MARCH, 1959
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Journal of

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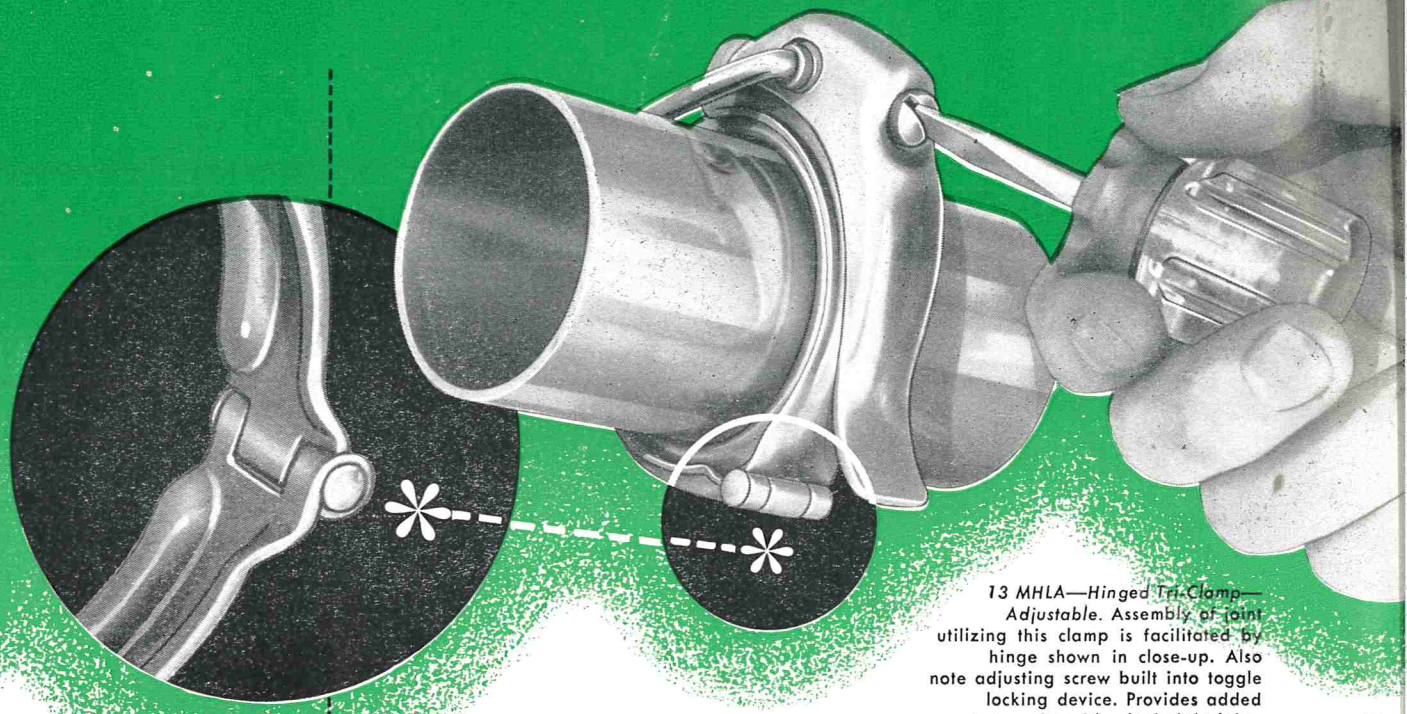

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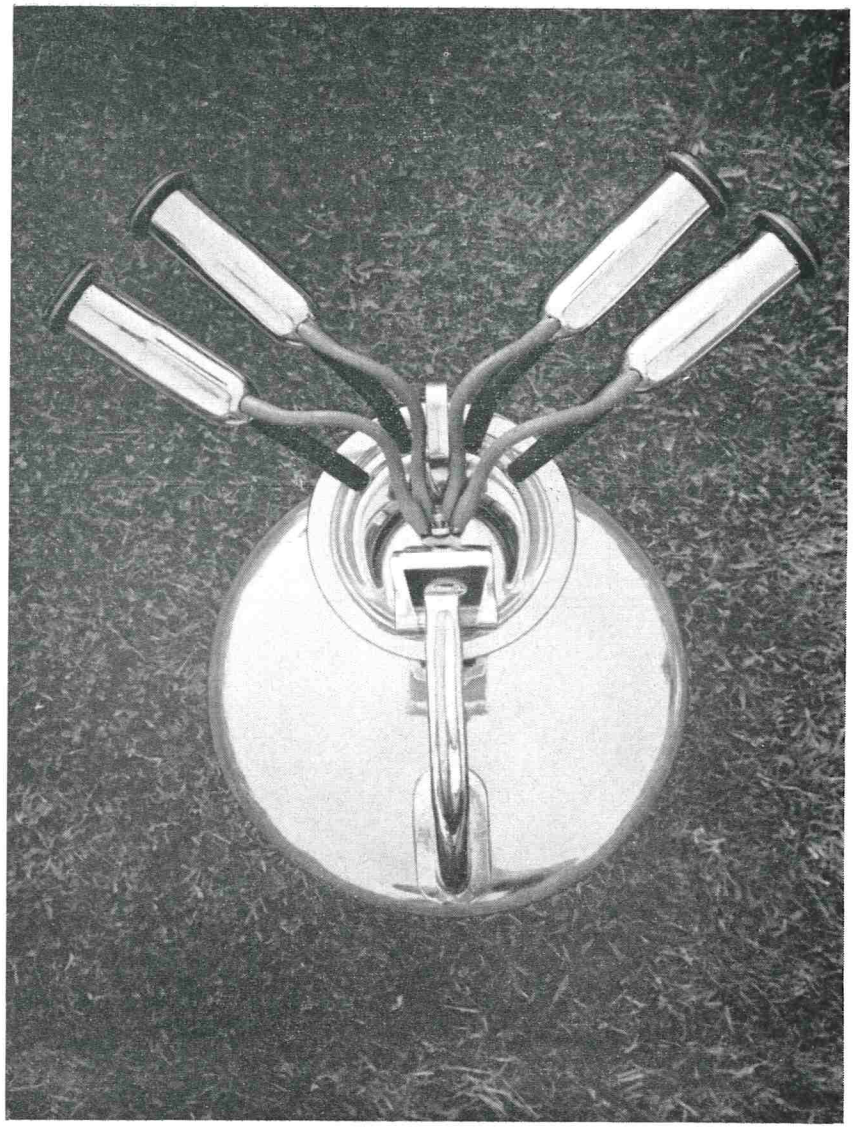

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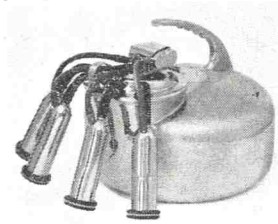

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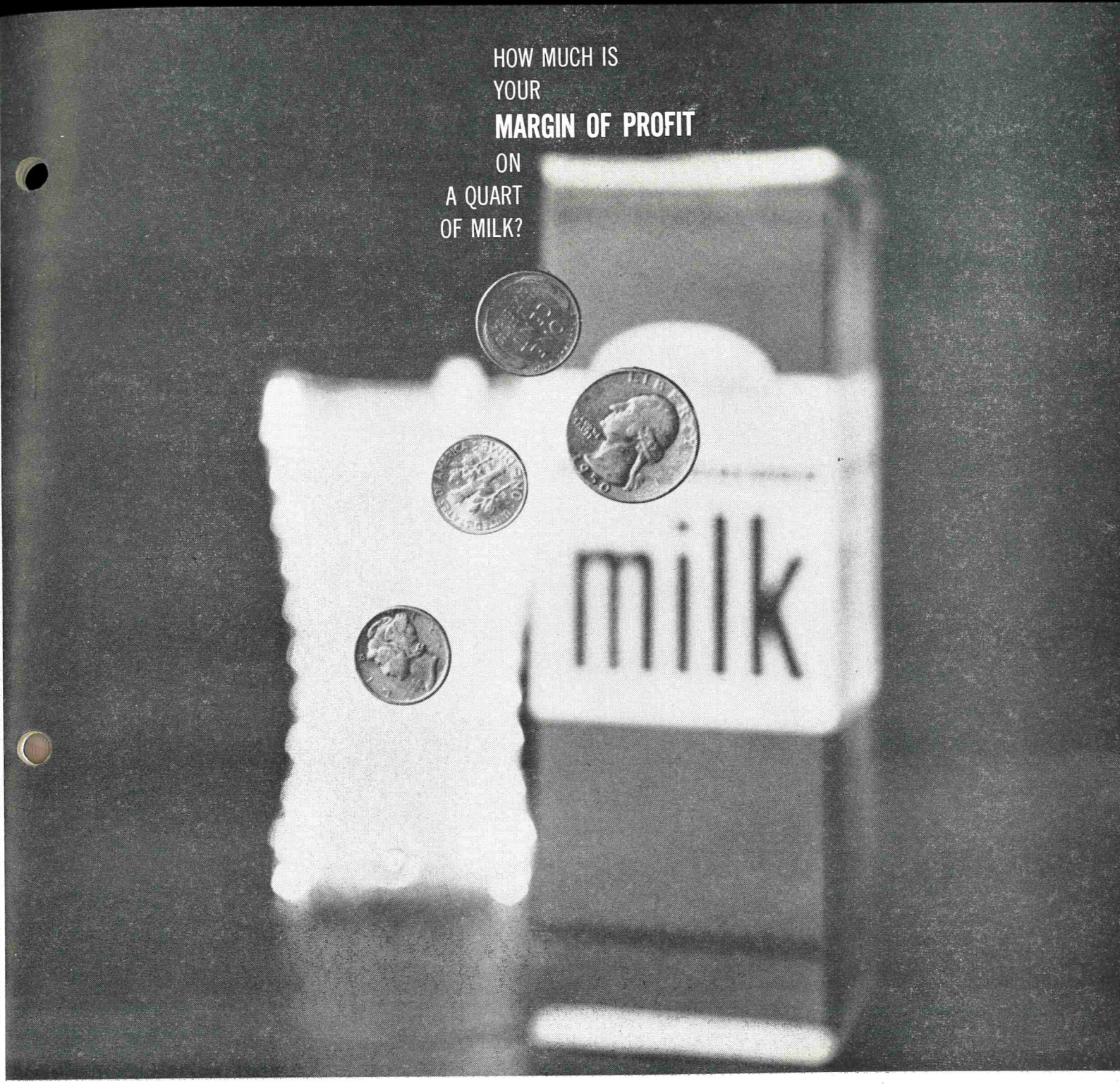

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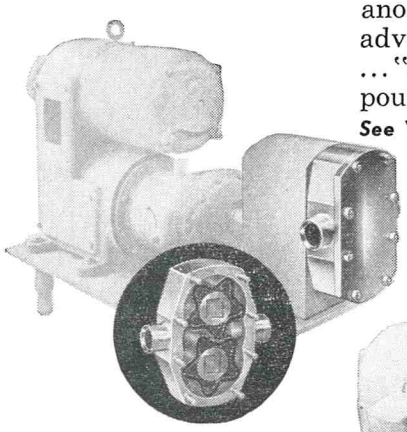

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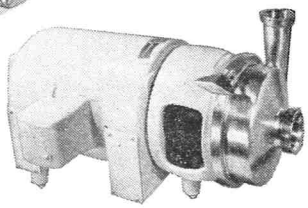

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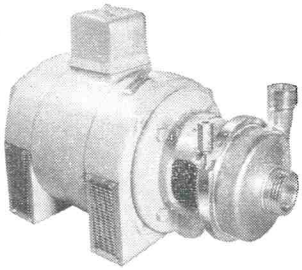

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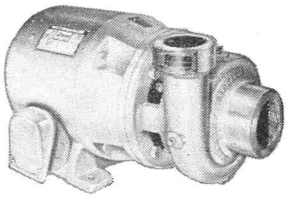

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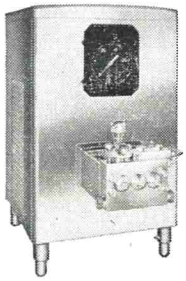

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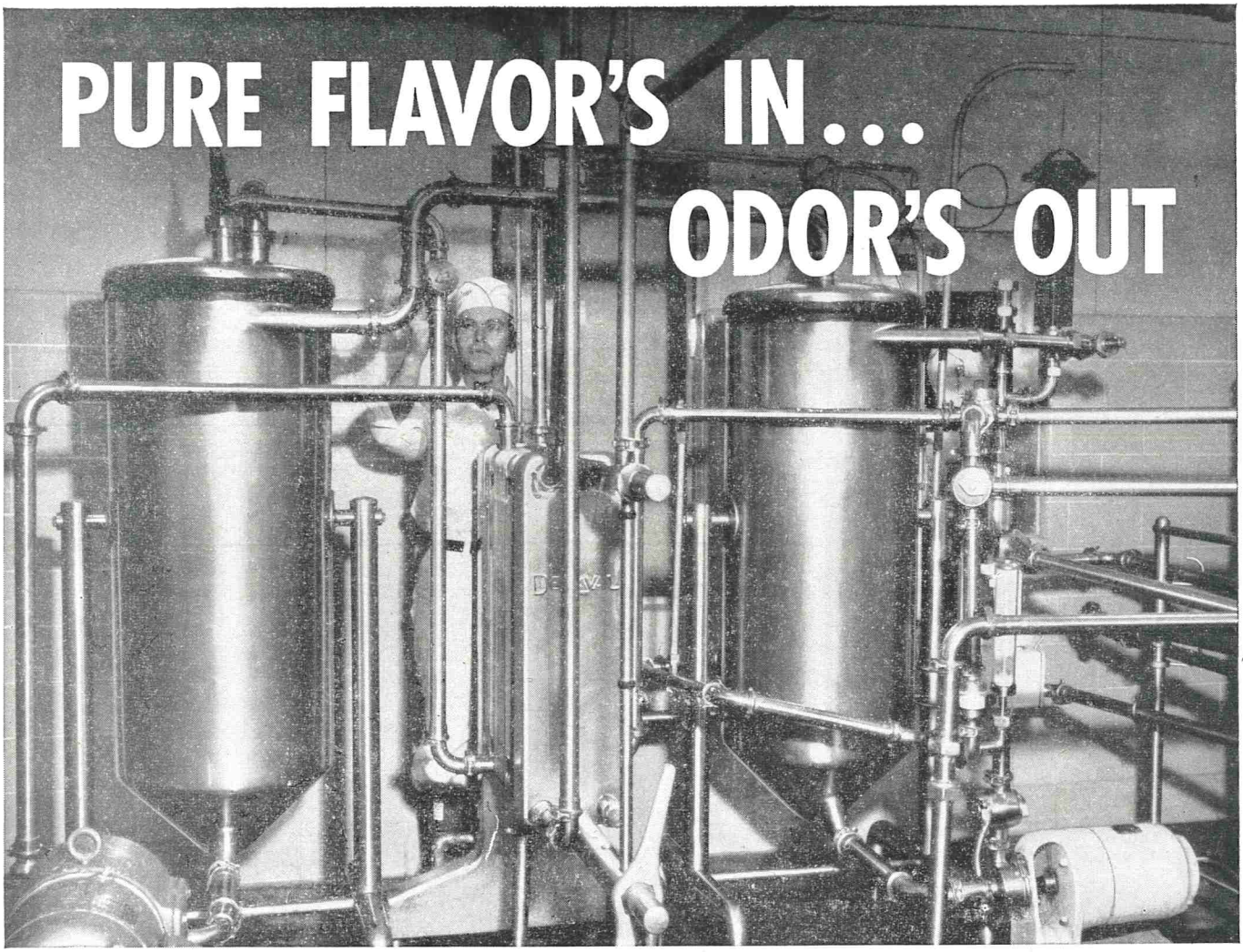

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STUDIES ON THE USE OF PLASTIC PETRI DISHES FOR THE CULTIVATION OF BACTERIA[1]

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Amherst, Massachusetts

(Received for publication November 20, 1958.)

Studies were made to determine whether or not plastic petri dishes affected bacterial growth when used in routine bacteriological examinations. No evidence of toxicity was demonstrated by the pour plate and streak plate techniques, growth curve and Warburg studies, and the phenol detection method. The wetting property of water for these dishes was less than for the glass dishes. The rate of water loss from media in plastic dishes was no greater than that lost from media contained in glass dishes. The plastic dishes were inert to inorganic and organic acids.

INTRODUCTION

The introduction of the petri dish in 1887 by R. J. Petri not only enabled bacteriologists to keep dust and contamination out of their cultures, but it also introduced new techniques in bacteriology. Pure culture studies and morphological examinations were facilitated, and eventually such techniques as the testing of disinfectants were made possible. Petri (*2*) suggested the use of a flat bottom dish, into which a medium could be poured, and placing a cover over it. This he called "Doppelschalen" - double shells; it would have a two-fold purpose: (*a*) the elimination of dust and contaminants from bacterial cultures, and (*b*) the preservation of cultures for a longer period of time. This method has been developed throughout the years and has resulted in the glass petri dish as we know it today.

Recently plastic petri dishes have been manufactured and marketed for use in bacteriological laboratories. Because of the composition of many types of plastic it was decided to initiate a study to determine whether or not these plastic petri dishes (P.P.D.) affected bacterial growth. Accordingly toxicity studies were carried out in order to determine the inhibition of growth in these plates. The keeping quality of media stored in these dishes was compared with that obtained using glass dishes (G.P.D.).

[1] Contribution No. 1183 from the College of Agriculture Experiment Station, University of Massachusetts, Amherst, Mass.

[2] Present address: General Foods, Co., Tarrytown, N. Y.

EXPERIMENTAL PROCEDURES

In an attempt to ascertain the presence or absence of toxic substances in the P.P.D., the following tests were made and the results compared with simliar tests using G.P.D.

Pour Plate Method

The test organisms employed were stock cultures of *Salmonella typhosa, Straphylococcus aureus, Streptococcus pyogenes* and *Corynebacterium diphtheriae.* These organisms were cultured on brain heart infusion agar slants for 24 hours at 37°C and transferred daily. A 24-hour culture was seeded in 5 ml of Butterfield's phosphate solution (*1*), and serial dilutions were made in Butterfield's Phosphate solution blanks. One ml of the appropriate dilution was then plated in each of 20 G.P.D. and 20 P.P.D. Fifteen ml of brain heart infusion Agar was used per plate. All plates were examined for colonial growth after 24 hours of incubation at 37°C. The results are presented in Table 1.

TABLE 1 — RANGE OF REPLICATE COUNTS OF VARIOUS PURE CULTURES GROWN IN PLASTIC AND GLASS PETRI DISHES

Organisms	No. of Replicates	Range of counts in plastic	Mean	Range of counts in glass	Mean
Salmonella typhosa	20	30- 60	46.3	30- 50	41.7
Staphylococcus aureus	20	127-141	133.6	130-147	135.8
Streptococcus pyogenes	20	152-269	226	180-242	224
Corynebacterium diphtheriae	20	60-279	187	84-281	180

The plates also were tested using natural products such as milk and water. The milk was procured from the University of Massachusetts Dairy Department. Water samples were obtained from the Connecticut River near Amherst, Massachusetts. One ml of the appropriate dilution of each product was plated in each of 20 G.P.D. and 20 P.P.D. and 15 ml of tryptone glucose extract agar (TGE) was then added to each dish. All plates were incubated for 24 hours at 37°C and examined for colonial growth. The results are presented in Table 2.

TABLE 2 — RANGE OF REPLICATE COUNTS OF MILK AND WATER IN PLASTIC AND GLASS PETRI DISHES

	No. of Replicates	Range of counts in plastic	Mean	Range of Counts in glass	Mean
Milk	20	118-156	137.7	120-152	133.2
Water	20	31- 63	41.9	31- 60	39.0

Streak Plate Method

This technique, although less rigorous than the pour plate method since the organisms are not in contact with the dishes, was used to culture strict aerobes. The aerobes selected were *Bacillus subtilis* and *Pseudomonas fluorescens*. Both organisms were cultured on nutrient agar at 37°C for 24 hours and transferred daily. Ten ml of nutrient agar was poured in 20 G.P.D., allowed to harden, and kept at room temperature overnight. A 24 hour culture was seeded in 5 ml of Butterfield's phosphate solution and dilutions made. Two-tenths ml of the appropriate dilution was pipetted on the agar and spread by sterile glass rods. All plates were incubated at 37°C for 24 hours and then examined for colonies. The results are presented in Table 3.

TABLE 3 — RANGE OF REPLICATE COUNTS OF STREAK CULTURES GROWN IN PLASTIC AND GLASS PETRI DISHES

Organisms	No. of Replicates	Range of counts in plastic	Mean	Range of Counts in glass	Mean
Pseudomonas fluorescens	20	45-156	83.1	45-164	85.6
Bacillus subtilis	18[a]	39-147	84.6	33-158	84.4

[a] 24 replicates in glass petri dishes

Phenol Detection

Phenol is perhaps one of the oldest disinfectants known. It was first introduced by Sir Joseph Lister in 1867 and was later investigated by Ehrlich in 1906 for its bactericidal activity. Phenol is very often incorporated in the manufacture of plastics, consequently it is of extreme importance to determine whether any active phenol or phenolic derivatives are present in the P.P.D. under investigation.

The P.P.D. were pulverized by a Waring Blendor and the crushed plastic was washed with distilled water and allowed to dry. The G.P.D. were pulverized by a mortar and pestle and also washed with distilled water and allowed to dry.

The Scharer modified test (3) was used to determine phenol. The procedure used is as follows: Thirty mg of crystalline 2,6 dichloroquinonechloroimide (CQC) was dissolved in 10 ml of methyl alcohol. Three sets of five tubes were employed as follows: the first set of tubes were negative control blanks containing 5.5 ml of distilled water; the second set of tubes contained 5.0 ml of distilled water and 0.25 gram pulverized plastic (equivalent to 0.5 ml water); the third set of tubes were positive controls containing 0, 2, 4, 8, 16 micrograms of phenol per 5.5 ml respectively. All tubes were incubated in a water bath at 45°C for 5 minutes. Two drops of CQC reagent were added to all the tubes, which then were incubated for another five minutes. The presence of phenol was indicated by the appearance of a blue color. The results are summarized in Table 4. The water used to wash the pulverized P.P.D. was tested for the presence of phenol and found to be free of phenol.

TABLE 4 — RESULTS OF STUDIES FOR THE DETECTION OF PHENOL IN PLASTIC PETRI DISHES

Negative control using Distilled Water			Experimental using Crushed Plastic			Positive control using varying amounts of Phenol		
Sample No.	ml Water	Reaction	ml Water	Grams of plastic	Reaction	ml Water	ml Phenol	Reaction
1	5.5	.....	5.0	0.25	.....	5.5	0	.....
2	5.5	.....	5.0	0.25	.....	5.0	0.5	+
3	5.5	.....	5.0	0.25	.....	4.5	1	++
4	5.5	.....	5.0	0.25	.....	3.5	2	+++
5	5.5	.....	5.0	0.25	.....	1.5	4	++++

Legend: ..... No phenol present; + Phenol present.

Growth Curve Studies

It was felt that autoclaving crushed P.P.D. would provide a means of releasing any potentially toxic substances chemically bound in the plastic. It was reasoned that if any toxic materials were present, the lag phase of the organism would be lengthened, thereby decreasing the multiplication rate of these organisms. Consequently, the following growth curve studies were initiated.

Ninety ml of nutrient broth was poured into each of six flasks. To two of the flasks, 10 grams of pulverized P.P.D. were added, to two flasks 10 grams of crushed G.P.D. were added, the remaining two flasks were used as controls. These then were sterilized by autoclaving for 121°C for 15 minutes. Serial dilutions of a 24 hour nutrient broth culture of *S. aureus, S. typhosa* and *S. pyogenes* were added to each lot of six flasks. Samples were then plated out in nutrient agar at three hour intervals for a period of 9 hours. All plates were incubated at 37°C for 24 hours and the colonies counted. The results are shown in Table 5.

Cell Respiration Studies

Cell respiration studies were performed using suspensions of *B. subtilis, S. aureus, S. typhosa, P. fluorescens* and *S. pyogenes* in the presence of 0.25 gram of pulverized plastic and glass. The oxygen uptake

TABLE 5 — THE EFFECT OF GLASS AND PLASTIC ON GROWTH OF VARIOUS ORGANISMS FROM MINIMAL NUMBERS AT 37°C.

Organism	Treatment	Count after following hours 0	3	6	9
Salmonella typhosa	Control	59	93	1,800	200,000
	Glass	96	89	2,100	195,000
	Plastic	61	97	1,800	180,000
Staphylococcus aureus	Control	67	90	1,750	220,000
	Glass	56	71	1,650	205,000
	Plastic	68	82	1,750	190,000
Streptococcus pyogenes	Control	125	210	400	20,000
	Glass	110	80	200	20,000
	Plastic	129	100	400	30,000

obtained in the presence of plastic was not significantly different from that obtained in the presence of glass.

Media Keeping Quality

Prolonged incubation of petri dishes is often necessary in bacteriological studies. Consequently, the rate of dehydration of the agar and the condensation in petri dishes may seriously effect the growth of colonies. To determine whether the rate of dehydration and moisture condensation in P.P.D. markedly differed from that of the G.P.D., the following investigation was undertaken.

Fifteen ml of tryptone glucose extract Agar (TGE) was poured into four sets of G.P.D. and four sets of P.P.D. Each set consisted of 5 plates. The plates were allowed to harden, weighed on a Torsion balance, and each set incubated for 48 hours at the following temperatures: 6°C, room temperature (approximately 30°C); 37°C; and 45°C. At the end of the incubation period plates were weighed and the difference from the original weight recorded. This was done for a period of 336 hours (14 days). Moisture condensation was observed. The weight of 15 ml of agar was obtained and the per cent water loss calculated for each set of dishes. The results are summarized in Table 6.

Effect of low pH

To determine the effect of low pH on the P.P.D., ten ml of concentrated sulfuric, hydrochloric, nitric, and glacial acetic acids were poured in a group of P.P.D. The plates were observed from time to time. P.P.D. were not affected by strong concentrations of organic and inorganic acids.

DISCUSSION

The results presented in Table 1 and 2 show no significant differences between the colony counts on the G.P.D. and the P.P.D. One observation is worthy of note, however. Most G.P.D. bottoms were scratched and cloudy thereby increasing the possibility of missing colonies by mistaking them for scratches, whereas the P.P.D. being clear and unmarred, revealed each colony distinctly. It was suggested that new G.P.D. be employed for more accurate comparison, however by doing so it was felt that normal laboratory procedures would not be followed.

It is of interest to note also that the wetting property of water on the G.P.D. was greater than on the P.P.D. When aqueous samples of bacterial suspensions were pipetted into the G.P.D. the film had a tendency to spread out evenly on the glass, whereas in the P.P.D. the sample located itself in one spot. This phenomenon may be of importance when plate counts involve large numbers of petri dishes, since thin films of aqueous samples evaporate more rapidly as a result of a larger surface area.

As shown in Table 3 no difference between counts on the G.P.D. and the P.P.D. was obtained with the streak plate method. Since *Bacillus subtilis* is a spreader, difficulty was experienced in obtaining valid plate counts with only 20 glass and 20 plastic petri plates, therefore 30 petri dishes of both glass and plastic were tested and the results tabulated. All plates having counts less than 30 were discarded, thereby accounting for the uneven numbers of samples. Since both sets of data were virtually identical statistical computations were unnecessary.

No free phenol or phenolic derivatives were present in these P.P.D. (Table 4). However, the absence of phenol does not eliminate the possibility of the presence of other toxic substances which might be in the plastic. By autoclaving the plastic dishes, toxic chemically bound materials might be released, thereby affecting bacterial growth. Table 5 shows no indication of any other toxic materials present. It was

TABLE 6 — PER CENT WATER LOSS IN G.P.D. AND P.P.D.

	48 hrs.		96 hrs.		144 hrs.		192 hrs.		240 hrs.		288 hrs.		336 hrs.	
	G	P	G	P	G	P	G	P	G	P	G	P	G	P
6°C	1.0	1.0	3.0	3.0	3.0	5.0	4.0	7.0	6.0	9.0	7.0	10.0	8.0	11.0
Room (Approx. 30°C)	3.0	4.0	7.0	9.0	12.0	16.0	16.0	20.0	22.0	26.0	25.0	31.0	30.0	41.0
37°C	11.0	11.0	70.0	24.0	31.0	38.0	41.0	50.0	55.0	64.0	66.0	73.0	79.0	79.0
45°C	30.0	30.0	57.0	64.0	87.0	95.0	Agar dried and cracked in plates							

realized that by autoclaving these plastic plates, the molecular structure is distorted, thus changing the physical and chemical state of the plastic. However, as previously mentioned, it was desired to submit these P.P.D. to a severe test. It was also realized that volatile toxic substances may be driven off by autoclaving, therefore respiration studies with the Warburg apparatus were included. The data obtained indicated no significant difference in the results obtained in comparing the affects of glass and plastic.

The amount of condensation on both G.P.D. and P.P.D was found to be same in both cases. The only difference observed was the type of condensation. The moisture on the inside cover of the G.P.D was more of a transparent film which moved freely when the G.P.D was tilted from side to side, whereas, in the P.P.D. the moisture consisted of many tiny droplets which formed a large opaque circle. These droplets of water adhered to the inside cover of the P.P.D and did not move as freely when these plates were tilted from side to side. As previously noted this phenomenon is due to the fact that the wetting property was less on the P.P.D. than on the G.P.D. Since a dry surface is desirable for colony counting, it would seem that P.P.D. would have some advantage in this respect.

The per cent water loss was the same for both the G.P.D. and the P.P.D. (Table 6). The agar in both sets of plates incubated at 45°C dried and cracked at the end of 144 hours.

The handling and storing of P.P.D. was easier than for G.P.D., since each plate bottom has its own proper lid and all dishes are of uniform size.

CONCLUSION

1. The absence of toxic materials in the P.P.D. was demonstrated by pour plate and streak plate methods, growth curve studies, Warburg studies, and the phenol detection method.
2. P.P.D. being free of scratches, enabled more rapid and easier counting of colonies when compared to used G.P.D. usually found in use in busy laboratories.
3. The wetting property of water was less in the P.P.D. than in the G.P.D. This might decrease the possibility of rapid dessication of aqueous samples, prior to the pouring of media into the plates.
4. The rate of water loss and condensation in P.P.D. was equivalent to that of G.P.D.
5. The inertness of the P.P.D. to strong organic and inorganic acids enables the use of these plates with media of low pH.

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THE INTERRELATION BETWEEN CONDUCTIVITY, PER CENT

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Milk produced by lactating cows varies widely in freezing point. A possible explanation may be found in the observation that high freezing point is associated with low lactose, high conductivity at 37°C and a high decrease in conductivity between measurements at 37°C and 0°C.

The freezing point of milk is used widely as a guide in determining the legality of milk for trade purposes. The present legal freezing point standard for milk is –0.550°C with a three per cent added water tolerance level which brings the maximum acceptable freezing point to -0.5335° C.

Milk, being derived from blood, is subject to physiological factors governing the production of the latter. It is known that the blood pressure or osmotic pressure varies little in a given animal or within a group of animals of the same species. Since milk is secreted against the osmotic pressure of blood it too must have a rather constant osmotic pressure. Coste and Shelbourn (3) report the osmotic pressure of cow's milk averages 6.78 atmospheres, with 3.03 atmospheres due to 4.7 per cent lactose, 1.33 atmospheres due to 0.1 per cent alkali chlorides (Cl^-, Na^+, K^+), and 2.42 atmospheres, due to other salts and ions, making for a total freezing point depression of 0.560 °C. The same authors state that as the osmotic pressure of milk is almost constant, it follows that any variation in the proportion of lactose will be accompanied by such a variation in the salts as will maintain the proper osmotic pressure. Thus, an increase in the amount of lactose will lead to a decrease, not necessarily in the amount of salts, but in the total number of their molecules and ions which will be found dissolved in milk.

The correlation between the osmotic pressure of milk and its freezing point is not constant, however. The osmotic pressure due to nonelectrolytes, such as lactose, and non-ionized salts may be converted fairly accurately to degrees of freezing point depression(4). Similarily osmotic pressures due to strong electrolytes such as NaCl follow a predictable pattern of freezing point depression. However, organic acids and their salts which contribute about 2.42 atmospheres of osmotic pressure are rather unpredictable in their effect (4).Apparently, because of their unpredictable behavior, attempts have failed thus far to predict the freezing point of milk on the basis of any one of its components (5).

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The present study was designed to study more closely the interrelationship between conductivity, per cent lactose and freezing point of milk.

Experimental Methods

Methods used in collecting milk samples, and in determining their conductivity, per cent lactose and freezing point were identical with those described by Pinkerton and Peters (7).

Results

Of the 400 milk samples considered in this study, 364 (91%) in Group I and II showed freezing points within the legal range, including the 3% added water

TABLE 1 — AVERAGE LACTOSE AND CONDUCTIVITY VALUES OF FRESH, RAW MILK FROM INDIVIDUAL ANIMALS GROUPED ACCORDING TO FREEZING POINT (TOTAL = 400 SAMPLES)

Group	Freezing point range (°C)	Per cent of total samples	Lactose (%)	Average values for Conductivity (mhos/cm x 10^4) at 37°C	at 0°C	Decrease (%)
I	Below -0.550	41	4.90	52.00	24.34	51.40
II	-0.550 to -0.5335	50	4.87	52.60	24.77	52.90
III	Above -0.5335	9	4.64	57.50	24.65	55.22

tolerance (Table 1). The remaining 36 samples (9%) in Group III had freezing points above -0.5335 °C.

Milk samples in Group I and II were similar in lactose content and in conductivity values at 37 °C and 0 °C. Samples in Group III, however, were lower in per cent lactose and higher in conductivity value at 37 °C, but not at 0 °C, as compared with samples in Group I and II. The difference in conductivity values between readings at 37 °C and 0 °C, expressed as per cent decrease in conductivity varied directly with the freezing point. The higher per cent decrease in conductivity (due to lowering the temperature of milk) in Group II and III must be considered responsible for the increase in freezing point. Assuming that all milk samples had the same original osmotic pressure (3), it would seem that milks in Group I, II and III differed in their salt and ion content sufficiently to give the milk in Group III an excessively high freezing point.

A statistical analysis of the above 400 samples showed that measuring conductivity at 37 °C resulted in a slightly higher predictive value (for predicting freezing point) than did the measurement at 0 °C; however, the difference in predictive value was not significant. Lactose values, on the other hand, gave a slightly, though not significantly higher predictive value with conductivity readings at 0 °C than at 37 °C. Since neither lactose nor conductivity measurements gave statistically significant predictive values, presentation of more detailed data is omitted. Multiple correlations were computed, however, but were not significant.

The data in Table 2 is presented to show variation in freezing point, lactose content and conductivity values in milk from individual cows on the same ration by group and breed. The two groups of 10 cows each, selected from the College herd, were similar in age, stage of lactation and free from previous cases of mastitis. Each group was maintained on a ration adequate for their level of production during the time of the experiment.

A close examination of the data shows considerable variation from animal to animal within each group when on the same ration. The influence of breed is

TABLE 2 — VARIATIONS IN FREEZING POINT, LACTOSE CONTENT AND CONDUCTIVITY VALUES IN MILK FROM INDIVIDUAL ANIMALS ON THE SAME RATION, BY GROUP AND BREED. (AVERAGE VALUES OF SEVEN WEEKLY SAMPLES)

Holstein						Jersey					
Cow No.	F. P. (-°C)	Lactose (%)	Conductivity (mhos/cm x 10^4) 37°C	0°C	Decrease (%)	Cow No.	F. P. (-°C)	Lactose (%)	Conductivity (mhos/cm x 10^4) 37°C	0°C	Decrease (%)
					GROUP A						
1	0.5448	5.12	53.85	23.89	55.63	6	0.5448	4.82	49.27	22.77	53.78
2	0.5440	4.91	57.65	25.68	55.45	7	0.5405	4.94	52.72	23.91	54.64
3	0.5310	4.86	56.90	24.82	56.38	8	0.5473	4.92	49.55	22.47	54.65
4	0.5430	4.90	56.28	24.97	55.63	9	0.5378	5.21	45.27	20.70	54.27
5	0.5383	4.62	65.52	28.39	56.66	10	0.5455	5.14	48.62	22.58	53.56
Ave.	0.5403	4.88	58.06	25.55	55.99	Ave	0.5432	5.00	49.08	22.48	54.20
					GROUP B						
11	0.5373	5.09	56.87	25.13	54.10	16	0.5410	4.94	49.74	22.47	54.82
12	0.5455	5.17	50.51	22.92	54.62	17	0.5363	4.95	49.79	23.34	53.17
13	0.5373	4.51	62.05	30.52	50.81	18	0.5651	5.39	49.40	23.53	52.37
14	0.5383	5.14	53.26	23.94	50.50	19	0.5614	5.26	50.53	23.68	53.13
15	0.5395	5.08	55.38	25.34	54.24	20	0.5520	5.66	44.04	19.94	54.72
Ave.	0.5396	5.00	55.61	25.57	54.02	Ave.	0.5432	5.24	48.70	22.59	53.61

Note: Per cent of samples with F. P. above -0.5335°C: Holstein A = 22.5%, B = 25%; Jersey A = 7.5%, B = 2.5%

also apparent. For the two groups of Holsteins the average values show somewhat higher freezing points, lower lactose content and higher conductivity values both at 37° and 0 °C than those observed for the two groups of Jerseys. The two Holstein groups show also a slightly higher per cent decrease in conductivity between temperatures of 37° and 0 °C than did the two groups of Jerseys.

The per cent of milk samples showing a freezing point above -0.5335 °C was 22.5% of Group A and 25% of Group B for the Holstein cows, whereas for the Jersey cows it was 7.5% and 2.5% for group A and B, respectively. These figures show that the same ration may give rise to milk differing considerably in composition and freezing point, depending on the breed of cows.

DISCUSSION

In the light of earlier work (*6*, *7*) and the results obtained in the present study, it becomes more apparent that there exists the possibility of classifying certain milk samples as watered although they are actually genuine and unadulterated. A more complete understanding as to why cows produce milk with abnormally high freezing points, how to correct such cases, and how to interpret the results more intelligently should be beneficial both to the producer and the regulatory official.

Individual differences in freezing point of milk from cows of the same breed as observed in this study have been reported previously (*1*). With respect to differences in freezing point between Holstein and Jersey milk, it may be of interest that Cole *et al.* (*2*) found lactose and chlorides to contribute about 80% of the freezing point depression in Jersey and about 75% in Holstein milk. This, according to Coste and Shelbourn (*3*), would result in a larger portion of the freezing point depression being due to "other slats and ions" in Holstein than in Jersey milk. This portion of salts and ions of milk must be regarded as the unpredictable component responsible for variations in the per cent decrease in conductivity observed throughout this study.

SUMMARY

Based on 400 authentic samples obtained from individual animals it was found that 36, or 9%, of the samples had freezing points above the three per cent added water tolerance level of -0.5335° C. These 36 samples had the lowest average per cent lactose. They also showed the greatest decrease in conductivity between temperatures of 37° C. and 0° C.

Neither lactose content nor conductivity at 37° C. or 0° C. were found to be statistically significant as predictors of freezing point of milk.

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SENSITIVITIES OF THE DISC ASSAY AND TRIPHENYLTETRAZOLIUM METHODS FOR ANTIBIOTICS IN MILK [1]

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In the absence of a quick "platform test" for antibiotics in milk, the Disc Assay Method (*10*), used, studied and modified by a number of investigators, (*1, 4, 5, 7, 8, 9*) has been commonly employed for detecting and controlling antibiotic residues in milk coming from the farm. This test has proven fairly satisfactory when coupled with an educational program among producers. However, it is apparently less sensitive to some antibiotics than to others and different workers have reported variable sensitivities to the same antibiotics.

A method, depending on dye reduction, Neal and Calbert's 2, 3, 5, Triphenyltetrazolium Chloride Method, (*6*) has not been used extensively but is of interest because it involves an incubation period of only 2½ hours and the authors report sensitivities comparable to many reported for the Disc Assay Method.

This study was undertaken in an effort to compare directly the sensitivities of the Disc Assay and the Neal and Calbert methods in detecting some antibiotics used in mastitis therapy and to note procedural variations which affect the results.

Preliminary observations verified the greater sensitivity obtained with 0.5 in. paper discs (Schleicher and Schuell) as compared with 0.25 in. discs (*8*) in the Disc Assay Method but the use of less than 6 ml. of seeded agar per plate (*5*) led to erratic results due to uneven depth in the plates. Comparisons were also made between the commonly used whey agar and trypsin digest agar. The whey agar gave better results because *B. subtilis* apparently grows more vigorously on trypsin agar, reducing the diameter of the zones of inhibition and hence the sensitivity of the assay. Furthermore, when longer periods of incubation were employed, secondary growth of the test organism appeared in and around the clear zones rendering the results less distinct.

Preliminary work with Neal and Calbert's Method, using *Streptococcus thermophilus* revealed that the reduction of triphenyltetrazolium chloride (T.T.C.) in the presence of neomycin sulfate was extremely erratic and it was concluded that the method is not satisfactory for this antibiotic.

Efforts were made to reduce the incubation period for T.T.C. reduction by employing vacuum incubation as in the neotetrazolium test of Day and Doan (*2*) and to use the latter test for detecting antibiotics but these were unsuccessful.

PROCEDURES

Extreme care was observed to wash and rinse very thoroughly all glassware employed in the study. In addition it was autoclaved before use.

The antibiotics assayed included potassium penicillin O, sodium penicillin G, dihydrostreptomycin sulfate, aureomycin hydrochloride and neomycin sulfate. These were obtained from the manufacturing laboratories in pure form and were freshly diluted in distilled water in serial concentrations before addition to the milk medium in quantities which produced the range of antibiotic levels required for sensitivity assays.

The milk medium was a high quality dry skimmilk which gave negative results when reconstituted and assayed for antibiotics by the two methods used. It was adjusted to 10 per cent solids with distilled water, distributed into suitable tubes and flasks and autoclaved before use.

It was discovered early in the work that the age of the seeded agar plates, used for the Disc Assay Method, exercised a very significant influence on the antibiotic levels that were capable of detection. Consequently this variable was investigated by making assays on all the antibiotics, at all concentrations, using seeded agar in 10 different age classes from 0 hours to 240 hours. The agar was held under refrigeration at approximately 4.5°C (40°F) during aging.

It was also noted that prolonged incubation of the seeded agar plates, planted with discs saturated with "neomycin milk", resulted in clearer zones of inhibition. This point was investigated by secondary incubation of these plates for periods up to a total of 22 hours.

Disc Assay Method. The details of the procedure followed those prescribed for penicillin in "Standard Methods" (*10*). Bacto Whey Agar, Bacto Subtilis

[1] Authorized for publication on December 23, 1958, as paper No. 2331 in the Journal Series of the Pennsylvania Agricultural Experiment Station.

Spore Suspension ampules and 0.5 in. Schleicher and Schuell discs sterilized in dry heat were employed. Six mls. of seeded agar were measured into selected flat bottomed Petri plates. Four samples, in duplicate, were accomodated on each plate at the time of planting. These were arranged on either side opposite each other and a control disc containing the sterile milk medium, without antibiotic, was placed in the center. After incubation, the critical observation was the disc of lowest concentration of antibiotic that produced a recognizable zone of inhibition.

Triphenyltetrazolium Chloride Method. Nine ml.–portions of the sterile reconstituted dry skimmilk containing the various concentrations of antibiotic, along with a control tube without antibiotic, were inoculated with 1 ml. of a 1:1 sterile milk dilution of an actively growing culture of S. *thermophilus* (ATCC, 7952) and incubated in a 37°C (98.6°F) water bath for 2 hours according to the recommendations of Neal and Calbert (*6*). Then, 0.3 ml. of a 1:25 aqueous solution of T.T.C. was added to the tubes and they were returned to the water bath for an additional 30 minutes. Examination of the tubes for development of a pink color, indicative of bacterial activity, was made under florescent light. The criteria for a positive test (inhibition of bacteria) was the failure of color (formazan) to develop or the development of a lesser degree of color than that present in the control.

RESULTS

The smallest concentrations of the antibiotics, detectable by the Disc Assay Method, are shown in Table 1. Lower concentrations of sodium pencillin G could be determined than of potassium penicillin O and the assay was more sensitive for both when the seeded agar was held refrigerated for periods of 25 to 72 hours before use. Levels of 0.0129 and 0.0208 units per ml., respectively, gave positive tests under these conditions. Longer aging of the plates diminished the sensitivity.

The lowest concentration of dihydrostreptomycin sulfate detectable was 0.743 microgram per ml. and this was obtained with seeded agar plates refrigerated for periods of over 217 hours. With this antibiotic the sensitivity of the method increased progressively with aging of the seeded agar up to 250 hours.

Refrigerated aging of the seeded agar affected the detection of aureomycin hydrochloride very much as with the penicillins, the lowest level (0.0535 microgram/ml.) being verified with agar aged for 73 to 96 hours. With this antibiotic, too, less sensitivity was obtained when the age of agar exceeded the optimum, dropping to 0.1463 microgram/ml. at 169 to 192 hours.

With neomycin sulfate the assay increased in sensitivity progressively with the age of agar, as with dihydrostreptomycin, the lowest concentrations detectable being 0.819 microgram/ml. at 169 to 192 hours. It was found that the sensitivity with this antibiotic could be improved by longer incubation of the planted plates when relatively fresh seeded agar was employed but this effect was not manifest with agar more than 96 hours old.

The reason for the greater sensitivity with aged seeded agar was not determined but it seems likely that refrigerated holding of the seeded plates reduced the vitality of the test organism thus enhancing the inhibitory effect of the antibiotics in low concentration.

The T.T.C. reduction method was found to be quite satisfactory for the antibiotics studied except neomycin. With the latter, the dye reduction and development of color was highly erratic and no relationship to antibiotic concentration was evident. The levels at which antibiotics were detected in milk are presented in Table 2. Lower concentrations of penicillin

TABLE 1 — SENSITIVITY OF THE DISC ASSAY METHOD

Age of seeded agar (hours)	Lowest concentrations of antibiotics detectable [a]: Potassium Penicillin O Units/ml.	Sodium Penicillin G Units/ml.	Dihydrostreptomycin sulfate microgram/ml.	Aureomycin H Cl microgram/ml.	Neomycin sulfate (b) microgram/ml.	Neomycin sulfate (c) microgram/ml.
0	0.0282	0.0151	4.053	.....	.....	.....
1-24	0.0214	0.0143	3.557	0.0630	6.393	3.068
25-48	0.0215	0.0129	3.135	0.0661	4.804	2.908
49-72	0.0208	0.0129	2.822	0.0576	3.693	2.284
73-96	0.0257	0.0135	2.663	0.0535	.....	2.305
97-120	0.0254	0.0138	2.305	0.0677	1.842	1.842
121-144	0.0279	0.0157	2.762	0.0701	1.608	1,608
145-168	.....	.....	<1.109	0.0976	1.186	1.060
169-192	.....	.....	>1.109	0.1463	0.819	0.819
217-250	>0.0344	>0.0174	0.743	.....	.....	.....

[a] These data are means of 2 to 10 trials. [b]Incubation period 6-7 hours. [c]Incubation period 10-22 hours.

TABLE 2 — SENSITIVITY OF THE TRIPHENYLTETRAZOLIUM CHLORIDE METHOD.

Antibiotics	Number of positive and negative tests at various concentrations of antibiotic/ml. [a]				
Potassium penicillin O	0.020 U.	0.018 U.	0.016 U.	0.014 U.	0.012 U.
	16+ 1–	11+ 2–	4+ 7–	2+ 9–	2+ 15–
Sodium penicillin G	0.006 U.	0.005 U.	0.004 U.	0.003 U.	0.002 U.
	17+ 2–	12+ 2–	9+ 7–	5+ 10–	0+ 14–
Dihydrostreptomycin sulfate	2.0 microgr.	1.8 microgr.	1.6 microgr.	1.4 microgr.	1.2 microgr.
	14+ 1–	13+ 5–	11+ 6–	7+ 7–	6+ 11–
Aureomycin H Cl	0.075 microgr.	0.060 microgr.	0.050 microgr.	0.040 microgr.	0.030 microgr.
	16+ 2–	10+ 7–	7+ 9–	4+ 13–	2+ 17–
Neomycin sulfate	Indeterminate results				

[a] + Positive tests (antibiotic detected); – Negative tests

G and streptomycin (except with long aging of the agar) were detectable than with the disc assay procedure, while with penicillin O and aureomycin the sensitivities were of about the same order by the two techniques. Concentrations per ml. detectable were 0.02 units of penicillin O, 0.006 units of penicillin G, 2.0 microgram of dihydrostreptomycin and 0.075 microgram of aureomycin. One advantage of the T. T.C. Method is the short time required for obtaining results while a disadvantage is the time and effort required to maintain an active growing culture of the test organism.

The actual sensitivities reported here for the T.T.C. method with sterilized, reconstituted dry skim milk used as the test medium, may be greater than can be obtained with samples of raw milk since Drury (3) has indicated that leucocytes exercise a reducing affect on dyes. However, the common practice of subjecting raw samples to a heat treatment of 80°C (176°F) or thereabouts before applying the test should greatly minimize any such influence.

SUMMARY

This study indicates that under the most favorable conditions noted the Disc Assay Method is capable of detecting, in milk, concentrations of 0.02 units of penicillin O and 0.013 units of penicillin G per ml. The sensitivity is greatest when the seeded agar is aged under refrigeration for more than 24 hours but less than 72 hours. The sensitivity of the method for aureomycin is about 0.055 microgram per ml. when the agar is aged between 48 and 96 hours. With dihydrostreptomycin sensitivity increases as the agar is aged up to 250 hours (limit of observation) and with such agar is about 0.75 microgram per ml.

The T.T.C. method, utilizing S. *thermophilus,* is capable of detecting, per ml. of milk, 0.02 U. of penicillin O, 0.006 units of penicillin G, 2.0 microgram of dihydrostreptomycin and 0.075 microgram of aureomycin. It is not satisfactory as a means of revealing the presence of neomycin.

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STATUS OF USE OF NONFAT DRY MILK AND PLAIN CONDENSED MILK IN THE PRODUCTION OF MARKET MILK PRODUCTS

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Nonfat dry milk and condensed skim milk have long been used as a source of solids for ice cream and other frozen desserts. Within the past several years there has been rapid increase in the use of added nonfat milk solids for various dairy products processed in fluid milk plants. The increased use is of significance in the light of the widespread adoption of Grade A standards for fluid milk and cream, and, regionally, for cottage cheese, and in the absence of similar standards for condensed and dried milk.

The Wisconsin Conference on Intra-State Milk Shipments, at its September, 1957 meeting, adopted as interim standards the proposed draft Supplement No. 1 to the Milk Ordinance and Code,, 1953 Recommendations to the Public Health Service "Sanitation of Dry Milk Products Used in the Commercial Preparation of Pasteurized Milk Products," draft of July 1, 1957. This proposed standard was developed in part by the Committee on Dry Milk of The National Conference on Inter State Milk Shipments.

In view of the adoption of the proposed standards for intra-state movement of pasteurized dairy products in Wisconsin, the Committee on Nonfat Dry Milk of the Wisconsin Conference on Itra-State Milk Shipments undertook a survey of the extent and nature of use of nonfat dry milk and condensed skim milk in the manufacture of dairy products in Grade A milk plants in the State of Wisconsin. A questionnaire was submitted to the regulatory office [1] in each of 25 cities in the state during the months of May and June. The health officer was requested to ascertain the actual use of nonfat dry milk and condensed skim milk in the dairy products produced in each of the dairy plants in the jurisdiction on any given day.

The results of the survey are believed to represent at least 80-90 per cent of the total utilization within the state. The results are presented in Table No. 1. Nonfat dry milk was used in 18, or 72 per cent of the cities. Condensed skim milk was used in 14, or 56 per cent of the cities on any given day. Nonfat dry milk was used in 45, or 47 per cent of the 98 dairy plants in the 25 cities, and condensed skim milk was used in 16, or 28 per cent of the plants. Well over 11,000 pounds of nonfat dry milk is being used daily in the production of processed dairy products; about half of this is used in products other than ice cream and other frozen desserts. By far the great proportion of the condensed skim milk is used for ice cream and frozen desserts, but a significant quantity is used for the production of cultured cream, and cream for cottage cheese.

[1] The assistance of the health officers in the cities in Wisconsin is gratefully acknowledged.

TABLE 1 — USE OF NONFAT DRY MILK AND CONDENSED SKIM MILK IN MARKET MILK DAIRY PRODUCTS PROCESSED IN DAIRY PLANTS IN 25 WISCONSIN CITIES ON ANY GIVEN DAY.

Dairy Product Processed	Nonfat dry milk		Condensed skim milk	
	Quantity of nonfat dry milk used	Quantity of dairy product in which nonfat dry milk was processed	Quantity of condensed skim milk used	Quantity of dairy product in which condensed skim milk was processed
	(lbs.)	(lbs.)	(lbs.)	(lbs.)
Cultured buttermilk	489	1,380	0	0
Cottage cheese	2,621	151,260	0	0
Half & half (cream)	373	28,745	47	240
Chocolate milk	95	9,600	0	0
Cream for cottage cheese	1,102	42,543	719	12,830
Low fat & 2% milk	2,250	99,540	46	800
Ice cream & frozen dessert	3,548	48,070	17,974	62,410
Cultured cream	836	29,008	7,865	22,300
Totals	11,314	410,146	26,651	98,580

NEED AND RECOMMENDED PRINCIPLES FOR FEDERAL MILK SANITATION LEGISLATION [1]

Background

The Association of State and Territorial Health Officers and the Conference of State Sanitary Engineers, in the interest of facilitating the flow of high quality milk in interstate commerce and of preventing the use of milk sanitation requirements as trade barriers, enlisted the cooperation of the U. S. Public Health Service in a study of these problems. In accordance with the recommendation (*Appendix A*) passed by the ASTHO at its 1957 annual meeting, and pursuant to the direction of the Association's Executive Committee on May 14, 1958 following its consideration of CSSE Resolution No. 3e (*Appendix B*), a subcommittee of the Environmental Sanitation Committee, ASTHO, was appointed to study the matter of Federal milk sanitation legislation relating to these problems. The members of this subcommittee were: Dr. Russell E. Teague, Chairman, Mr. Alfred H. Fletcher, Dr. Henry A. Holle, Mr. Karl M. Mason, Mr. C. B. Neblett, Dr. Carl N. Neupert, Mr. Blucher A. Poole, Dr. James E. Scatterday, and Mr. Willis Van Heuvelen.

This subcommittee met with representatives of the Public Health Service in Washington, D. C. on September 4, 1958, to consider the current status of the sanitary control of milk, the need for Federal regulation of interstate milk supplies, and the merits of bills which have recently been introduced in the Congress for Federal regulation of fluid milk and fluid milk products. The preliminary report prepared by the subcommittee was approved by both the Environmental Sanitation Committee and the Federal Relations Committee of the ASTHO. Based on the report and recommendations of these Committees, as well as subsequent discussion of the problems involved, the Association formally adopted the following statement and recommendation.

Statement

Resolution No. 10 (*Appendix C*) adopted by the ASTHO at its 1957 annual meeting, and Resolution No. 3e adopted by the CSSE at its 1958 meeting, both dealing with the responsibilities of State and local health agencies for the sanitary control of milk supplies and the continuing need for the exercise of such control as a consumer protection measure, were reviewed. Consistent with these resolutions, the Association believes there is a need to strongly reaffirm that the sanitary control of fluid milk and fluid milk products is a public health matter which is primarily the responsibility of State and local governments except where interstate commerce is involved, and that the exercise of such control should be vested in health departments which are consumer protective agencies rather than in agencies whose principal responsibility is to foster agricultural interests.

The Association gave consideration to the practice of some States and municipalities to use health regulations as economic barriers to the free movement of fluid milk both in intrastate and interstate commerce, a practice which has resulted in several bills being introduced in the Congress to establish pre-emptive Federal control over interstate milk. The Association recognizes that States and their political subdivisions have the right to exclude milk of questionable quality, but unanimously agrees that health regulations should not be used to restrict either the intrastate or interstate movement of milk of high sanitary quality. In this connection it is felt that the sanitary control of market milk and milk products cannot be divorced from the economics of milk production, processing and marketing, and that health agencies at all levels of government have a responsibility to avoid taking actions which cannot be sustained on public health grounds and which have an adverse economic effect on the dairy industry.

The changes which have taken place in the dairy industry in the past 25 years, and which have resulted in greatly increased volumes of milk being offered for sale in interstate commerce, were reviewed in order to determine whether or not the present system of State and local supervision could be utilized for the control of interstate milk shipments without creating an undue burden on interstate commerce. It was the consensus of opinion that the problems of the industry can no longer be considered solely on a local milk shed basis, that the increased interstate movement of milk has complicated its control by State and local agencies, and that uniform sanitary standards and practices are necessary to insure the quality of milk shipped interstate and to eliminate the unjustified use of health regulations as trade barriers. While the voluntary cooperative State-PHS program for the certification of interstate milk shipments, established

[1] An official statement and recommendation of the Association of State and Territorial Health Officers adopted at its annual meeting in Washington, D. C., October 20-24, 1958. Additional copies of this report may be obtained from Dr. M. I. Shanholtz, Secretary, ASTHO, Virginia Department of Health, Richmond 19, Va.

at the request of the ASTHO, has greatly facilitated interstate milk shipments, it has not been able to break down deliberate barriers toward which current Federal legislative proposals are directed. For these reasons, it was agreed that some form of Federal legislation is needed.

The Association considered specific forms of Federal legislation that might be appropriate. While it favors the objectives of H. R. 7794 and certain aspects of this and similar bills, it is opposed to those sections of the bills that would provide for centralized Federal control, supervision, and the extension of such control to all milk supplies "affecting interstate commerce". It was felt that direct Federal supervision would unnecessarily superimpose another layer of control on existing State and local systems that might be utilized, and that the "affects interstate commerce" provisions would result in the Federal government pre-empting the right of State and local governments to control their intrastate supplies.

Consideration was also given to an approach which would simply place a legislative base under the present voluntary State-PHS milk certification program. It was recognized that such an approach would not solve in its entirety the trade barrier problem and thus would not be acceptable to the proponents of the proposed Federal legislation. However, in view of the fact that the voluntary certification program, which utilizes State and local inspection services, has proven effective and practical in operation, the Association believes that the essential elements of this program should be incorporated into any Federal legislation enacted by the Congress to control interstate milk supplies. It was the consensus that if these elements were coupled with a provision prohibiting a State or municipality from excluding milk from out of State sources which compiled with basic public health criteria for certification, that such an approach would provide an effective and practical means of assuring high quality products for consumers in milk-importing areas and for eliminating the use of health regulations as trade barriers without abridging the rights of State and local agencies to control the sanitary quality of their intrastate supplies. In fact, the Association believes that this approach would strengthen the programs of State milk sanitation agencies. Therefore, the following recommendation was passed on October 24, 1958 at the annual Association meeting in Washton, D. C.

RECOMMENDATION

That the Association of State and Territorial Health Officers recommend to the Congress the adoption of Federal legislation pertaining to interstate milk shipments, incorporating the following principles:

A. Declare as public policy that the sanitary control of fluid milk and fluid milk products is necessary to protect the public health, and that the exercise of such sanitary control is primarily the responsibility of State and local health departments, except that no State or local government has the right to obstruct the free movement in interstate commerce of fluid milk products of high sanitary quality by the use of unnecessary sanitary requirements or other health regulations;

B. Establish uniform sanitation standards and practices consistent with those contained in the unabridged form (Part III and Part IV) of the Milk Ordinance and Code — 1953 Recommendations of the Public Health Service, for fluid milk and fluid milk products shipped in interstate commerce;

C. Authorize the Surgeon General of the Public Health Service to conduct, in cooperation with State milk sanitation authorities, a program for certification of interstate milk shippers, in which certification would be based on compliance ratings made by State milk sanitation rating officials in accordance with a rating method, criteria and procedures to be promulgated by the Surgeon General of the Public Health Service;

D. Authorize the Surgeon General to certify only those interstate sources of fluid milk and fluid milk products which are awarded a compliance rating of 90% or more by the State milk sanitation authority;

E. Authorize the Surgeon General:

(1) To make such ratings, inspections, laboratory examinations, studies and investigations as he may deem necessary to satisfy himself as to the validity of the sanitation compliance ratings submitted by the State milk sanitation authorities for certification,

(2) To provide for revocation or suspension of certifications for cause, and

(3) To disseminate information on certified sources;

F. Prohibit the use of State and local milk regulations as trade barriers to the interstate shipment of fluid milk and fluid milk products of high sanitary quality by providing that no State, municipal or county authority or official may exclude, on public health grounds, or because of varying sanitation requirements, any fluid milk and fluid milk products shipped in interstate commerce from sources certified by the Surgeon General as having a sanitation compliance rating of 90% or more, if, upon receipt, such fluid milk and fluid milk products comply with the bacterial standards, temperature requirements, composition standards, and other criteria specified in the prescribed sanitation standards and practices;

G. Authorize the Surgeon General to amend the prescribed sanitation standards and practices if, after

consultation with State and territorial health authorities, other State milk control agencies and the dairy industry, he finds amendments are necessary to either protect the public health or to eliminate obsolescent sanitation standards and practices;

H. Authorize the Surgeon General:

(1) To conduct research and investigations, and to support and aid in the conduct by State agencies, other public or private organizations and institutions of research and investigations, concerned with the sanitary quality of fluid milk and fluid milk products, and

(2) To make the results of such research studies and investigations available to State and local agencies, public or private organizations, and the milk industry;

I. Authorize the Surgeon General to:

(1) Train State and local personnel in milk sanitation methods and procedures,

(2) Provide technical assistance to State and local milk sanitation authorities on specific problems,

(3) Conduct field studies and demonstrations, and

(4) Cooperate with State and local authorities, public and private institutions, and industry, in the development of improved programs for control of the sanitary quality of milk; and

J. Exclude from provisions of the legislation manufactured dairy products such as butter, condensed milk and evaporated milk unless used in the preparation of fluid milk or fluid milk products, sterilized milk or milk products not requiring refrigeration, all types of cheese other than cottage cheese, and nonfat dry milk, dry whole milk and part fat dry milk unless used in the preparation of fluid milk or fluid milk products; and further

K. Authorize necessary appropriations for the Surgeon General to carry out his responsibilities under the legislation;

That its Secretary transmit the views contained in this recommendation to the Secretary of the Department of Health, Education, and Welfare, to the appropriate committees of the Congress, and to other interested parties.

APPENDIX A

RECOMMENDATIONS OF THE ASSOCIATION OF STATE AND TERRITORIAL HEALTH OFFICERS – 1957

That an appropriate Committee of the Association of State and Territorial Health Officers be appointed to work with the Surgeon General to determine the advisability of Federal legislation which is currently being developed in the field of sanitary control of milk shipped interstate.

That the Public Health Service strengthen its program for the certification of interstate milk shippers so as to increase the confidence of the participating States in the effectiveness of the program, and that the Service encourage in every way possible the National Conference on Interstate Milk Shipments.

APPENDIX B

CONFERENCE OF STATE SANITARY ENGINEERS RESOLUTION NO. 3e

LEGISLATION – MILK SANITATION

WHEREAS, milk is a highly perishable food product for the most part produced and marketed intrastate, the sanitary control of which has been effectively conducted on a local milkshed basis, and

WHEREAS, milk sanitation programs conducted by State and local health agencies, with technical assistance from the Public Health Service, have markedly reduced the incidence of milk-borne disease, and

WHEREAS, several bills have been introduced in the Congress to establish Federal sanitary control over milk shipped interstate, most of which would abridge the rights of States and their political subdivisions to protect their market milk supplies and some of which would separate sanitary control of milk from health agencies:

Therefore be it

RESOLVED, that the Conference of State Sanitary Engineers, representing the 48 States, Alaska, Hawaii, Puerto Rico and the Virgin Islands, in conference assembled, May 9, 1958, at Washington, D. C., take a positive position to the effect that Federal milk sanitation legislation should include the following principles:

(1) a declaration by the Congress that the sanitary control of fluid milk and fluid milk products is a public health matter and is the responsibility of States and their political subdivisions,

(2) authorize the Public Health Service to conduct research and to provide technical services and training in support of State and local milk sanitation programs, and (3) require the Public Health Service to administer a voluntary program for certification of the sanitary quality of fluid milk and fluid milk products shipped in interstate commerce, in cooperation with the States and the milk industry:

And be it further

RESOLVED, that copies of this resolution be transmitted to the Surgeon General of the Public Health Service and to the Association of State and Territorial Health Officers, with the recommendation that authorization be given to have the position of

this Conference, as stated herein, formally presented in testimony before any future Congressional hearings dealing with the sanitary control of fluid milk and fluid milk products.

APPENDIX C

ASSOCIATION OF STATE AND TERRITORIAL HEALTH OFFICERS RESOLUTION NO. 10

MILK SANITATION

WHEREAS, milk has been in the past an important agent in the spread of disease, and

WHEREAS, in the event of outbreaks of disease the public health agencies become responsible for locating the failures of preventive measures and for halting the spread or recurrence of the outbreaks, and

WHEREAS, milk retains all its potentialities as a transmitter of disease, although present-day practices of sanitary control have greatly reduced the incidence of illness brought about by milk consumption, and

WHEREAS, present-day practices of sanitary control were brought about by the unremitting efforts of health agencies over a period of 75 years, in the face of determined resistence by the producers and marketers of milk, and by agencies supporting their interests, and

WHEREAS, public health agencies, in the present, as in the past, have the primary legal and moral responsibility for preventing disease, the professional and technical skills that are required by such work, an abiding belief that prevention of disease is an important service of government, and a readiness to put the consumer's interest over and above commercial interests, and

WHEREAS, certain other agencies whose primary responsibility is to foster the interests of the producers and marketers of milk have attempted, in some cases successfully, to take over the duties of milk control from the public health agencies, and

WHEREAS, the end result of such a process must be to place an important public health responsibility in the hands of persons not fitted by interest, training or philosophy to protect the consumer of milk, while at the same time public health authorities are deprived of one of their most important means of preventing transmission of disease: Now, therefore, be it

RESOLVED, by the Association of State and Territorial Health Officers, in conference assembled at Washington, D. C. on November 8, 1957, THAT statutory provisions for the fundamental State authority for the sanitary control of milk production, processing and distribution should be vested in the State health agencies, and that the necessary delegations of duties for implementing inspections and other control measures should be made to local health departments in manners best suited to obtain uniformity, efficiency and protection in the interests of the whole community of our nation, and be it further

RESOLVED, that every effort be made by the members of the Association of State and Territorial Health Officers to further the purposes of this resolution by forcefully presenting the facts outlined herein to the public and legislative bodies of their respective States.

Special Service Article

Editor's note: This is the second of a series of articles on, "Some Essentials of Food Establishment Sanitation." This article, and those to follow will review and discuss certain selected aspects of this problem.

Some Essentials Of Food Establishment Sanitation

In the first article of this series, the importance of people in the food service industry was stressed. It was indicated that close attention should be paid to their health, health habits, and physical condition. Even with present day mechanization, the human element in the food business still stands out as a number one factor.

Food Wholesomeness.

Next to people, and practically unseparable in any list of essential elements, is the food itself. Almost universally, food ordinances stress food safety and wholesomeness. However, the question might be raised, "Is too much being taken for granted in this phase of the food control program?" While it is true that the sanitary quality of food has shown and continues to show marked improvement, the sanitarian, in his rounds of inspection must be ever alert to conditions and circumstances which may endanger food wholesomeness.

Wholesomeness, as it applies to food, is somewhat difficult to define, concisely. There are a number of points to be considered. Generally however, the broad meaning of wholesomeness of food denotes products for human consumption that have the attributes of purity, safety and acceptability. Conversely, unwholesomness is easier to define. Here, a long list detailing conditions can be given which influence food wholesomeness, directly or indirectly. However, for the purposes of this article wholesomeness will be considered to mean a pure, safe and acceptable product.

Conditions Effecting Food Wholesomeness.

When food ordinances are viewed as a whole, it is readily seen that nearly every provision points basically to the protection of food wholesomeness. Since this is true, then the sanitarian must be concerned constantly with a great variety of conditions which directly effect wholesomeness. Some of the more prominent circumstances, classified arbitrarily, and given in abbreviated form are as follows:

1. People
   a. Infectious materials. Pathogenic organisms may be introduced because of transmissible illness and the carrier state among workers.
2. Water
   a. Food or food containers exposed to, or washed in unsafe water
3. Sewage & Plumbing
   a. Drip from leaking overhead sewer or waste lines
   b. Contamination of food and food containers by sewage back flow
   c. Back siphonage into potable water
   d. Flooding of food storage areas
4. Insects
   a. The house fly and the cockroach, when allowed access to food may introduce pathogenic microorganisms
5. Rodents
   a. Rats and mice may introduce both extraneous contaminants, i. e., hair, urine, feces, and pathogenic microorganisms
6. Storage
   a. Failure to provide protected storage permitting the introduction of foreign materials or harmful microorganisms.
   b. Failure to use cold storage properly, thus allowing undesirable change to take place in food. Both enzymatic and bacterial changes will result.
7. Chemicals
   a. These may be added in a variety of ways, i. e., intentionally or accidentally. They may be in the form of preservatives or additives, soluble linings or coating on food contact surfaces or through improper use of disinfectants, insecticides and rodenticides.
8. Food Contact Surfaces
   a. Surfaces upon which food is prepared or processed, or contact surfaces of containers and utensils that have not been subjected to effective bactericidal treatment may contribute to food unwholesomeness
9. Improper Cooking
   a. Aside from a number of infectious bacteria parasites and helminths may also remain viable if cooking is not sufficiently complete. Trichinosis from insufficiently cooked pork is a classic example. Botulism, which may result from ingestion of improperly processed canned food is another example.
10. Foods Inherently Poisonous
    Mussels and clams in certain seasons, poisonous mushrooms, flesh of certain fish, ergotism from paratitic fungus of rye grain. Food allergies may also be mentioned as a factor.

Checking for Signs of Unwholesomeness

The above list of ten separate items points to the need for diligence in the inspection of food served to the public. The existence of any one or a combination of the elements listed can constitute the cause of illness, both known and unknown. Sufficient epidemiological studies of food borne outbreaks have been made to confirm the fact that somewhere along the line, some safeguard has been neglected and food has become unwholesome.

Aside from the usual environmental survey of the food establishment, made routinely day in and day

out by public health and other personnel, there are other signs and criteria which the sanitarian can use to evaluate food wholesomeness. Some of these criteria will be given for specific foods. They apply mainly to organoleptic appraisal and are useful in making on the spot decisions either to condemn food as definitely unwholesome, or to order it withheld from sale until more exacting laboratory determinations can be made.

Some Signs of Unwholesomeness

A. Fresh Meat (1)

1. Beef

a. Sliminess — this is the result of bacterial growth and is evidence of lack of proper temperature and moisture control in the refrigerator. Sliminess is usually first noticed on those parts where circulation of air is most restricted such as underneath skirt and hanging tenderloin and on the inside of the flank. Sliminess is evidenced by moist, sticky surfaces accompanied by a distinct odor which in advanced cases may become very offensive. If this condition is found to be extensive the beef should be rejected because it indicates faulty handling. The seriousness of surface slime lies in the fact that internal deterioration may have taken place.

b. Evidence of Contamination

If beef quarters or other wholesale cuts are found to be soiled and dirty this is generally evidence of carelessness during transportation and delivery. It calls for investigation into handling methods used by the packer or wholesaler. Beef, either fresh or frozen should never be piled on a dirty floor. Trucks used for transporting fresh meat should be scrupulously clean and floors covered with paper or clean canvas. All trucks should be covered. For long hauls, refrigerated trucks are used, but for local delivery generally they are not. In hot weather, even for local delivery refrigerated trucks should be used because of the high perishability of the product. Cleanliness of the beef carcass is highly important. Beef that becomes wet or contaminated with dirt spoils more readily than dry clean beef.

c. Detection of Sulphite

Sodium sulphite is sometimes illegally added to hamburger to conceal inferiority and give the meat a fresh red appearance. Such adulteration can be detected through the use of malachite green. Ten drops of a 0.20 per cent aqueous solution of machalite green is added to a half teaspoonful of meat. Meat containing sulphite will decolorize the dye quickly. This is a useful field test for the detection of added sulphite.

2. Poultry (2)

a. Decomposition

Dressed poultry decomposition can be detected by a stickiness under the wings, under the thigh, at the top of the wings and around the apron. There is a sebaceous gland at the latter portion that is often cut out by the dresser because of its quick spoilage detecting property. Chilled chickens, both drawn and undrawn have limited keeping qualities. In undrawn birds, the contents of the digestive tract are likely to ferment unless temperatures close to freezing are maintained.

3. Fresh Fish

a. Signs of Spoilage

Fresh fish is very perishable. The condition of fresh raw fish can be judged by noting certain points. The gills should be pink to dark red in color and firm. As decomposition takes place the gills become faded until in badly decomposed fish they become slimy and gray or grayish green. In old fish, the eyes become dull and sunken. When decomposed blood cells diffuse into the flesh, a reddish color around the backbone is noted. A stale fish laid across the hand is less rigid than a fresh one. In stale fish the flesh will pit on pressure since resiliency has been lost.

4. Oysters

a. Spoilage

Aside from organaleptic testing, a pH reading on oysters or oyster liquor will assist in establishing wholesomeness. The pH of fresh shucked oysters varies between pH 6.0 and 7.0. A pH value of 5.4 to 5.8 is regarded with suspicion. Values below this range are indications of decomposition. Convenient field examination can be made of the liquor by adding methyl red indicator solution. This indicator has a range of pH 5.4 to 6.0.

4. Other Foods

a. Stored Cereals — observe for possible insect infestation, rodent contamination, discoloration of sacks indicative of overhead leakage on sacks and moldiness.

b. Canned foods

Observe cans for leakers, springers or swells. A leaker is a can not hermetically sealed and which allows air to enter and the product

to exude. Leaks are qualified by section of can affected such as crimp, seam, end or body. Springers are filled cans with ends bulged. This may be from over filling, insufficient exhausting or production of hydrogen or carbon dioxide gas through bacterial action, or action of acid content on the metal of the can. When one end is pressed in with the hands or finger, the opposite end bulges out. Goods in such cans are not safe for consumption and should be rejected.

Swells are bulged out filled cans with both ends remaining taut as distinguished from the springer. Swells are caused by much the same condition as springers. The swell may also be due to pin point leaks which allows entrance of microorganisms. Swells should be rejected as unfit.

Exercise Powers of Observation

This article quite obviously has not attempted to list all of the many defects which may occur in food. However, the examples given will serve to indicate that the sanitarian should look at food with a trained eye. Observation of processing, transportation, preparation and storage may reveal faults which lead to some of the conditions described above. Food defects, in nearly all cases, indicate faulty handling, or a failure to employ satisfactory techniques. Persons working regularly with foods should cultivate an inquisitive attitude as regards to food wholesomeness. This is highly essential to the proper enforcement of the common provision in most food ordinances which reads about as follows: *All food and drink shall be wholesome, free of spoilage, adulteration, misbranding and contamination and shall be safe for human consumption. It shall be handled, prepared and served in a sanitary manner and under sanitary conditions.* This section encompasses a wide and inclusive background. Essentially, it is one of the basic principles for effective food control. Other specific details establishing environmental factors stem from it and are closely allied with it.

REFERENCES

1. War Department, "Inspection of Subsistence Supplies, TM 10-210, 1940, Washington, D. C.
2. Adams, H. S., "Milk and Food Sanitation Practice, 1947." The Commonwealth Fund. New York, N. Y.

COMMITTEE REPORTS — 1958

REPORT OF THE COMMITTEE ON ORDINANCES AND REGULATIONS PERTAINING TO MILK AND DAIRY PRODUCTS — 1958

MILK FOR MANUFACTURING REQUIREMENTS

In 1956 the Committee on Ordinances and Regulations reviewed and summarized state laws and regulations pertaining to milk for manufacturing and concluded that more attention should be given in some areas to the sanitation requirements for such milk with corresponding emphasis on appropriate quality standards. Logically, the 1957 Committee investigated the possibility and desirability of the Committee preparing suggested standards and requirements for milk for manufacturing. The investigation, which continued through 1958, included observations of trends in milk for manufacturing and interviews with regulatory officials concerned with this problem. Consideration was also given to the possible scope of such requirements.

Early in 1958, however, the Committee was advised by the United States Department of Agriculture of the impending need for that agency to explore the possibility of writing production requirements for milk for manufacturing. The Committee on Ordinances and Regulations regards such activity on the part of the United States Department of Agriculture as a step which may lead to very satisfactory fulfillment of the recommendations contained in the 1956 report in respect to milk for manufacturing.

In view of this and in the interest of promoting uniformity and avoiding duplication, the Committee on Ordinances and Regulations feels it can best accomplish its objective by serving in an advisory capacity and reviewing the proposed specifications, as requested by the United States Department of Agriculture, and submitting the recommendations to the Association.

LABELING OF MILK, MILK PRODUCTS, AND FROZEN DESSERTS

At the 1957 Annual Meeting of the Association, the Committee on Ordinances and Regulations was assigned the task of studying the problem of variations in labeling requirements and their interpretations and making recommendations which would lead to greater uniformity of labeling.

During the year the Committee explored various ways and means of accomplishing this objective and attempted to more clearly define the problem. The following conclusions were reached:

1. Although conflicting labeling requirements do exist among various jurisdictions, misunderstanding and variations in interpretations are important contributing factors in the lack of uniformity in labeling.
2. Industry's primary interest is in labeling regulations that are uniform and that can be clearly interpreted.
3. Progress toward uniformity in labeling can best be achieved through a cooperative effort whereby regulatory officials will meet to discuss their differences in labeling and be willing to make adjustments in their respective requirements in the interests of uniformity.

4. Conferences of regulatory officials on a regional basis, rather than one national effort, will be most productive.

5. The Committee on Ordinances and Regulations should provide the regional groups with basic guide lines for labeling requirements and perform a liaison service so that the work in the various regions will be in harmony.

6. The project should embrace milk, milk products, and frozen desserts. Consideration will first be given, however, to fluid products.

The committee on Ordinances and Regulations therefore considers its most expedient course of action to be that of encouraging regional cooperation among states on uniformity in labeling laws and their interpretations, and to establish close contact with such regional groups in order that the over-all effort will lead to nationwide uniformity. Essential to the success of this plan will be the development, by the Committee, for dissemination to the regional groups, basic guide lines on labeling requirements. A subcommittee has been appointed to draft these rules.

Members of the Committee located in various areas of the United States will serve as contacts between the regional groups and the Committee on Ordinances and Regulations. One cooperating regional group was organized recently in the Northeast and several more are in existence over the United States as committees of other organizations.

NEW YORK CITY SANITARY CODE REVISION

Last spring the New York City Department of Health requested the International Association of Milk and Food Sanitarians to review and make recommendations on the proposed New York City Sanitary Code. The International referred the Code to the Committee on Ordinances and Regulations for study and comment.

The Committee restricted its review to Title IV Environmental Sanitation; Article 101, Milk and Milk Products, and Article 103, Frozen Desserts. After careful study of the provisions of these Articles the Committee on Ordinances and Regulations concluded that the proposed draft is in need of considerable revision and modification to bring it into suitable form and recommends that the International Association of Milk and Food Sanitarians report the Committee's conclusions to the Commissioner of Health of the City of New York. The Committee also recommends that its specific comments regarding Articles 101 and 103 be submitted by the International Association of Milk and Food Sanitarians to the Commissioner of Health.

TUBERCULOSIS TESTING

During the year, the Committee received from a farm organization a resolution requesting certain modifications in the tuberculosis testing requirements of the United States Public Health Service Milk Ordinance and Code. The resolution called for altering the eradication program to permit slaughterhouse testing of animals for tuberculosis in place of the present system of testing. Upon careful study and consultation with various authorities in the field of animal disease eradication the Committee concluded that such a testing procedure is not adequate and, furthermore, would reduce the uniformity of testing which now exists.

FUTURE WORK

The Committee on Ordinances and Regulations earnestly invites the membership of the Association to submit for review, directly or through their affiliate association, comments, suggestions, and proposals which will advance the uniformity, practicability, and enforceability of regulations. It is through such cooperation that this Committee can most effectively serve the membership of the International Association of Milk and Food Sanitarians.

Donald H. Race, *Chairman*	K. A. Harvey
H. J. Barnum	C. H. Holcombe
C. V. Christiansen	Dr. R. M. Parry
Dr. J. C. Flake	John Richman
A. B. Freeman	E. Small
O. H. Ghiggoile	Stephen J. Wolff

REPORT OF THE COMMITTEE ON MEMBERSHIP — 1958

The function of a membership committee is to obtain new members. To determine the methods for accomplishing this task requires a considerable amount of prior preparation in order to formulate a plan for at least a 3-year campaign.

Your Committee has now prepared a format for this campaign. The preliminary steps will consist of sending letters to each member of the Association, asking him to help in our drive to interest sanitarians in becoming members of the world's foremost organization of milk and food sanitarians.

The scond step will consist of a letter to all of the nonmember sanitarians in the United States and Canada, pointing out to them the many advantages of membership in the International Association of Milk and Food Sanitarians. This, of course, is a formidable task and the Committee, together with the help of many members of our Association, have already compiled a list with the names of several thousand sanitarians.

To achieve this goal we need your help. This program will be of direct benefit to you as well as any new members you obtain. Increasing the membership will allow us to broaden the scope and coverage of the *Journal of Milk and Food Technology, thus* increasing the value of the Association to all members.

Within the next few months, you will be receiving a letter asking you to obtain at least one new member this coming year. It will supply you with a number of pertinent facts to use. If you are in a state or area where an affiliate is in existence, request the new member to join through the affiliate. In all other cases, the membership application, which will be enclosed with the letter, should be mailed directly to the Executive Secretary.

Many affiliates have already embarked on a recruitment program. Some of them have devised methods for this purpose which we think could be duplicated on a national scale. However, before your Committee can undertake any of these methods, they will first present them to the Executive Board for review.

In order to add a personal note to the letters of prospective members, the Committee feels that in areas where affiliates do not exist at present, that the letters should be signed by a sanitarian in that area. In order to further this goal, we are asking each of you who are involved to write to the *Chairman* and indicate your willingness to assist.

Of the many suggestions made to the Committee during the past year, the following are a few that we would like to bring to the attention of the membership for their scrutiny.

1. All new members accepted during the remainder of 1958 will not be required to pay any additional dues until 1960. This will include subscription to the *Journal of Milk and Food Technology.*

2. At each affiliate meeting accept new members at $3.00 for the first year, this to go to the International, and charge a registration fee to all in attendance to make up the loss to the affiliate.

3. Ask prospective members to write for a free copy of the *Journal of Milk and Food Technology* in order to acquaint them with one of the outstanding features of our organization.

There is an important question that must be answered before the plan becomes functional. Your Committee decided that the Chairman should sign the letters to present members of our Association. However, in recruiting new members, it was felt that the Chairman should appear before the Affiliate Council meeting to determine their attitudes before a final decision is made. The Council was of the opinion that for recruitment in areas where affiliates exist, that letters should be sent by the local affiliates. The letters are to be prepared by the Committee and can be reproduced in quantity for the affiliate on its own stationery.

The future of sanitarians is dependent to a great extent upon professional recognition for the tremendous part they play in the protection of the public's health. In order to accomplish this goal, we need a strong organization that will not only be recognized, but also will be respected by all the public health professions.

To sit idly by and wait for this task to be accomplished by others can never result in success. It must be emphasized and reiterated that the active support of each member of our organization is needed to accomplish this purpose.

Harold Wainess, *Chairman*
Harold J. Barnum
Dr. H. E. Calbert
D. C. Cleveland
Dr. L. K. Crowe
Clifford Goslee
Mel H. Herspring
Dr. C. K. Johns
Howard K. Johnston
Kenneth L. Pool
P. E. Riley
Otis E. Skiles
H. L. Thomasson
L. O. Tucker
Charles E. Walton
George Wright

REPORT OF THE COMMITTEE ON RECOGNITION AND AWARDS — 1958

Two awards for distinguished service — The Citation Award and the Sanitarian's Award — are presented annually by the International Association of Milk and Food Sanitarians, Inc. It is the responsibility of the Committee on Recognition and Awards to conduct those activities of this Association concerned with selection of the recipients, presentation of the awards, publicity, and related matters.

The purpose of The Citation Award, which was formally established in 1952, is to bestow well-deserved recognition upon members of this Association who, through long and distinguished service, have contributed greatly to the professional advancement, growth, and stature of the International Association of Milk and Food Sanitarians, Inc. The rules for this Award state that a suitably framed citation shall be presented each year to that member whose past services have been judged to be the most outstanding.

Any member of the Association, or an Affiliate Association, may nominate an individual for The Citation Award. Such nomination must be accompanied by a statement listing the individual's past contributions and services to the Association, and it must be mailed prior to May 1 if the candidate is to receive consideration for the current year's award. All nominations are reviewed and rated by the Committee on Recognition and Awards, and the nominee receiving the majority vote of the Committee is named the recipient. This year six nominations were received by the Committee. Dr. Milton R. Fisher, whose services to this Association have been outstanding, was selected as the recipient of The Citation Award for 1958. It was presented to him at the annual meeting banquet, in New York City.

The second of these two awards, The Sanitarian's Award, is in the opinion of the Committee, one of the most important honors that can be conferred upon a professional public health worker. It was created for the purpose of bestowing long overdue recognition upon the local sanitarian — the man whose contributions to public health have been so significant. The Sanitarian's Award is sponsored jointly by five manufacturers of sanitation chemicals, The Diversey Corporation, Klenzade Products, Inc., Oakite Products, Inc., Pennsylvania Salt Chemicals Company, and the Olin Mathieson Chemical Corporation, and is administered by our Association. It consists of an appropriate plaque and one thousand dollars in cash. It is conferred annually upon a local sanitarian from the United States, or Canada who, within the past five years, has made meritorious contributions in the field of milk and food sanitation and to the public health and welfare of his community.

The rules governing the eligibility of candidates for The Sanitarian's Award, method of nomination and method of selection, are published each year in the December or January issue of the Journal of Milk and Food Technology. The Committee on Recognition and Awards has sole responsibility of the selection of the recipient, and the Executive Board has no voice in the selection. This year ten nominations for The Sanitarian's Award were received by the Committee. Selection of the recipient from among these men was a difficult task, however, the Committee judged the over-all contributions of Mr. Carl A. Mohr, of the Green Bay, Wisconsin Health Department to be the most outstanding and he was selected as the recipient for 1958.

In 1957, the Committee in its report recommended that each Affiliate Association establish a Committee on Awards. It is gratifying to note that a number of affiliates did this with the result that seven of the ten nominees submitted in 1958 originated from these committees.

The Committee on Recognition and Awards now consists of six members — the two immediate Past Presidents and four members selected at large. The tenure of appointment for all members is now two years and their terms are staggered so that one-half of the members are replaced each year. The Senior Past President serves as Chairman of the Committee and votes only in the event that it is necessary to break a tie.

The Committee wishes to thank all those who assisted and cooperated in the 1958 program.

Harold S. Adams, *Chairman*, Indianapolis, Ind.
Richard S. Mansfield, Tennessee Assoc.
Richard M. Parry, D.V.M., Connecticut Assoc.
James M. Doughty, Jr., Texas Assoc.
Paul Corash, New York Association and immediate Past President
C. G. Leonard, So. Carolina Assoc.

REPORT OF COMMITTEE ON FROZEN FOOD SANITATION — 1958

There are numerous "heat and eat" frozen food items currently available on the market. From the standpoint of fabrication, these food items fall into two categories:

1. Foods in which the ingredients, either raw or cooked, are assembled and are thoroughly cooked before packaging and freezing. There is little or no possibility of contamination by handling after final cooking of this type product, and these products normally show a low bacteria count.

2. Foods in which the ingredients are precooked, subjected to one or more hand operations (cutting, boning, dicing, etc.), then assembled, packaged and frozen without any further heat treatment. These foods are contaminated by handling after cooking, and they normally show a much higher bacterial count than foods in the first category.

From a public health standpoint, the foods in the second category pose a problem. In 1956, this Committee conducted a limited bacteriological study on this class of food and found, in several cases, extremely high bacteria counts and the presence of organisms which are indicative of fecal contamination. This study was reported to the membership at the meeting in Seattle, Washington, and was published in the May, 1957 issue of the Journal.

Manufacturers discount any possible danger to the consumer with the statement that since these foods are thoroughly heated by the consumer immediately prior to eating, any pathogens present will be killed. While it was felt there was some merit to this argument, it was observed that directions on the packages for cooking these products varied widely from manufacturer to manufacturer.

In order to determine whether the cooking directions given by the manufacturers were adequate to produce a temperature lethal to pathogens throughout the product, your Committee conducted a limited study of the heat penetration in seven different "heat and eat" frozen food items. The products selected for the study were beef pot pies, chicken pot pies, turkey pot pies, tuna pot pies, roast beef hash, spaghetti and meat in sauce, and macaroni and cheese. Duplicate samples were obtained from 9 manufacturers of beef pot pies, 9 manufacturers of chicken pot pies, 9 manufacturers of turkey pot pies, 2 manufacturers of tuna pot pies, 1 manufacturer of roast beef hash, 1 manufacturer of spaghetti and meat in sauce, and 1 manufacturer of macaroni and cheese. All samples were purchased from retail outlets on a consumer basis.

Most directions for cooking these products specify that the oven shall be preheated to a given temperature and then the food placed in the oven for a stated interval of time. If a housewife is in a hurry, it is conceivable that the food may be placed in a cold oven with the thermostat set at the stated temperature and the food allowed to remain in the oven for the stated time. To obtain data as to the effect of this situation, the samples obtained were divided — one sample being placed in an oven preheated according to label instructions and the duplicate sample placed in an unheated oven.

These findings indicated that, in many cases, the present directions for heating these classes of frozen foods leave much to be desired in obtaining adequate heat treatment to provide lethal temperatures; particularly if the foods are heated in a nonpreheated oven. These results, coupled with the results of the bacteriological study made by this Committee in 1956, indicate that a potentially hazardous situation exists in frozen "heat and eat" foods. The bacteriological study indicated the occurrence of high total bacteria counts and the presence of organisms of the coliform, paracolon, and other members of the gram negative enteric group in many of the samples examined. The present study indicates, in many instances, that following the directions on the label does not result in a lethal temperature in the food.

It is the opinion of the Committee that this situation needs further attention and action by public health officials. There is need for improved sanitary conditions in the manufacturing operations and especially a need for pasteurization or sterilization of the product before filling to reduce or eliminate the bacterial load in these foods. There is a need for manufacturers to re-examine their label directions for cooking to provide lethal temperatures in these foods. This Committee believes that this situation is of sufficient gravity to warrant concerted efforts by public health and regulatory officials to acquaint the industry with these potentially hazardous conditions and to work with industry to find a satisfactory solution to the problem.

Frank E. Fisher, *Chairman,* Indiana Association
W. P. Boylston, South Carolina Association
O. A. Ghiggoile, California Association
Glenn Hayes, Illinois Association
William C. Miller, Jr., I.A.M.F.S.
Raymond Summerlin, Georgia Association
Kenneth G. Weckel, Wisconsin Association

REPORT OF THE COMMITTEE ON FOOD EQUIPMENT SANITARY STANDARDS — 1958

Following the pattern set in 1957, increasing activity has been apparent in the development of food equipment standards through cooperation between industry and health agencies. This committee is still active with two agencies in this area, namely the National Sanitation Foundation (NSF) and the Automatic Merchandising — Health Industry Council (AMHIC).

NATIONAL SANITATION FOUNDATION

The annual meeting of the Joint Committee on Food Equipment Standards of the National Sanitation Foundation was held in Ann Arbor, Michigan, April 8, 9 and 10, 1958, which the Chairman of this Committee attended.

During the meeting the subject of the Special Device Program reported on by the committee in 1957 was again discussed. The Joint Committee agreed upon three avenues of approach to the development of food equipment standards, namely:

1. Standards *per se* when the work is done in connection with an industry task committee.

2. Broad criteria for evaluating classes of equipment in a general category but where limited industry participation is secured.

3. Broad criteria for all other food equipment not falling under 1 or 2 above.

In all three cases, the Joint Committee is to function only in the establishment of such standards or criteria and not in the area of approval of specific pieces of equipment when they meet the standards or criteria established.

This agreement completes the action started in 1957 to divorce the approval of special devices from the activities of the Joint Committee. Pending the clarification of this point by the Executive Board of IAMFS, the Chairman of this Committee passed all votes regarding special devices handled at the April meeting.

Standard No. 5, for hot water heating equipment was completed with the addition of charts and tables for the sizing

of equipment and is now ready for reproduction and distribution. It is recommended that this standard be accepted by our association. This should prove a valuable tool to the sanitarian in the field who is faced with approval of water heating equipment installations.

The development of Standard No. 6, for counter type freezers has reached a point where very few items remain in question. At present the proposed standard is being checked with Mr. E. B. Buchanan who is to work with the committee in this field as a member of the Sanitary Procedures Committee. Since these two committees are both working in this field, it is imperative that no conflict exist between standards developed by the 3A Committee and the NSF.

The development of "Basic Criteria for the Evaluation of Manual Activated and/or Coin Activated Vending Machines" has continued this year with both NSF and AMHIC. This document being prepared by NSF is nearing completion and should be ready for distribution during the next few months. It is not anticipated that it will bear a standard number but will be identified by its title alone.

In the coming year the development of standards in the following areas is expected to start:

1. Pot, Pan and Tray Washing Equipment.
2. Refrigeration Equipment
3. Mechanically Operated Food Preparation Equipment

Copies of the latter two have been requested for an early review by the entire committee:

AUTOMATIC MERCHANDISING — HEALTH INDUSTRY COUNCIL

On June 4, 1958, the third meeting of the newly formed Automatic Merchandising Health Industry Council of the National Automatic Merchandising Association (NAMA) was held. Since the activities of this group are in the area of food equipment, the chairman of the Food Equipment Committee was requested by the President to act as the International Association of Milk and Food Sanitarians representative, pending formal acceptance of a voting membership on AMHIC.

AMHIC serves as a advisory body to NAMA. As such, it makes recommendations regarding NAMA programs for machine evaluation, research, education and related sanitation activities.

It is expected, during the coming year, that this group will develop basic criteria which will be used to give uniform evaluation of machines by all evaluating agencies. Such evaluation is to determine compliance with the USPHS Ordinance and Code, "The Vending of Foods and Beverages."

It was also decided to hold more frequent meetings of AMHIC to expedite the development of such criteria. The next meeting will be in St. Louis, Missouri, in November in connection with the annual meeting of NAMA.

In the near future NAMA will mail lists of machines, for which a certificate of compliance has been issued, to all interested parties upon request. Routinely they will be mailed to Regional Offices of the Public Health Service and to State Health Departments.

This particular phase of standards development promises to increase in the near future. It is recommended that the IAMFS formally accept a voting membership on AMHIC and that this responsibility be added to the other activities of this committee in keeping with item (2) of the stated objectives of the the committee.

GENERAL ACTIVITIES

Also during the year two separate companies contacted Mr. Thomasson, Executive Secretary requesting assistance in developing equipment standards in related food industries. Both these requests have been answered and offers of assistance given in keeping with our operating policy in this field.

CONCLUSION

In 1957 both co-chairmen of the committee tendered their resignations upon accepting employment with industry groups. The loss of these two men, William V. Hickey and David E. Hartley, will be felt by the committee for a long time to come.

Late in 1957 the present chairman was appointed for 1958 together with several new members.

It should be noted that in the case of counter-freezers NSF and 3A are both developing standards. Also the committee is working with NSF and AMHIC on the development of criteria for the evaluation of vending machines. Both situations must be approached in such a manner that we do not establish dual standards for a given piece of equipment. The committee is working hard to see that such a situation does not occur.

The year ahead promises to be a most active one with a number of new standards being scheduled for study. It has become quite apparent that the need for standards for all types of food equipment is increasing due to the important part they play in uniformity of inspection in the food sanitation field. Both NSF and AMHIC are to be commended for the work they are doing in this field.

John H. Fritz, *Chairman*
Col. F. H. Downs, Jr.
Karl K. Jones
John McCutchen
Wilbur C. Parkinson
James W. Smith
James A. Stalbird
Jerome Trichter
James A. Westbrook
Lt. Commander D. R. Gooden, MSC, USN

REPORT OF THE COMMITTEE ON COMMUNICABLE DISEASES AFFECTING MAN — 1958

The investigation and reporting of foodborne disease in the United States is notoriously poor. Even though 200 to 250 foodborne disease outbreaks involving 10 to 12 thousand persons are reported annually to the Public Health Service, many States are not reporting any such outbreaks and others are reporting less than 5 each year. Dr. K. F. Meyer has estimated that several hundred thousand cases of foodborne illness occur annually.

The Committee on Communicable Diseases Affecting Man developed and published in 1957 a Procedure for the Investigation of Foodborne Disease Outbreaks. This Procedure has already been widely accepted by States and local health authorities throughout the United States, and over 6,600 copies have been sold. In addition, the Pan American Sanitary Bureau of the World Health Organization published it in Spanish in June 1958 for distribution throughout the Central and South American countries.

This Procedure has been used in regional, State and local training courses on the investigation of foodborne disease outbreaks. State officials have reported greatly improved understanding and a fuller utilization of the Procedure by State and local sanitarians and members of other disciplines as a result

of these courses. Therefore, the Committee would urge broad endorsement and/or sponsorship by State health agencies of such training courses for wider use and more effective application of the Procedure.

Although the wide use of the Procedure in the United States will undoubtedly contribute significantly toward improved investigations of foodborne disease outbreaks, it will not necessarily improve the reporting of such outbreaks. In an effort to obtain a more accurate accounting of the actual number of food poisoning outbreaks that occur annually and the number of persons involved in the United States, the Committee on Communicable Disease Affecting Man is currently undertaking a comprehensive survey which will not only indicate the number of outbreaks which occur in a given unit of population but also the foods most commonly involved, the types of establishments to which most outbreaks can be traced and the factors which most frequently contribute to such outbreaks. This information will be requested through a questionnaire to selected individuals active in milk and food sanitation work and who are known to have a professional interest in this subject. The data collected will be summarized and analyzed, and a comprehensive report prepared for presentation at the annual meeting in 1959.

Raymond J. Helvig, *Chairman*, Silver Springs, Maryland
John Andrews, Raleigh, North Carolina
H. L. Bryson, Vancouver, B. C., Canada
Raymond Fagan, Kenneth Square, Pennsylvania
John H. Fritz, Washington, D. C.
Stanley L. Hendricks, Iowa Association
Dwight D. Lichty, Florida Association
E. R. Price, Missouri Association
T. E. Sullivan, Indiana Association

SUMMARY REPORT OF THE DAIRY FARM METHODS COMMITTEE — 1958

The Dairy Farm Methods Committee held two regional meetings this year in addition to the one held at the annual meeting. One was held at the 3-A Committee meeting in St. Louis, Missouri in May and the other in conjunction with the New York State Association Farm Practices Committee meeting in Norfolk, Connecticut in June. At the latter meeting only the eastern representatives were in attendance.

Our major study this year has been principally the Cleaning-in-Place of farm pipeline milkers. A Task Committee under the chairmanship of Kelly Saunders has, by means of a questionnaire, made an extensive study of the thinking of people in the Industry as well as committee members relative to the handling of in-place cleaning of pipeline milkers on the farm in regard to the following:

1. The design and installation of such systems
2. Proper cleaning procedures
3. Methods of evaluating the cleanliness of such systems

A detailed report of the recommendations of this Task Committee is included in the complete annual report of the Farm Methods Committee.

This committee has also been concerned with the presence of objectionable components in some of the filter media which is being distributed on the market today. Samples of all makes of filter material have been checked in a research laboratory and recommendations made to the manufacturers. The cooperation of the filter material companies has been excellent and it is the feeling of this committee that there is no langer any necessity for concern in regard to this matter, particularly with respect to the manufacturers of the standard brands.

A sub-committee under the chairmanship of Professor Ivan E. Parkin has been established to consolidate all of the various state and city departmental regulations on Bulk Tank Drivers. This project is in the course of development and we expect during the coming year that the committee will be in a position to recommend standard procedures for tank truck drivers to follow in the pick up and handling of bulk tank milk on the farm.

Another sub-committee under the direction of Professor Richard P. March was established to make a survey of the less conventional types of equipment now used in conveying milk from the cow to the bulk milk tank. This sub-committee is concerned with the practicability of such equipment and the methods of cleaning it. This study will cover (*a*) the portable transport systems employing dumping stations and flexible tubing; (*b*) the transport system using portable dumping stations with rigidly installed pipelines; and (*c*) the portable pipeline milker. This study is now in effect and should be completed at the time of our next annual meeting.

R. W. Metzger, *Chairman*
C. F. Bletch
G. D. Coffee
M. K. Cook
J. C. Flake
H. C. Goslee
R. S. Guthrie
M. E. Held
H. Y. Heiskell
G. H. Hopson
R. M. Keown
J. L. Littlefield
R. P. March
A. G. McLeod
M. O'Conner
R. R. Palmer
I. E. Parkin
R. M. Parry
C. W. Pegram
A. K. Saunders
A. G. Shaw
H. F. Stone
W. Trobaugh
L. O. Tucker

REPORT OF THE COMMITTEE ON SANITARY PROCEDURE — 1958

Two meetings of the 3-A Sanitary Standards Committees, in which the Committee on Sanitary Procedure takes part, have been held since the last Report of this Committee, published in the May, 1958, number of the Journal, was presented. The first was held at the Kellogg Continuing Education Center, on the campus of Michigan State University, East Lansing, Michigan, on December 2-4, 1957. Eleven of the fourteen members attended that meeting. The Spring, 1958, meeting was held at the Pick-Melbourne Hotel, St. Louis, May 20-22, 1958, inclusive, and was attended by ten of the fifteen members.

The apparent discrepancy in the numbers of members constituting the Committee is due to several factors. Retirement, during 1957, from their positions as regulatory sanitarians prevented two active members, both of long connection with the Committee—Harry E. Bremer and H. Clifford Goslee—from accepting reappointment following the Louisville meeting. Due solely to his inability to attend meetings of the 3-A Sanitary Standards Committee, Ben Luce, of the Washington State Department of Agriculture, was not re-appointed. The death of James A. Stalbird, this Spring, further decimated the ranks of Committee members.

Early in 1958, J. L. Littlefield, Assistant Chief, Dairy Division, Michigan Department of Agriculture, became a member of the Committee.

At the close of the Kellogg Center meeting, it was optimistically presumed that the Sanitary Standards for Milking Machines, and an amendment to the 3-A Sanitary Standards

for Pumps for Milk and Milk Products, were in a form which could shortly be signed by the chairman of the several committees, and submitted for publication; and that such progress had been made toward completion of the revision of the 3-A Sanitary Standards for Farm Holding and/or Cooling Tanks that one more meeting would suffice for completion. Unfortunately, that optimism was not warranted. It was discovered that small, but significant, changes were desirable; but consideration and approval by all of the agencies engaged in their formulation had to be obtained before they could be signed and submitted for publication.

During the St. Louis meeting, 3-A Sanitary Standards for Portable and Stationary, Suspended or Floor-Type, Pail or Cow-to-Can Milking Machines, as well as an amendment of the 3-A Sanitary Standards for Pumps for Milk and Milk Products (to permit impellers or rotors to be coated with rubber or rubber-like material) were adopted. Some progress also was made toward the completion of drafts of Sanitary Standards for (*a*) methods and equipment for supplying air under pressure, and (*b*) automatic bulk fluid milk and fluid milk products vending machines.

A draft of Sanitary Standards for Fillers and Sealers of Single Service Containers for Fluid Milk and Fluid Milk Products was completed at the April, 1957, meeting of 3-A Sanitary Standards Committees, except for the enumeration of acceptable plastic materials for specified parts. Plastics must necessarily satisfy the functional requirements of filler and sealer parts, without distortion or damage, and must be nontoxic. Determination of the latter characteristics is delegated to the Food and Drug Administration. To date, the number of tentatively named plastics which has been cleared by the FDA does not warrant the inclusion of a list in the Appendix and publication of these sanitary standards must await clearance of other plastics.

Other sanitary standards in more or less advanced stages of preparation, but which have not been subjected to review by the Committee, include those pertaining to: fillers and closers of single service ice cream containers, and of cottage cheese containers, and ice cream freezers. Sanitary standards of which one or more drafts have been reviewed by the Committee (other than those already named in this Report) include those pertaining to: batch pasteurizers and to separators and clarifiers.

The only evidence of activity of the Committee (other than the 1956-57 Annual Report) published during the past twelve months has been the "3-A Accepted Practices for the Sanitary Construction, Installation, Testing, and Operation of High-Temperature Short-Time Pasteurizers," the 34-page pamphlet published in June.

The compilation of these construction, installation, testing, and operating, as well as cleaning, practices and procedures has been an undertaking the magnitude of which is not readily apparent in the mere 34 pages of printed text and flow and arrangement charts. Members of this Association, and all others who are or expect to be concerned in any way with plate-type HTST pasturizers, are indebted to those members of a sub-committee of the 3-A Sanitary Standards Committees who participated in the development of these 3-A Accepted Practices.

Paradoxically, this publication is the result of deliberations and conferences conducted three to five years ago, by individuals many of whom are no longer active in the formulation of 3-A Sanitary Standards. The draft of these 3-A Accepted Practices was considered to be complete, and ready for signature, at the time of the Dairy Industries Exposition, in Atlantic City, in the Fall of 1956. The interim has been devoted to (*a*) limitation of the application of the practices set forth, (*b*) inclusion of conditions under which a homogenizer may be located downstream from the flow-diversion device, (*c*) to very thorough editorializing and checking of the numerous cross-references to numbered and lettered sub-sections, and (*d*) careful proof-reading.

There remain to be published the 3-A Sanitary Standards for Portable and Stationary, Suspended or Floor-Type, Pail or Cow-to-Can Milking Machines, and the amendment to the Sanitary Standards for Pumps for Milk and Milk Products.

The extended delay in effecting revision of the 3-A Sanitary Standards for Farm Holding and/or Cooling Tanks—now in process for four years or more—has been of much concern and very disappointing to the Committee; fully as much so as it has been irritating to other members of the Association, individually and collectively.

Those not acquainted with the details of the procedure by which the various provisions of a sanitary standard, or of its revision, are tentatively drafted by a Task Committee, are distributed to and reviewed by members of the Committee on Sanitary Procedure prior to joint meetings of the 3-A Sanitary Standards Committees, and are discussed at those meetings, can have no concept of the causes of the delays which have plagued the 3-A Sanitary Standards program from its inception—not only in the revision of the Sanitary Standards for Farm Tanks. An accounting is clearly in order; but the time allotted to the presentation of this Report does not permit it now.

It may be stated, however, that a principal cause has been recognized, and steps have been taken to counteract it during a meeting of the Committee on Sanitary Procedure, the Milk and Food Program of USPHS, and the Task Committee on Farm Tanks, at University Park, Pennsylvania, on October 14-16, at which a concerted effort will be made to reach full agreement on the Revision of the 3-A Sanitary Standards for Farm Holding and/or Cooling Tanks.

C. A. Abele, *Chairman*
John Andrews
E. B. Buchanan
D. C. Cleveland
Paul Corash
M. R. Fisher, D.V.M.
Mark D. Howlett, Jr.
J. L. Littlefield
C. K. Luchterhand
James A. Meany
Sam O. Noles
Ivan E. Parkin
D. B. Whitehead
H. L. Thomasson, Ex. Officio

NEWS AND EVENTS

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 your questions in and we will attempt to answer them.

QUESTION:

The increasing incidence of bulk tanks has made it impossible to obtain bacteriological samples of individual producers milk in the usual manner. Going to each farm the required number of times is not economically feasible for most regulatory agencies. Can you suggest a method of sampling that will be economical and at the same time prove satisfactory to the regulatory agency.

ANSWER:

This problem of sampling bulk milk has been widely discussed. One factor must be accepted by all regulatory people, namely, that they are going to relinquish sample taking to the man that goes to the farm, the bulk tank driver. If he is trained, supervised and licensed by the regulatory agency, he can take samples for official analyses. To require an additional man to take samples from bulk tanks on farms is prohibative cost-wise, as well as unnecessary, regardless of who pays the bill, consumers or industry.

The following method is quite satisfactory to ensure a good sample.

1. Have haulers take a sample suitable for bacterial counts every day. On days it is not used for that purpose it can be used for the butterfat test. Sterile equipment should be available at all times. Large screw cap test tubes can serve as sample bottles. For plants lacking sterilizing facilities, small plastic bags with tear off tops have been used in at least one market. Dippers if used, should be carried in a sanitizer solution. In cold climates this solution must be mixed with a compatible alcohol to prevent freezing.

2. Adequate refrigeration must be provided on trucks to make certain that samples are kept cold. This system enables a regulatory agency to go to a plant, and pick up samples. Due to late arrival of tank trucks, some samples will have to be held overnight; therefore, adequate refrigeration must be provided at the plant.

A very helpful article on this and related subjects appeared in the March 1958 issue of the *Journal of Milk and Food Technology*. Anyone faced with the problem of obtaining bulk tank samples would do well to refer to this article.

It is suggested that the following individuals be contacted for further information:

Mr. Harold Barnum, City Health Department, Denver Colorado, or W. C. Lawton, Quality Control Laboratory, 2274 Como Ave., St. Paul, Minnesota.

SEEK NATION-WIDE ACTION TO OVERCOME GROWING FOOD FAD MENACE

Prominent representatives of industry, government and the medical and nutritional fields today joined in a concerted attack on food faddists and faddisms which are bilking the American public of hundreds of millions of dollars annually. All agreed that there was an urgent need for a nation-wide educational campaign to awaken the public to this increasingly serious menace to health and the pocketbook.

Addressing a joint meeting of the Nutrition Foundation and the Northern California Section of the Institute of Food Technologists at the Claremont Hotel in Berkeley, California, Dr. Fredrick J. Stare, chairman of Harvard University's Department of Nutrition, cited food faddism as a major national health problem, not only because it is a hazard to public health but also because it extracts needless millions of dollars from the mis-informed and the poor, who can ill afford it.

The medical profession, Dr. Stare emphasized, especially physicians, and nutritionists, with the help of educators, the food industry and certain government agencies have a special responsibility not only of combatting fallacies disseminated by these pseudo-authorities, but also of actively participating in supplying accurate information in positive programs of nutritional education.

At the same time, Dr. C. G. King, Executive Director of the Nutrition Foundation reported that the advances being made in the fields of food, medical and public health research are most encouraging, in the sense that we should soon be in a position to solve a number of key technical and health problems on the basis of new and reliable information. Dr. King cited as a major advance research evidence that sorghum flour can be blended with corn meal and cottenseed flour to furnish a low-cost source of protein adequate for child growth. This improved use of grains, he emphasized, can be one of the crucial economic and health gains for millions of people in areas where adequate food supplies are extremely limited.

Dr. Stare accused, as the purveyors of spurious information on food and nutrition, the natural food proponents and the speudo-scientific writer who quotes glibly and irresponsibly from research of authentic scientists while inserting paragraphs of quackery and mis-information which predict fearful maladies if certain foods are omitted or certain foods consumed and makes exaggerated claims of cures and improved health.

Natural food faddists, the Harvard professor stressed, not only ascribe superior nutritional merits to these foods but also engender fear in the public by their condemnation of modern processed and refined foods as being nutritionally worthless and even positively deleterious to health.

The merits ascribed to special foods cover the gamut of man's earthy desires from long life span to "sex rejuvenation" and the cure of practically every known disease, Dr. Stare said. Special foods and natural foods are good, just as good as foods found in any supermarket, Dr. Stare explained. Their use, he continued, is harmful when exorbitant prices are paid for them by people who can ill afford them or when people use them for self-treatment and delay seeking medical advice when needed.

Dr. K. L. Milstead, Director, Division of Regulatory Management of the Food and Drug Administration stated that Federal law enforcement in regard to food mis-representation is only part of the answer. If we are to deal effectively with the problem, he explained, federal law enforcement must be supplemented by strong state and local enforcement and by broad educational programs to bring the true facts to the public. Through modern media of mass communications and even through our educational systems, the American public is being propagandized to undermine their confidence in the purity and nutritional value of their food supply, Dr. Milstead warned.

Among other advances in the broad area of nutritional research, Dr. King emphasized the importance of new, clear evidence that the element selenium is an essential nutrient, separate from its peculiar relationships with vitamin E. Continued evidence that fluoridation of water supplies is both safe and effective in decreasing the occurrances of tooth decay was also cited as a great importance in public education. Of interest to the public and citrus growers, Dr. King said, was the further evidence that generous intakes of Vitamin C tend to favor less demands for some of the B-complex, as a result of good effects on intestinal bacteria.

INSECTS DESTROY $4 BILLION IN FOOD PRODUCTS ANNUALLY

Plant and animal pests rank among the foremost causes of food destruction, food deterioration and food contamination, with insect damages conservatively estimated at $4 billion every year. This shocking revelation was made by Dr. George C. Decker, of Urbana, Illinois, noted scientist and entomologist, writing in Nutrition Reviews, monthly scientific publication of the Nutrition Foundation.

Despite this unhappy situation, Dr. Decker points out, the American public, which has access to the most abundant and varied diet of any nation in history, seems to take this bountiful and varied food supply for granted, totally oblivious of the fact that man is engaged in a constant conflict with insects for every crop he grows.

Insects, Dr. Decker explains, in the course of their evolution have acquired an uncanny degree of fitness that permit at least some representatives to survive, if not thrive, in almost every earthly environment. Furthermore, tremendous reproductive potential and rapid rate of development enables insects to make adjustments to changes in their environment in relatively short time. Thus, though apparently under control, insects, almost overnight, may appear in destructive forces.

Insect control has been an objective of man almost since he first appeared on this earth, ages after the animal kingdom. Today, only through insecticides and pesticides can agricultural damages, caused by insects, be controlled. A study by the Department of Agriculture revealed that when certain new insecticides were used production of cauliflower rose by 120%, onions 140%, celery 140%, sweet corn 160% and beet seed 180%. Even milk production increased by 15% per animal through insect control.

Dr. Decker chides the critics of chemical control of insects by emphasizing that food in the necessary amount could not be produced without the use of insecticides and pesticides. He further cites assurances by numerous private and federal agencies that there are no health hazards involved in the use of chemical deterrents.

In conclusion, the entomologist warns that there is little question that insects will continue to demand tribute of enormous proportions. If we are to hold our own or even progress in the continuing fight, research in insect control must continue and even be expanded.

MARKET MILK AND ICE CREAM CONFERENCES TO BE HELD AT PURDUE

Professor H. W. Gregory, Head of the Dairy Department at Purdue University, has announced two one-day meetings to be held in April 1959. On April 15 the Market Milk Conference will be held and the Ice Cream Conference will be held on April 16.

The conferences are an annual affair sponsored in cooperation with the Indiana Dairy Products Association. Dairy industry and university specialists will discuss topics selected because of their current interest to milk processors and ice cream manufacturers.

For further information write to: Mr. H. F. Ford, Smith Hall, Purdue University, Lafayette, Indiana.

BOVINE MASTITIS REVIEW CITED

There is an excellent review article on bovine mastitis by W. N. Plastridge of the University of Connecticut, in the September 1958 issue of the *Journal of Dairy Science*. The author cites 236 different references. He summarizes his review as follows:

The principal organisms associated with mastitis are Streptococcus agalactiae, Streptococcus uberis, and Micrococcus pyogenes. These organisms usually cause a chronic mastitis and loss in milk yield with or without the appearance of clinical symptoms. Mastitis due to other organisms is not common, but may be a serious problem in an occasional herd, especially following udder infusions improperly administered. When cultural tests are made on incubated milk, the leucocyte count must be used in interpreting the results, and when made on fresh milk, consideration must be given to the number and kinds of organisms present. S. agalactiae can be eradicated from most herds by good sanitation combined with frequent cultural tests and treatment of all infected quarters.

The sanitary measures now in general use are inadequate to prevent new and reinfection with M. pyogenes and S. uberis. Thus, treatment of infected quarters is of limited value.

Degree of exposure to infection, natural resistance of individuals, age, stage of lactation, and prolonged milking duration influence the rate of udder infections. Abusive machine milking, especially prolonged milking and use of worn or poorly designed teat cup liners, tends to increase the rate of clinical mastitis in infected quarters.

7TH NATIONAL CONFERENCE ON INTERSTATE MILK SHIPMENTS ANNOUNCED

The seventh National Conference on Interstate Milk Shipments will be held April 20-22 at the Statler Hotel in St. Louis, Missouri. Attendants from 35 states and the District of Columbia, representing public health and agricultural agencies, industry and others concerned with interstate milk shipment are expected to participate.

H. L. Hortman, Louisiana State Board of Health, who serves as Chairman of the Conference, announced:

"Our biennial National Conference on Interstate Milk Shipments is a voluntary organization which meets to develop procedures which will facilitate the interstate shipment of milk of high sanitary quality to any area where needed. At this year's conference, we propose to consider additional agreements which will provide even more mutual confidence on the part of both shipping and receiving areas, and thus furnish the best possible milk supply to people in every section of the country. Thanks to our earlier conferences, we now have the Interstate Milk Shippers List, which is published quarterly by U. S. Public Health Service. This contains the names of almost 700 interstate milk shippers who market the production of approximately 100,000 dairy farms, together with sanitation compliance ratings of their supplies, as certified by state milk sanitation rating officers. These lists are distributed by the Public Health Service on request to milk sanitation authorities in receiving areas."

C. K. Luchterhand, Wisconsin Board of Health, who is program chairman for this year's meeting reported:

"Basic agreements reached at earlier conferences will be reviewed in St. Louis, be discussed in task force committees, and changes will be voted upon by the general assembly. Amendments may be incorporated into the basic agreements by majority vote. Among the subjects scheduled for general consideration are: labeling and identification of processed milk products; necessary areas of clarification of the basic agreements, as regards mandatory responsibilities and specification of procedures; the position of the Association of State and Territorial Health Officers on interstate milk shipment legislation; proposed federal legislation; utilization of the Conference's basic agreements in the intrastate movement of milk; and current problems in the administration of the program."

Representatives of regulatory agencies and industry may present other specific problems from the floor if they are not covered in the program, and these problems will be assigned to the respective committees for consideration. Should anyone desire to introduce changes in existing basic agreements, such changes will have to be presented at the opening session of the meeting where the general assembly will vote on whether or not such proposals will be acceptable for consideration.

Serving on the Program Committee with Mr. Luchterhand are: Harvey J. Weavers, Wisconsin State Department of Agriculture; K. G. Weckel, University of Wisconsin; George Steele, Minnesota Dept. of Agriculture; and H. B. Robinson, Milk and Food Program, U. S. Public Health Service.

DR. OLSON TO ATTEND INTERNATIONAL DAIRY CONGRESS

Dr. J. C. Olson, Associate Editor of the Journal, will attend the International Dairy Congress to be held in London, England, June 29 – July 3. This is the fifteenth such Congress and this year's event will be held under the auspices of the International Dairy

Federation.

The scientific and technical program is divided into six sections and eighteen subjects. Papers and research studies from the world's dairy scientists will be presented. Prince Phillip, Duke of Edinburgh, will serve as President of the Congress.

After attendance at the Congress, Dr. Olson will carry out a planned itinerary of study and observation at dairy research centers in England, Holland and Sweden. He expects to be in Europe until about October 1. He will be accompanied by Mrs. Olson and their youngest son.

SCIENCE MUST SELL THE LAYMAN

Who can estimate how much productive effort has been lost to mankind by the time scientists have persuaded a reluctant populace to acknowledge their discoveries? In the field of public health alone, such giants as Jenner, who made possible the eradication of smallpox, Pasteur who opened the way to the prevention and control of bacterial disease, Semmelweis, whose persistence saved the lives of millions of newborn infants, Salk, who, in the face of opposition even within scientific ranks, has virtually conquered paralytic polio—these and many other explorers at the frontiers of science have had to battle their way through a morass of ignorance, superstition, and indifference.

Only by the force of their convictions and the time devoted to advancing them in lay circles, have the benefits from application of their discoveries been realized.

Even as this is being written, the same type of opposition has reared its ugly head to hinder the introduction of an essential nutrient, fluorine, into the water supplies of communities certain to benefit thereby. The evidence that this element is needed to build decay-resistant teeth is overwhelming. Not only has it been established in many species of laboratory animals, but also in large scale, controlled research studies conducted in towns throughout the country. It is accepted by the National Research Council, the American Public Health Association, the American Medical Association, and authorities from coast to coast.

True, not all children have carious teeth, even in low fluoride areas, but statistics show that controlled fluoridation of water is capable of cutting the incidence in half. Tooth decay is not merely a cosmetic problem for the growing child. Focal infections and gastrointestinal disorders at all ages, not to mention pain and discomfort, are often attributable to caries and subsequent faulty dentition. This can be largely prevented by insuring the presence in the diet of that vital trace of fluorine which many local communities now lack. Fluorine in this quantity is a food element, not a medication and not a poison. In just the same sense iron and copper in trace quantities are food elements, but in massive doses can be used as drugs or poison.

Some day our children and their children will be writing about the crackpot and sectarian obstructionists to this form of dental prophylaxis in the same vein as we now regard the opponents of vaccination and hospital sanitation.

Reprinted from: Food and Drug Research.

RADIO ACTIVE ISOTOPES USED TO MEASURE CLEANABILITY

Radioisotopic techniques have been used by E. B. Masurovsky and W. K. Jordan of the Department of Dairy Industry, Cornell University, Ithaca, N. Y. to *study the relative cleanability of milk-contact surfaces.* These techniques make possible the testing of a wide range of materials and surface finishes in a highly reproducible and directly comparable manner. Not only can the quantity of soil be accurately determined by these techniques, but the pattern of soil distribution on a surface can be clearly shown. The utility of radiological techniques for the determination of relative concentrations and location of Phosphorus^{32} – labeled bacteria on a variety of materials in their studies on the cleanability of eating utensils have been demonstrated. This paper, in the October issue of the Journal of Dairy Science, reports on the investigations carried out using this method for the determination of the removal of soils bearing Phosphorus ^{32} – labeled Escherichia coli and Micrococcus pyogenes var. aureus from a variety of milk-contact surfaces.

On the basis of all the tests performed, the surface finishes which displayed the greatest ease of cleanability were the highly polished, nonporous surfaces. The finely ground and smoothly molded finishes followed close behind, and the cold rolled, abraded, blasted, and porous finishes were the most difficult to clean. Under the conditions of testing utilized in these experiments, the direct agar-submersion technique proved to be ineffective as a means of accurately determining the relative cleanability of different surface finishes and of different materials. The radiological counting procedure proved to have higher reproducibility than agar-submersion methods for estimating the numbers of bacteria remaining on a cleaned surface.

STUDIES ON THE DECONTAMINATION OF RADIO ACTIVE WATERS

The effectiveness of water treatment processes in the removal of radioactive waste materials is the subject of *REPORT OF THE JOINT PROGRAM OF STUDIES ON THE DECONTAMINATION OF RADIOACTIVE WATERS*, a document jointly prepared by the Health Physics Division of the Oak

Ridge National Laboratory and the Robert A. Taft Sanitary Engineering Center of the U. S. Public Health Service, and just issued by the Public Health Service.

Joint research studies carried on since 1950 by the above-named groups indicate that the degree of removal of radioactive contaminants depends primarily on the chemical form of the contaminant and the particular water treatment process employed. Radioactive materials that might result as waste from AEC and non-AEC installations, as well as nuclear bomb debris, were used in the experiments.

It was found that under emergency conditions some removal of radioactive materials would be accomplished by conventional water treatment processes. However, the degree of removal might or might not be adequate, depending on the nature and concentration of the contaminants. An evaluation in terms of known safe limits for water consumption should be made after such treatment to determine the existence of a health hazard.

Official requests for copies will be honored by the Public Health Service and Atomic Energy Commission. It is also available from the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C., at $1 per copy (publication number ORNL-2557).

UNIVERSITY OF NORTH CAROLINA ANNOUNCES APPOINTMENT OF DR. JAMES C. LAMB III

The University of North Carolina announces the appointment of Dr. James C. Lamb, III as Associate Professor of Sanitary Engineering in the Department of Sanitary Engineering of the School of Public Health at Chapel Hill. Since 1955, Dr. Lamb has been serving as a sanitary engineer with American Cyanamid Company, in Bound Brook, New Jersey. He has been responsible for the technical aspects of the industrial waste program including the laboratory and pilot plant work which culminated in the complete process design, construction, and initiation of operation of a $4.500,000 waste treatment plant at Bound Brook.

Dr. Lamb received his undergraduate education in civil engineering at Virginia Military Institute and his graduate education, leading to the Doctor of Science in sanitary engineering, at the Massachusetts Institute of Technology. Dr. Lamb has held previous teaching positions at Virginia Military Institute and the Newark College of Engineering and has served as special lecturer and research associate in sanitary engineering at the Massachusetts Institute of Technology.

Dr. Lamb is the author of numerous technical papers and is a member of the American Society of Civil Engineers, the American Water Works Association, the Federation of Sewage and Industrial Wastes Associations, Sigma Xi, Chi Epsilon, and is a registered professional engineer in Virginia.

In addition to his teaching responsbilities at the University of North Carolina, Dr. Lamb will be in charge of research work sponsored by The Mead Corporation on the chemistry and removal of color from pulp mill wastes.

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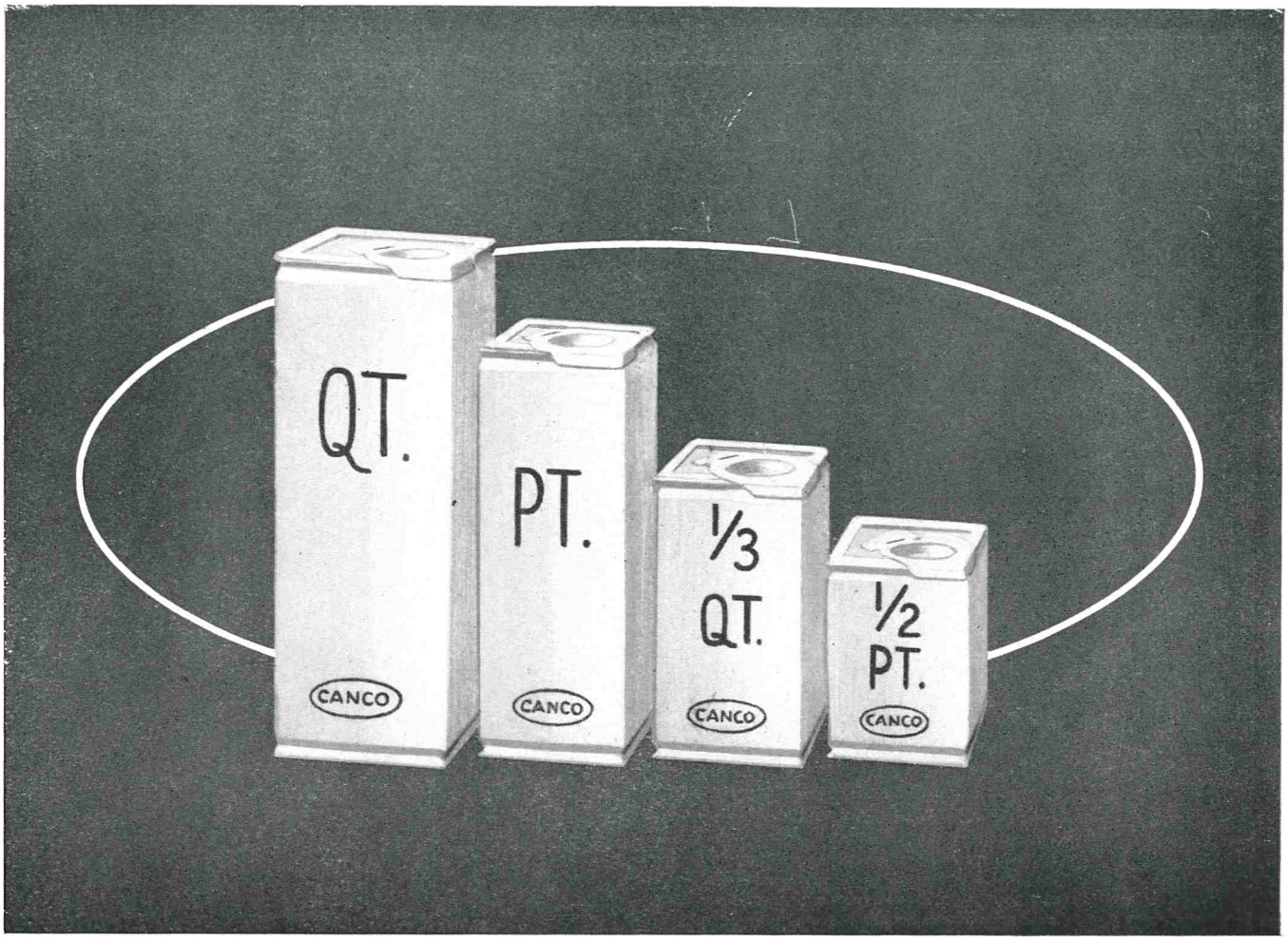

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"The milking machine is indispensable to the dairy industry and, when properly adjusted and used, it reduces the cost of milk production. However, there are times when, due to mechanical faults, poor sanitation, and improper use, this machine may be an important etiological factor in acute mastitis in many herds. Mechanical faults may be responsible for many cases of mastitis because they cause slow, incomplete milking and injury to the teats.

• • • • •

PUMP — The vacuum pump should be the correct size for the number of units being used. For instance, if a dairyman plans on using only two milker units at any one time and his installation is not too long or complicated, then probably a two-unit pump will be satisfactory. However, it might be better to install a pump of slightly greater capacity than will be required. Then, by the use of vacuum control regulators, the vacuum can be maintained within the range recommended by the manufacturer. A poor or undersized pump may provide too low or a fluctuating vacuum. This will result in slow milking, a frequent cause of trauma to the teats and udder. A pump with the correct capacity maintains a uniform vacuum on the pipe line at all times with or without the milker units in operation. Recovery from the loss of vacuum during changing of unit is rapid."

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