. staphylococcus culture. The inoculum of staphylococci was such as to obtain a semi-confluent lawn of these cocci on the poured plate. After solidification of the agar two spots of an 18-hr. culture of each effector organism were pipetted onto the surface of each agar medium. Four organisms were used per duplicate plate and each experiment was performed thrice. All plates, except those containing high temperature lactic acid bacteria, which were grown at 37°C., were incubated 24 hr. at 30°C.

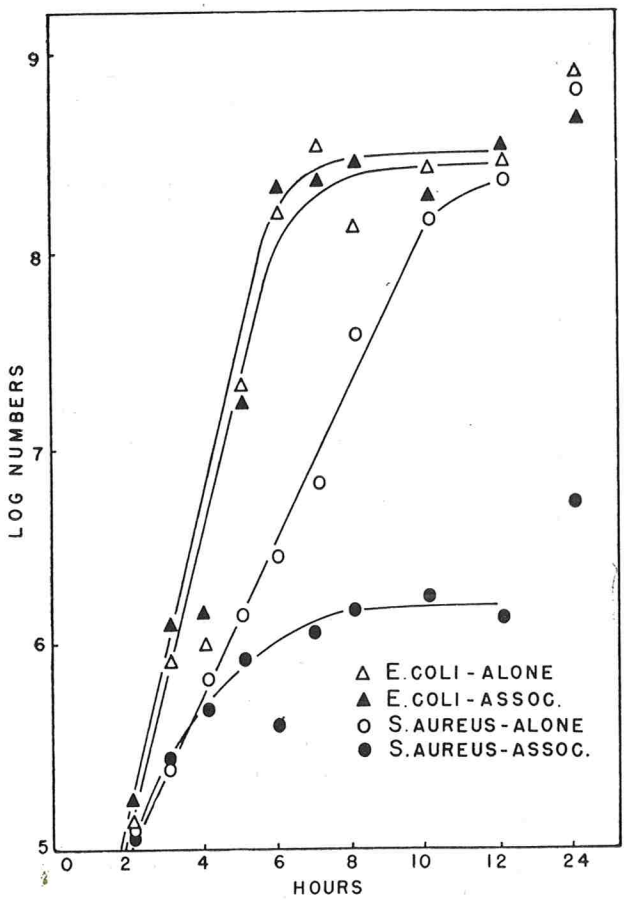

Figure 2. Growth and maximum numbers of *E. coli* H-52 and *S. aureus* 255 in pure culture and in association at 30°C. in meat infusion broth. Direct microscopic counts through 12 hours; plate counts at 24 hours.

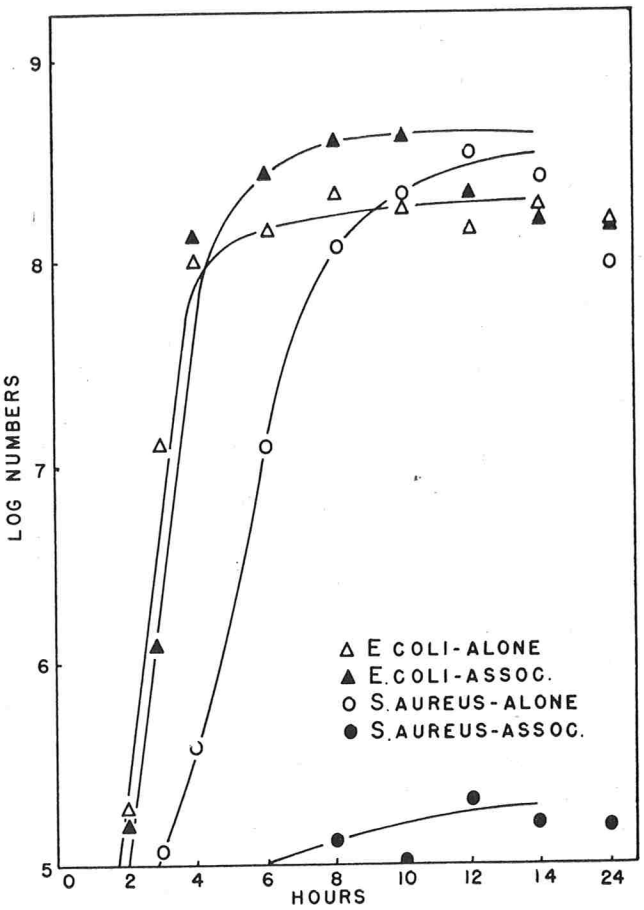

Figure 3. Growth and maximum numbers of *E. coli* H-52 and *S. aureus* 255 in pure culture and in association at 44°C in meat infusion broth. Direct microscopic counts through 14 hours; plate counts at 24 hours.

For the studies of competitive growth in broth, *S. aureus* strains 255 and 261 and *E. coli* strains Gratia and H-52 were first grown in broth at 30°C. for three successive days, the third transfer being incubated for only 18 hr. Numbers of bacteria in this culture were counted by the direct microscopic method and enough of the culture was used as an inoculum to give 100,000 cells per ml. in the inoculated test broth. The final volume in each inoculated broth tube, whether one or two organisms were added, was made up to 10 ml. Incubation temperatures for the experiment were 15, 30 and 44°C. Samples were taken at intervals for direct microscopic counts during the period of active growth and for a plate count at the termination of the incubation. For the plate counts mannitol salt agar was used for numbers of viable staphylococci

and violet red bile agar for *E. coli*. Previous tests had indicated that these media gave practically as high counts as less selective media.

RESULTS

Screening Tests

The results of screening tests with spot plates showed that most consistent in their inhibition of growth of the staphylococci on all of the media employed were *Streptococcus faecium* (4 strains), *Streptococcus faecalis*, *S. faecalis* var. *liquefaciens*, *Streptococcus lactis* strain X-13 (nisin-producing), and eight cultures of lactobacilli isolated from meat. Somewhat less consistent inhibitors were *Lactobacillus lactis* strain 39a, *Pseudomonas fluorescens* (2 strains) *Micrococcus freudenreichii* (2 strains) *Pediococcus cerevisiae* (2 strains) and three species of *Leuconostoc*. The streptococci and lactobacilli, especially on meat infusion and nutrient agars, were stimulatory outside the perimeter of the zone of inhibition, indicating that the products of the effector organisms were inhibitory in higher concentrations and stimulatory in lower concentrations.

It was observed, too, that the two enterotoxigenic strains of *S. aureus* were inhibited more often than the two non-enterotoxigenic strains, especially by the lactic acid bacteria, including *Leuconostoc* and *Pediococcus*.

Organisms with little or no apparent effect on the growth of *S. aureus* included: *Streptococcus cremoris*, *S. lactis*, *S. thermophilus*, *Lactobacillus bulgaricus*, *Pseudomonas aeruginosa*, *P. fragi*, *Pseudomonas* cultures from chicken and meat, *Micrococcus flavus*, *M. ureae*, *M. varians*, *Escherichia coli*, *Aerobacter aerogenes*, *Alcaligenes viscolactis*, *Proteus vulgaris*, *Salmonella gallinarum*, *Serratia marcescens*, *Brevibacterium linens*, *Bacillus subtilis*, *B. cereus*, *B. polymyxa*, *B. coagulans*, *Microbacterium lacticum* and six yeasts. Some of the above cultures at times were stimulatory to *S. aureus*.

The above results indicated that the effect of the effector organism on *S. aureus* depended upon: (*a*) the strain of *S. aureus* tested; (*b*) the strain or species of the effector organism employed; and (*c*) the culture medium on which the test was conducted.

Competitive Growth of S. aureus and E. coli

When *S. aureus* strain 255 and *E. coli* strain Gratia were grown together in broth at 15°, 30° and 44°C the coliform organism had comparatively little influence on the growth of the staphylococcus although maximum numbers of cocci were reduced about tenfold in the presence of *E. coli*.

However, when enterotoxin-producing *S. aureus* strains 255 and 261 were grown with the more typical *E. coli* strain H-52, the latter was definitely inhibitory to the staphylococci. When *S. aureus* strain 255 was grown with *E. coli* strain H-52 the staphylococcus was strongly suppressed when incubation was at 15°C. (Figure 1) or 44°C. (Figure 3), multiplying less than two generations and attaining numbers insufficient for the production of appreciable amounts of enterotoxin. At 30°C. (Figure 2) the staphylococcus was considerably suppressed but did attain about 2.3 million cells per ml. in 12 hours and about five million in 24 hours as compared to about 720,000,000 per ml. in the culture where *S. aureus* grew alone.

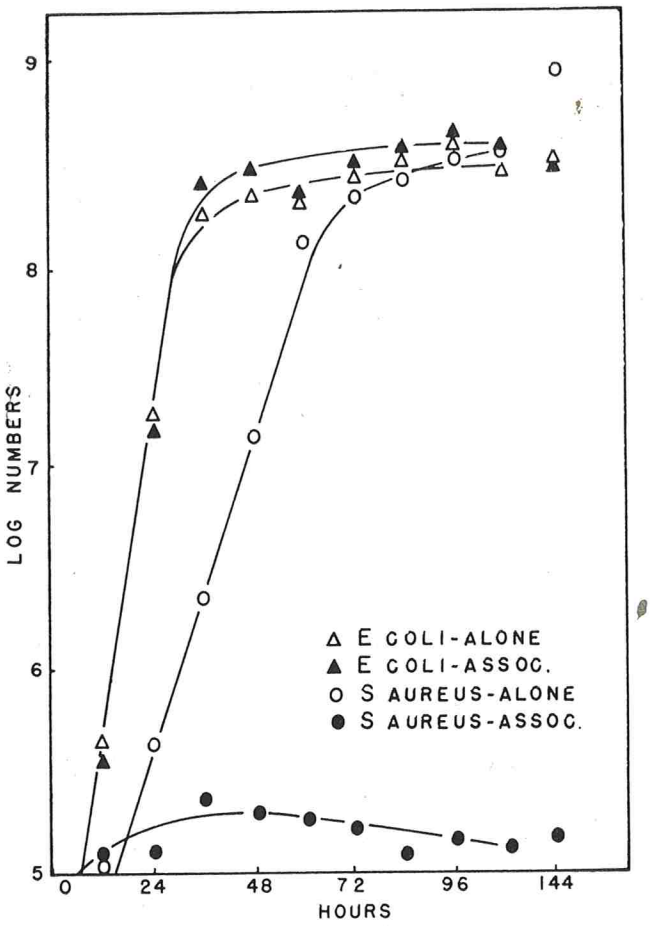

Figure 4. Growth and maximum numbers of *E. coli* H-52 and *S. aureus* 261 in pure culture and in association at 15°C. in meat infusion broth. Direct microscopic counts through 108 hours; plate counts at 144 hours.

Similar results were obtained when *S. aureus* strain 261 was grown with *E. coli* strain H-52. Again at 15°C. (Figure 4) and at 44°C. (Figure 6) *S. aureus* went through less than two generations during the duration of the experiment and the staphylococcus was considerably suppressed at 30°C. (Figure 5).

The results demonstrated that: (*a*) the staphylococci had little apparent effect on the growth of *E.*

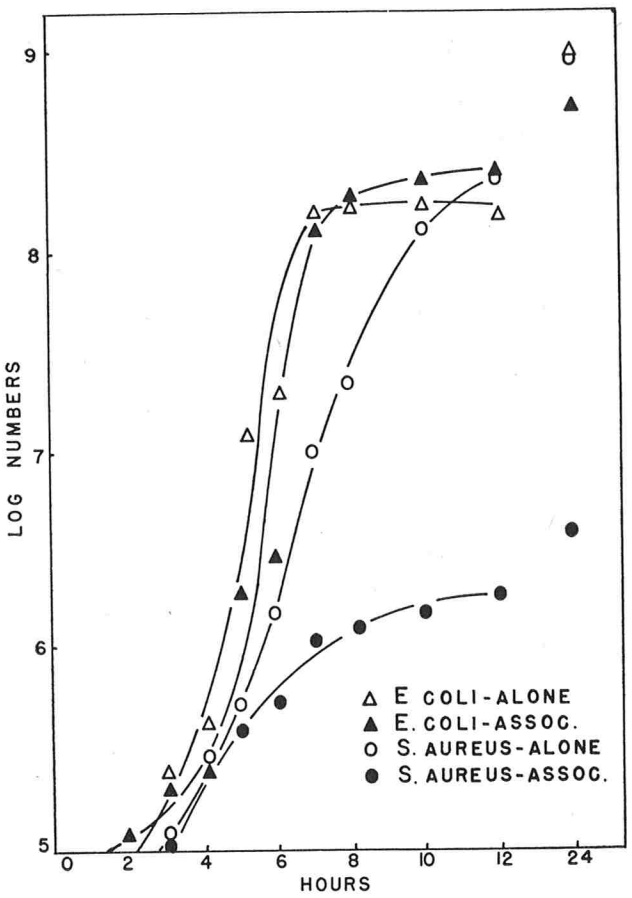

Figure 5. Growth and maximum numbers of *E. coli* H-52 and S. *aureus* 261 in pure culture and in association at 30°C. in meat infusion broth. Direct microscopic counts through 12 hours; plate counts at 24 hours.

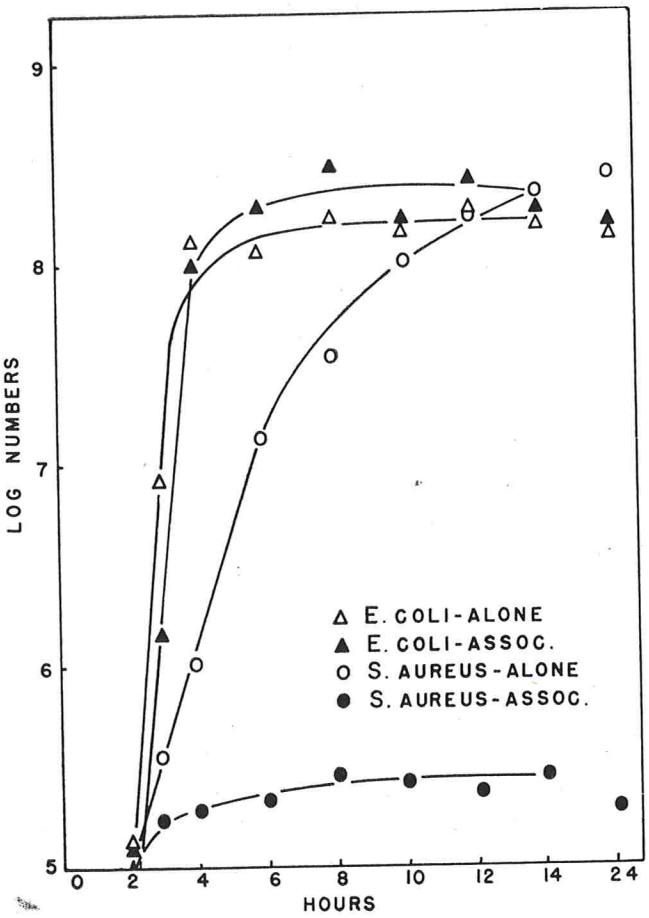

Figure 6. Growth and maximum numbers of *E. coli* H-52 and S. *aureus* 261 in pure culture and in association at 44°C in meat infusion broth. Direct microscopic counts through 14 hours; plate counts at 24 hours.

coli; (*b*) a typical *E. coli* inhibited markedly the growth of two enterotoxigenic strains *of S. aureus;* and (*c*) the inhibitory effect of *E. coli* varied with the strain used.

Discussion

The effect of competing microorganisms on growth of S. *aureus* in foods often must be important in determining whether appreciable enterotoxin formation will take place. The present work has indicated that some species of food bacteria are inhibitory to S. *aureus* according to spot-plate tests. It also has been shown, however, that *E. coli*, which gave no indication of inhibition of the staphylococci, could strongly suppress the growth of S. *aureus*, especially at a low or a high incubation temperature, and that the inhibition was evident from the start of growth of the two organisms. More organisms, both those inhibitory to S. *aureus* on the spot plates and those not, are being tested as competitors for the staphylococcus.

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THE EFFECT OF CARBON DIOXIDE REMOVAL UPON THE FREEZING POINT OF VACUUM TREATED MILK

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Vacuum treatment of fluid milk by non-steam injection flavor removal equipment has been shown to elevate the freezing point of milk when the equipment is operated at low levels of flash-cooling. This study indicates that the loss of carbon dioxide, at the reduced pressures employed for the vaporization of volatile flavor components, is a prime factor responsible for the freezing point elevation. The implications of the effects of carbon dioxide loss on the freezing point of milk are discussed.

The use of non-steam injection vacuum treatment equipment in conjunction with high-temperature, short-time (HTST) pasteurizers has been shown *(2, 4)* to result in an elevation of the freezing point of milk when processing occurred at low levels of treatment or degrees of flash-cooling. The loss of dissolved gases, resulting from the reduced pressures used in this type of vacuum equipment to boil off the undesirable flavor components, has been thought to be *(2, 6)* the primary cause of the freezing point alteration.

The effects of processing upon the gas content of milk have been noted by several investigators. Frayer (1) and Van Slyke and Keeler (11) discovered that the heating of milk during pasteurization to 143°F. for 30 minutes reduced the carbon dioxide content. Van Slyke and Baker *(10)* reported it was possible to remove the carbon dioxide completely from milk by laboratory vacuum exhaustion. This was verified by Noll and Supplee (5), who were able to effect significant changes in the gas content of milk by subjecting it to vacuum treatment, flushing with other gases, or a combination of these techniques. It is apparent that the gas content of milk is constantly shifting as a result of processing. The low partial pressure of carbon dioxide in the atmosphere, and the comparatively higher concentration of this gas in milk could account for this readjustment.

The present study was undertaken to determine the relationship between carbon dioxide loss and the freezing point elevation of milk resulting from vacuum processing of fluid milk.

Experimental

Mixed herd milk was received every-other-day from producers with bulk tanks and processed the following day. The milk was pasteurized at 172°F. for 16 seconds in a HTST unit engineered for 80% regeneration and a capacity of 3400 pounds per hour. It was homogenized at 2200 psi. after vacuum treatment, but before the final heating section. Vacuum treatment was accomplished with a non-steam injection single chamber unit[1] located after raw regeneration. The vacuum unit was operated as explained in a previous publication *(4)*.

Eight trials representing 11 different levels of treatment or flash-cooling degree increments were studied. Raw milk samples collected from the balance tank and vacuum treated milk samples obtained from a valve in the line after the final cooling section were checked for freezing point and carbon dioxide content. The freezing points were determined in duplicate using a model F Fiske cryoscope.[2] The carbon dioxide content was determined with a Van Slyke blood gas manometric apparatus using the method as described by Van Slyke and Peters *(9)*, but substituting 20% lactic acid for sulfuric acid *(10)*.

The following is a description of several terms used in this study: *(a)* the degrees of flash-cooling refers to the difference in temperature between the milk entering and leaving the vacuum chamber; *(b)* the percentage concentration of milk was calculated from degrees of flash-cooling using the formula $Y = -0.270 + 0.109\ X$, where Y represents the percentage of milk loss, and X the degrees of flash-cooling (7); (c) the freezing point difference was the difference between the freezing point of the vacuum treated milk and the raw milk control; and *(d)* the freezing point elevation was the rise in the freezing point of the laboratory vacuum treated sample over the raw sample.

In the experiments performed in the laboratory, an apparatus, as shown in Figure 1 was designed to facil-

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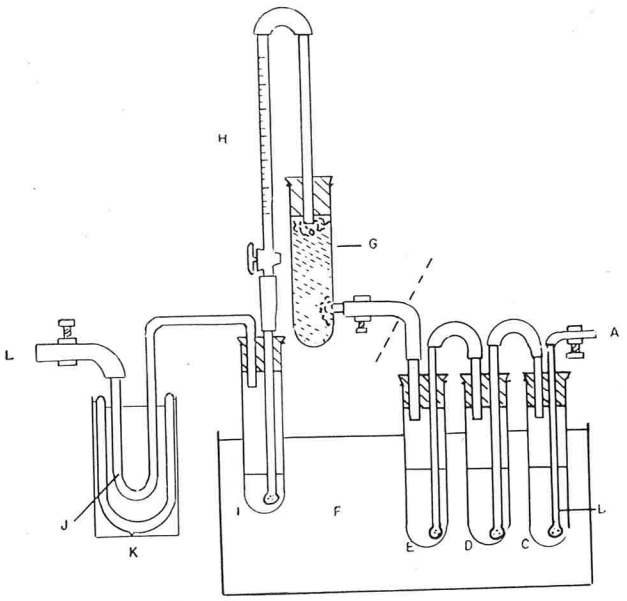

Figure 1. Apparatus for laboratory removal of carbon dioxide from milk: (A) Air intake; (B) Gas washing device; (C) Sulfuric acid; (D, E,) Sodium hydroxide; (F) Water bath; (G) Anhydrous calcium sulfate; (H) Burette; (I) Milk sample; (J) U-tube vapor trap; (K) Dewar flask; (L) Water aspirator.

itate and regulate the removal of carbon dioxide from a raw milk sample. Carbon dioxide-and moisture-free air was aspirated at a uniform rate through 10-ml milk samples for varying lengths of time (a few seconds to an hour) so that the resulting samples contained various levels of carbon dioxide. Moisture-free air was obtained by drawing laboratory air *(A)* through a series of 35 mm. x 250 mm. gas washing test tubes and a moisture absorbent. The air was drawn *(B)* through 100 ml of concentrated sulfuric acid *(C)*, then through two tubes each containing 100 ml of 0.1 *N* sodium hydroxide *(D, E)* and finally through a column of anhydrous calcium sulfate with an indicating band *(G)*, before bubbling slowly into the milk sample *(I)*. The tubes containing sulfuric acid, sodium hydroxide and the milk sample were immersed above their content level in a water bath *(F)* thermostatically maintained at 30°C. To prevent loss of water vapor which would result in a depression of the freezing point of the milk sample, a vapor trap *(J)* was installed in the exhaust line from the sample tube. The vapor trap consisted of a U-tube submerged in a liter Dewar flask containing dry ice and isopropyl alcohol *(K)*. After the desired aspiration time the tubing was closed at all closures to prevent entrance of air into the system and the U-tube assembly was removed from the Dewar flask. The milk sample then was flushed into the vapor trap and back to the sample tube by inverting the assembly. This flushing was done three times to insure recovery of all water collected in the U-tube. The sample then was drawn up through the gas washing device by applying suction at the point indicated by the broken line in Figure 1, and into a 5-ml burette *(H)* installed in the line directly above the sample tube. This sampling burette then was used to deliver samples to the manometer and the cryoscope. The carbon dioxide determination requires the sample to be delivered into the manometer cup above the extraction chamber under a measured amount of lactic acid. This feature plus the fact that a sealed-off rubber tubing was attached to the upper end of the burette prevented exposure of the sample to atmospheric carbon dioxide.

The studies on the effect of laboratory removal of carbon dioxide on the freezing point of milk required protection of the sample from atmospheric carbon dioxide during the freezing point determination. A 2-ml sample was delivered from the burette (Figure 1) to a test tube which had been flooded with nitrogen. When the sample was introduced into the test tube, nitrogen was allowed to flow continuously into the test tube and the space above the sample was flooded prior to applying a rubber stopper. These samples were stored in ice water until the freezing point determinations were made. When the stopper was removed and the probe assembly was introduced for operation of the cryoscope and during the entire freezing point determination, a constant flow of nitrogen was maintained over the test tube.

The method of least squares was used for determining the relationship between freezing point elevation and carbon dioxide removal. The standard error of estimate was used as a measure of accuracy of the regression equation *(8)*. Simple and partial coefficients of correlation were used to indicate the significance of the data *(8)*.

RESULTS

The effect of a single vacuum chamber located after raw regeneration upon the carbon dioxide content and freezing point of milk is shown in Table 1. The data indicate a loss of carbon dioxide due to vacuum treatment and an elevation of the freezing point at low levels of flash-cooling. There appears to be a linear relationship between freezing point difference and concentration of the milk, which agrees with previous findings *(4)*. There does not appear to be a similar relationship between carbon dioxide loss and freezing point difference. It may be postulated that with increasing degrees of flash-cooling there should be a decrease in carbon dioxide content because of the increasing amount of vacuum applied to the milk. This does not appear to be true. The variable carbon dioxide content of the raw milk (2.42 to 5.15 volume

percent) probably results in its variable removal at a given amount of vacuum. This may explain the non-uniform pattern of the carbon dioxide loss.

The correlation coefficient between freezing point difference and carbon dioxide loss calculated from Table 1 is $r = 0.62$. The partial correlation between freezing point difference and carbon dioxide loss after adjusting for the concentration variable resulted in a correlation of 0.51, and after adjusting for the variable raw milk carbon dioxide values resulted in a correlation of 0.38.

Since the correlation coefficients between freezing point difference and carbon dioxide loss in the dairy plant experiments were not high and because of the variable concentration of milk in the study, the results were not considered conclusive. Thus, a laboratory study, using apparatus described under Experimental, whereby the concentration factor could be eliminated, was undertaken to determine the relationship between carbon dioxide loss and freezing point difference in vacuum treated milk. The raw milk samples used in the laboratory study were equivalent in age to the milk used in the plant experiment.

The results of the laboratory study on the effect of carbon dioxide removal upon the freezing point of milk are shown in Table 2. The upward trend of freezing point elevation with increasing volume percent carbon dioxide loss was $Y = -0.0021 + 0.000077X$ with a standard error for the regression equation of 0.00007°C. and a correlation coefficient of 0.72, where Y denotes the freezing point elevation, and X the carbon dioxide volume percent loss. The correlation coefficient was not materially improved by calculations based on a curvilinear trend. The partial correlation between freezing point elevation and carbon dioxide loss after adjusting for the variable raw milk carbon dioxide values resulted in a correlation of 0.72. The freezing point elevation did not appear to become apparent until approximately 25% of the carbon dioxide had been removed from the milk. This may be explained by the sensitivity limitations of the cryoscope (±0.001°C.).

The results clearly indicate that laboratory removal of carbon dioxide from milk by vacuum treatment will elevate the freezing point. The effect appears to be of sufficient magnitude to account, at least in part, for the freezing point elevation which occured in the plant study (Table 1), when operating the vacuum equipment at low levels of flash-cooling.

The removal of carbon dioxide by vacuum processing should vary with the carbon dioxide content of the original milk. The carbon dioxide content of the raw milk in the plant study varied from 2.42 to 5.15 volume percent (Table 1) and in the laboratory study from 2.80 to 6.33 volume percent (Table 2). Since carbon dioxide removal elevated the freezing point of milk, it would seem logical that the degree of elevation at a given level of vacuum processing would depend upon the carbon dioxide content of the raw milk as indicated by the partial correlation calculated from the data shown in Table 1. Thus, the accuracy of regression equations *(4)* for estimating water adulteration of vacuum treated milk would be contingent

TABLE 1. THE EFFECT OF A SINGLE VACUUM CHAMBER LOCATED AFTER RAW REGENERATION UPON THE CARBON DIOXIDE CONTENT AND FREEZING POINT OF MILK

Flash-cooling	Concentration of milk	Freezing point difference	Carbon dioxide volume percent		Carbon dioxide loss
			Raw milk	Treated milk	
(°F)	%	(°C)	(%)	(%)	(%)
6	0.38	+0.004	5.15	1.10	78.6
7	0.49	+0.005	5.15	0.95	81.6
8	0.60	+0.002	5.15	0.76	85.2
9	0.71	+0.002	2.86	0.96	66.4
9	0.71	+0.001	3.14	1.06	66.2
10	0.82	−0.002	3.15	1.06	66.3
11	0.93	0.000	2.95	0.67	77.3
13	1.15	−0.005	3.15	0.94	70.2
13	1.15	0.000	2.95	0.53	82.0
14	1.26	−0.004	3.44	1.17	66.0
16	1.47	−0.005	2.42	0.76	68.6
18	1.69	−0.008	3.21	1.30	59.5
19	1.80	−0.009	2.86	0.84	70.6

TABLE 2. THE EFFECT OF LABORATORY REMOVAL OF CARBON DIOXIDE UPON THE FREEZING POINT OF MILK

Volume percent Carbon dioxide		Carbon dioxide loss	Freezing point elevation
Raw milk	Treated milk		
(%)	(%)	(%)	(°C)
4.63	3.63	21.6	0.000
4.63	3.44	25.7	0.001
4.89	3.18	35.0	0.002
4.71	2.99	36.5	0.001
4.89	2.84	41.9	0.002
4.97	2.31	53.5	0.001
4.71	2.10	55.4	0.001
4.35	1.66	61.8	0.001
4.45	1.64	63.1	0.002
4.03	1.34	66.7	0.003
4.45	1.01	77.3	0.004
4.35	0.96	77.9	0.002
3.37	0.55	83.7	0.002
4.03	0.55	86.4	0.006
4.97	0.53	89.3	0.002
3.51	0.36	89.7	0.004
6.33	0.64	89.9	0.002
4.97	0.46	90.7	0.006
4.03	0.37	90.8	0.008
2.80	0.17	93.9	0.008
2.80	0.13	95.4	0.009
6.33	0.18	97.2	0.004
3.37	0.01	99.7	0.007

upon the carbon dioxide content of the original milk. This would probably make borderline cases of watering in milk treated at low levels of vacuum difficult to detect.

The variation in carbon dioxide content (2.42 to 6.33 volume percent) of the raw milk supplies as received at the dairy plant in this study is in agreement with observations of other investigators *(1, 5)*. However, the carbon dioxide content of milk immediately after milking has been reported as 10 volume percent *(3)*. The present-day trend toward longer storage of raw milk and methods involved in handling such milk, apparently results in a lowering of the carbon dioxide content of fluid milk as it is received at dairy plants. Since this study indicates that carbon dioxide loss elevates the freezing point, the trend toward longer storage would have the effect of elevating the –0.550°C. standards for milk. Futhermore, the variable carbon dioxide content of milk may account, in part, for the normal freezing point range for milk.

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TO: MEMBERS OF THE INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS

A number of problems arose concerning the scheduled meeting of the IAMFS at Jekyll Island, Georgia. Without detailing those problems, the officers of the Georgia Society of Sanitarians advised the Executive Board of the IAMFS that it would be advisable to hold the meeting at some other location. The Iowa Affiliate has agreed to be host to the annual meeting this year instead of 1963. The dates will be August 14th-17th and detailed information concerning reservations, etc., will be sent to each of you.

If any of you had made reservations at Jekyll Island, the reservations are cancelled and refunds will be made to those who made deposits.

It is with regret that all of the various changes have been made but we want to thank the Iowa Affiliate for helping arrange the meeting upon short notice and hope that all of you will support this meeting by your attendance.

We want to thank the Georgia Society of Sanitarians and its members who worked so hard to promote the meeting in the Southeast. The change of meeting place does not reflect in any manner upon the management of the Wanderer Motel, the officers of the Georgia Society of Sanitarians, or the many members who contributed so much to the planning of the meeting.

Let's all be in Des Moines, August 14-17.

JOHN J. SHEURING

President, IAMFS

REGULATION OF BACTERICIDES UNDER THE FEDERAL INSECTICIDE, FUNGICIDE AND RODENTICIDE ACT

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On the basis of legislative definition, official regulation, and legal interpretation, all sterilizing, disinfecting, sanitizing, and germicidal chemicals except those sold *solely* for use on or in the living body of man or other animals are *economic poisons* as that term is defined in the Federal Insecticide, Fungicide and Rodenticide Act *(16)* and subject to regulation by the Department of Agriculture *(5)* if shipped in interstate commerce or Federal territories, or received from any foreign country. Economic poisons require registration or preclearance under this law before they are offered for sale. All physical *devices* for controlling bacteria and fungi on or in inanimate materials are also subject to Federal regulation under the provisions of this statute but registration is not required.

A breakdown or classification of antimicrobial economic poisons according to intended end use would include:

1. Surgical and dental instrument sterilizers and disinfectants.
2. Medical and veterinary hospital, clinic and office germicides.
3. Mortician and funeral parlor equipment sterilizers, disinfectants and sanitizers.
4. Barber shop and beauty parlor instruments, equipment and premise sterilizers, disinfectants and sanitizers.
5. Laundry and dry cleaning chemical disinfectants, sanitizers, and bacteriostats.
6. Institution maintenance (janitorial), germicidal and sanitizing chemicals.
7. Dairy, bottling, canning and food processing equipment disinfectants, sanitizers, and sanitizing detergents.
8. Restaurant, tavern, lunch counter, and bar sanitizers and disinfectants for equipment, dishes and glasses.
9. Sewage disposal and chemical toilet germicides.
10. Public drinking water and swimming pool disinfectants and slime control chemicals; and industrial water supply antimicrobial additives.
11. Bacteria and fungus control chemicals employed in secondary oil recovery process waters and brines.
12. Bactericides and bacteriostats sold for use in cutting oils and oil-water emulsion cooling compounds.
13. Household germicides and detergent-sanitizers.
14. Farm building and equipment disinfectants, germicides and sanitizers including products specially used for milking and hatchery equipment.
15. Slime control agents for paper mills.
16. Food, feed and industrial material preservatives where the objective is protection against bacteria and fungi.
17. Air sanitizing chemicals.

Although this classification seems imposing it does not cover a rather large number of smaller group specialty products such as *(a)* disinfectants for reconditioning second-hand brass and reed band instruments (required by some local public health ordinances), *(b)* telephone disinfectants, and *(c)* detergent-sanitizers for contact lenses and the like, all of which are likewise subject to the law. Devices subject to the provisions of the law include:

1. Sanitizing ultra-violet lamp assemblies.
2. Heat sterilizers.
3. Pasteurizers.
4. Ozone generators sold under labeling bearing antimicrobial claims.
5. Bacteriological filters.

Registrations on economic poisons are issued without pretesting based on the Department's best judgment of the representations and supporting information submitted by the manufacturer or applicant. All proposed labels are reviewed by Department specialists to determine *(a)* the suitability of the proposed name, *(b)* if the net content and ingredient statements are in agreement with the forms permitted in the law, *(c)* the presence of the name and address of the manufacturer or distributor, *(d)* if the label bears caution and warning statements adequate for the protection of the general public, and *(e)* adequacy of the directions for use given.

In the case of the net content statement, the ingredient statement, the need for precautionary labeling, and the manufacturer's or distributor's name and address, the requirements are set *within* the law itself. The net contents must be given in the case of liquids as fluid ounces, pints, quarts or gallons, whichever is the largest single unit present, and in the case of powders, solids and gases (including pressurized containers) as avoirdupois ounces or pounds, whichever is the largest single unit present. Only two forms of ingredient statements can be accepted. In the first form the correct name and percentage by weight of each active ingredient and the total percentage by weight of the inert ingredients must be given. In the second form the correct names of all active and inert ingredients respectively must be given in the descending order of the percentages of each present in each classification and the total percentage by weight of the inert ingredients must be shown. The law defines as active ingredients those which have activity *per se* in the uses recommended and are present in the formula in sufficient concentrations to contribute to the over-all activity. Inert ingredients are defined as those which do not have activity *per se* in the uses recommended, are antagonistic

to the principal active ingredients or those which although possessing activity *per se* are not present in sufficient amounts to contribute to the over-all activity of the formula.

Names which clearly imply that a product is something different than that which it is or possesses properties other than those which it actually possesses are considered unsuitable and are not acceptable. For example, it is held to be improper to identify a product as a pine or pine oil disinfectant if it does not comply with the accepted commercial standards for pine oil disinfectants *(15)*. Also, it is held to be improper to represent a product as a sterilizer when it will not sterilize when used as directed.

Precautionary labeling requirements must be patterned to cover the dangers inherent in handling the product as sold, as well as those associated with use as directed. Four general categories of toxicity are recognized. The first is the highly toxic class as defined in the regulations as those products which produce death in half or more than half the animals of any species at a dosage of 50 milligrams at a single dose or less per kilogram of body weight when administered orally; those which produce death in half or more than half of the animals of any species at a dosage of 200 parts or less by volume of the gas or vapor per million parts by volume of air in continuous inhalation for one hour or less; and those which produce death in half or more than half of rabbits tested at a dosage of 200 milligrams or less per kilogram of body weight when administered by continuous contact with the bare skin for 24 hours or less. The second is the class immediately below the highly toxic and in general includes formulations having toxicities down to one-tenth those of the highly toxic class. The third group embraces products having hazards down to about one-tenth of those in class two. The fourth class is comparatively free from danger.

Highly toxic products are required to be labeled with the skull and crossbones, the word "Poison" in red on a contrasting background and an antidote statement including the words "Call a physician immediately." Labels for products in the second category require warning statements practically equivalent to those specified for highly toxic products except that they need not bear the skull and crossbones, the word "Poison" or an antidote statement. As a substitute for the word "Poison" a statement such as "Warning, may be fatal if swallowed, inhaled, or absorbed through the skin" is required. Labels for products in the third category are required to carry the word "Caution" and statements outlining the means of avoiding the principal hazards of use and handling. Category four products usually do not need warning, caution or antidote statements although unqualified claims for safety can seldom be justified.

Precautionary labeling requirements must take into account such factors as fire hazards, potential injury to fish, wildlife, beneficial insects, food contamination, injury to crops and the possibility of accidental injury to small children and other individuals who cannot read because of blindness or lack of education.

The Department holds that directions which will give the results claimed when applied in all the applications recommended are necessary to meet the term "adequate" stipulated in the law. Determinations as to the adequacy of the directions with different chemicals for all of the antimicrobial applications listed above provide real challenges for the Department specialists.

Where standards have been set in U. S. Public Health Service recommended ordinances and codes as in the case of the "Milk Ordinance and Code, 1953 Recommendations of the Public Health Service" *(10)* and the "Ordinance and Code Regulating Eating and Drinking Establishments" *(11)* it is not too difficult to set up minimum requirements for registration on which an effective enforcement program can be developed.

Where no uniform Federal recommendations as to public health ordinances and codes exist and where no official medical, veterinary medical, dental or other professional standards have been established and where a wide variety of municipal, county and state codes do exist the Department sets the minimum requirements for registration based both on a consensus of existing codes and its own best estimation as to the level which adequate public protection requires and where there is reason to believe an effective enforcement program is possible. Typical examples of this situation are "Barber shop and beauty parlor disinfectants and devices" *(6, 7, 8, 9)*, and "Swimming and Wading Pool Germicides and Devices."

With those applications and products where neither local or Federal public health ordinances or recommendations exist the minimum requirements for registration are set according to evaluations of the available scientific literature, information furnished by applicants and/or tests in the Department laboratories.

Acceptance for registration should not be interpreted as a recommendation by the Department. The manufacturer is responsible for all claims which appear on either a registered or unregistered label. Registration is simply a means through which products are brought to the attention of the Department, affording an opportunity to obtain precautionary

labeling which may be necessary to protect the public and to correct obvious defects insofar as the various other requirements of the law are concerned.

The Department operates an aggressive enforcement as well as an effective registration program. It maintains a staff of field investigators who collect samples of registered and unregistered products from shipments made in interstate commerce. The labeling of all samples collected is checked against the registration files, the samples are then analyzed chemically, tested bacteriologically to determine the validity of the claims and directions for use and checked by the pharmacologist if necessary to determine whether or not the precautionary labeling meets with legal requirements.

The law provides authority for a number of enforcement actions. Interstate shipments of economic poisons made without registration or which are deemed to be adulterated or misbranded may be seized by the appropriate United States Attorney upon recommendation by the Department. This is a civil action against the merchandise. Criminal proceedings may be initiated against the manufacturer after notice of violation has been sent directly by the Department to the shipper of any economic poison which *(a)* has not been registered, *(b)* is shipped under labeling bearing claims and representations differing in substance from those made in connection with its registration, or *(c)* is misbranded and/or adulterated affording him an opportunity to make such explanation of the violation in writing or orally as may be possible. If a reasonable explanation cannot be made the case may be referred to the proper United States Attorney for prosecution. There are also certain provisions for the cancellation of registrations which can be employed as enforcement aids. It should be made a matter of record, however, that many technical and minor violations are corrected voluntarily each year by manufacturers simply through informal correspondence calling deficiencies to their attention.

The effectiveness of the Department's program insofar as determinations as to the validity of claims and the adequacy of application directions for antimicrobial chemicals are concerned depends largely upon the establishment of standardized laboratory testing methods which yield results that can be accurately interpreted in terms of actual use concentrations and modes of application.

Laboratory testing methods are continually being evaluated as to their suitability for referee use under the auspices of the Association of Official Agricultural Chemists. As rapidly as proposed methods are found to be accurate and precise enough for acceptance they are published and made available by that organization.

In the case of disinfectants, germicides, sanitizers and detergent-sanitizers recommended for use on dairy utensils, food processing equipment, cooking utensils, and dishes and glasses in restaurants, taverns and bars there are two official A.O.A.C. methods which have been found to have special merit. These can be identified as the "Available Chlorine Germicidal Equivalent Concentration Test — Official" *(2)* and the "Germicidal and Detergent Sanitizers Test — Official *(13)*. The former provides an accurate index to the public health value of organic chlorine bearing chemicals and halophor formulations as germicidal rinses for previously cleaned dairy and food processing equipment as well as dishes and glasses in restaurants. The latter which may be more commonly recognized as the Chambers Test *(3)* or the Weber and Black Method *(21)* provides satisfactory data insofar as water-hardness tolerances of quaternary ammonium formulations recommended for dairy, food plant and restaurant use are concerned, and the minimum concentrations of germicidal formulations which can be permitted in use at any time in washing or rinsing dairy utensils, food processing equipment or dishes and glasses in restaurants, taverns and bars. Both methods take into account the necessity for quick bactericidal action with products recommended for these applications. It has been determined *(12)* that the 30 second end point in the "Germicidal and Detergent Sanitizers Test — Official" with alkaline sodium hypochlorite is at the 50 p.p.m. available chlorine concentration and that the one test culture increment-one minute end point in the "Available Chlorine Germicidal Equivalent Concentration Test — Official" is 50 p.p.m. of available chlorine as alkaline sodium hypochlorite. Thus, results obtained by the two methods are directly comparable. Since neither method alone is entirely satisfactory for all of the evaluations which need to be made on products in this class this is an essential and fortunate circumstance.

While public health officials are concerned with the concentration and activity of the product in use at any time the Department is primarily concerned with the activity and concentration of the solution which must be recommended at the beginning of the sanitizing operation to assure the minimum activity required by the public health inspector at any time. With alkaline hypochlorites the pattern of public health acceptance is firmly established. Solutions providing 100 p.p.m. of available chlorine are required at the beginning of the sanitizing operation where chemical facilities are available to test the concentration of the solution in use so that it will not fall below 50 p.p.m. of available chlorine at any time. Where such testing facilities are not available, the con-

centration of the starting solution must be high enough to provide 200 p.p.m. of available chlorine. This accepted use pattern is employed as a guide for the interpretation of data obtained with the two methods referred to above in terms of the acceptable concentrations of starting solutions with the various products submitted for registration and/or sampled by Department investigators. The "Available Chlorine Germicidal Equivalent Concentration Test — Official" is especially adapted to determinations as to the minimum concentrations necessary to recommend for starting solutions with formulas prepared from organic chlorine bearing chemicals, and mixed halogens, iodophors and peroxides. It is a relatively simple and uncomplicated procedure which provides with a remarkable degree of precision a direct measure on the concentration of such formulas that possess equivalent speed and capacity of kill to solutions of sodium hypochlorite at p.H 8.5 providing 50, 100 and 200 p.p.m. of available chlorine. Its effectiveness in the Department's registration and enforcement program with products recommended for those applications where these concentrations of sodium hypochlorite have been accepted as public health standards clearly suggests that modifications might be developed for use in connection with the regulation of drinking water and swimming pool water disinfectants where minimum available chlorine concentrations as hypochlorite have widespread public health acceptance.

The "Germicidal and Detergent Sanitizers Test — Official" provides a reasonably accurate index to the hard water tolerances of quaternary ammonium compound formulations. Claims for effectiveness in hard water are not accepted for registration unless the applicant submits supporting satisfactory experimental evidence using this procedure. Hard water label claims on official regulatory samples are checked by this method. This test has also been applied successfully in investigations on the effectiveness of various sequestrants on the hard water tolerances of formulas and in studies on the relation of molecular structure in quaternaries to hard water tolerances. It appears to have a ± 10% coefficient of variation in such applications. When applied to determine the minimum concentration of a given product which can be permitted in use at any time distilled water solutions are usually employed. Distilled water solutions of the more active quaternaries may give the required 30 second, 99.999% reduction end point in this method at concentrations as low as 15 p.p.m. *(17)*. In such a situation consideration could be given to recommending a starting concentration of 60 p.p.m. based on the fact that no chemical test for determining the residual concentration of active quaternary in use has received public health approval and acceptance of the concentration multiples of 2 and 4 required with hypochlorites. This is considerably below the commonly recommended 200 p.p.m. concentration with this type of chemical. While it might be considered acceptable by the Department a recommendation at this level is seldom encountered since it would usually limit any proposed hard water tolerance claim to a level too low for widespread geographic acceptance. Many manufacturers and some public health officials are prone to recommend or specify concentrations of chemicals acceptable as germicidal rinses of previously cleaned hard nonporous surfaces for disinfecting porous table tops, floors, walls and other surfaces where the efficiency of the precleaning operation falls far below that attainable with dishes and glasses in restaurants, stainless steel, glass or monel metal found in dairy and food processing equipment. The Department holds that higher concentrations must be provided with all types of chemical formulations for such applications. The concentrations required to disinfect such surfaces are determined by the A.O.A.C. Use-Dilution Test — Official *(1)*.

In the administration of the law the terms "sanitize" and "disinfect" are not considered to be synonymous. In most applications to disinfect would be to sanitize. However, the word "sanitize" carries with it the connotation of cleanliness and it is difficult to envisage the designation of a disinfected fecally contaminated board as sanitized unless the process involved a cleaning operation. On the other hand, the Department is willing to concede that in day to day maintenance operations where no specific disease organisms are known or suspected of being present, applications of germicidal chemicals at concentrations and in modes of application that could not always be relied upon to provide disinfection in the accepted meaning of the term may furnish the practical result desired. It is not uncommon therefore to accept products as sanitizers under directions for use which would not be acceptable for a disinfecting claim.

Combination detergent-sanitizers and germicidal-detergents are accepted for registration for a rather wide variety of applications. Such designations clearly imply that these products possess practical value as cleaners as well as in sanitizing and/or disinfecting. In the case of a detergent-sanitizer designation *(18)* it is held that the manufacturer is representing his product to the public as something more than an ordinary cleaner and that it must possess activity in the uses recommended in reducing bacterial populations significantly greater than that associated with a cleaning operation using either white floating soap or tetrasodium pyrophosphate. A variety of simulated use tests have been employed

with success to support enforcement activities on this point. In the case of a germicidal-detergent it is held that if a product is so designated the label must bear adequate directions for applying the product in a manner that will both clean and disinfect. If evidence is available to show that both results can be obtained in one operation directions for application in this manner may be accepted as adequate. If the evidence indicates that an initial cleaning operation followed by a rinse with a fresh solution is necessary to assure disinfection then the directions given on the label must specify application in this manner.

At this time the impact of the many new laws enacted by State and Federal legislatures with the stipulated objective of protecting the public from the danger of chemicals on the distribution and use of germicides cannot be accurately measured in its entirety but it would seem that it will not be as great as some individuals have predicted. In some instances exemptions have been made for products subject to the Federal Insecticide, Fungicide and Rodenticide Act. In others some overlapping authorities have been created. Whenever and wherever the latter situation develops the Department works with the enforcement agency involved to clarify the situation as rapidly as possible. No major changes in registration requirements are anticipated although it is only reasonable to suppose that certain minor adjustments in labeling requirements may be necessary with specific chemicals in some recommended applications.

From a sales promotion standpoint an almost unbelievable circumstance exists with germicidal chemicals. At a time of apparent widespread public alarm over the potential dangers of exposure to traces of chemicals found in the atmosphere, drinking water and food as well as through skin contact with such inanimate materials as clothing and surfaces like the interior walls of dwellings, the distributors of this class of compounds have elected to initiate an agressive program extolling the potential benefits of active chemical residues in environmental sanitation programs. This situation has created some very difficult regulatory problems. Reliable information as to the levels of antimicrobial activity which can reasonably be expected from residues of the various germicidal chemicals on paper and fabrics, in paints, floor waxes and similar commodities is meager or nonexistent. No extensive public health studies have been conducted which either establish or disprove the existence of practical sanitation values in the various applications proposed. Each possible benefit must always be weighed against the potential hazard to the consumer and data on the effect of exposure of the human organism to an environment saturated with the specific chemicals known to possess residual antimicrobial activities does not exist. In spite of all this the Department has developed a reasonably effective regulatory program for products to which germicidal chemicals have been added. This has been outlined in two recent publications *(19, 20)*. It is based on the simple premise that a manufacturer is entitled to make such claims for his product as there is reason to suspect may be true providing safety in the recommended applications can be established. It should be emphasized, however, that the Department's responsibility to the consuming public makes it impossible to countenance recommendations for applications in which there is no apparent reason to expect a useful function.

Under the terms of the Miller Bill, Public Law 518, an Amendment to the Federal Food, Drug and Cosmetic Act *(14)*, petitions for residue tolerances or exemptions for bactericides and bacteriostats recommended for use in the production, storage, and transportation of raw agricultural commodities cannot be considered by the Food and Drug Administration until, *(a)* an application for registration under the Federal Insecticide, Fungicide and Rodenticide Act has been filed with the Department of Agriculture, *(b)* a certificate of usefulness issued, and *(c)* an opinion rendered relative to the correctness of the tolerance requested. In the case of the products under consideration here the number involved is not large. However, large numbers of germicidal and sanitizing chemicals registered under the Federal Insecticide, Fungicide and Rodenticide Act are recommended for use in connection with the processing of food. Based on policy statements presently available it would appear that their status under the Food Additives Amendment of the Federal Food, Drug and Cosmetic Act *(4)* will depend largely upon the modes of application specified on the label.

This brief outline covering the scope of the Department's legal responsibilities, the activities of the supporting functions required for enforcing the law, and the general requirements for sterilizers, germicides, bactericides, disinfectants and sanitizers includes only a few specific illustrations. These have been selected from the problems encountered with products sold to the milk and food industries. The sanitation and/or public health requirements in these industries have been much more firmly established than is the case with most of the other consumers of bactericidal chemicals. This materially simplifies the Departments activities in this area. There appears to be a growing interest in the problems of environmental sanitation in other areas but the need for critical studies in these other areas exceeds the interest shown by bacteriologists and public health officials. Until such a time as firm and

uniform agreements can be arrived at by public health officials for many of these other applications the registration requirements and enforcement activities in the Department will in all probability be pitched at a somewhat lower level with products sold for these uses than is the case with products sold for application by milk and food processing companies.

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PROTECTION OF FOOD PROCESSING PLANTS DURING NATIONAL EMERGENCIES[1]

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Food processing is a basic industry that probably is of interest in the Communist plan of infiltration, subversion, espionage and sabotage. If we grant this assumption then we can properly say that we are in a period of continuing national emergency. In times of world tension, such as the present, our enemies could cause constant harassment and consumer complaints in the food industry without attracting a great deal of attention.

How could an enemy cause harassment without attracting attention? The answer is sabotage. You may be thinking that sabotage would be difficult, but consider for a moment the last food plant that you visited while we discuss this subversive type warfare.

The agent must get into a food plant before acts of sabotage can be committed but this is not difficult. The food processing industry has not placed any emphasis on investigation of employees, so the saboteur could very easily be employed in the operation. In addition only a few food plants have any security system such as enclosures and guards. Many operations are such that strangers may walk in and out with no one so much as saying a word to them. Therefore, gaining entrance to commit a subversive act would be no problem for the trained person.

If an enemy does gain access to our plants what is available that might be of interest to him? The answer to this would depend upon what was to be accomplished. If production was to be stopped the plant, personnel, and equipment would be the likely targets.

Much progress has been made in mechanizing the food processing industry and each piece of equipment is vital to the fast moving production lines. Improper maintenance is the greatest cause of work stoppage that most food plants face under present conditions. An excellent example of this, recently seen, was a corn cannery with a breakdown of the waste conveyor belt. The waste could not be removed from the plant fast enough manually so the entire operation had to be closed until repairs were made. This was unintentional but think how easy it would be to do the same thing intentionally. This breakdown could have been avoided if the maintenance crew were well trained and instructed to check all equipment before the operation began.

Many phases of the food industry make use of control instruments. Tampering with this type of necessary equipment or setting the instruments to give false readings could be used to great advantage by a person desiring to create difficulties in food production. An example of this would be in the milk plant which is of interest to many of you. The retorting or pressure cooking of canned foods is another critical area where control instruments are vital to production. The National Canners Association recommends that retorts be equipped with steam bypasses so that the operation may be carried on manually if necessary. Another protection against instruments that may have been tampered with is the mercury thermometer that is recommended on each retort. Even when the instruments are in use the operator must check the recorder against the mercury thermometer which should be adjusted to a Bureau of Standards thermometer at least once each year, preferably more often. If the retorting operation is not accurately completed loss of product and possibly dangers to health will occur. Other forms of equipment sabotage would include addition of abrasives to bearings or greases, and the improper adjustment of precision equipment, such as the closing machine in a canning plant. If the closing machine adjustments are altered even to a very small degree the final seam may be inadequate to prevent recontamination of the product and loss from spoilage. As a deterrent to equipment damage all parts and supplies used in maintenance should be kept in a separate locked room with the supervisor responsible for the keys. With all possible precautions the greatest hope for avoiding equipment sabotage is a loyal, alert maintenance crew.

Food production may quickly be halted by interfering with or creating dissension among plant employees. One of the methods that may be used is the creation of situations that may cause accidents to key personnel. Stoppages of this type are only temporary but reduced production is generally the result. Materials may be spilled on floors or walkways so that the employee may fall, and guards can be removed from moving equipment to cause injury to the hands or fingers. Such things occur daily in the food plant

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but consider how much greater the problem would be if some of the dangers were created intentionally. Many plants have safety programs which are quite effective but additional effort would need to be expended to cope with intentional hazards. This may be accomplished by the sanitarian since maintaining the work area in a sanitary condition is basic to safety.

Ill feeling among employees, which reduces production, may result if filthy, poorly maintained employee facilities are allowed in the food plant. Plugged toilets, lack of soap and towels could result because someone in the plant made an effort to create these conditions. As all of you know these conditions exist much too frequently without anyone trying to accomplish the task. Efforts must be made by all responsible persons to see that clean, adequate locker rooms, toilets and lavatories are provided.

A complete halt of production occurs when employees strike. If an agitator has one or two points to criticize, this could be sufficient to create dissatisfaction that would end in a walk-out. Safe, clean work areas and adequate, clean employee facilities all add up in keeping down dissatisfaction that could cause complete work stoppage.

Disruption of normal activity in food plants is possible by partial or total destruction of the plant proper. In total destruction explosives may be used but if this is the method to be used the agent must get the materials into the plant. If plant security measures have been taken some protection is afforded against this type of sabotage. Little else is possible in protection except the requirement that all employees change into uniforms and leave all personal belongings and clothing in lockers. When we consider that clean work uniforms add to the general appearance and sanitation of a food plant then this protection from sabotage has all the more to recommend it.

Fire is another method of interfering with production by destroying or damaging the plant. Fire fighting equipment must be available in all areas, and employees should be given thorough instructions in fire fighting. The greatest protection is the maintenance of a sanitary plant in which starting a fire would be difficult. If warehouses, storage rooms and the production areas are kept free of waste paper, litter, and other debris, we will have established the first line of defense against work stoppage by fires.

It is possible that the enemy would not want to stop production but would wish to reach many hundreds of people through the products produced in food plants. Illness, injury and fear could occur among our people if such a program were carried on by enemy agents. Three types of materials could be used for contaminating the foods. These are: extraneous material, chemical agents, and bacterial agents.

Extraneous materials are in the category of nuisance additives, yet a great deal of confusion and waste could result from such materials. The enemy would have a wide selection of foreign objects to use that might include glass, metal fragments, wood slivers, or soil. Such foreign materials present sufficient problems to the food industry from accidental entry even now, but if intentional addition took place the confusion and ill will would be beyond comprehension.

Thousands of chemical agents could be used in sabotage of food products and the selection made would depend a great deal upon the purpose to be achieved. The damage done could vary from giving the food an off-odor or off-flavor to causing illness or death if the food were consumed. Some chemicals may be available in the plant but in all likelihood the saboteur would bring the compound into the plant.

The use of bacterial contaminants is a subversive method that may be considered as relatively new yet the difficulty that could be caused makes this intentional additive one to which serious thought must be given. The bacteria, or in some cases the toxins produced by certain bacteria, could be brought into the food plant in such small containers that they could be easily concealed on the person of the saboteur. One of the most potent poisons known is botulinus toxin which if added to a food, water, or milk could create havoc in an entire city. As a plug for the canning industry, canned foods would be the safest food available if enemy agents were attempting to contaminate our food supply with bacteria or toxins. The final heat treatment of the closed container is the greatest protection we have against this type of subversive act.

How and where could contamination of the food or water occur? Around food plants many avenues are available if we assume that the enemy has gained entrance to the plant and has the contaminant available. In those plants that have their own water supplies this could be an easy way to get chemical agents into all phases of the production process. Stand pipes and storage tanks are all too frequently covered without locking. The contaminated water may be used directly in or on the product or in the clean-up of the production equipment to such an extent that the chemical would be in the final food.

In addition to chemical contamination of the plant water supply, bacteria could be used to some degree. In those industries when foods are not heated sufficiently to destroy the harmful bacteria this would be an easy avenue for the saboteur. Illness would occur among the employees and those foods that were produced would cause illness among the consumers.

One source of product contamination that would be well suited for any of the three classes of materials —foreign objects, chemicals or bacteria—is the ingredient materials that are added to the food. This would cover such things as salt, sugar, spices, and flavorings. Frequently these materials are stored in large quantities in areas where little activity takes place thus the saboteur could do his job with little risk of being observed. A rodent-proof storage room, built in accordance with good sanitary practice and kept locked, is the best protection available against contamination of these materials. A responsible employee should be assigned the task of cleaning and maintaining the room. In addition, this employee should check and rotate the stock so that any tampering would be observed.

Contamination of the product itself is possible at many points in the production cycle and would be subject to all types of contaminants. The most logical place to add materials to the product would depend upon the type of food being produced. In the manufacture of most foods mixing or blending tanks are used and contaminants added at this point might easily escape observation before packaging. In the canning plant the sirup or brine tanks would be placed where all types of contaminants could be added. Detection of the material would be difficult since the brining often occurs just before the can enters the closing machine. The addition of contaminants could also be made directly into the product at the supply tank for the filler or the filler bowl. Tightly covered tanks are recommended for general sanitary reasons and this would make the task of the saboteur more difficult. The only other protection is close and constant supervision of production areas by trustworthy personnel.

If an enemy was successful in contaminating the food production of a plant there still remains another line of defense. The products must reach the consumer before the purpose has been achieved. The quality control laboratory can thwart the aims and hopes of the agent. Statistical sampling and examination of all products is becoming more and more the rule rather than the exception in food plants. These trained technical people may detect only the slightest variation in a product but this would be sufficient to require further tests and sampling which could lead to the detention of the food. If a contaminant is found by the laboratory its source must then be found before the operation could safely continue.

Open warfare with bacteria, chemicals, or radiation would present entirely different problems from those discussed. We have dealt with sabotage since this type of activity has received only slight attention in the food industry. If the word sabotage is mentioned the average person thinks of the industrial plant, aircraft factory, or shipyard, yet as a possible danger to the people of this country the food plants could be the prime target for enemy agents.

If the next time you are in a food plant you begin to think about what could be done to protect the food against sabotage, this discussion will have served a purpose.

REPORT OF THE COMMITTEE ON DAIRY FARM METHODS—1960

The Farm Methods Committee has been active during the past year on many projects which are pertinent to the dairy industry and the production of high quality milk. Since it was recognized that the control of antibiotics and pesticides is a most important factor in milk production today, the major interest of the committee has centered around a study of this problem. The committee also realizes, however, that while bulk tank handling of milk has improved quality, it is not a cure-all and has intensified some of the problems in quality milk production and created others. This then is a matter for concern and study for the committee and the industry at large and becomes a part of our overall long range program. Sub-committees have, therefore, been set up to continue to study the methods and procedures which are pertinent to this system of milk handling.

The following is a summary report on all projects of this committee for the past year:

ANTIBIOTICS

A survey of 21 dairy production areas of the U. S. indicates a low incidence of antibiotics in milk as a result of a stepped up educational program in conjunction with official control measures. Incidence of positive reactors varied from .3 to 1% based on a standard of .05 units per ml with one state reporting good results on the finished product by using .005 units per ml as the standard. Enforcement plans varied from compulsory testing by industry with regulatory spot checking to periodic official routine testing of individual producer supplies. Penalty action varied from a warning on original offense and three day exclusion on a repeat, to hearings, seizures and suspensions on the first offense and then various terms for the second offense. Periods of suspension varied from the requirement of a negative test, a two day or one week exclusion as a first offense penalty to a two week to 30 day suspension for a repeated offense. Most of the reports did not mention these periods which may indicate that they are being worked out in accordance with the seriousness of the problem.

While official plans are varied the program recommended by the Farm Practices Committee of the New York State Association deserves recognition as a successful means of obtaining antibiotic-free milk and with minor variations could be promoted as a uniform method of control throughout the United States.

The program requires:

1. Monthly testing by industry of composite samples representing milk from not more than 10 individual producers, or bi-monthly testing of individual producer samples. If a composite test is positive the milk from each producer represented in the sample must be tested.

2. A warning to the producer on the first positive test; then take follow-up sample immédiately, and invoke penalty if second sample is positive. Penalty action requires a 2 day exclusion of the producers milk.

3. Regulatory agencies to spot check supplies to supplement industry program.

A program for control of antibiotic residues in milk cannot depend on enforcement activities alone but must include a continuing educational program, stressing the need for good herd management, proper milking practices, organized herd health programs and proper use of drugs for treatment.

All milk producers should be advised:

1. To withhold all milk from treated cows, regardless of the method of treatment for a period of at least 72 hours or for the period of time prescribed on the labeling of the product or by the veterinarian administering or supervising the treatment.

2. To milk treated cows last so there will be no chance of antibiotic carry-over on the milking equipment.

3. To have treated cows clearly marked so there will be no error at milking time.

4. To enlist the cooperation of their veterinarian in identifying animals that have been treated with antibiotics.

PESTICIDES

On the state and local level, while some testing for pesticide residues has taken place, the bulk of activity can be covered under the heading of "education." Educational programs sponsored by many different groups, generally emphasized such factors as *(a)* follow the label instruction to the letter and heed all statements regarding application; *(b)* apply pesticides only to specific crops or animals, in amount specified, and at the times specified; *(c)* store pesticides in original container out of reach; and *(d)* properly dispose of empty containers.

The following summary is indicative of the activity of state regulatory agencies in this matter as received from 33 states:

> Number of states reporting educational program—33 or 100%.
> Number of states reporting lab testing for chemical residues in milk — 11 or 33.5%.
> Number of states reporting lab testing for chemical residues in feed — 6 or 18.4%.
> Number of states indicating a more extensive future program 13 or 39.5%.

The subcommittee presents the following conclusions regarding pesticides and other chemical residues based on a study of a representative group from one section of the country:

1. DDT is the primary trouble-maker and particular attention should be directed to its' proper usage.

2. Chemicals for the control of insects, weeds, vermin, and other specific applications are essential to the production of good feed supplies and good milk.

3. Spray application by agencies of state, cities and towns may result in crop residues beyond the control of the farmer.

4. Because public good, public health, and economics of milk production are involved, some control over use of such chemicals is necessary. The control method should not be a straight-jacket for the farmer nor the agency involved, but should be one which charges the person or agency with the responsibility for any consequences.

5. Most states will adopt legislation or regulation. In doing so, consideration should be given to development of legislation patterned after the Uniform Insecticide, Fungicide and Rodenticide Act as developed by the Council of State Governments and modified to incorporate 1959 amendments to the Federal Act.

6. Because methods of analysis are complex, technical people and elaborate laboratory facilities are needed. Many questions are asked as to whether residues are present on feed and in milk. Each state should consider how best to answer such inquiries.

7. Public agencies involved in spray application may vary in each state. All should be permitted to express their interest and to take part in formulating control legislation.

8. Objectives of legislation should be to keep our food supplies wholesome and healthful.

CLEANING AND SANITIZING MILKING MACHINES IN CONJUNCTION WITH PIPELINE MILKING SYSTEMS

The satisfactory cleaning of the rubber parts of the milking machine is considered to be a major problem in the proper operation of a CIP pipeline system. In order to aid in correcting this problem the committee offers the following recommendations:

1. The washing solution velocity of five feet per second for CIP lines should be maintained, not only in the CIP line, but through every rubber part including each teat cup.
2. Because of the porous make-up of rubber it is recommended that all rubber parts should be dismantled and hand-brushed at regular intervals.
3. All rubber parts should receive a regular weekly soak in hot water and a suitable strong caustic.
4. If two sets of rubber parts are used, in what is commonly called the Alternate Method, then a cold 6-% caustic week-long soak should be used.
5. Compatible washing compounds should be selected for the farm water supply.
6. Proper washing temperature should be used at all times.
7. The sanitary trap should be installed only between the CIP line and the vacuum line of the milking machine.
8. The rubber vacuum lines of the milking machine should be cleaned and sanitized by exactly the same methods as used for the rubber parts which carry milk.
9. Milking machine dealers should be schooled in cleaning techniques as well as proper installation methods in order to assist the milk producer in the proper maintenance of his system.

IN-PLACE CLEANING OF FARM BULK TANKS, FARM PICK-UP TANK TRUCKS AND OVER-THE-ROAD TANKERS

A subcommittee has been appointed to study in-place cleaning of farm bulk tanks, farm pick-up tank trucks, and over-the-road tankers. Although the study is not completed certain observations have been made and are reported herein:

1. In the case of in-place cleaning of vacuum tanks care must be taken to place the tank under vacuum before beginning the cleaning operation. This is essential to prevent loss of cleaning solution, chemical staining of the outside of the jacket, and to give the cleaning solution greater speed and thus greater impact upon the surfaces to be cleaned.
2. In any in-place cleaning operation considerable manual washing still remains to be done. Gaskets between the cover and tank proper, rims of tank covers, agitators, portions of the measuring stick, nipples, valves, and other accessories must be hand washed then replaced before starting the CIP cycles.
3. Care must be taken in selecting a cleaner which is compatible with the water supply and is as nearly non-foaming as possible. Acid cleaners, if used, should be followed immediately with an alkali cleaner.
4. Too much cleaning solution prevents the proper movement of the cleaning solution over the tank bottom and walls. Insufficient solution starves the pump and the solution impact against the surface is greatly diminished.
5. In-place cleaning of open or atmospheric type tanks is not as effective as in the case of vacuum tanks.
6. In the case of farm pick-up tanks and over-the-road tankers recent developments show that spray heads may be effective in cleaning. The height of the washer head from the bottom of the tank is important and will vary with different diameter tanks.
7. The length of over-the-road tankers has a definite influence on the effectiveness of the cleaning job. In some instances, where there are two manhole covers, two washer heads are needed.
8. Washer units should be properly stored to prevent contamination between usages.

Considerable research is being carried on by the various cleanser manufacturers with many different types of compounds, using solutions at variable temperatures from hot to cold tap water. It may well be expected that future developments will revolutionize this important phase of milk sanitation.

STANDARDIZATION OF PROCEDURES, TESTS, EQUIPMENT AND ENFORCEMENT FOR FARM BULK TANK MILK SAMPLING, WEIGHING AND TESTING

It is hoped that the work of this subcommittee will result in uniform standards for qualifications and training of drivers for licensing by regulatory agencies so that there may be reciprocity between organized agencies of licensed drivers whose routes may cross state lines.

A preliminary report of this group offers the following recommendations for inclusion in this report:

1. Every sample taken by the driver should be taken in a manner and in a container suitable for use in any type of test desired; i.e. butterfat, bacteriological examination or for adulteration of any kind.
2. Regulatory agencies should license drivers so that samples taken by the driver may be used by the official regulatory agency or for examination by an approved laboratory.
3. The producer may provide at the farm a proper sanitized dipper for use in taking samples.
4. A minimum time for which milk in the farm tank should be agitated should be established, but allowances should be made by a driver for certain types of tanks requiring more time and for tanks holding large volumns of milk which may require more than the average time of agitation to secure a proper sample. Driver training courses should be held to educate drivers on this and other details of which the driver should be well acquainted.
5. The dairy plant should provide facilities for keeping samples at proper temperatures until picked up by the laboratory.
6. Ice should be conveniently available to haulers and responsibility of having samples properly iced should be with the licensed driver.
7. Samples should be properly identified at the time of securing the samples at the farm with the date of pick up, temperature of milk, producers' names or numbers and receipt left at farm giving all necessary information as to permit, weight, etc.
8. The driver should have facilities for holding samples at the required temperature and for protection from contamination.

MILK TRANSFER SYSTEMS

The following definitions are suggested in the interest of standardizing the terminology pertaining to this subject:

Pipeline milker — a milking system which conveys the milk directly from the cow through a rigid pipe (stainless steel or glass) to the bulk tank or cans.

Dumping station — a receptacle used in the barn into which milk is dumped directly from the bucket milker. This receptacle is part of a transfer system. The receptacle is connected by tubing to a glass or stainless steel transfer line, or directly to a plastic hose which extends to the milk house.

Transport system — milk conveying equipment used in conjunction with conventional bucket milkers and consisting of a mobile tank or receptacle in which to carry milk from the barn to the milk house. It is a type of transfer system.

Portable pipeline — a type of transfer system using flexible tubing through which the milk is conveyed to the bulk tank.

A survey of the various types of transfer systems was covered in detail in the 1959 Report. Since then another type of transfer system has been introduced. It consists of 8-ft lengths of ½-in. diameter heat resistant glass tubing joined together with couplings made from Tygon tubing. Total length of the transfer line will vary from about 16 ft. to over 100 ft. Vacuum is used to move the milk through the system; no pump is employed. The lines are washed by the reverse-flush method. Installations of this type have been permitted in some areas so that they can be studied by the regulatory authorities.

A study of the practicability of transfer systems indicates in some areas that such installations are increasing rapidly. They do save the heavy labor of carrying milk. However, they are considered by some as simply a stop-gap between the carrying of milk and the use of a pipeline milker. Usually those systems made up of component parts which have already been considered acceptable have met with regulatory approval, but radical systems such as those using long lengths of Tygon have not been accepted in some areas.

Many sanitarians feel that all transfer systems are practical and fill a need. While standards of sanitary construction should be issued, they believe that the proper cleaning of such systems is a management problem and each unit should be placed on the basis of individual responsibility for its continued satisfactory operation.

It is apparent that the practicability of operation and methods of cleaning the various types of these systems will be a matter of concern for this committee until such time that uniform standards and regulations are developed as a guide for their proper use and operation.

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Dr. George D. Coffee
Dr. Max W. Decker
Dr. J. C. Flake
Dr. Richard S. Guthrie
Milton E. Held
M. W. Jefferson
Robert M. Keown
Elmer Kihlstrum
R. P. March
Richard M. Martin
Mike O'Conner
Alexander A. Pais
Russell R. Palmer
I. E. Parkin
Dr. R. M. Parry
A. K. Saunders
Alex G. Shaw
Harry F. Stone
Morris L. Strommer
William Trobaugh

REPORT OF THE COMMITTEE ON EDUCATIONAL AND PROFESSIONAL DEVELOPMENT—1960

The work of the committee during the past year was accomplished through the use of subcommittees. They were namely *(a)* Subcommittee on Scholarship, *(b)* Subcommittee on Preparation of a Sanitarian's Career Brochure, *(c)* Subcommittee on Professional Standards and Registration.

REPORT OF THE SUBCOMMITTEE ON SCHOLARSHIP

Scholarship Award

The scholarship announcement and application form was sent to the eighteen universities and colleges offering undergraduate courses leading to a degree in Sanitary Science or Public Health. Some institution representatives, when acknowledging the receipt of these forms, indicated that they were not receiving applications from students for undergraduate study in Sanitary Science or Public Health. Unofficial information received indicated that two institutions have discontinued undergraduate study in this area. However, in spite of this information, nine applications for the scholarship were received. This is the largest number of applications received for any given year. Six states were represented by the nine applications. The applications were circulated among the subcommittee members for selecting the applicant to recommend for receiving the award. The recommendation was forwarded to the Executive Board of the Association for making the award of the $300.00 William B. Palmer Scholarship.

Scholarship Fund

A letter was sent to the secretary of each affiliate association for the purpose of soliciting funds for the scholarship program. The letter also gave a brief resume and progress report of the program. A copy of the scholarship announcement was attached. The total amount in the scholarship fund is $379.75, which is sufficient for the 1960-61 scholarship.

Since the approval of the scholarship program in 1955, with the first award being made for 1956-1957 school year, the contributions per year have been as follows:

1956	$103.00
(This includes $15.00 from Dec. 5, 1955)	
1957	$113.75
1958	$210.00
1959	$ 93.00
1960	$160.00

(To Date of Sept. 12, 1960)

These figures show that yearly voluntary contributions have not been sufficient to finance the cost of the scholarship. It does not seem that the committee should be put in a position of making yearly solicitations. Since this year's award will bring the fund down to $79.75, it appears that other means will have to be found for securing funds unless the program is underwritten by the Association.

Meeting of the National Health Council

Mr. Gilbert Kelso attended a conference on "Manpower Shortages in the Field of Health" held October 22, 1959 at Atlantic City, New Jersey as a representative of the IAMFS.

Recommendations

1. It is recommended that the scholarship award be continued for another year. This is based on increased interest as is shown by the nine applications which were received this year. The fact that some undergraduate curricula in Sanitary Science may be discontinued does not lessen the need for assistance to promote study in this area, but may indicate a greater need for support. It is noted that one university has added a Sanitary Science Curriculum during the year.

2. It is recommended that this committee undertake a study of the various undergraduate curricula in the field of sanitation now being offered by universities and colleges. This has not been done for several years. During this lapse of time there has been a considerable change in philosophy and emphasis with respect to undergraduate versus graduate training in these areas. The recommended curriculum as presented by this committee in the Annual Reports of 1958 and 1959 are

to be used as the basis for a comparative study. The findings can be used for determining the need for the "William B. Palmer Scholarship."

SUBCOMMITTEE ON PREPARATION OF A SANITARIAN'S CAREER BROCHURE

This subcommittee was delegated to investigate the possibility of preparing a brochure or pamphlet dealing with the work of the sanitarian. It is hopeful that such a publication can be prepared in a manner which will be helpful in recruiting students to enter the field of Sanitary Science or Public Health, and as an aid in informing the public of the sanitarians' part in public health and sanitation programs. The subcommittee has accumulated the available material and is attempting to crystalize ideas for preparing the format of such a brochure. It is hopeful that a draft can be presented at the next annual meeting.

SUBCOMMITTEE ON PROFESSIONAL STANDARDS AND REGISTRATION

Current Status of Sanitarian Registration Legislation

The subcommittee was in contact with several states and received information on registration laws adopted or under consideration throughout the nation. During 1960, Kentucky enacted legislation to establish legal procedure for registering sanitarians. This makes a total of eighteen states to enact such legislation. In addition, New Jersey requires the licensing of health officers and sanitary inspectors. Several other states have already had bills to register sanitarians considered by their respective legislatures or plan to introduce such legislation in the near future. It is a recognized fact that a good registration law in each state is needed to establish minimum standards for professional sanitarians, and it is also an accepted fact that practically all present or contemplated registration laws emphasize education and training of the sanitarian as essential to his professional development and acceptance by the public. It is recommended that the Committee continue contact with the various states in this area.

Model Law and National Registry of Professional Sanitarians

In the 1959 report of the Committee on Education and Professional Development, which was presented to and accepted by the membership of the Association, it states that "the subcommittee will relegate the area of model legislation and a national registry to the Sanitarians' Joint Council and restrict its efforts to assisting the Council in initiating and conducting effective programs in these areas. However, if the Joint Council is unable to develop a working and active program within the next year, this Committee will recommend to the Executive Board that the Association proceed in these areas."

During the year, the Joint Council has developed a proposed model act for the registration of Sanitarians (see J. Milk and Food Technol., **23**: 268-270. 1960) and which has been reviewed by the Executive Board. Some members of the Committee had the privilege of reviewing this model act during its development stages. It is believed that many states will make use of this model as a basis for drafting effective and uniform legislation. It is further believed that a good registration law in each state would be especially beneficial to all segments of the milk, food and general sanitation programs throughout the nation, by encouraging a more adequate number of qualified individuals to prepare themselves for this profession and to enter the field of sanitation. Therefore, it is recommended that the Association adopt the model act. The acceptance of this act will conclude this Committee's work in this area. However, the Committee must be ever mindful of its obligation by keeping abreast of new concepts, improvements and changing times which are bound to arise and make the necessary recommendation to fit the need.

For creating a Specialty Board for the certification of Sanitarians, and for the purpose of clarification and understanding that a distinction exists between certification and registration, the Sanitarians' Joint Council made the following statement a part of their 1959 minutes which were approved in Washington, D. C., June 18, 1960:

"As a statement of policy the Sanitarians' Joint Council believes it is necessary to make a clear distinction between certification and registration. It recognizes registration as a process by a government licensing body created by state legislative action. It recognizes certification as a process undertaken and executed by the profession itself through its constituent societies and affiliations. Certification is the recognition of professional achievement resulting from educational preparation and competent practice of the profession with marked distinction. Certification is not given at the start of a professional career and it is in no sense an authority to practice the profession."

Since this statement has the endorsement of the IAMFS, it is recommended that the Association approve the concept and encourage the establishment, development and implementation of a Specialty Board for the certification of Sanitarians. It is further recommended that this Committee continue to maintain contact with the Joint Council in the pursuance of the goals to be obtained by the creation of the Specialty Board.

Even though a working and active program in this area has not been enacted by the Joint Council, it is recommended that the Association's engagement in establishing its own program in this area be postponed for another year. This recommendation is based on the progress made by this Council during this past year.

W. Howard Brown, *Chairman*
Russell B. Cunningham
Karl K. Jones
Gilbert L. Kelso
Dr. Samuel O. Lear
Richard Mansfield
Thomas McLaughlin
Dr. Sumner Morrison
Guy P. Stephens
Raymond Summerlin
Haynes Wright

REPORT OF THE COMMITTEE ON BAKING INDUSTRY EQUIPMENT—1960

The Baking Industry Equipment Committee's primary function is to assist the Baking Industry Sanitation Standard Committee (BISSSC) in the formulation of standards for bakery equipment. Since our last year's report there have been two standards approved and published. Standard No. 16 *Doughnut Equipment,* was published with the effective date being October 1, 1959. Standard No. 17, *Pan Greasers,* was published with the effective date being July 1, 1960. It is the recommendation of this committee that these standards be accepted by this organization. With the approval and publication of these two standards the total number of standards published is now seventeen. Other standards are in various stages of completion and BISSC is planning on preparing additional standards for equipment not presently covered.

The baking industry, along with other food manufacturers, is fast becoming automated. Equipment is being used today that was not available only a few short years ago. With increased mechanization of bakeries we have inherited new problems in sanitation. These problems have, for the most part, been successfully solved. The equipment being manu-

factured to meet BISSC requirements is both efficient and sanitary. It can be easily cleaned and readily inspected. It is constructed of materials meeting exacting specifications.

Bakery equipment meeting BISSC standards will win the approval of sanitarians everywhere and prove a money and time saver to the bakery owners. This committee is proud of the equipment being manufactured to BISSC requirements. We are also proud of the part we have played in writing these standards. However, we believe that BISSC should institute a more vigorous and more aggressive approach toward publicizing these standards. It is of little value to have excellent standards for bakery equipment without at the same time informing prospective purchasers that such equipment is available. Concerted action toward publicizing BISSC standards should be taken by all the concerned segments of the baking industry. The trade associations, the trade magazines, the manufacturers of bakery equipment and the suppliers to the bakeries could all do their part in publicizing BISSC standards. We sanitarians also can do our part in this endeavor. We can ask that all new bakery equipment being installed meet BISSC standards. We do this routinely in the milk field and to a lesser extent in the restaurant field by requiring that new equipment shall conform to recognized standards.

To insure that equipment being advertised and sold as conforming to BISSC standards, actually is in compliance, we believe that BISSC should approve all plans and specifications for equipment. Wherever equipment, such as bulk flour handling equipment, is fabricated within a bakery, it should be inspected as to compliance with BISSC standards. A seal or decal could be placed on the equipment stating that it meets BISSC specifications.

With concerted action by BISSC and its member organizations, we believe that BISSC standards can be as universally accepted in the baking industry as the 3-A standards are in the milk industry.

Vincent T. Foley, *Chairman*
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James H. Burrows
Richard S. Doughty
W. R. McLean
Louis W. Pickles
George Prime
Paul Valaer

REPORT OF THE COMMITTEE ON ORDINANCES AND REGULATIONS—1960

Uniform Labeling

The major work of the Committee on Ordinances and Regulations this year has been in the field of uniform labeling of milk and dairy products. This is a continuation of a project started in 1957.

One of the problems which has concerned the committee since the beginning of this project has been the development of a sound workable plan for bringing together all efforts and activities of the various agencies and groups interested in achieving uniformity in labeling so that one coordinated move can be made toward reaching this objective. After careful study the committee last year recommended that the International Association of Milk and Food Sanitarians consult with the Food and Drug Administration and the Public Health Service of the United States Department of Health, Education, and Welfare and other appropriate organizations in the interest of exploring and developing a plan which will utilize and coordinate the work of such groups for the purpose of developing and promulgating:

1. Uniform labeling practices for milk and dairy products.
2. Uniform definitions and standards of identity for milk and dairy products, where this appears desirable in the judgement of the groups concerned; and
3. Commonly accepted designations and nomenclature for milk and dairy products with the intent of securing broad general acceptance thereof by federal, state, and local regulatory authorities.

This proposal was presented to the membership of the International in the form of a resolution at the last annual meeting. The resolution was passed and the project was submitted to the Executive Board for direction and further planning.

Following the suggestions and recommendations of the Executive Board, the Committee on Ordinances and Regulations, with the cooperation of President Hickey; Dr. A. C. Dahlberg, Cornell University; Harold J. Barnum, Chairman of the National Conference on Interstate Milk Shipments; Past President Franklin Barber; Harold Clark, then President of the Association of Food and Drug Officials of the United States, and others, contacted key people in the several organizations and developed a plan for organizing a national committee on uniform labeling. The plan included compiling a suggested list of organizations that might want to be represented and a suggested procedure for organizing and operating such a national committee. In all, 19 separate agencies, associations, or groups were included in the list. These were categorized into the following groups concerned with labeling milk and milk products: *(a)* official regulatory agencies and associations; *(b)* national associations or organizations; *(c)* fluid milk and ice cream industry associations; *(d)* concentrated milk industry associations, and *(e)* butter and cheese industry organizations. Other organizations probably will be suggested as their interest in labeling is discovered.

The suggested organizational plan and an invitation to attend a meeting on Sunday, October 30, 1960 at 1:30 p.m. in Parlor F of the Hotel Morrison have been mailed by President Hickey to the chief representative of each of the 19 groups. It is hoped that at that time a basic labeling organization will be founded and that a chairman and secretary will be elected to vigorously promote the effort to achieve uniformity in labeling. Following the meeting we hope to present a rather complete picture of the organizational set up and plan of operation in the JOURNAL OF MILK AND FOOD TECHNOLOGY.

Proposed Standards for Food Establishments

During the year the committee has been asked to review the first draft of a proposed Military Standard for Minimum Sanitary Standards for Food Establishments. These standards were developed by the Quartermaster Food and Container Institute for the Armed Forces. The committee has completed its review and submitted its comments to the Executive Board for their consideration.

Uniform Milk House Specifications

At the last annual meeting the Committee on Ordinances and Regulations was asked to study uniform construction specifications for milk houses and specifically the proposition of whether or not the USPHS Milk Ordinance and Code should permit direct openings from the milk house to the stable if positive ventilation from the milk house to the stable is provided. This project was to be studied jointly by the Committee on Dairy Farm Methods and the Committee on Ordinances and Regulations.

The problem is being considered at this time and a report will be completed in the near future.

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C. V. Christiansen
A. B. Freeman
O. H. Ghiggoile
K. A. Harvey
C. H. Holcombe
Livingston Jennings
Dr. Howard K. Johnston
Dr. R. M. Parry
E. Small
John F. Speer
Dr. Kenneth Weckel
Stephen J. Wolff

REPORT OF THE COMMITTEE ON RESEARCH NEEDS AND APPLICATIONS

During 1960 the Committee answered questions on the following items:

1. Routine plate counts and pin point colonies on Violet Red Bile Agar.
2. The midge fly as an insect vector for typhoid or polio.
3. Proper storage for teat cup assemblies.
4. Use of air filters.
5. Freezing of milk samples.
6. Antibiotics in milk.
7. Bacterial standards for cooked foods and also for foods in vending machines.

In addition, the Committee carried on detailed correspondence with the Committee on Food Sanitation Research Needs of the APHA. Detailed comment was offered to a request concerning Procedures for Testing Pasteurization Equipment. This Committee submitted questions and answers to the Journal on a regular basis.

The activities of this Committee appear to be increasing in the direction of serving as a clearing house for new ideas and practices for the man in the field. Since this was the primary objective of the Committee, it is recommended that the policies and procedures be continued.

MEMBERS

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Howard Froiland, City Health Dept. City Hall, Aberdeen, So. Dakota

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Dr. C. K. Johns, Officer-in-Charge, Dairy Technology, Dept. of Agriculture, Experimental Farm and Science Service, Ottawa, Canada

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Ivan E. Parkins, Cooperative Extension Service, Penn State University, University Park, Pa.

Dr. K. G. Weckel, Department of Dairy and Food Industries, University of Wisconsin, Madison, Wisconsin

REPORT OF THE COMMITTEE ON FOOD EQUIPMENT SANITARY STANDARDS—1960

During the past ten years, your Committee has been actively engaged in working with national organizations in the development of sanitary standards for food equipment. Through cooperation with organizations representing health and industry agencies such as the, National Sanitation Foundation (NSF) and more recently the Automatic Merchandising Health-Industry Council (AMHIC), standards for food equipment are developed and amended where necessary to better fufill the needs of public health and to facilitate the manufacture of food equipment which will meet public health acceptance throughout the Nation.

The following report will outline the Committee's activities this year and progress in meeting its objectives. Much credit for any accomplishments must be given to the consideration and support of the officers and directors of the Association and to many other individuals whose contributions have enabled your Committee to carry out its work.

NATIONAL SANITATION FOUNDATION

At the 1960 meeting of the National Sanitation Foundation's Joint Committee on Food Equipment Standards, consideration was given to the proposed Standard No. 7 on Commercial Refrigerators and Freezers and the Basic Criteria for the Evaluation of Special Equipment and/or Devices, and to a review of other proposed standards and revisions of Standards No. 2 through 5.

The first action affecting your Committee was the review of the third draft of the proposed Basic Criteria and the final working draft of the proposed Standard No. 7. The Basic Criteria is the result of several years of work by members of the Committee to develop criteria for the evaluation of equipment or devices which cannot logically be covered by Standards and to provide a means of correlating other Standards, as well as serving as a reference document in future developments of Standards. The Basic Criteria and the Standard No. 7 were both approved by the Joint Committee at the 1960 meeting with the understanding that both documents would soon be available for distribution in mimeographed form and would be reviewed again by your Committee prior to their printing and final publication.

At the recommendation of your Association and other organizations represented on the Joint Committee, a proposed Standard on Hand Powered Food Equipment and Standard No. 2 are presently undergoing a comprehensive review, evaluation, and revision by the NSF staff, and a working draft will soon be available to the Committee for their review and comment.

The Underwriters Laboratory has recently modified their requirements for air space between the bottom of the gas burner and the burner box. These require the burner box to project into the 6-in. space below many dishwashing machines. Research work in this area indicated that the problem with the burner boxes might be eliminated in the near future; therefore, the Joint Committee recommended that the requirement that a clear space of 6-in. be maintained beneath equipment be waived for the present. Recent revisions of Standard No. 3 will result in the elimination henceforth of dish-machine racks made entirely of wood. The Foundation and the Industry are currently carrying on a research project to obtain answers to the industry's problems of maintaining water at 160° and 170°F in multiple tank dishwashing machines with gas and electricity. Based on these studies, the NSF staff is to review

and re-evaluate the requirements for these machines and make recommendations to the Joint Committee.

A clarification of Standard No. 5 on the installation of self-contained water generating equipment recently was made. In the future, the Standard will be interpreted as including hot water generating systems consisting of two or more heaters connected in parallel by an approved prefabricated manifolding system.

A review of the proposed Recommended Installation Section of Standard No. 4 has been made. The Foundation is evaluating the proposal and will co-ordinate its activity in this area with the industry prior to submission of another draft to the Joint Committee for action.

At the present time the National Sanitation Foundation Standards are for the most part limited in their application to equipment manufactured for the restaurant industry. The Committee recommends that the National Sanitation Foundation consider inviting representatives of the food market industry to participate in the development of new standards or in the expansion of existing Standards to include food equipment used by both industries not covered under presently recognized evaluation programs.

AUTOMATIC MERCHANDISING HEALTH INDUSTRY COUNCIL

The fifth annual meeting of the Automatic Merchandising Health Industry Council of the National Automatic Merchandising Association was held during the last of 1959 and was attended by representatives of public health organizations and affected industries. The morning of the first day was given to the public health representatives for a discussion of public health objectives and policies to be followed in their work with the entire membership of AMHIC. This proved to be an extremely enlightening experience for your Chairman and aided the group in expediting the work of the Council.

The principal item on the agenda was a review of the second draft of the Vending Machine Evaluation Manual. A small Subcommittee of public health and industry representatives was appointed for the purpose of preparing a third draft incorporating suggestions of the Council and distributing this draft to AMHIC. Since the AMHIC meeting, your Committee has reviewed the third and much improved draft of the proposed Manual and submitted its comments to the Chairman of the Council's Public Health Committee for his use in development of a fourth draft for distribution prior to the 1960 meeting of AMHIC.

The next topic on the agenda concerned the clarification of the composition, organization and procedures of AMHIC. At the recommendation of the Council members, the Secretary of AMHIC amended the AMHIC Organization Form and submitted the amended form to the members during 1960.

The last item was a report of the Subcommittee on Recommendations Concerning the Public Health Service Ordinance and Code. The report contained several comments on the need for modifying or further interpreting the document. The Council members were instructed to review the report and submit comments on modification or clarification of the Ordinance and Code to the Subcommittee. Your Committee has submitted its comments which will be compiled with those from other members of the Council and eventually submitted to the Public Health Service for consideration and possible incorporation in the next printing of the Ordinance and Code.

SUMMARY

The past year has shown considerable activity and the next year promises also to be a very busy one for your Committee. The Committee recommends that the Association continue its work with NSF and AMHIC in developing workable and acceptable standards for the food industry, and it urges all sanitarians and health departments to support the work of the Association's Committee and subscribe, by law or administrative policy, to programs of these two national organizations by demanding that all food equipment installed in their areas show evidence of compliance with the Food Equipment Sanitary Standards Program.

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Col. F. H. Downs, Jr.
D. R. Gooden
Gene McElyea
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Eaton E. Smith
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Jerome Trichter
James A. Westbrook

NEWS AND EVENTS

HEPATITIS OUTBREAKS ATTRIBUTED TO RAW SHELLFISH

The first four months of 1961 have been noteworthy not only for a record high incidence of hepatitis throughout the country but also for two outbreaks, one minor and one major, related to the consumption of raw shellfish. The first of these was recognized in Pascagoula, Mississippi and in Mobile and Troy, Alabama, and was traced to raw oysters.

The second occurred in New Jersey and New York and was traced to clams collected from the Raritan Bay.

The Pascagoula Outbreak: During the first three months of 1961, 77 cases of infectious hepatitis occurred in southern Mississippi and Alabama which were traced to the consumption of raw oysters obtained from a localized area at the mouth of the heavily contaminated Pascagoula River. Known oyster related cases were confined to the cities of Pascagoula, Mississippi and Mobile and Troy, Alabama.

All of the oyster related cases were icteric and satisfied certain criteria including a positive history of ingestion of raw oysters 15 to 50 days prior to onset of symptoms and a negative history of known contact with a previous case or receipt of a blood transfusion during the incubation period of infectious and serum hepatitis. These cases were predominantly adults, many of whom were in the middle and upper socioeconomic classes. The following table shows

total oyster related cases in each of the cities and counties involved:

Table I
Oyster-Related Hepatitis Cases by Place of Onset

City and County	Total Cases	Age		Oyster Related Cases	Age	
	No.	<20	>20	No.	<20	>20
Jackson County						
Pascagoula	50	22	28	37	13	24
Rest of County	43	32	11	9	4	5
Mobile County						
Mobile	31	5	26	21	0	21
Rest of County	24	16	8	6	1	5
Pike County						
Troy	6	3	3	4	1	3
Total	154	78	76	77	19	58

Table II
Pascagoula cases by age and oyster eating habits.
Jackson County, Mississippi, Infectious Hepatitis Cases
December 1, 1960 through March 25, 1961 by Age
And Oyster Eating Habits

Age Group	Pascagoula				Remainder of County			
	Ate*	Didn't Eat	Unkn.	Total	Ate*	Didn't Eat	Unkn.	Total
0-4	1	1		2		2	1	3
5-9	2	3		5		8	1	9
10-14	6	4		10	2	12	1	15
15-19	4	1		5	3	3		6
20-29	9	1	1	11	1		2	3
30-39	10	2		12	1	3	1	5
40-49	4			4	2			2
50+	1			1				
Total	37	12	1	50	9	28	6	43

*History of consumption of raw oysters 15 to 50 days before onset of symptoms without previous contact with a known case.

The oyster hepatitis relationship first came to light in Pascagoula. During the period January 1 through March 25, 1961, 50 cases had onset there and an additional 43 cases occurred in the rest of Jackson County. The appearance of the epidemic curves makes it quite clear that Pascagoula was the focus of the epidemic. The adult preponderence of the cases is evident.

Careful epidemiological histories taken from the oyster cases and other studies revealed that few of the adult cases had known contact with a previous case and that water, milk, public eating establishments, and social or occupational exposure were not possible modes of spread.

Raw oysters, however, ingested an average of 33 days prior to onset of symptoms by 37 Pascagoula and 9 county cases offered an explanation for the epidemiological characteristics of this outbreak. The explosive Pascagoula outbreak is composed almost entirely of oyster related cases.

The high proportion of Pascagoula cases, 74 per cent, having eaten raw oysters might have been the reflection of the food consumption pattern in a community where oyster-tonging is a popular local industry. A survey of healthy persons, however, showed that only a small proportion of the total population, less than 10 per cent, gave a history of eating oysters in the *raw* state. Furthermore, the main source of the oysters consumed by the cases was one local commercial dealer who provided less than 5 per cent of the fresh oysters sold in the area.

The oysters were tonged from a single bed located near a beacon at the mouth of the Pascagoula River about a mile below a point where raw sewage from the city is emptied. In addition, there was immediate contamination at the river mouth from sewage outfalls of local industries.

Oysters consumed by cases in the Mobile area had been obtained from a downtown restaurant and two other local distributors. However, they were traced back through fishermen who admitted tonging oysters at the mouth of the Pascagoula River. The Troy cases had eaten oysters provided by the same dealer who had supplied most of the Pascagoula cases.

Hepatitis cases were investigated also in other Gulf Coast cities including Biloxi, Gulfport, Panama City, Pensacola, Apalachicola, and Port St. Joe. Few cases had occurred in these cities and they were not oyster related; most were under 20 years of age.

Although hepatitis cases were associated with oysters from the river mouth and not the Pascagoula reef located west of the River, multiple water samples taken over the reef on February 10 had coliform counts far in excess of minimum shellfish certification standards. On this basis, the entire Pascagoula oyster fishing area was closed on February 18, 1961.

No hepatitis cases attributed to contaminated oysters have occurred in the area since March 21.

Taken from: CDC Hepatitis Surveilance Report No. 5, May 3, 1961.

AMERICANS CHANGE THEIR FAT EATING HABITS

Americans, on the average, consumed slightly more than one ounce of milk-fat per day in 1960, a 21% reduction from average consumption of this type of fat in the 1935-39 period, according to a report released by the United States Department of Agriculture.

This decline in per capita use of milkfat (or butterfat) came during a period when total consumption

of all fats was increasing from 107.8 pounds in the 1935-39 period to 118.3 pounds in 1960. Dairy products in all forms provided 29.4% of all fats consumed in the earlier years but dropped to 21.2% of all fats in 1960.

The major reason for the declining use of milkfat is the replacement of butter by oleomargarine. In 1940 Americans consumed, on the average, 17 pounds of butter and 2.4 pounds of oleomargarine. Total consumption of both spreads had dropped slightly by 1960, but per capita consumption of oleomargarine had grown to 9.4 pounds while butter was down to 7.8 pounds.

Meats, poultry, game, and fish were the leading source of fats in the American diet, providing 30.2% in 1935-39 and 35.5% in 1960. However, recent studies indicate that actual consumption of fats in meat may be much lower than these estimates suggest. Much more of the fat is trimmed from the meat before use these days, and cooking methods have changed considerably also. Broiling, for example, removes much more of the fat than does frying the meat in a pan.

Eggs provided only 3.5% of the total fat in 1935-39 and 3.6 in 1960. Lard accounted for 10.2% in the earlier period but dropped to 6.7% in 1960.

The big change over the past 20 years has been in the increased use of vegetable fats of various kinds. Oleomargarine, with soybean oil providing 81% of the total fats used in this product in 1960, accounted for 2.1% of all the fat consumed in 1935-39 but had grown to 6.4% of the total in 1960. Shortenings, made largely from vegetable oils, provided 11% of the fat in 1935-39 and 10.7% in 1960.

Edible fats and oils used chiefly for cooking and as salad oils grew from 6% of the total fat consumption in 1935-39 to 9.6% in 1960.

While Americans have reduced their total use of milkfat on a per capita basis, they have increased the consumption of the milk solids not fat quite substantially. Increases in the use of whole fluid milk, skim milk, nonfat dry milk, cottage cheese, other types of cheese, and frozen dairy desserts account for the greater use of nonfat milk solids even while butter consumption has been dropping.

Since milk provides about one-fourth of the American supply of protein, three-fourths of the calcium, and almost half the riboflavin, the consumption of milk and milk products continues to play a very important part in supplying the American people with essential food nutrients.

Recent efforts to find meaning in the statistical relationships between consumption of animal fats and increases in heart disease do not hold up too well in view of the Department of Agriculture reports on fat consumption. While the total intake of animal fat is estimated to be about one pound higher in 1960 than it was in 1935-39, it is very probable that comparisons based on actual use of meat fats would show that there has been a decline in per capita consumption of animal fats. Even using the figures as reported, there has been a shift toward greater use of vegetable oils in the diet.

Actually the statistical relationship between increased use of vegetable oils and heart disease is much clearer, but this has no real meaning since scientists have not yet been able to prove any direct relationship between fats in the diet and heart disease.

NATIONAL CONFERENCE ON INTERSTATE MILK SHIPMENTS HELD IN ST. LOUIS

The Eighth National Conference on Interstate Milk Shipments was held in St. Louis, Missouri, April 4-6 at the Hotel Statler, under the chairmanship of Harold J. Barnum, Denver City Department of Health and Hospitals.

Participants from 33 states and the District of Columbia, representing public health and agricultural agencies, industry, and others concerned with the shipment of milk in interstate channels, gathered for the purpose of discussing and improving the agreements whereby regulatory authorities from milk importing areas might accept with confidence the milk shipped into their jurisdictions without the necessity of making direct inspections of the distant supply.

The N.C.I.M.S. is a voluntary program and according to the agreements developed by the Conference, inspection, laboratory control, and certification of interstate milk supplies are performed by the State and municipalities in which the source of milk is located. The 1953 edition of the United States Public Health Service Milk Ordinance and Code, and the rating procedures developed by the United States Public Health Service are used as uniform criteria for the evaluation and certification of interstate milk supplies.

At this Conference, a panel consisting of C. H. Holcombe, Minnesota Department of Agriculture; David Evans, Texas Department of Health; Karl Mohr, City Health Department, Green Bay, Wisconsin; Donald H. Race, Dairymen's League, Syracuse, New York; and K. G. Weckel, University of Wisconsin as Moderator, reviewed and discussed Conference objectives and agreements as they apply to the shipper, the receiver, the local authority, and the industry.

Dr. Russell Teague, Commissioner of Public Health for the Commonwealth of Kentucky presented a paper on the "Views of the Association of State and Territorial Health Officers on the Use of Health Regulations as Trade Barriers," in which he said the use of public health regulations to prevent the free movement of milk in commerce was contrary to the interests of the A.S.T.H.O. Dr. Teague further stated that the A.S.T.H.O. during the entire period of its existence has been interested in the very same objective as the Conference – that is, "to promote the best possible milk supply for all the people."

Reports from standing committees on "Non-Biological Contaminants in Milk and Milk Products" by H. E. Calbert, University of Wisconsin; "Bulk Milk Driver Training" by E. O. Wright, Iowa State University; "Continuous Survey and Rating" by John Schlegel, Indiana State Board of Health; "Uniform Labeling" by Park Livingston, Franklin Park, Illinois; "Laboratory" by Luther Black, Public Health Service; "Uniform Bill of Lading" by S. J. Wolff, St. Louis, Missouri; and "Recodification of Conference Agreements" by D. W. Taylor, Public Health Service were presented for Conference consideration and action.

To bring the Conference up-to-date, special progress reports were presented. R. W. Metzger, Dairymen's League, Syracuse, New York, reported on the "National Mastitis Action Committee"; A. Richard Brazis, Public Health Service, reported on the "Public Health Service Bulk Milk Shipment Studies"; and John D. Faulkner, Public Health Service, reported on the "Public Health Service Activities Related to the Interstate Milk Shipment Program."

To facilitate the functions of the N.C.I.M.S., one day was devoted to Task Committee activities, in which improvements and modifications of Conference agreements were considered. Through the assignment of problems to the various Task Committees, changes in Conference agreements are studied and recommendations for proper action to the general assembly.

At the Conference business meeting the following persons were elected to the Board of Directors: David Evans, Austin, Texas; Roger Holkesvik, Bismark, North Dakota; Roger Stephens, Logan, Utah; and Bueford Pearson, Dallas, Texas. Park Livingston, Franklin Park, Illinois, was appointed chairman for the next two years.

FOOD POISONING OCCURS ON TRANS-PACIFIC FLIGHT

According to the *Morbidity and Mortality Weekly Report* of the Public Health Service for March 24, a violent gastroenteritis was reported among 13 of 28 passengers arriving by air in Honolulu on Jan. 16, 1961. The flight originated at Vancouver, B.C.; a stop was made at San Francisco but no food was taken aboard. About 1½ hours out, 13 passengers became violently ill with nausea and vomiting. All who were ill reported eating breast of chicken Jeanette. Those who had not partaken of the chicken did not become ill. Items from lunch and dinner served prior to the outbreak were received for bacteriological examination. No organisms commonly associated with food poisoning were found in any of the specimens of foods submitted, except 3 portions of breast of chicken, which showed a coagulase-positive *Staphylococcus aureus* 187 in counts up to 11,000,000 per gram. The pilots and other crew members, who do not eat the food that is prepared for the passengers, did not become ill. It is worth noting that this precaution is designed to prevent a disastrous staphylococcal food poisoning episode among crew members. As an additional precaution, the hours of eating for the pilot and co-pilot are staggered on trans-oceanic flights.

Reprinted from the Journal Amer. Med. Assoc. 4-15-61.

ELEMENTS OF PIPELINE MILKING SYSTEMS ARE DESCRIBED IN DE LAVAL BROCHURE

A 24-page brochure offered by the De Laval Separator Company provides a practical guide to the planning of a pipeline milking system.

It details the factors involved in selection of a particular system and describes the procedure used and the advantages of all systems in common use.

The brochure points out that planning a system involves the size of the herd, available labor supply, financial resources of the individual farmer, the housing system employed and the farmer's personal preferences.

The merits and limitations of three types of housing used in pipeline milking are discussed: a plan in which the stanchion barn is used for both milking and housing, a plan in which all cows are milked in the stanchion barn but some are housed in a loafing shed, and a plan in which cows are housed in a stanchion barn but milked in an adjacent parlor.

The advantages of loose housing vs. stanchion barn housing are also covered.

Four types of parlors are described and discussed: The side-opening parlor, the U-shaped parlor, the walk-through parlor, and the herringbone parlor.

A copy of the brochure may be obtained from The De Laval Separator Company, Poughkeepsie, N. Y.

PAPERS PRESENTED AT AFFILIATE ASSOCIATION MEETINGS

Editorial Note: The following is a listing of subjects presented at recent meetings of Affiliate Associations. Copies of papers presented may be available through the Secretary of the Respective Affiliate Associations.

CALIFORNIA ASSOCIATION OF DAIRY AND MILK SANITARIANS
October 17, 18, 19, 1960
Secretary: W. S. Armstrong, Los Angles City Health Dept., Los Angeles, Cal.

The Microscopic Examination of Retail Milk Stored at Various Temperatures - Virgil Hulse, San Francisco Health Dept.

Electrical Safety on the Dairy Farm - Colin J. Watt, Div. of Industrial Safety, State of Cal., Fresno.

Panel Discussion: Installation and Operation of Milking Machines and Pipelines.

Moderator: H. J. Sartori, Bureau of Dairy Service.

Milking Machine Analysis - Richard Eide, Fresno County Farm Advisor.

Welded Pipelines on G. A. Dairies - D. J. Radmacher, Bureau of Dairy Ser.

Recent Development in Lowered Pipelines and Its Effect on Vacuum - George DeMedeiros, Dairyman's Coop. Creamery Assoc., Tulare.

Problems Encountered from the Inspector's Viewpoint - Walter Wilson, Los Angeles County Health Dept.

The Disposable Bulk Package - George DeMedeiros, Dairyman's Coop. Creamery Assoc., Tulare.

Panel Discussion: Dairy Inspections as Viewed by the Industry.

Moderator: Eugene Scaramella, Danish Creamery Assoc., Fresno.

Operating Under Grade A Inspection Agencies - Art Hayes, Foremost, Golden State Co., Oakland.

Inspection of Manufacturing Milk - Robert Edwards, Carnation Co., Gustine.

Activity Relative to State Legislative Program Regarding Inspection - Don Hardie, Milk Producers Assoc., Modesto.

Inspection from the Producers Viewpoint - Russell Richards, Commodity Specialist, Cal. Farm Bureau Federation, Berkeley.

Panel Discussion: New Trends in the Planning and Constructing of G. A. Dairies

Moderator: B. Q. Engle, San Francisco Health Dept.

Panel Members: George Hasler, Bureau of Dairy Service, Fresno; D. A. Cordray, Bureau of Dairy Service, Santa Rosa; Tim O'Connor, Field Rep., Borden's Co., Gustine.

Chemistry of Cleaning and the Application of These Principles to Solving Practical Problems - Robert Barrett, Vice-Pres. & Tech. Dir., Klenzade Products, Inc., Beloit, Wis.

P. G. and E. Dairy Lighting Studies - Tom Ayres, Agric. Power Engineer.

What is Good Lighting? - Herman Fisher, Agric. Power Engineer.

How Much Light is Needed? - Don Fisher, Illumination Engineer.

Economics of Good Lighting - A. R. Johnson Agric. Power Engineer.

Recent Trends in Domestic Fly Control - Earl W. Mortenson, Senior Vector Control Specialist, State Dept. Public Health, Fresno.

Patterns of Authority in Working with People - Dr. Stanley E. Lindquist, Prof. of Psychology, Fresno State College.

The Status of the Proposed Educational Standards for Cross Registration of Environmental Sanitarians - Frank Stead, State Dept. Public Health, Berkley.

QUESTIONS AND ANSWERS

Note: Questions of technical nature may be submitted to the Editorial Office of the Journal. A question in your mind may be in the minds of many others. Send in your questions and we will attempt to answer them.

QUESTION:

What standards of ingredient content including the minimum of egg solids would be generally acceptable for "egg nog" and "boiled custard?"

ANSWER:

Egg Nog: Federal and State Standards for the Composition of Milk Products — Agricultural Handbook No. 51 U.S.D.A. Agricultural Marketing Service. Revised October 1959, lists the following standards by states which have standards:

	Butterfat (Min.)	*Egg Yolk Solids (Min.)*	*(Max.) Stabilizer*
California	6%	0.5%	0.6%
Delaware	6%	1.0%	0.5%
Maine	6%	1.0%	0.5%
New Hampshire	6%	1.0%	0.5%
New York	8%	1.0%	0.5%
No. Carolina	8%	0.5%	0.5%
Pennsylvania	6%	1.0%	0.5%

Based on the foregoing, the range is sufficiently close that compatability with adjacent states for the purposes of uniformity of product and labelling, should be the determining factor in arriving at a standard to be adopted.

Boiled Custard: This concoction does not appear as a milk product in any of the literature available to us. Assuming that it is a strictly localized product made with milk and eggs and sweetener, a reference to the newly adopted Federal Food & Drug definition and standard for frozen custard should be considered. In this case, a minimum of 1.4% of egg yolk solids is mandatory. Color simulating egg may be prohibited. Because of lack of experience with this product on a commercial basis, we would hesitate to comment further on this item.

MILK BORNE EPIDEMIC OF TYPHOID REPORTED FROM PROVINCE OF QUEBEC.

The Canadian Journal of Public Health recently reported an epidemiological study of an outbreak of typhoid fever traced to a raw milk supply sold in the town of Montmagny, population 6000, near Quebec, Canada.

At the time of the epidemic, 1200 quarts of pasteurized and 600 quarts of raw milk were sold daily in the town. The raw milk was distributed by four dairymen. The outbreak was first recognized when a medical practitioner notified the health unit office that there were 8 typhoid cases in the hospital. It

was found that all the families of these patients were purchasing raw milk from the same dairyman whose well had dried up and who was using unboiled river water for cleaning his dairy equipment. Warned previously of the danger of using river water, the dairyman had remained unconvinced. "Especially in winter," he said, "I did not believe that microbes could exist in ice cold water." A son of the dairyman had been ill but had not seen a physician; he had continued to work in the dairy. Subsquently, 8 of the 10 persons in the family developed typhoid fever.

Total number of cases was 197, with no deaths. Even in this day with adequate knowledge of milk pasteurization and the inherent danger of raw milk known, we have another classic example of what can happen when basic rules of hygiene are not followed and raw milk still continues to be sold.

MEDIA CERTIFICATION BEGUN

Certification of specific lots of media, produced by two firms, has been announced by the Microbiological Medical Commission. A statement concerning the formation and purpose of the Commission was published in the May 1960 issue of the *Journal of Milk and Food Technology*, together with a statement of the underlying needs for control of culture media.

Approval of media by the Commission is based on performance tests by a qualified laboratory employing both raw and pasteurized milk, and the results analyzed statistically. The reference media employed by the Commission is either of those designated as "B" or "C" by Roberts and Pessin (Journal of Milk and Food Technology **15**: 104. 1952.). Performance is measured following the procedure proposed by Fertig and approved by the Coordinating Committee on Laboratory Methods of the American Public Health Association (American Journal of Public Health **44**: 935. 1954.

Batches of media approved by the Commission bear a sticker label with a specific certification number for each lot as indicated below.

CERTIFIED BY THE
Microbiological Media Commission, Inc.
Certification No.

To date, batches of media prepared by Case Laboratories and by Consolidated Laboratories have been tested by the Commission and found satisfactory for certification.

DAIRY PRODUCTS HIGH ON EXPORT LIST

Dairy equipment exported from the United States in 1960 had a total value of $640,103, according to figures just released by the Census Bureau. Canada, United Kingdom, Venezuela, France, The Netherlands and Finland were largest buyers, in that order.

With a production of 7,256,000 tons of milk, 1959-60 set a new record high. Export of all dairy products, except butter, were up, with cheese showing an export gain of 33 per cent.

Sales for dollars, accounted for 70 percent of U.S. agricultural exports in 1960 — a total of $3,353 million. This was $639 million more than in 1959. Twenty per cent were sales for overseas local currencies under Title I of P.L. 480, and the other 10 per cent were export under other government-financed programs such as Titles II and III of P.L. 480, and Mutual Security.

World commercial trade in nonfat dry milk increased in the last decade from 118 million pounds to 310 million pounds. New Zealand was the largest supplier, the U.S. second largest.

Biggest dollar market for U.S. nonfat dry milk, Mexico, accounted for 20 million pounds in 1960, a third more than in 1955.

TAFT ENGINEERING CENTER COURSE ON PASTEURIZATION SCHEDULED

The Robert A. Taft Sanitary Engineering Center at Cincinnati, is offering a course in *Milk Pasteurization Controls and Tests*, September 12-14, 1961.

Subect matter to be covered is as follows:

- Development of Pasteurization Processes and Standards
- HTST Pasteurization Equipment, Design and Operation
- HTST Auxiliary Equipment and the Testing of Equipment
- Trends in Thermal Processing of Dairy Products
- Design and Operation of UHT Pasteurization Equipment

This three day course is designed specifically for milk sanitation officials engaged in milk plant inspection. Several types of milk pasteurization eqiupment are available for demonstration and practice. Trainees are given full opportunity to operate the pasteurizers, manipulate the controls and observe how the equipment performs under correct and incorrect procedures.

In this course, interest is centered mainly on the actual practice operation of the equipment, controls, and safety devices. Lectures, audio-visual aids and discussion periods precede and follow each laboratory exercise.

Application for attendance at the course should be addressed to: Dr. Robert P. Myers, Taft Sanitary Engineering Center, 4676 Columbia Parkway, Cincinnati 26, Ohio.

RESIDUAL TREATMENTS FOR FLY CONTROL

Three organophosphorus toxicants — Diazinon, malathion, and ronnel — are currently labeled for use against house flies in dairy barns. The addition of sugar to formulations of these toxicants generally augments the efficacy of the residues, but the degree of increase in effectiveness varies with the insecticide involved. Sugar is usually included in the formulation at a rate of 2.5 parts to 1 part of the toxicant.

At Savannah, Georgia treatment of dairy barns with malathion-sugar sprays at a rate of 200:500 mg./sq.ft. or Diazinon-sugar formulations at a rate of 100:250 mg./sq.ft. has produced satisfactory fly control levels for periods up to 7 weeks. Results with Diazinon were consistent but control with malathion was erratic, effective abatement varying from 1 to 7 weeks in different tests. In other sections of the country, control data reflect shorter or longer periods of effectiveness for these two compounds.

Ronnel at 200 mg./sq.ft. provided excellent control of *M. domestica* for 8 to 9 weeks in dairies at Savannah, Georgia. At a dosage of 100 mg./sq.ft. with or without a sugar additive, the period of effectiveness was 4 to 5 weeks. At 20 mg./sq.ft. with or without sugar, control was ineffective within 1 week after treatment.

Studies of Bayer 29493 as a residual treatment in dairy barns at Savannah, Georgia, indicate it to possess excellent potential for extended control. When applied to dairy barns as an emulsion at a dosage of 100:250 mg. of toxicant: sugar per sq.ft. or at 100 mg./sq.ft. of toxicant alone, it gave 7 to 12 weeks and 7 to 8 weeks control, respectively. At 50 mg./sq.ft. with or without sugar, Bayer 29493 gave 6 to 10 weeks of effective control. In Florida, tests[a] with Bayer

Table On Organophosphorus Insecticides for Use in Fly Control.

Type Application	Toxicant	Formulation	Remarks
RESIDUAL		(For 50 gallons of finished spray)	Add sugar (25#) to formulation for maximum residual effectiveness. Spray surfaces at a rate of 2 or more gallons per 1000 square feet. Maximum strength permitted for Diazinon and ronnel, 1.0 percent, malathion, Diazinon and ronnel can be used in dairy barns including milk rooms, meat packing, and other food processing plants.* Malathion can be used in dairy barns and meat packing establishments but in milk rooms and other food processing plants*, it is acceptable *only* when the premium grade material is used. None are accepted for complete interior treatment of houses. Avoid contamination of human and animal food, watering troughs. Do not treat milk rooms or food processing areas while in operation.
	Diazinon	2 gal. 25% EC or 16# 25% WP plus water	
	Malathion	2-4.5 gal. 55% EC or 32-64# 25% WP plus water	
		2 gal. 25% EC or 16# 25% WP plus water	
BAITS (Dry/Wet)	Diazinon	1# 25% WP plus 24# sugar; 2 fl. oz. 25% EC plus 3# sugar in 3 gal. of water.	Apply 3-4 oz. (dry) or 1-3 gallons (wet) per 1000 sq. ft. in areas of high fly concentration. Repeat 1 to 6 times per week as required. Avoid application of bait to dirt or litter. The use of permanent bait stations will prolong the efficacy of each treatment. All toxicants except Dibrom are available as commercial baits which are labeled for use in dairies and, except for DDVP, in food processing plants.* None of these baits should be employed inside homes. Do not contaminate feed or watering troughs.
	Malathion	2# 25% WP plus 23# sugar	
	Ronnel	2 pts. 25% EC plus 3# sugar in 3 gal. water.	
	DDVP	3-6 fl. oz. 10% EC plus 3# sugar in 3 gal. water.	
	Dibrom	1.0 fl. oz. 50% EC plus 2.5# sugar in 2.5 gal. water.	
	Bayer L 13/59	1# 50% SP plus 4# sugar in 4 gal. water.	
IMPREGNATED CORDS	Parathion and Diazinon	To be prepared by experienced formulators only.	Install at rate of 30 linear feet of cord per 100 square feet of floor area. Accepted for use in dairies and food processing plants.* Handle and install cords per manufacturer's instructions.
SPACE SPRAY	Malathion	5 gal. 55% EC in 41 gal. water	Apply 20 gal. per mile.
	Diazinon	11 gal. 25% EC in 34 gal. water	Apply 15 gal. per mile.
	Bayer 29493		
	DDVP	6 gal. 50% EC in 44 gal. water	Except for malathion none of these pesticides has been specifically labeled for outdoor space applications.
	Dibrom		
LARVICIDES	Diazinon	1 fl. oz. 25% EC to 1 gal. of water	Apply 7-14 gallons per 1000 square feet as a coarse spray. Repeat as necessary, usually every 10 days or less. For chicken droppings use only where birds are caged. Avoid contamination of feed or water or the spray on animals.
	Malathion	5 fl. oz. 55% EC to 3 gal. of water	
	Ronnel	1 pt. 25% EC to 3 gal. of water	
	DDVP	2 fl. oz. of 10% EC to 1 gal. of water	

EC — Emulsifiable Concentrate WP — Wettable Powder SP — Soluble Powder
*Includes dairies, milk rooms, restaurants, canneries, food stores and warehouses, and similar establishments.

29493 at 200 mg./sq. ft. gave good results for 4 to 5 weeks, and for 1 to 2 weeks at 100 mg./sq. ft.

DDVP, although highly effective against house flies, does not give extended control when applied as a residual treatment alone or with sugar or aroclor additives. After approximately 1 week of marked house fly reductions, densities usually return to pretreatment levels.

In limited tests in Florida, Dibrom, a compound closely related to DDVP, has been reported[a] to provide good control for 1 to 2 weeks when applied at a rate of 200 mg./sq. ft. At a rate of 100 mg./sq ft., Dibrom was ineffective after 7 days. At Savannah, Georgia, a single test of a Dibrom: sugar emulsion sprayed at 200:500 mg./sq.ft. produced satisfactory control for 3 to 4 weeks. Dibrom is labeled for use in dairies (except in milk rooms) and food processing establishments.

In some areas, house flies may be partially susceptible to one or more of the chlorinated hydrocarbon insecticides. Methoxychlor (200 mg./sq.ft.) and lindane (25 mg./sq.ft.) are the toxicants currently labeled for use in dairy barns.

Residual treatments are effective against other flies that have resting habits similar to those of the house fly. The little house fly, *Fannia canicularis,* which frequently is a pest in chicken ranches and daries, is readily susceptible to residual applications of dieldrin, ronnel and malathion. Dieldrin at a dosage of 25 mg./sq.ft. remains effective for extended periods, whereas the toxicity of malathion and ronnel deposits is relatively short lived. However, these last two compounds will control both *Fannia* and resistant *M. domestica.* Since both *Fannia* and *M. domestica* frequently rest out-of-doors on vegetation and exterior walls during hot weather, treatment should be applied to these surfaces as well as to the interior of the building. *In making applications on interior surfaces of chicken ranches, extreme care should be taken to avoid feed and water contamination.*

Reprinted from 1961 CDC Report on Public Health Pesticides

OBITUARIES

PROFESSOR H. C. JACKSON, UNIVERSITY OF WISCONSIN, TAKEN BY DEATH

Prof. H. C. Jackson, 69, veteran state dairy processing researcher and chairman of the University of Wisconsin department of dairy and food industries died suddenly.

He suffered a heart attack at Welch's Embers, 3520 E. Washington Ave., Madison, where he was a principal guest at the testimonial dinner honoring L. C. Peckham, Chicago, Illinois, a federal health official with the USPHS.

Prof. Jackson was pronounced dead on arrival at University hospital.

A nationally recognized dairy authority, Prof. Jackson did some of the early research on irradiation of milk—the process of adding vitamin D to milk as it is sold today. He worked closely with all phases of the dairy industry and the food processing industry in Wisconsin.

Prof. Jackson, who lived at 4014 Council Crest, was to have retired from the University faculty in June. Ever since he came to Wisconsin in 1927 and joined the College of Agriculture staff he has been chairman of his department.

He was recognized for his dairy research nationally and in 1933 served as president of the American Dairy Science Assn., a group with which he was planning to work in June when it holds its national meeting in Madison.

A native of Covert, N. Y., Prof. Jackson was recipient of three degrees from Cornell University. He worked in the Cornell dairy industry department from 1915 to 1924 and then was an associate dairy manufacturing specialist in the U. S. Department of Agriculture's bureau of dairy industry.

Prof. Jackson worked actively with the First Baptist Church in Madison. He also aided city groups in planning scores of dairy meetings.

Surviving are his wife; two daughters, Barbara Jackson, Sheboygan, a home agent, and Mrs. Virginia King, who is living in Houghton, Mich., area; and a son Howard Campbell Jackson, Kankakee, Ill.

TIMOTHY E. SULLIVAN, NATIONALLY KNOWN FOOD AND DRUG OFFICIAL DIES

Timothy E. Sullivan, Director of the Division of Food and Drugs, for the Indiana State Board of Health, died, following surgery on June 2. He was 60 years of age.

"Tim," as he was affectionately known by his many friends and professional colleagues, joined the Division of Food and Drugs in 1933. He became Division Director in 1947. He made an outstanding record in the food and drug field. He was instrumental in legislative matters and during his term of office, many new laws and regulations strengthening the State food and drug program were enacted.

He was a most capable director in matters requiring investigational procedures. Through his leadership, citizens were protected from medical charlatans and phony drugs. He developed

a procedure for the investigation of food borne disease outbreaks which has formed the basis for uniformity of investigations nationwide.

"Tim" was a prominent member of the Food Law Institute and traveled frequently to New York and Washington to give lectures before Institute members. He was a past president of the Association of Food and Drug Officials of the United States, past president of Central States Food and Drug Association, and a member of the Indiana Association of Sanitarians. He was in demand as a speaker before industry trade associations and was highly regarded as a capable and dedicated public servant. He served on many national committees and was consulted frequently by the Federal Food and Drug Administration.

He was a lecturer in public health at Indiana University School of Medicine and conducted courses in both public health administration and food and drug law. He was recently selected by the State Department, through the International Cooperation Administration, to travel to Formosa to give consultative service to the Nationalist Chinese Government in matters relating to food and drug regulation and control. It was his plan, had he lived, to be in Formosa for a three month period beginning this fall.

Surviving are his wife, Alma, a son, Harold, a daughter, Mrs. Rosemary Roempke, a sister, Mrs. Mary Feeney and ten grandchildren.

Mr. Sullivan's untimely death is a serious loss to the State of Indiana, and to the Nation. Highly respected by all who knew him for dedication to the cause of pure food and drugs, his loss leaves a void that will be difficult to fill. To his wife, family and many friends, the members of *International* convey deepest sympathy.

Classified Ads

FOR SALE

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

POSITIONS AVAILABLE

Sanitarian wanted—applicant must be a graduate of a recognized college or university with major work in bacteriology or sanitation. Would participate in the development of the City's environmental sanitation program in a newly organized Health Department. Starting salary is $5,640.00 per year, with liberal vacation and retirement plan. Qualified applicant can look forward to advancement to administrative head of the department. Send resume and photo to City of Moline, Health Department, 619 - 16th Street, Moline, Illinois.

GRADUATE SANITARIAN

Excellent opportunity in an expanding public health department—For further information, Write: City of Rockford Personnel Office, 4th Floor, City Hall, 425 East State Street, Rockford, Illinois.

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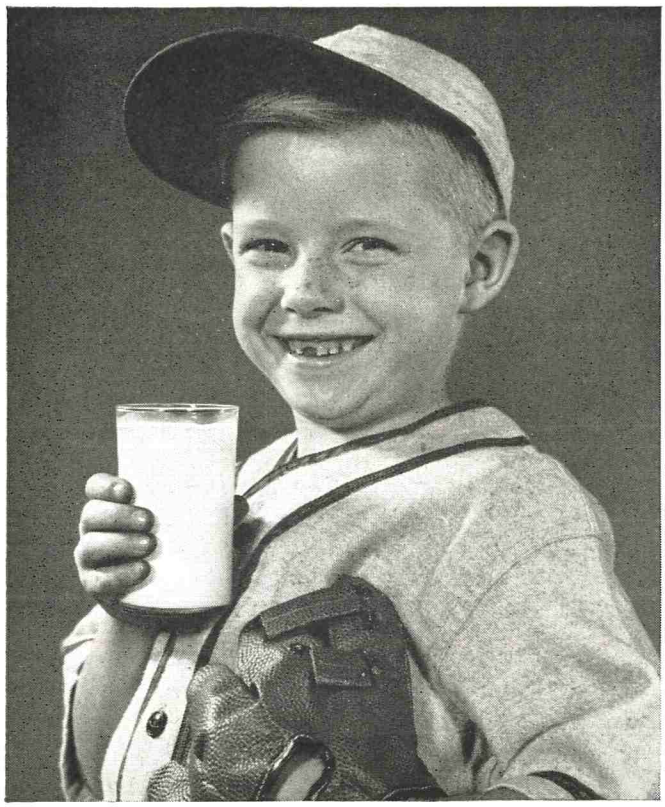

Big Man

. . . IN YOUR FUTURE AND OURS

Insuring a dependable supply of pure, fresh milk for growing America is a responsibility Heil shares with you and the entire dairy industry. We take this responsibility seriously, and the record proves it. For over 25 years, Heil has pioneered major advancements in the sanitary design of milk storage and transport tanks. We think it's one important reason why *more milk goes to market in Heil tanks than in all others combined!*

THE HEIL CO.

MILWAUKEE, WISCONSIN

New plastic pick-up tank underscores Heil leadership . . . superior insulation for greater protection . . . large-radius corners for easier, more sanitary cleanout.

Fiske MILK CRYOSCOPES

Available For Immediate Delivery

STOP! Added Water In Milk

FISKE MILK CRYOSCOPE determine accurate water content in milk and other dairy products by the freezing-point method. An aid to dairies and processors in controlling the quality of their product. Enables public health authorities and testing laboratories to process test samples rapidly and easily with minimum of technically trained personnel.
Today's FISKE MILK CRYOSCOPES, available in laboratory or portable models, offer these . . .

NEW, EXCLUSIVE FEATURES:

- **SHOCK FREEZING**
- **DUAL STIRRING RODS**
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- **STAINLESS STEEL UNBREAKABLE TEMPERATURE PROBE**
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Fiske FISKE ASSOCIATES, INC.
BETHEL, CONNECTICUT
Creators of
Precision Electronic Devices

With TRANSFLOW

• Clear • Flexible • Plastic

TUBING

ANY DAIRY FARMER CAN EQUAL THIS RECORD!

We're purposely showing here a *typical* record* made with a 3-year-old length of TRANSFLOW, because it is one that any dairy farmer should be able to equal. *It has been surpassed by thousands of TRANSFLOW users*, like the Michigan dairy farmer who reports that his counts have been 5,000 or less for over a year.

Why is sanitation improved by the use of TRANSFLOW and equipment incorporating TRANSFLOW —Milking Machines, Portable Transfer Systems, Dumping Stations, "Cleaned-In-Place" Cleaning Units and Tank Trucks? There are several principal reasons:

TRANSFLOW'S SMOOTH, DENSE SURFACE can't trap tiny particles, virtually eliminates interior build-up;

TRANSFLOW'S LOW SURFACE TENSION assures complete drainage, so that no residual liquids remain in the tubing as a source of contamination such as bacteria growth;

TRANSFLOW'S NON-AGING, NON-OXIDIZING PROPERTIES prevent the development of bacteria-harboring cracks and pits;

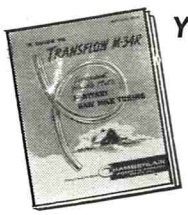
TRANSFLOW REQUIRES FEWER FITTINGS AND COUPLINGS — which are difficult to clean and therefore always potential trouble spots—because its flexibility permits snaking it around corners and obstructions;

TRANSFLOW'S LOW HEAT LOSS and fine insulating properties serve to maintain the temperature of cleaning and sanitizing solutions, so important when tubing is cleaned in place.

TRANSFLOW'S CLARITY provides a quick, easy, *sure* check on cleanliness.

*Name on request.

1886-A



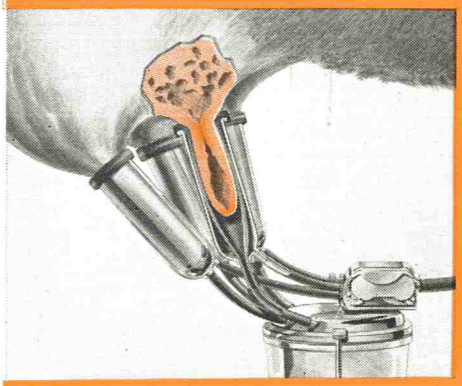
YOURS FOR THE ASKING

We think you'll find our new TRANSFLOW Tubing brochure both interesting and informative. We'll be happy to send you a copy without cost or obligation. Simply write Chamberlain Engineering Corp., Akron 9, Ohio.

CHAMBERLAIN
engineering corporation
AKRON 9, OHIO

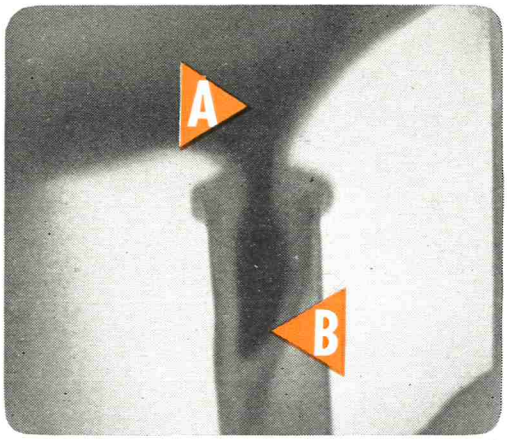
Caught in the act!

NEW X-RAY MOVIE PROVES TEAT DAMAGE WHEN TEAT CUPS ARE LEFT ON TOO LONG

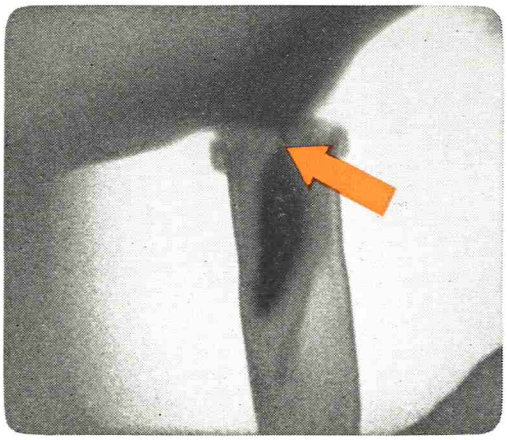


A major cause of mastitis is the irritation of teats caused by failure to remove each teat cup as the quarter is milked out. This damage to teat tissues is documented in a dramatic new motion picture — filmed partly in X-ray.

Ask your Surge dealer to show you this unusual film —"A Reminder to Dairymen" — produced by the Babson Bros. Co. in the interest of good cow milking. Your Surge dealer welcomes group showings — 4H, FFA, and others. No obligation, of course.



Correct milking. (A) is the bottom of the gland cistern . . . black area (B) the teat cistern. Passageway between two cisterns is open — allowing vacuum to remove milk without injury.



Dry quarter. Passage closes, causing tissues (arrow) between two cisterns to rub tightly together. Since quarter is empty, milk no longer acts as a cushion, protecting inner surfaces against damage.

HERE'S WHY DR. TURNER SAYS:

"Remove teat cups as each quarter is milked out."

By Dr. C. W. Turner, Professor of Dairy Husbandry, University of Missouri

In machine milking, the milk is removed by vacuum acting on the end and side of teat. When the cow has let down her milk, its removal by this process is pleasurable. However, as soon as all the available milk is removed from each quarter, the vacuum acting on the teat causes discomfort to the cow . . . and injury to the delicate tissue lining the teat and milk cistern of each quarter. *The irritation and traumatic injury to the delicate tissues of the gland is a common predisposing cause of mastitis.* The incidence of mastitis has been reduced markedly by rapid milking and by removing the machine as soon as the milk has been removed.

Yet Mastitis Still Occurs! What Can Be Done?

Milkers frequently neglect the fact that the milk produced by the four quarters is unequal. Usually the fore quarters produce only 40 percent of the milk. The fore quarters are thus milked out one to three or more minutes faster than the average rear quarters. Occasionally it is a "light" rear quarter that milks out faster.

With unequal milking time of the quarters, the fact remains that the faster milking quarters are subject to *irritation and trauma of the vacuum for periods of from one to three or four minutes if the machine is left on until all quarters are dry.*

Reduce this cause of mastitis! Improve your machine milking by this rule. *Don't wait until all four quarters are milked out! Remove each teat cup as the quarter is milked out.*

Following this additional rule of better milking will result, first, in further reducing the incidence of traumatic-caused mastitis.

Second, it will increase milk yield by obtaining more milk from the more productive quarters which take more time to milk out.

Vacuum acting on the quarters which are milked out is painful to the cow, and induces the secretion of the bad hormone which causes cows to "hold up" more of the last milk rich in fat.

SURGE

BABSON BROS. CO.

2843 W. 19th Street • Chicago 25, Ill.