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Editorials

The opinions and ideas expressed in papers and editorials are those of the respective authors. The expressions of the Association are completely recorded in its transactions.

A Message from a Hold-Over President

THE fact that the International Association of Milk Sanitarians did not hold a meeting in 1943 has necessitated the extension of the terms of the officers of the Association, including that of the president.

This office makes heavy demands upon the time of the occupant, and ex-presidents usually sigh with relief when their successors take office. Consequently, the inability of the Association to elect new officers has postponed my relief, as well as deprived the Association of the benefits of a new administration.

On the other hand, this extension of my term of office affords me an opportunity to bring to a conclusion activities begun last year, and to act upon delayed inspirations for service to the Association. In the rush of committee appointments and organization, and routine correspondence, the incoming president has little time to think of long-range plans, and may miss fleeting opportunities for the advancement of the Association. Insomuch as an added year to my term of office affects that situation, it is welcomed because of the opportunities it will surely present me to make up for deficiencies of the past year.

I promise the membership, however, that a meeting and election of officers of the Association will be held during 1944, unless it is specifically prohibited.

C. A. A.

Some Current Trends in Milk Sanitation and Technology

THE movement in the direction of greater simplification of milk regulation is accelerating. For a long time, this endeavor took the form of attempts to secure greater uniformity in health department requirements. To do this, conference after conference has tried to agree on what are the essentials of sanitation. Conferees have endeavored to draw up a set of requirements applicable everywhere, but, as with compromises in general, no one was satisfied. So no generally accepted code of basic requirements has been promulgated. However, regional groups and local regulatory organizations have gone ahead and are adopting various degrees of simplified milk control.

The practical value of the direct microscopic examination of Breed smears served to draw increasing attention to the value of examinations of the milk itself. This swing from emphasis on farm scores to examination of milk samples has been accentuated by the spectacular development of the phosphatase test to evaluate the adequacy of pasteurization. Then along came the favorable reports of "deck examinations" from the New York City Health Department. (This name is given to the examination of shipments of milk in the original cans on receiving platforms. See papers in November–December issue.)

And now we are hearing much about Connecticut's three-point system. This procedure utilizes the direct microscopic clump count, the test for the presence of coliform organisms, and the phosphatase test—all together showing the bacteriological quality of the milk supply, the extent of improper handling after pasteurization, and the effectiveness of pasteurization itself. This program has been found to broaden the service of the laboratory examination of dairy products and give better control information without commensurate increase in expense.

Equally significant is the trend toward examining samples of milk to locate diseased animals in the milking herd. This procedure depends predominantly on the use of dye solutions whose reactions indicate abnormal conditions. The recently revised publication of the Hotis test marks an advance in this field. An excellent summary of the value and significance of these tests is given by Frayer in our next issue.

A new one is the state-wide application of the serum agglutination method of locating cattle that are infected with the organisms of Bang's disease. Bremer in Vermont (see this issue, page 26) reports the finding of extensive infection among the herds of dealers in raw milk. Similar findings elsewhere have indicated the extensiveness of this infection but here is the first instance known to us where the test has been made the basis for a state-wide regulatory program.

A regrettable trend is observed in the manufacture of ice cream. For many years the industry has invested great sums of money to educate the public as to the nutritive value of ice cream. Nutritionists and health officers have emphasized the desirability of considering this product an important food, supplying milk solids pleasurably to the ill and the convalescent, and necessarily to many who have some aversion to the flavor of milk as such. The forced decrease in the milk-solids content of frozen desserts is a backward step in public health nutrition—although we do not herewith mean to protest the immediate national emergency which necessitates this curtailment.

This restriction is in line with the action taken in Massachusetts of allowing the sale of cream which contains less than the legal limit of 16 percent butterfat. The regulatory officials consider that this step is preferable to the worse dilemma of having no cream at all. Some voices are heard to decry such actions as "letting down the bars." Others defend it as exhibiting public health statesmanship.

The flavor of milk has long been recognized as an important factor in the over-all public health position of milk in the diet. Health officers have encouraged dealers to reject off-flavor milk but heretofore they have not taken regulatory action in this respect themselves. Voices are now heard calling for the regulatory rejection of such milk because of its adverse effect on milk consumption and consequent impairment of public health prophylaxis.

Equipment is being studied to prolong its life. Glass is coming back in greater diversity of applications than ever before, as pipe-lines, pumps, even whole tanks. Plastics have not made much impression on plant equipment. Milk plant engineering is moving in the direction of greater compactness, easy dismantling, accessibility to all parts, and improved cleansing operations.

The effective supervision of a milk supply and its operating plant requires an ever-increasing technical skill. Courses of instruction in milk plant engineering and technology are springing up all over the country, both for plant operators as well as for the regulatory personnel. Dissatisfaction is being voiced at the inadequateness of the curricula for the conventional "dairy courses." Many thoughtful dairy people are emphasizing the need for more milk (and general food) engineering.

J. H. S.

Uniformity—How Shall We Get It?

FOR years, milk regulatory officials have endeavored to secure greater uniformity in milk control procedures. They all agree quite well—in the abstract—on what constitutes public health essentiality in milk production and handling. However, when they buckle down to working out a program to print, they fail to remedy the present confusing heterogeneity. Even the widely advertised and energetically promoted ordinances recommended by the Washington governmental agencies do not secure uniformity by reason of the quality and policies of local interpretation and enforcement.

One factor contributing to this situation is the absence of any measuring stick, so to speak, whereby we can secure quantitative expressions for the application of various ideas and practices. Too many sanitarians have ideas about this-or-that but have no other means than their impressions and beliefs for measuring the effectiveness of their efforts. No wonder that conferences break up without any clear-cut advance: there are too many preconceived ideas petrified in molds that resist change, especially when the suggested changes rest on no better evidence than the beliefs of the persons who present them.

In the meantime we are jolted into recognition that, coming in on our flank, we are noticing the development of a regulatory procedure that bids fair to carry us a long way toward the very objective that we have been seeking. This pro-

cedure is the examination of the milk itself. After all, what is it that the people want: a milking parlor or good milk?—a compilation of thousands of inspection records or good milk?—an elaborate licensing, inspection, and supervisory procedure or good milk?

Practically all sanitarians agree that it is the latter that we want, and that the "program" is necessary only as a tool to achieve quality in the milk. Milk laboratorians have held that if milk is unsafe and unfit to drink, then such milk ought to reveal this condition by laboratory examination. So there has been accumulating a collection of methods that are serviceable to this end. Knowledge concerning their limitations and possibilities have been more or less common for some time. What has been needed are a few regulatory officials who combined this knowledge with vision of the public need and with regulatory opportunity. Such men must have the intellectual independence to try out the various tests, and they must also have the "intestinal fortitude" to act on the basis of what they find.

As a result, we see platform tests coming strongly forward. This is no sudden flash in the pan. For years, experiment station workers have been discussing laboratory and field tests, publishing bulletins, holding symposia, writing books, and doing everything except "selling" these procedures to the regulatory officials. Thank Heaven—or something—we have a group of public health men who think about what they are doing and are pondering over vital statistics, inspection procedure, and personnel efficiency.

The new procedure of deck inspection (and its analogues) gives immediate indication, even the measure, of milk quality. If the product is undesirable, the field man immediately has tangible evidence of what to look for on the farm. The undesirable milk itself never gets into the weigh pan.

These tests are duplicatable. Any properly trained operator can conduct them. They constitute measuring sticks of dependable and reproducible quality. They are being increasingly used over the country. The technique is well standardized. It is tied into laboratory tests which are well known. We believe that as these techniques become more widely known and more highly developed, they will furnish the most dependable sort of common ground on which all milk supplies may be evaluated.

We look for uniformity in regulations. We are getting it in the examination of the milk itself.

J. H. S.

A Comparison of the Roll-Tube and Standard Plate Methods of Making Bacterial Counts of Milk*

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THE use in Europe of a roll-tube technique for the quantitative and qualitative analysis of milk and other products was observed by one † of the authors. Since this technique appeared to possess certain advantages over the standard plate method, a study was undertaken for the purpose of comparing the results from the two methods.

The history of the development of the roll-tube method of making bacterial counts as outlined by Damm (2) dates back to 1886. In that year, Esmarch described a method of making bacterial counts by introducing the test material into gelatin contained in an ordinary test tube, closing the tube with a cotton stopper covered by a rubber cap, and rotating it by hand under a stream of cold water until the gelatin congealed on the walls. This method had the disadvantage that some of the gelatin would adhere to and penetrate the cotton stopper, and it was difficult to produce a uniform layer of gelatin on the walls of the tube. Subsequent improvements were made in the method, such as introducing mechanical rotating devices. However, many of the handicaps of the procedure were not overcome until a motor-driven roll-tube apparatus, as described by Mundinger and Woeckel (6), was developed. Using this apparatus and a Burri 0.001 ml. loop, Damm (2) obtained milk counts which were closely comparable with those obtained by the standard plate method. Gramm (3) reported on the practical application of this method for counting the bacteria in milk and Lerche (4) pointed out the usefulness of the apparatus and tubes for making surface cultures, such as are usually made on agar slants.

PROCEDURE

The equipment used was a six-tube apparatus made by Paul Funke & Company, with counting lens and tubes. The tubes have an over-all length of 15.3 cm. and an inside diameter of 1.9 cm. A constriction in the tube about 2–3 cm. from the top prevents the medium from wetting the cotton plug when the tube is rapidly rotating in a horizontal position. For making counts the tubes are filled with 7 ml. of an agar medium, containing preferably 2.0 percent of agar in order to give the desired consistency to the medium. The tubes are plugged and sterilized, and just before use are tempered in a water bath to 45° C., inoculated with the milk, and after careful mixing of the contents rotated at a speed (about 2,000 r.p.m.) sufficient to deposit the agar in a layer of

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uniform thickness against the inside wall where it congeals after a short time (about 3 minutes). The tubes are then incubated in a nearly horizontal position with the bottom of the tubes slanting slightly downward to carry down any small amount of moisture that may collect and which may cause the development of spreaders over the agar surface. Occasionally when the tubes were incubated in an absolutely horizontal position, free moisture in amounts sufficient to encourage the growth of spreaders was encountered. The use of a 2.0 percent agar in place of a 1.5 percent agar greatly decreased this difficulty. The gelation of the agar can be speeded up in warm weather by playing a fan upon the rolling tubes or by rolling them in a cool room. After incubating, the counting of the colonies may be facilitated by using a lens attached to a metal cylinder which is slipped over the agar roll-tube.

In comparing the bacterial counts on milk by the standard plate and the roll-tube methods, dilutions of 1:100 and 1:1000 were made using the standard procedure (1). The plates and tubes were prepared with a 2.0 percent tryptone-glucose-extract-milk-agar and incubated at 37° C. side by side in the same incubator. To facilitate the counting of colonies in the tubes, the tubes were marked off with lines and all colonies were counted.

Since the actual length of the agar surface in the tube was approximately 12.0 cm. and the inside diameter about 1.9 cm., the agar surface area, taking into consideration the thickness of the agar layer (about 0.11 cm.) was approximately that of a standard petri dish 9.0 cm. in diameter. Some additional tubes prepared locally had a useful length of 11.5 to 12.0 cm. and an inside diameter of 1.8, thus providing an agar surface area slightly less than that of a standard 9.0 cm. petri dish. Figures 1, 2, and 3 show the roll-tube apparatus, the position of incubating cultures, and the developed colonies and counting lens.

From 6 to 20 plate and roll-tube cultures were made from each of 14 samples of milk, making a total of 227 plate and 228 roll-tube cultures. In addition, plate and roll-tube cultures were made in duplicate from 43 different samples of milk. All inoculations for a given sample were made from one and the same dilution. In each comparison the average number of colonies fell within the range of 30 to 300 per roll-tube or plate as recommended by *Standard Methods for the Examination of Dairy Products* (1).

DISCUSSION OF RESULTS

In Table 1 are summarized the results of the 14 comparisons in which 6 to 20 plate and roll-tube cultures were made from each sample of milk. The average roll-tube count was lower for 11 of the milk samples and higher for 3. In 7 of the 14 comparisons the average roll-tube count was within 10 percent of the plate count, in 10 within 15 percent, in 11 within 20 percent, and in only one was the difference greater than 25 percent.

A statistical summary of the 14 comparisons, using the actual colony counts, is presented in Table 2. Considering the data as they actually were obtained, the variances and standard deviations were higher for the plate count in 11 of the comparisons, and the coefficients of variation were higher for the plate method in 9 comparisons. The mean variance, mean standard deviation, and mean coefficient of variation all were higher for the roll-tube method.

The general applicability of the roll-tube as compared to the plate method can be evaluated best by considering the pooled information from the 14 milk samples. First, it is of importance to test the significance of the differences between the general plate

TABLE 1

SUMMARY OF COMPARISONS OF SIX TO TWENTY REPLICATE PLATE AND ROLL-TUBE COLONY COUNTS OF FOURTEEN SAMPLES OF MILK

Milk No.	No. of Cultures		Colony Range		Average No. of Colonies		Ratio
	Plate	Tube	Plate	Tube	Plate	Tube	Tube/Plate
1	20	20	41–81	27–69	55.7	46.3	0.831
2	14	14	32–56	25–36	41.3	31.8	0.770
3	15	15	192–311	146–199	258.7	172.3	0.666
4	13	13	81–114	70–94	93.8	83.8	0.893
5	19	19	152–225	67–268	214.2	212.1	0.990
		(17)[1]		(181–268)[1]		(227.4)[1]	(1.062)[1]
6	6	6	111–156	104–140	129.2	119.5	0.925
7	19	19	30–65	26–54	49.0	41.3	0.853
8	16	16	70–117	72–106	99.3	93.4	0.941
9	19	20	14–59	37–61	37.3	45.6	1.223
	(16)[2]		(29–59)[2]		(41.4)[2]		(1.101)[2]
10	19	19	87–137	76–149	115.1	104.0	0.904
11	20	20	81–118	72–103	95.4	85.0	0.891
12	20	20	109–154	110–133	129.1	122.2	0.946
13	18	18	130–188	149–178	158.4	164.5	1.039
14	9	9	25–40	23–44	32.7	35.6	1.089
Total	227	228					

[1] After omitting two lowest counts.
[2] After omitting three lowest counts.

and roll-tube means; second, the interaction between milks and methods should be tested to determine if all milks react similarly to the two methods; and third, the difference between the plate and roll-tube variances should be tested for significance.

In pooling sums of squares to arrive at a generalized pooled variance, it is necessary that the data fulfill two conditions, namely: (1) the variances of different samples must be homogeneous, and (2) the means must be independent of their variances or standard deviations (7). The variances in Table 2 were highly heterogeneous for both methods as determined by Bartlett's chi-square test for homogeneity of variances (7). Furthermore, correlations between means and standard deviations were found to be positive and highly significant.

On further examinations of the data in Tables 1 and 2, it was noted that unusually large discrepancies in range, variance, and standard deviation between the two methods occurred in several of the milk samples. As shown in Table 1, the wide range in roll-tube counts of 67–268 for sample 5 was due to two extremely low counts which when omitted left a range of 181–268. When the three lowest counts for the plate method in sample 9 were omitted, the range was changed from 14–59 to 29–59. Other large discrepancies, particularly that in sample 3, could not be explained by occasional divergent counts.

In a study of the reliability of the plate method, using numerous parallel plate cultures, Malcolm (5) observed the occurrence of similar variations. As a result, he recommended the use of five parallel plates in the routine examination of milk for bacterial content.

It will be noted in Table 2 that the discrepancies between variances of the two methods in samples 5 and 9 were markedly diminished when the low counts were omitted. However, the mean variances of the two methods for all 14 samples now were reversed in magnitude. When in addition, sample 3 was omitted, the mean variances of

TABLE 2

STATISTICAL SUMMARY OF THE COMPARISON OF THE COLONY COUNTS FROM REPLICATE PLATE AND ROLL-TUBE CULTURES OF FOURTEEN SAMPLES OF MILK

Milk No.	Degrees of freedom (n–1)		Mean ($\bar{x}$)		Sum of squares (Sx^2)		Variance (V)		Standard deviation (s)		Coef. of variation (C.V.)	
	Plate	Tube	Plate	Tube	Plate	Tube	Plate	Tube	Plate	Tube	Plate	Tube
1	19	19	55.7	46.3	2,010.21	1,798.20	105.80	94.64	10.3	9.7	18.5	21.0
2	13	13	41.3	31.8	610.86	168.36	46.99	12.95	6.9	3.6	16.6	11.3
3	14	14	258.7	172.3	12,893.93	3,267.33	921.00	233.38	30.3	15.3	11.7	8.9
4	12	12	93.8	83.8	1,234.31	744.31	102.86	62.03	10.1	7.9	10.8	9.4
5	18	18 (16)[1]	214.2	212.1 (227.4)	9,650.53	46,388.95 (8,131.90)	536.14	2,577.16 (508.24)	23.2	50.8 (22.6)	10.8	23.9 (9.9)
6	5	5	129.2	119.5	1,403.83	891.50	286.17	178.30	16.9	13.4	13.1	11.2
7	18	18	49.0	41.3	1,334.00	940.11	74.11	52.23	8.6	7.2	17.6	17.6
8	15	15	99.3	93.4	2,779.00	1,509.94	185.27	100.66	13.6	10.0	13.7	10.7
9	18 (15)	19	37.3 (41.4)	45.6	2,979.68 (1,211.94)	850.80	165.54 (80.80)	44.78	12.9 (9.0)	6.7	34.5 (21.7)	14.7
10	18	18	115.1	104.0	2,869.79	4,146.79	159.43	230.36	12.6	15.2	11.0	14.5
11	19	19	95.4	85.0	1,976.55	1,073.95	104.03	56.68	10.2	7.5	10.7	8.9
12	19	19	129.1	122.2	2,039.80	987.20	107.36	51.95	10.4	7.2	8.0	5.9
13	17	17	158.4	164.5	3,908.44	1,792.50	229.91	105.44	15.2	10.3	9.6	6.2
14	8	8	32.7	35.6	176.00	374.22	22.00	46.78	4.7	6.8	14.4	19.2
Total or weighted mean	213	214	108.7	98.2	45,893.92	64,933.79	215.46	303.43	14.7	17.4	13.5	17.7
Total or weighted mean [2]	(210)	(212)	(110.0)	(104.8)	(44,126.18)	(26,676.74)	(210.12)	(125.83)	(14.5)	(11.2)	(13.2)	(10.7)
Total or weighted mean [3]	(196)	(198)	(99.3)	(86.9)	(31,233.18)	(23,409.41)	(159.33)	(118.22)	(12.6)	(10.9)	(12.7)	(12.5)

[1] Numbers in parentheses represent revised data.
[2] Revised values substituted for roll-tube count of milk sample 5 and plate counts of milk sample 9.
[3] Milk sample 3 omitted and revised values substituted for roll-tube count of milk sample 5 and plate count of milk sample 9.

the two methods were more nearly alike. Nevertheless, the data still did not fulfill the conditions necessary for arriving at a generalized pooled variance.

Because the variances and standard deviations were roughly proportional to the means, the counts were transformed into logarithms. After the transformation the variances were still highly heterogeneous. Furthermore, the means and their standard deviations were not independent; however, in contrast to the results obtained from actual counts, the means and standard deviations now were negatively and significantly correlated.

When square roots of the counts were used, better results were obtained than by the use of the actual counts or logarithms. In Table 3 are shown the calculations from square roots corresponding to the calculations from actual colony counts in Table 2.

With all counts included, the chi-square values from tests for homogeneity were far beyond the one percent level of significance. Omitting the two lowest counts secured by the roll-tube method in sample 5 and the three lowest counts obtained by the plate method in sample 9, the chi-square values were only slightly beyond the one percent level.

Of greater significance still was the fact that the means were now independent of their standard deviations except for the difficulty presented by sample 3 in the plate method. When this sample was omitted for the plate method, the correlation approached zero and was not significant. Also, when it was omitted in applying the chi-square test for homogeneity, the resulting chi-square value was no longer significant for the plate method. The effect on the pooled variances and other values is shown by the numbers in parentheses in the last line of Table 3.

Three analyses of variance, one including the square roots of all the counts, one including revised roll-tube data for sample 5 and plate data for sample 9, and one using these revised data and in addition omitting the data for sample 3 entirely, are presented in Table 4.

In applying the F test (7) the difference between methods was found to be significant in the first and second analyses and highly significant in the third. In general, therefore, the counts using the roll-tube method were lower than the counts using the plate method.

The interaction between samples and methods was highly significant in the first and second analyses, and significant almost to the one percent level in the third. This indicates that there were differential responses among the different samples to the two methods. It will be pointed out later that the roll-tube counts tend to be lower than the plate counts, particularly when counts are high.

The question as to whether the variances of the two methods were similar or significantly different can be answered either by testing them for homogeneity or by applying the F test to the ratio of the variances. Both tests were applied to the three pairs of mean variances in the last three lines in Table 3. Using all the data, the difference between the variances shown in Table 3 was found to be significant, with a greater variance occurring in the roll-tube counts than in the plate counts. The reverse was true when the revised values for the roll-tube counts of sample 5 and the plate counts of sample 9 were substituted. If, in addition, sample 3 is omitted, the variances are not significantly different and the counts from the two methods may be said to be equally variable. It also should be pointed out that a test of significance of the interaction in Table 4 is not valid unless the plate and roll-tube variances are similar.

TABLE 3

STATISTICAL SUMMARY OF THE COMPARISON OF THE COLONY COUNTS FROM REPLICATE PLATE AND ROLL-TUBE CULTURES OF FOURTEEN SAMPLES OF MILK (COLONY COUNTS TRANSFORMED INTO SQUARE ROOTS)

Milk No.	Degrees of freedom (n–1)		Mean ($\bar{x}$)		Sum of squares (Sx^2)		Variance (V)		Standard deviation (s)		Coef. of variation (C.V.)	
	Plate	Tube	Plate	Tube	Plate	Tube	Plate	Tube	Plate	Tube	Plate	Tube
1	19	19	7.4	6.8	8.42	10.70	.4432	.5632	.67	.75	9.1	11.0
2	13	13	6.4	5.6	3.28	2.59	.2523	.1992	.50	.45	12.8	8.0
3	14	14	16.0	13.1	21.78	2.98	1.5557	.2129	1.25	.46	7.8	3.5
4	12	12	9.7	9.1	5.51	3.35	.4592	.2792	.68	.53	7.0	5.8
5	18	18	14.6	14.4	10.20	74.25	.5667	4.1250	.75	2.03	5.1	14.1
		(16)[1]		(15.1)		(6.93)		(.4331)		(.66)		(4.4)
6	5	5	11.3	10.9	4.33	4.14	.8660	.8280	.93	.91	8.2	8.3
7	18	18	7.0	6.4	5.59	8.04	.3106	.4467	.56	.67	8.0	10.5
8	15	15	9.9	9.6	11.91	6.97	.7940	.4647	.89	.68	9.0	7.1
9	18	19	6.0	6.7	24.00	2.10	1.3333	.1105	1.15	.33	19.2	4.9
	(15)		(6.4)		(7.64)		(.5093)		(.71)		(11.1)	
10	18	18	10.7	10.2	11.69	14.39	.6494	.7994	.81	.89	7.6	8.7
11	19	19	9.8	9.2	3.80	4.36	.2000	.2295	.45	.48	4.6	5.2
12	19	19	11.3	11.1	7.82	1.95	.4116	.1026	.64	.32	5.7	2.9
13	17	17	12.6	12.8	4.39	6.76	.2582	.3976	.51	.63	4.0	4.9
14	8	8	5.7	5.9	1.59	4.35	.1988	.4833	.45	.70	7.9	11.9
Total or mean	213	214	9.9	9.5	124.31	147.43	.5836	.6889	.76	.83	7.6	8.8
Total or mean [2]	(210)	(212)	(10.0)	(9.5)	(107.95)	(79.61)	(.5140)	(.3755)	(.72)	(.61)	(7.2)	(6.4)
Total or mean [3]	(196)	(198)	(9.6)	(9.2)	(86.17)	(76.63)	(.4396)	(.3870)	(.65)	(.62)	(6.8)	(6.7)

[1] Numbers in parentheses represent revised data.
[2] Revised values substituted for roll-tube count of milk sample 5 and plate count of milk sample 9.
[3] Milk sample 3 omitted and revised values substituted for roll-tube count of milk sample 5 and plate count of milk sample 9.

TABLE 4

ANALYSES OF VARIANCE OF THE SQUARE ROOTS OF THE MEAN BACTERIAL COLONY COUNTS FROM PLATE AND ROLL-TUBE CULTURES OF FOURTEEN SAMPLES OF MILK

	Before revision			*After revision of roll-tube data for milk No. 5 and plate data for milk No. 9*			*After revision of roll-tube data for milk No. 5 and plate data for milk No. 9, and omission of data for milk No. 3*		
Source of variation	*Degrees of freedom*	*Sum of squares*	*Mean square*	*Degrees of freedom*	*Sum of squares*	*Mean square*	*Degrees of freedom*	*Sum of squares*	*Mean square*
Between milks	13	3,756.73	288.98 **	13	3,737.17	287.47 **	13	2,989.93	249.16 **
Between methods	1	24.80	24.80 *	1	33.30	33.30 *	1	14.46	14.46 **
Interaction	13	67.10	5.16 **	13	55.71	4.29 **	13	10.61	.88 *
Within subclasses	427	271.74	.64	422	187.56	.44	394	162.80	.41
Total	454	4,120.37		449	4,013.74		419	3,177.80	

* Significant.
** Highly significant.

In a similar study involving six samples, with average colony numbers of from 183 to 337 per plate or roll-tube method, Damm (2) reported a coefficient of variation of 14.13 and 16.38 for the plate and roll-tube culture methods respectively.

The results of the 43 comparisons of duplicate counts made by the two methods are shown in Table 5. The roll-tube count was lower than the plate count in 27 comparisons and higher in 16. A statistical analysis of the data, using the square roots of the counts showed the difference between the roll-tube count and the plate count for the 43 samples to be highly significant. The t value of 3.21 surpassed the 1 percent level for 42 degrees of freedom. It appears, therefore, that the roll-tube method gives results commonly lower than the plate method.

Further examination of the data in Table 5 revealed that large discrepancies in the average counts between the two methods might be occurring more frequently in samples having high plate counts. By plotting the plate counts against differences between methods in a contingency table and applying the chi-square test for independence, it was found that such was the case. Since the surface area of the agar was slightly less in the roll-tube cultures than in the plate cultures, it is possible that the slightly lower roll-tube counts might have been due to greater crowding of colonies in the tube.

SUMMARY AND CONCLUSIONS

Two series of comparisons were made, using the standard plate method and the roll-tube culture method for determining the numbers of colonies developing from milk. One series consisted of making 6 to 20 replicate cultures by each method of 14 different samples of milk, whereas the second series consisted of making duplicate cultures by each method of 43 milk samples.

When the actual counts or their logarithms were used in the statistical analysis, the variances of different milk samples were found to be highly heterogeneous for both methods. Furthermore, the means and standard deviations were significantly correlated, positively for actual counts, and negatively for the logarithms.

Square roots of the colony counts yielded more satisfactory results. When analyzed by this technique, a significant difference was found to exist between the colony counts obtained by the two methods. In general the counts obtained by the use of the roll-tube method were lower than by the use of the standard plate method. This appeared to be true, particularly with milks of high colony counts and may possibly be due to the fact that the surface area of the agar of the roll-tube cultures was smaller than that of the plate cultures, thus increasing the crowding of the colonies. A comparison of the two methods using a larger tube, therefore would be of interest.

Variances in the two methods appeared to be about equal. Although the roll-tube method gave a slightly lower count than the plate method, the difference was not of sufficient magnitude to justify the rejection of the method.

The following advantages may be cited for the roll-tube method of making bacterial counts. The tubes are subject to less breakage, require less storage space, and are more easily handled than petri dishes. They may be filled with the correct amount of agar, sterilized, and kept on hand in a relatively small space in the refrigerator to be ready for instant use in the laboratory or carried about easily for use in the field, on receiving platforms, and in the plant. They may even be sent through the mail to inspectors and technicians in the field and to operators

TABLE 5

A COMPARISON OF DUPLICATE COUNTS BY THE PLATE AND ROLL-TUBE METHODS ON FORTY-THREE SAMPLES OF MILK

Sample No.	Average No. of Colonies		Square root		Ratio of counts Tube to plate
	Plate	Tube	Plate	Tube	
1	63.5	51.5	8.0	7.2	.811
2	149.0	116.0	12.0	10.8	.779
3	88.0	51.0	9.4	7.1	.580
4	209.0	171.0	14.5	13.1	.818
5	156.5	204.0	12.5	14.3	1.304
6	121.5	89.0	11.0	9.4	.733
7	62.0	34.5	7.9	5.9	.556
8	33.0	30.5	5.7	5.5	.924
9	140.5	47.5	11.8	6.9	.338
10	80.5	63.5	9.0	8.0	.789
11	36.5	43.0	6.0	6.6	1.178
12	50.5	60.5	7.1	7.8	1.198
13	50.5	46.0	7.1	6.8	.911
14	159.5	151.0	12.6	12.3	.947
15	225.0	230.5	15.0	15.2	1.024
16	41.5	52.5	6.4	7.3	1.265
17	64.0	71.5	8.0	8.4	1.117
18	101.0	120.0	10.0	11.0	1.188
19	63.5	57.0	8.0	7.5	.898
20	64.0	52.2	8.0	7.2	.820
21	100.0	51.5	10.0	7.2	.515
22	210.5	223.5	14.5	14.9	1.062
23	75.0	73.0	8.7	8.5	.973
24	134.0	74.0	11.6	8.6	.552
25	116.5	100.0	10.8	10.0	.858
26	82.5	48.0	9.1	6.9	.582
27	285.5	248.0	16.9	15.7	.869
28	240.0	74.5	15.5	8.6	.310
29	59.0	44.5	7.7	6.8	.754
30	70.5	56.5	8.4	7.5	.801
31	41.0	35.0	6.4	5.9	.854
32	113.0	121.0	10.6	11.0	1.071
33	150.0	145.5	12.2	12.1	.970
34	200.0	134.5	14.1	11.6	.673
35	273.0	273.5	16.5	16.5	1.002
36	112.0	115.5	10.6	10.7	1.031
37	61.5	62.0	7.8	7.9	1.008
38	78.0	81.5	8.8	9.0	1.045
39	41.0	56.5	6.4	7.5	1.378
40	35.0	37.0	5.9	6.1	1.057
41	40.5	48.0	6.4	6.9	1.185
42	36.5	34.5	6.0	5.9	.945
43	143.5	65.5	12.0	8.1	.456
Total	4,658.5	3,946.5	427.1	392.1	

Mean difference = .814
t = 3.21
Highly significant for 42 degrees of freedom.

of small plants and receiving stations who have limited laboratory facilities and who prefer not to make their own media. Further savings in the cost of making bacterial counts are possible by using a calibrated inoculating loop for which the tubes are especially adapted. This procedure eliminates the time, skill, and equipment required for making sterile dilution blanks, for cleaning and sterilizing pipettes, making the dilutions, and plating. Another factor which merits some slight consideration at this time, where agar supplies are limited, is the fact that the roll-tube method requires only about 7 ml. of culture medium compared with 10–15 ml. used in the petri dish. Less incubator space is needed, which may be of importance where large numbers of routine analyses are to be made. Also there is less danger of contamination of the tubes than of the plates, a fact which should tend to increase the dependability of the results. Finally, the incubated tubes may be carried around in a compact package for demonstrational use by the field man and others doing educational work. Aside from their use in making bacterial counts, the roll-tubes and apparatus may be used for making surface cultures by whirling the sterile agar in the tubes and after thorough solidification of the agar inoculating with a bacterial suspension and rewhirling the tubes. The tubes provide a larger surface than ordinary agar slants and also a means of uniform inoculation.

On the other hand, the roll-tube method of making bacterial counts requires a special motor-driven apparatus for rotating the tubes, which should be large enough to accommodate twelve or more tubes, so that no time will be lost in waiting for the agar to congeal in the whirling tubes. (Tubes may be removed or added while the apparatus is running.) Congealing is retarded at warm room temperatures, and under such conditions a fan may be necessary to cool the whirling tubes or the whirling may have to be done in a cool room. Because of the collection of small amounts of free moisture in the bottom portion of the tube, the incidence of spreading colonies is apt to be greater with roll-tube cultures than with petri dish cultures, unless care is taken that the tubes are incubated with their bottom ends slightly sloping downward. In the roll-tube method, it is desirable to use a somewhat firmer agar than is necessary in the plate method. Roll-tube cultures are somewhat more difficult to count than corresponding plate cultures, especially when the number of colonies approaches 300. Surface colonies are not as plainly seen in the roll-tube as in the petri dish.

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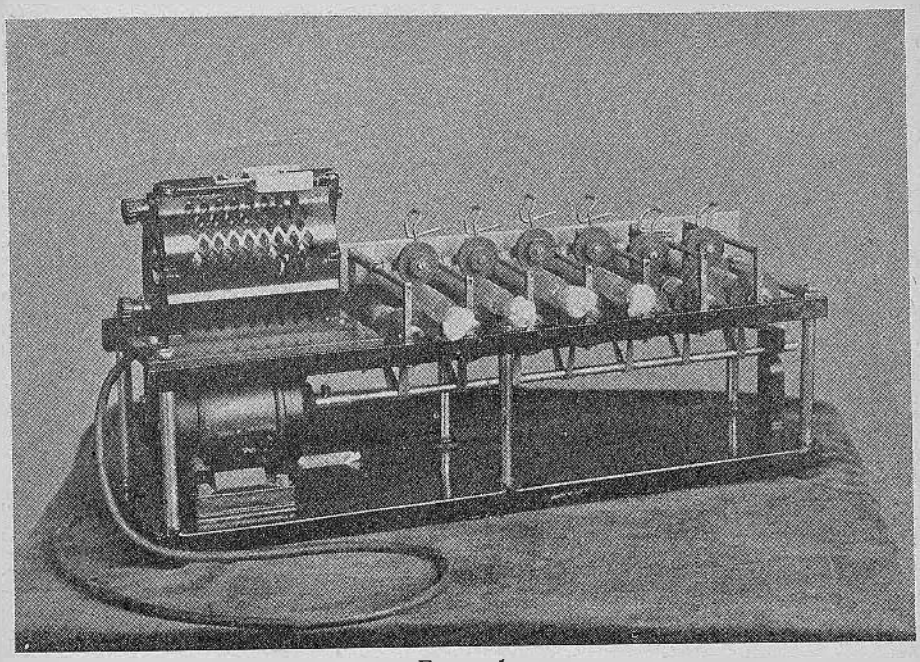

FIGURE 1
A six-tube roll-tube apparatus

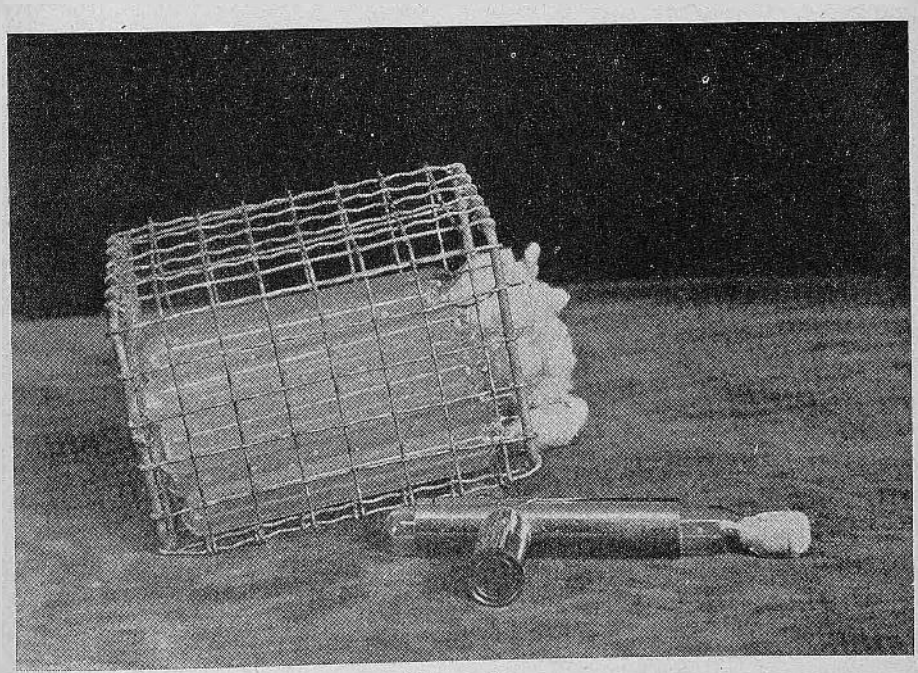

FIGURE 2
Position of incubating roll-tubes and counting lens in position over tube

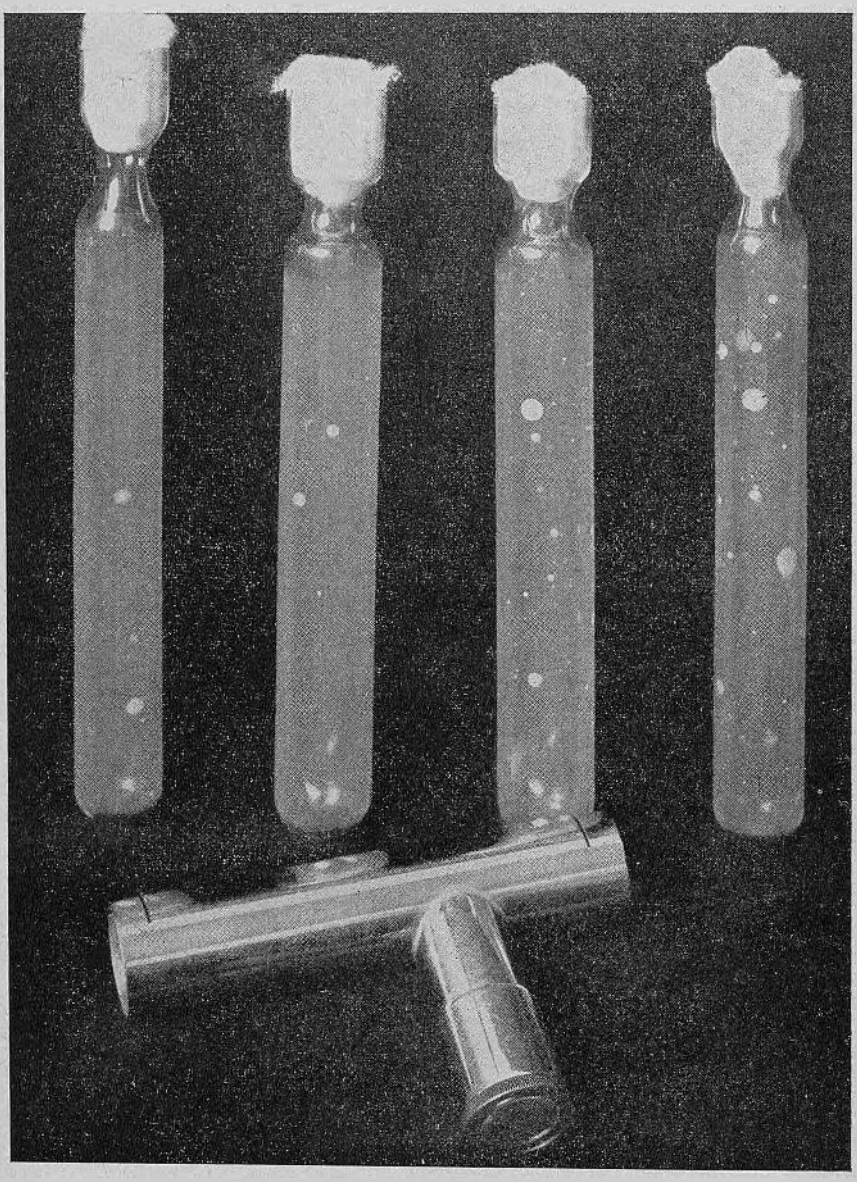

FIGURE 3
Roll-tube cultures showing colonies and counting lens

Cold Weather Care of Milking Machine Rubber Parts*

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THE ability of a weak lye solution to maintain the rubber parts of milking machines in good sanitary condition is now widely recognized (1, 2, 3, 4, 5, 6, 7, 8). However, one drawback to its use lies in the freezing of the solution during cold weather. To avoid this, some farmers move their solution racks into the stable for the winter; others build cabinets heated with an electric light bulb to enclose and protect the solution rack. The present paper records a search for a more satisfactory solution of the problem.

It seemed worth while exploring the possibility that the lye solution would remove any remaining traces of milk solids in a much shorter space of time than the customary period between milkings. If it could accomplish this during the period required to take care of the metal utensils—approximately 5 minutes—it would be highly convenient. The effectiveness of such a method was therefore tested out as follows: after a suction rinse with cold water, the teat cup assemblies of the three single units in use at the Central Experimental Farm were filled with lye solution which had been held in a cold storage room at around the freezing point. After 5 minutes, the solution was drained out and the teat cup assemblies allowed to remain in the cold room until next milking. They were not dismantled nor brushed during the test, yet appeared quite clean when inspected at the end of the fourth week.

While no significant bacterial growth would be expected at such a temperature, the extent of bacterial contamination was nevertheless determined by swabbing and rinsing the inner surfaces of the inflations and tubes with sterile water. Bacteria counts were made on the recovered rinse waters, as well as on the milk of the first cow milked with each unit. This was repeated three times during the 4 week trial. The results were in line with expectations, the average counts being 470 per ml. for the rinse waters and 2,600 per ml. for the milk samples.

Since temperatures considerably above freezing are also encountered in milk houses during the winter months, it was felt desirable to learn the effectiveness of the 5 minute treatment when the teat cup assemblies were held between milkings at higher temperatures. For the next seven weeks, the assemblies were held during and after treatment at temperatures between 70° and 80° F. They were not dismantled, nor did they receive any brushing treatment during this period, yet inspection at the end of the trial revealed a very satisfactory physical condition. Bacteriological contamination was again checked on four occasions in the manner previously indicated, and was found to be surprisingly low, averaging 550 per ml. for the sterile water rinses and 3,500 per ml. for the milk samples.

Although these findings suggested that the lye solution is much more effective than we had previously realized, it was considered desirable to continue the 5 minute treatment with storage at room temperature for a full year, and to judge its effectiveness by

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(a) the general level of bacteria counts made on bulk samples of mixed night's and morning's milk taken from the pasteurizing vat, and (b) by periodical inspection of the rubber parts to determine their physical cleanliness. The bacterial analyses, summarized in Table 1, wherein the average monthly

TABLE 1

MONTHLY LOGARITHMIC AVERAGES OF COUNTS ON RAW MILK AT C.E.F. DAIRY

Month	*1941–42*	*1942–43*
December	6,339	5,383
January	9,037	4,477
February	7,162	9,226
March	5,768	7,145
April	7,211	16,900
May	6,684	12,000
June	9,572	4,500
July	8,405	12,000
August	9,676	9,247
September	7,396	4,850
October	6,532	20,000
November	21,530	14,000

counts for the period of the trial are compared with those of the previous year, indicate no significant increase in bacteria count levels. As to the physical cleanliness, it should be stated that after the preliminary trials reported above, our customary practice of dismantling the teat-cup assemblies every week or ten days was reverted to. On these occasions, the rubber parts were inspected, then brushed in warm washing powder solution to remove any debris which might have accumulated between the outer surface of the inflations and the teat-cup shells. When necessary, the inflations were trimmed to the correct length before the units were re-assembled. At these periodical inspections there was no evidence of the presence of any fat or other milk solids, with the exception of a slight deposit of calcium phosphate in some of the inflations after they had been in service for several months. Their physical condition compared very favorably with that of many units on farms where, according to the operators, more elaborate, expensive, and time-consuming methods are being followed.

DISCUSSION

The opinion is widely held among milk sanitarians that there is only one way to clean the rubber parts of a milking machine, and that is by dismantling the teat cup assembly after every milking and brushing all parts thoroughly with a hot washing-powder solution. While this is the traditional method for cleaning metal dairy utensils and equipment, it does not follow that no other method can do the job. Hot water is rarely available in abundance on the average farm, while the necessity for dismantling and brushing after each milking has never been demonstrated. A search for a method which would avoid the need for large volumes of hot water led to the development of the cold water rinse—lye solution method in 1930 (4). A similar method, developed at the University of Wisconsin, was described by Hastings and Werner (2). Both methods rely upon the detergent action of a weak (0.5 percent) lye solution to saponify the fat and dissolve the casein in any traces of milk not removed by the initial cold water rinse. The lye solution also prevents the growth of bacteria. We have yet to hear of an instance where this method has not given satisfactory results. The findings reported in the present paper suggest that the lye solution method is even more effective than was previously realized. Such being the case, one wonders whether insistence upon more laborious and time-consuming methods can be justified, especially in view of the current scarcity of help on farms.

Since these studies were commenced, a recommendation has been encountered that during freezing weather the lye solution be drained from the tubes not less than 30 minutes after filling (8). This would generally entail

a special trip to the milk house, a disadvantage avoided by the 5 minute treatment. Warning is also given that the 30 minute treatment should be used only during freezing weather, but our results suggest that such a warning is unnecessary.

ACKNOWLEDGMENTS

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A TABLE OF COMBINATIONS OF TIME, CAUSTICITY AND TEMPERATURE FOR THE SOAKER COMPARTMENT OF MILK BOTTLE WASHERS OF THE SOAKER TYPE *

An article entitled, "Application of Scientific Control in the Bottling Industry" by Max Levine appeared in *Food Research*, January–February, March–April, 1938. There are a formula and a table in this article which give combinations of equal bactericidal value and which are based on the standards of New York City.

We believed that this table was valuable and have used it in a slightly different form which we thought would be more convenient for pasteurization plant operators who have this type of bottle-washer. In preparing the table, we used the formula solved for temperature as follows: Degrees Fahrenheit=194.241—57.2451 log of causticity—31.9591 log of minutes.

* Compilation of data by H. G. Oldfield, Minneapolis, Minnesota.

COMBINATIONS OF TIME, CAUSTICITY AND TEMPERATURE FOR THE SOAKER COMPARTMENT OF MILK-BOTTLE WASHERS OF THE SOAKER TYPE

Soaking Time Minutes	*Percent Strength of Caustic (NaOH)*						
	1%	1½%	2%	2½%	3%	3½%	4%
	° F.	° F.	° F.	° F.	° F.	° F.	° F.
1	194	184	177	171	167	163	160
2	185	175	168	162	157	153	150
3	179	169	162	156	152	148	145
4	175	165	158	152	148	144	141
5	172	162	155	149	145	141	138
6	169	159	152	147	142	138	135
7	167	157	150	145	140	136	133
8	165	155	148	143	138	134	131
9	163	153	146	141	136	133	129
10	162	152	145	139	134	131	128
11	161	151	144	138	133	130	127
12	160	150	143	137	132	129	126
13	159	149	141	136	131	128	125
14	158	148	140	135	130	127	124
15	157	147	139	134	129	126	123

The bottles should be given a final rinse with water kept sterile by means of heat or by a suitable chlorine containing compound.

Heat Resistant Coliform Organisms, with Particular Reference to Butter*

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OVER a period of years various investigators have studied the heat resistance of coliform organisms, particularly with reference to their ability to survive the pasteurization of milk. In general, the results show that the great majority of coliform cultures do not survive the exposures used in milk pasteurization but certain of them indicate that some strains may be unusually heat resistant (1, 3, 4, 5, 6, 8, 9).

The renewed interest in the use of the coliform test as an indication of pasteurization efficiency and sanitation in milk plants, and possibly other dairy plants, has again attracted attention to the heat resistance of the organisms.

In the studies reported herein *Escherichia* organisms of unusual heat resistance were repeatedly encountered. Most of them came from butter, but various other materials also were involved.

PROCEDURE

In the examination of butter for coliform organisms a sample was melted, centrifuged and the fat removed with precautions against contamination. Tubes of gentian violet lactose peptone bile broth were inoculated with 1 ml. and 0.1 ml. portions of the serum. Milk, buttermilk, and cream were added directly to gentian violet lactose peptone bile broth, and water was inoculated into lactose broth; with these materials 10 ml. portions were placed in 10 ml. double strength concentrations of the enrichment media while 1 ml. and 0.1 ml. portions were added to 10 ml. single strength concentrations. Incubation was at 37° C. Material from a tube showing gas was smeared on eosin methylene blue agar for purification and preliminary identification.

In testing a culture for heat resistance, 0.2 ml. of a 2-day milk culture grown at 37° C. was suspended in 10 ml. sterile skimmilk; 2 ml. portions of this suspension were sealed in small glass tubes and exposed for various periods in a water bath at 61.7° C. After exposure, a tube was cooled in ice water, broken, and the contents transferred to a tube of litmus milk for incubation at 37° C.

RESULTS

In connection with cooperative work between the Iowa Agricultural Experiment Station and a butter manufacturing plant, a number of heat resistant coliform strains were isolated. A transfer of one of the more resistant strains (identified as *Escherichia coli*) was studied in considerable detail at the Station. When tested repeatedly over a period of several months, it regularly survived 61.7° C. for 40 minutes although a part of the time it was held at approximately 3° C. The high heat resistance of the organism was verified in two other laboratories also interested in heat resistant coliform species; one of them that investigated its identity reported it was *E. coli*.

Resistant coliform organisms in cheese. Considerable difficulty was encountered with gas formation in edam cheese made in plant A from

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pasteurized milk. Investigation of the defective cheese indicated coliform organisms were the cause and from certain of the cheese *Escherichia* organisms were isolated. Heat tests on the cultures indicated they almost invariably survived 61.7° C. for 30 minutes. Tests on pasteurized milk from the plant showed that at the time it was free of coliform species. Infection of the cheese eventually was traced to defective vats.

Resistant coliform organisms in pasteurized milk. There was reason to suspect the presence of coliform organisms in milk pasteurized in plant B. Pasteurization was conducted in a spray vat with an exposure of 30 minutes at 62.2° C. Immediately after pasteurization the samples were removed aseptically and cooled in ice water. During a period in mid-summer, coliform types occasionally were found in the pasteurized milk. Heat tests were not conducted on the cultures at this time, but a number of them were held at approximately 3° C. without transferring for about 13 months when they were removed and sub-cultured in litmus milk. Four of the cultures grew and were transferred several times. They were tested for heat resistance and one of them survived 30 minutes at 61.7° C.; the others failed to survive 20 minutes.

In a more detailed study of the presence of coliform organisms in milk from plant B, two samples of raw milk and two corresponding samples of pasteurized milk were examined weekly from Dec. 10, 1942, to Oct. 7, 1943. With each sample, five 10 ml. portions were enriched at 37° C. in 10 ml. double strength gentian violet lactose peptone bile broth and five 1 ml. portions in single strength broth; during summer months the 10 ml. inoculations of raw milk were replaced with 0.1 ml. inoculations. Tubes containing the smallest inoculation of a sample which gave gas were cultured on eosin methylene blue agar to confirm the presence of coliform organisms; the 10 ml. enrichments of pasteurized milk also were smeared on the agar regardless of gas formation.

In the period outlined, 83 raw milk samples and 83 corresponding pasteurized milk samples were examined. Although coliform organisms regularly were found in the raw milk, they never were found in the pasteurized milk.

Resistant coliform organisms in various materials from a butter plant. In connection with studies on the water supplies of butter producing plants, various materials were examined for coliform organisms and frequently the heat resistance of isolated cultures was determined. At one of the plants (plant C) coliform organisms were repeatedly obtained. Results of heat tests on selected cultures are given in Table 1.

Of the 18 *Escherichia* cultures studied, 16 survived 20 minutes at 61.7° C., 12 survived 30 minutes and 7 survived 40 minutes. The cultures

TABLE 1

HEAT RESISTANCE OF SELECTED COLIFORM CULTURES ISOLATED FROM PLANT C

Material examined	*Genus isolated*	*No. cultures tested*	*Cultures surviving 61.7° C. for* 20 min. no.	20 min. %	30 min. no.	30 min. %	40 min. no.	40 min. %
Butter wash water	*Esch.*	1	0	.0	0	0	0	0
Cream	*Esch.*	4	3	75.0	2	50.0	0	0
	Aerob.	1	0	0	0	0	0	0
Buttermilk	*Esch.*	1	1	100.0	0	0	0	0
Butter	*Esch.*	12	12	100.0	10	83.3	7	58.3

showing the greatest resistance came from butter, although two obtained from cream survived 30 minutes at 61.7° C. Since the butter wash water regularly was chlorinated, it would be expected to yield coliform cultures only rarely; the one culture isolated from it failed to survive 20 minutes at 61.7° C. The one *Aerobacter* culture tested was very low in heat resistance.

Resistant coliform organisms in butter. The high heat resistance of coliform organisms isolated from butter at plant C suggested an investigation of the heat resistance of coliform organisms in butter from other sources. Accordingly, samples of butter were collected from various plants, examined for coliform organisms, and heat resistance was determined on the cultures isolated. Certain of the plants yielded cultures which were highly resistant; Table 2 presents results on two of these plants.

TABLE 2

HEAT RESISTANCE OF COLIFORM CULTURES ISOLATED FROM BUTTER FROM PLANTS D AND E

Plant	*Butter sample no.*	*Genus isolated*	*Min. cultures survived 61.7° C.*
D	1	*Aerob.*	<20
	2	*Aerob.*	<20
	3	*Esch.*	40
	4	*Esch.*	40
	5	*Esch.*	40
	6	*Esch.*	40
E	1	*Esch.*	40
	2		
	3	*Esch.*	<20
	4	*Esch.*	<20
	5	*Esch.*	30
	6	*Esch.*	40

All of the six butter samples from plant D yielded coliform organisms; four of them yielded *Escherichia* cultures and two *Aerobacter* cultures. All of the *Escherichia* cultures survived 40 minutes at 61.7° C. while neither of the *Aerobacter* cultures survived 20 minutes.

Five of the six samples from plant E yielded coliform organisms of the *Escherichia* type. At 61.7° C. two of the cultures survived 40 minutes, one survived 30 minutes but not 40 minutes and two did not survive 20 minutes.

A summary of all the examinations of butter samples, including heat tests on selected cultures, is given in Table 3.

The results indicate that coliform organisms are widely distributed in butter. Of a total of 220 samples from 77 plants, 143 from 65 plants contained these types. The great majority of samples yielded *Escherichia* cultures only; in a few instances both *Escherichia* and *Aerobacter* species were obtained while rarely only *Aerobacter* cultures were isolated.

The studies on heat resistance of selected cultures from the various samples show that a high percentage of the *Escherichia* cultures isolated from butter are considerably more heat resistant than would be expected on the basis of work done by previous investigators on cultures isolated from milk and certain other materials. Of the 92 *Escherichia* cultures from Iowa butter, 58 (63.0 percent) survived 20 minutes at 61.7° C., 35 (38.0 percent) survived 30 minutes and 16 (17.4 percent) survived 40 minutes. While the numbers of *Escherichia* cultures obtained from butter from other states are small (presumably because of the small number of samples examined), it is significant that again considerable numbers of them were heat resistant. Of the 116 cultures selected from all the samples examined, 74 (63.8 percent) survived 20 minutes at 61.7° C., 48 (41.4 percent) survived 30 minutes and 28 (24.1 percent) survived 40 minutes. The 17 *Aerobacter* cultures examined did not show significant heat resistance. All except two of them were killed in less than 20 minutes at 61.7° C. and the two that survived 20 minutes did not survive 30 minutes.

Detailed studies on heat resistant cultures. Although many of the cultures survived 40 minutes at 61.7° C.,

TABLE 3

RESULTS OF TESTS FOR COLIFORM ORGANISMS IN BUTTER FROM ALL PLANTS, INCLUDING HEAT TESTS ON SELECTED CULTURES

Source of butter samples	*No. plants represented*	*No. samples tested*	*No. samples positive*	*Cultures tested for heat resistance*		*Cultures surviving 61.7° C. for*					
						20 min.		*30 min.*		*40 min.*	
				genus	*no.*	*no.*	*%*	*no.*	*%*	*no.*	*%*
Iowa	71	182	117	*Esch.*	92	58	63.0	35	38.0	16	17.4
				Aerob.	12	1	8.3	0	0	0	0
Missouri	3	18	17	*Esch.*	15*	8	53.3	8	53.3	7	46.7
				Aerob.	4*	0	0	0	0	0	0
Kentucky	1	8	3	*Esch.*	3*	3	100.0	2	66.7	2	66.7
				Aerob.	1*	1	100.0	0	0	0	0
Illinois	1	6	4	*Esch.*	4	3	75.0	1	25.0	1	25.0
Tennessee	1	6	2	*Esch.*	2	2	100.0	2	100.0	2	100.0
Totals	77	220	143	*Esch.*	116	74	63.8	48	41.4	28	24.1
				Aerob.	17	2	11.8	0	0	0	0

* Some samples yielded both *Escherichia* and *Aerobacter* cultures.

the method of determining the heat resistance gave no indication of the number of cells present at any time. Even though a culture is heat resistant, not all the cells are equally so, and the numbers of organisms should decrease as the period of heating increases. To determine the extent of survival in resistant cultures, counts were made on suspensions of organisms before and after exposure at 61.7° C. The suspensions were prepared and heated in the manner already described and counts were made with tryptone glucose extract milk agar, using an incubation of 48 hours at 37° C. The results are given in Table 4.

organisms in the original suspensions were purposely kept low to compare the rates of destruction with those in suspensions having high numbers. The unheated suspensions had 58,000 and 130,000 organisms per ml.; after 20 minutes heating the counts had dropped to 30 and 2,600 per ml., respectively, while after 30 minutes both counts were less than one organism per ml. The percentages of organisms surviving 20 minutes were 0.05 in trial 11 and 2.00 in trial 12. With heavier suspensions of the same cultures in earlier trials (trials 3 and 4), corresponding percentages were 3.25 and 6.67. Thus with fewer organisms in

TABLE 4

NUMBERS AND PERCENTAGES OF *Escherichia* ORGANISMS SURVIVING 61.7° C. FOR VARIOUS PERIODS

		Bacteria surviving 61.7° C. for							
	Bacteria per ml. in original	*20 min.*		*30 min.*		*40 min.*		*50 min.*	
Trial	*suspension*	*no.*[1]	*%*	*no.*[1]	*%*	*no.*[1]	*%*	*no.*[1]	*%*
1	15,300,000	3,000,000	19.60	245,000	1.60	48,000	0.31	11	0.00007
2	10,500,000	5,500,000	52.40	1,800,000	17.14	29,000	.18	860	.008
3	12,600,000	410,000	3.25	52,000	.41	1,060	.008	7	.00006
4	18,600,000	1,240,000	6.67	248,000	1.33	700	.004	9	.00005
5	9,800,000	50,000	.51	21	.0002	<1	....	<1	.....
6	9,700,000	14,000	.14	15	.0002	2	.00002	<1	.....
7	10,000,000	364,000	3.64	22,000	.22	340	.003	2	.00002
8	12,000,000	7,100,000	59.16	191,000	1.59	550	.005	<1	.....
9	12,200,000	770,000	6.31	1,360	.011	1	.000008	<1	.....
10	5,100,000	520,000	10.20	18,000	.35	340	.007	<1	.....
11	58,000	30	.05	<1	...	<1	....	<1	.....
12	130,000	2,600	2.00	<1	...	<1	....	<1	.....

[1] = number per ml.

In trials 1 to 10, inclusive, the unheated suspensions had relatively high counts, from 5,100,000 to 18,600,000 per ml. Although the counts had decreased in each case after 20 minutes heating, they still were high. As the heating continued the numbers dropped off rather rapidly but they were significant in all trials after 30 minutes and in most trials after 40 minutes. In five of the trials organisms survived 50 minutes heating; in one, the count then was still relatively high while in the other four the counts were very low.

In trials 11 and 12 the numbers of the original suspension there was a greater percentage destruction during the heating. However, the comparisons were not made on the same subculture of each strain which may have been a factor in the results.

DISCUSSION

The results of the studies substantiate the work of earlier investigations in showing that some strains of coliform organisms are considerably more heat resistant than others. The resistant strains belonged to the genus *Escherichia* rather than to the genus

Aerobacter, a fact that may be of significance in considering certain defects of pasteurized milk and cream which may be due to coliform organisms, such as ropiness.

The frequent occurrence of coliform organisms in butter and the high percentage of heat resistant *Escherichia* cultures encountered indicate the need for further study of these organisms in butter. Although it is possible that some of the resistant strains survive pasteurization of the cream and thus gain entrance to the butter, it is not probable that an extensive contamination of butter occurs in this way due to the rather high pasteurization temperatures used with cream for butter; also the cream often is acid which would increase the destruction of organisms with a given exposure. The churn may be an important source of coliform organisms, particularly heat resistant *Escherichia* types. The heat treatment given churns in attempts at cleaning and sterilization may tend to select the more resistant types of coliform organisms which then multiply and are added in significant numbers to the butter during the manufacturing process.

The considerable number of heat resistant coliform organisms isolated and the particularly high resistance of certain of the strains indicate the need for care in interpreting results of coliform tests on pasteurized dairy products. This is especially true with milk if it is to be subjected to a pretest incubation period of 24 hours at 22.2° C. (2,7). In this type of examination the survival of one or two cells in a comparatively large volume of milk could account for relatively large numbers of the organisms at the end of the incubation and thus would be highly significant.

SUMMARY

Escherichia cultures of comparatively high heat resistance were encountered rather frequently in dairy products, especially in butter. Of 116 cultures selected from isolations from butter, 74 (63.8 percent) survived 20 minutes at 61.7° C., 48 (41.4 percent) survived 30 minutes and 28 (24.1 percent) survived 40 minutes. Bacterial counts on certain of the resistant cultures indicated that in some of them appreciable numbers of cells still were present after 50 minutes exposure at 61.7° C. Heat resistant *Aerobacter* cultures were not encountered.

The general results suggest that *Escherichia* cultures isolated from pasteurized dairy products should be tested for heat resistance before assuming that pasteurization was inadequate or that contamination had occurred.

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The Value of the Milk Serum Agglutination Test in Safeguarding Raw Milk Supplies*

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PURPOSE OF THE MILK SERUM TEST

THE milk serum agglutination test is one of the comparatively recent additions to the list of milk tests. The purpose of the test is to determine whether or not there is evidence of Bang's infection in the milk. Since the Bang's disease organism is destroyed by pasteurization, there is little if any value in applying the test to pasteurized milk. The fact that approximately two-thirds of the milk sold by licensed dealers in Vermont is now being pasteurized limits the application of the test to that third of the supply that is sold as raw and in addition to the raw used on farms. There are now about 350 herds from which raw milk is being sold by licensed dealers.

EARLY USE OF THE TEST

The Committee on Standard Methods for the Examination of Dairy Products included the milk serum test in its 1939 edition of *Standard Methods.* That action gave official recognition to the value of the test. Dr. I. F. Huddleson, Research Professor in Bacteriology at Michigan State College did a vast amount of experimental work in the method of making the test and he wrote a book, "Brucellosis in Man and Animals," which covers many phases of the Bang's disease problem. Dr. R. T. Westman of Kansas City, Kansas, was one of the first health officers to make extensive use of the milk serum test.

On May 13, 1941, Dr. Edwin M. Knights of the Providence, R. I., Health Department reported his use of the milk serum agglutination test. This report was given at Bridgeport, Connecticut, at the meeting of the Connecticut Association of Dairy and Milk Inspectors. The test had been conducted on individual samples of milk produced by 1,097 cows in 31 herds that furnished the raw milk to Providence. These were the herds that furnished 3 percent of raw milk to the city and were considered the best herds in Rhode Island. They were therefore permitted to furnish the only raw milk sold.

One of these herds supplying milk to a boy who contracted undulant fever contained four reactors to the milk serum test and these results were confirmed by an official blood test of the same cows.

An average infection of 14.3 percent was found in the thirty-one herds. The net result was that twelve herd milk supplies were changed to pasteurized milk, fifteen others to the pasteurization of a large portion of their supply and only three remained as raw milk dealers. Any herds from which any raw milk was sold had removed the reactors. Only one of the thirty-one herds contained no reactors.

So far as I have been able to learn, Vermont is the first state to apply the use of the milk serum test to all raw milk sold by licensed dealers in the state.

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* Presented at the 22nd Annual Meeting of the Vermont Dairy Plant Managers Association, Burlington, November 4, 1943.

OUR PROBLEM

Two months after I heard Dr. Knights render his report at Bridgeport, the Vermont Department of Public Health reported three cases of undulant fever to us on a Vermont raw milk route with a request to test the herd as soon as possible. The owner had already applied for the test and ten days later the result showed 24 reactors, 12 suspects, and 21 healthy animals. The results of this blood test aroused our interest in the possibility of locating Bang infection in our raw milk supplies.

At that time less than a third of our retail milk was being pasteurized and about a thousand herds contributed to our raw milk supply. Comparatively few of these herds had been blood tested. The state Bang's control law permitted reactors to be retained in the herds. The new state milk inspection law, however, and the regulations required by that law, had been in effect less than a year and these provided that no milk should be sold for consumption within the state unless it was obtained from healthy cows. It therefore followed that no milk could legally be sold from cows reacting to the Bang test. Before describing the plan that we adopted in the use of the milk serum test, permit me to discuss the importance of Bang's disease and the occurrence of undulant fever in Vermont.

IMPORTANCE OF BANG'S DISEASE

Results of official blood testing in Vermont show that two-thirds of the herds are infected. The initial tests of 2,390 herds show 17 percent of the animals tested were reactors.

To show the possible relationship of Bang's disease and undulant fever, I will again quote Dr. Huddleson, who says, "The two important channels through which the Brucella (the Bang's organism) is eliminated from the infected cow are the uterus at the time and shortly after abortion and the infected udder. The organism may be eliminated in the milk from the infected udder during the life of the animal."

It is not strange, therefore, that cases of undulant fever have occurred where raw milk from infected animals was being used. It is probably not the job of a milk inspector to attempt to control the occurrence of contact cases of undulant fever that are due to handling animals and carcasses infected with Bang's disease.

OCCURRENCE OF UNDULANT FEVER

The first cases of undulant fever were reported in the United States in 1904 and in Vermont in 1928. Thirty-two states have reported a peak in the number of cases during the past three years. The importance of undulant fever in recent years is therefore emphasized. One state reported 354 cases last year. For Vermont the number reported by the State Department of Health are listed in Table 1.

TABLE 1

Year	*Number Cases Undulant Fever*
1928	2
1931	13
1934	24
1938	42
1941	58
1943 (to Nov. 1)	57

Half of the cases that have occurred in Vermont during the calendar years 1941 and 1942 were on the routes of licensed raw milk dealers and the remainder were on dairy farms where raw milk was used and where cattle were handled and in some cases slaughtering done. The cases have been widely scattered. They have included several lawyers, a school teacher, the owner of a defense plant, a post office employee, a recruiting officer, laborers, housewives, farmers, school children, and four retail raw milk dealers. There have been no sporadic outbreaks although in several instances more than one case has occurred on the same milk route. Only

three contact cases, supposedly due to the handling or butchering of cattle, have been reported in Vermont during the last three years. Four cases have been fatal during this period.

It is evident from Table 2 that there are many mild cases of undulant fever that escape diagnosis inasmuch as several cases have been found in persons who were required to submit to examinations when seeking employment.

OUR EXPERIENCE WITH THE MILK SERUM TEST

Two years ago we began the use of the milk serum agglutination test. A sample of raw milk was secured for test from each raw milk dealer. In some cases these samples were mixed milk from different farms and it became necessary to obtain a separate sample from each herd supply. A summary was made after we had tested 690 herd samples and it was found that 12 percent of the samples showed infection. We thought it was desirable to know which cows were infected in addition to knowing that there was infection in the herd. Consequently we sampled the individual cows in the herds that showed infection. In this work separate samples were tested from 1,853 cows in 92 herds with the result that there were 15 percent reactors and 6 percent suspects on the milk serum test.

Since the milk serum test shows evidence of Bang's infection in the milk, it gives evidence of potential danger in many of our raw milk supplies. Following out this program, 40 of the 92 herds were then blood tested under the State-Federal Cooperative Control Plan. Of the 1,181 cows in these 40 herds there were 22 percent reactors and 9 percent suspects. Six of these herd owners discontinued selling milk in local markets. They then sold their milk to the shipping station that was sold for local use. We wrote them the following letter:

"DEAR SIR:

On ..... the Vermont Department of Agriculture tested milk from ..... of your milking cows for evidence of Bang's disease.

"Bang's disease in dairy cows may infect the milk and when the milk is so infected may cause undulant fever in the persons drinking such raw milk.

"Milk produced by ..... of your cows showed infection. Infected milk is a menace to public health and we therefore recommend that you have your entire herd tested at once for Bang's disease and remove all reactors from your herd or that you arrange promptly to pasteurize your entire milk supply.

"An application blank for the blood test of your herd is enclosed. Please sign it and return to this office within ten days or arrange within ten days *to have your milk which is sold in local markets pasteurized.* Unless you follow one of these two options,—namely, blood test your herd and remove reactors if any or pasteurize all of your locally sold milk, we shall be compelled to ask you, or the dealer who sells your milk, to show cause why the state license authorizing sale of this milk should not be suspended.

"The elimination of infected cattle from your herd or the pasteurization of milk tends to protect you against a claim that may arise due to the sale of infected raw milk as well as to protect the health of your family and of your milk consumers. Your reply by return mail is requested."

TABLE 2

AGE GROUPING OF UNDULANT FEVER CASES

	Under 10 yrs.	*20–25 yrs.*	*25–50 yrs.*	*Over 50 yrs.*
1941	3	12	24	16
1942	2	9	29	15
1943 (to Nov. 1)	2	14	27	14

The owners of infected herds were at once given the option of having their herds officially blood tested and to eliminate reactors, if any were found, or to pasteurize their entire milk sup-

since all milk shipped into the larger cities from this area is pasteurized at destination. Incidentally pasteurization does destroy the Bang organism if present in the milk. Six other dealers started to pasteurize their entire milk supply and the other 28 herd owners removed the reactors from their herds and continued to sell raw milk.

This program is being continued at the present time except that we secure a sample of milk for the milk serum test from each can of milk produced for sale as raw milk. It is recognized that we miss infection due to the fact that there are frequent herd additions.

The milk serum test is being used as a screen test toward securing a safe milk. A positive or suspicious test demands either that the herd be officially blood tested and reactors removed or that the milk be pasteurized.

UNDULANT FEVER INVESTIGATIONS

It has been our privilege to comply with the request from the State Board of Health to investigate the sources of milk used by many persons who have had undulant fever during the past three years. Table 3 summarizes the results of this work.

There is apparently some decrease this year in the number of cases occurring on raw milk routes. Approximately half of the herds supplying raw milk dealers in the state have now been blood tested.

TABLE 3

Year	*Number cases undulant fever reported*	*Number cases on raw milk routes*	*Number supplying herds blood tested*	*Number Bang reactors in these herds*
1941	58	29	17	149
1942	57	28	21	188
1943 (to Nov. 1)	57	19	15	73

COMPARISON OF MILK SERUM AND BLOOD SERUM AGGLUTINATION TESTS FOR BANG'S DISEASE

The blood serum agglutination test, commonly called the "blood test," is the official test employed in the cooperative state-federal control of Bang's disease in dairy herds. Samples of the blood are drawn and identified with the ear-tag numbers corresponding to the cows from which the samples are taken. After the blood coagulates the clear serum is used to make the test.

The milk serum agglutination test is similarly made by using the clear serum after the milk has coagulated. Coagulation may be hastened by the addition of a small amount of rennet to each sample of milk.

Comparisons of the two tests have been made on the same cows in 31 Vermont herds. These tests were made between October, 1941, and September, 1942, and all the herds were producing milk sold by retail raw milk distributors. A total of 472 cows were compared. The majority of the milk serum and blood serum tests of these 31 herds were less than 60 days apart although a few of the tests were more than 90 days apart. All tests were made in the same routine and by the same technicians as are employed in official Bang's disease control work. Comparisons follow:

71.8 percent (339 cows) of the milk and blood tests checked.
10.8 percent (51 cows) of the negative tests on milk were suspicious on blood.
12.1 percent (57 cows) of the negative tests on milk were reactors on blood.
4.4 percent (21 cows) of the suspicious tests on milk were reactors on blood.
0.9 percent (4 cows) of the reacting tests on milk were suspicious on blood.

Many cows, as shown above, that are negative on the milk serum test may be suspects or even reactors on the blood serum test. The above results show that 99.1 percent of the official blood tests either checked or were higher in titer than the milk tests

of the corresponding cows. This indicates that many reacting animals would be overlooked if the milk serum test were used as the basis for the determination of reactors. When the milk serum test shows even a slight reaction, it is reasonably sure that a blood test of the animal would also show as strong a reaction and very probably a stronger one. The above comparison shows that the milk serum test gave the stronger reaction on only 4 cows or less than 1 percent of the total number of animals tested.

In both the blood and the milk serum tests, cows are classified as "negative," "suspicious," or "reactors" depending on the results obtained by testing various amounts of the blood or milk serum respectively in combination with a prepared antigen which is a product made from Brucella or Bang's organisms. The agglutination results are read in accordance with Table 4.

The presence of an appreciable amount of agglutinins in the serum caused by the infection results in an agglutination or clumping together of the organisms contained in the antigen. These agglutinated organisms settle to the bottom of the tube and can be plainly seen with the naked eye. A partial agglutination in a dilution of 1 : 100 is read 5 and is shown above as a suspicious result. A complete agglutination in a 1 : 100 dilution indicates a reacting animal and is recorded as 6.

CONCLUSIONS

The use of raw milk from Bang infected herds presents an important health control problem. The milk serum test furnishes information that assists control officials to combat this problem. Our milk supplies can be made safe from Bang's infection by proper testing of cattle and removal of reactors or by pasteurization of the milk.

TABLE 4

READING THE AGGLUTINATION TEST

Dilution		*Reaction*	*Code*	*Result*
1 : 25	0.08 c.c. serum to 2 c.c. antigen....	None	0	Negative
1 : 25	0.08 c.c. serum to 2 c.c. antigen....	Partial agglutination	1	Negative
1 : 25	0.08 c.c. serum to 2 c.c. antigen....	Complete "	2	Negative
1 : 50	0.04 c.c. serum to 2 c.c. antigen....	Partial "	3	Suspicious
1 : 50	0.04 c.c. serum to 2 c.c. antigen....	Complete "	4	Suspicious
1 : 100	0.02 c.c. serum to 2 c.c. antigen....	Partial "	5	Suspicious
1 : 100	0.02 c.c. serum to 2 c.c. antigen....	Complete "	6	Reactor
1 : 200	0.01 c.c. serum to 2 c.c. antigen....	Partial "	7	Reactor
1 : 200	0.01 c.c. serum to 2 c.c. antigen....	Complete "	8	Reactor

Report of Committee on Frozen Desserts

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THE dairy industry is going through one of the most trying periods of its existence. The demand for milk is unprecedented but the necessary men, materials, cows, and feed with which to produce it are scarce or non-existent. This situation has brought plenty of headaches to the dairy inspector. From the time he starts out in the morning until he ends up at night, he sees these conditions and hears the complaints and excuses of the farmer and the milk plant operator. It takes a pretty level-headed, clear-thinking dairy inspector to withstand this daily bombardment of complaints and excuses without giving in or at least weakening to the point of relaxing some of the requirements and overlooking a great many things. These are especially trying times for the new and inexperienced inspector and for the old-time, easy-going fellow who obtained his job through politics. They, like the inexperienced soldier, become panicky under fire. The seasoned veteran (soldier or dairy inspector) takes the battle in stride. Their training and knowledge of essentials stands them in good stead.

WHAT SHALL BE OMITTED?

In the dairy industry as in our lives, many things which are daily routine can be eliminated without disastrous results. Food, clothing, and shelter are necessities in this country. In the dairy industry *health* (of the cows and employees), *cleanliness* (of machinery, utensils, cows, and employees), and effective pasteurization of the final product are prime requisites in the dairy industry. Do not relax your vigilance on these essentials. A milk pail or can may be battered but it should be clean. Machinery may make a lot of noise and need repairs but it should be clean. Cows may need more feed and better stables but they should be clean and healthy. Workmen may be inexperienced but they should be healthy and clean and taught the necessity of cleanliness and care in handling dairy products. The emphasis should always be on sanitation.

Inspector and dairyman alike should be made to appreciate that now of all times dairy products must be kept sanitary to preclude the possibility of disease epidemics. These would do more damage at this time than whole divisions of the Axis armies in our midst.

One becomes so accustomed to routine that he thinks that unless a thing is done as it always has been done, it is not right. There are many laboratory tests for the sanitary quality of milk. In some states they have decided that of the many tests only three, the coliform, the phosphatase tests, and the direct microscopic count are the ones that give them the necessary information on the sanitary quality of milk. This saves a great deal of time and money.

In dairy inspection let us emulate the example of the laboratory. Let us study the situation and decide what are the essentials, then concentrate on them, and let the rest go for the duration. Let us not harass the overworked producer who already has so many troubles with labor shortage, machinery, materials, and government regulations that any unnecessary and foolish demands from a sanitary inspector represents the "last straw."

Relief is already in sight for dairy plant equipment. The W.P.B. has amended limitation order L-292 and

authorizes more dairy plant equipment for 1944. The new quotas permit manufacture of 80 to 125 percent of the average annual production of milk for the years 1939, 1940, and 1941 with higher quotas assigned to cheese and dry milk equipment.

Do not think that you have all the troubles. It is interesting to note how similar are the problems of the control officials from three widely separated states representing the East, West, and South. A report from each of the other states would doubtless show the same conditions. The reports of my colleagues follow:

ENFORCEMENT OF ICE CREAM STANDARDS UNDER WAR CONDITIONS

BY O. A. GHIGGOILE

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California was one of the first states in the union to undertake a comprehensive control program relating to ice cream and similar frozen products. This program was developed and sponsored by the industry as a means of correcting certain evils which existed within it and to provide for a uniform program for the maintenance of high quality products. We were, therefore, indeed fortunate in having the wholehearted support of the industry when we entered the field to enforce stringent laws. Those experienced in law enforcement fully realize and appreciate the meaning of such cooperation. With the support of the industry we were able to bring about corrections within a short period of time.

For the purpose of administering the program, adequate funds were necessary. Since it is difficult at times to secure appropriations from the Legislature for the administration of a new program, the industry took it upon itself to make the program self-supporting. This was accomplished by assessing a fee for a license to manufacture frozen dairy products, based upon the volume of business. The Act specifically provided that all monies received are to be credited to a special fund to be used exclusively for the enforcement of laws and the administration of the program relating to ice cream and similar frozen products. Everything had been going smoothly for a number of years, and the program resolved into one of routine. Everyone seemed happy and satisfied with the results being accomplished. Then the war came along, and along with it came many problems, problems perhaps no different from those confronting regulatory officials and the industry in other states. However, each state, I believe, likes to feel that its problems are just a little more serious than those of other states.

With the entrance of this country into the war, a few of our manufacturers (and this is true with other branches of industry) took the position, because a state of war existed in this country, that some of our requirements and standards should be overlooked or relaxed. The fact remains, however, that now, more than ever, standards and sanitation should be maintained. Relaxing or ignoring some of the requirements enacted into law for the protection of public health and safety may not only impede our war efforts, but may prove far more disastrous than the loss of a major battle. The large concentration of service men and the tremendous increase in our civilian population makes the rigid enforcement of laws more necessary. Therefore, our requirements have not been relaxed nor modified except in two instances to be mentioned later and which do not affect public health. There has been no let-

down in our constant drive to maintain sanitary standards and high quality in ice cream and similar products.

Fortunately, we have the same personnel on this program as we had before the outbreak of war, including four ice cream manufacturing specialists, well trained and qualified to understand all problems relating to ice cream and similar products, and capable of assisting the industry with the solution of its technical and trade problems.

Lack of experienced men and scarcity of equipment have created some serious problems and have placed additional burden and responsibility upon regulatory officials. Experienced men had to be replaced with inexperienced and untrained men, some of whom had never worked around milk products or in a milk products plant. These men were not familiar with nor did they understand the manner and methods of proper washing and sterilization of milk handling equipment, so it became our duty to assist in training these new employees in sanitary practices. Shortage of help and inexperienced men have caused many undesirable shortcuts to crop up such as quick, incomplete washing and sterilization of equipment, failure to dismantle sanitary pipe lines, fittings, pumps, and so on, after each time used, improper or inadequate sterilization, improper pasteurization and care of pasteurization charts, improper protection of products during transportation, and carelessness in compounding mixes, resulting in the manufacture of products below legal standards of composition. To a certain extent, these problems are with us in normal times, but the present state of affairs compounds them no end.

Much of the time of our specialists is devoted to educating inexperienced employees in the proper care in washing, sterilizing, and handling equipment so that products can be produced and sold with bacterial counts within our legal standard of 75,000 per gram. I believe the large percentage of high counts found in our ice cream today is due to faulty methods and equipment. The need of trained personnel in our plants is apparent to all, and in this connection the University of California at Davis has rendered a great service to the industry by conducting training courses in various cities throughout the state for the benefit of plant employees. In former years annual short courses were given at the University of California at Davis, which afforded an opportunity for persons to attend these courses relating exclusively to dairy industry problems. Since the United States Army has taken over the college at Davis, instruction can no longer be given, so the staff is to be highly commended for bringing instruction to the men in their own locality.

Inability to procure new equipment presents another serious problem in that as equipment becomes worn it is much more difficult to properly wash and sterilize it in order to maintain it in a sanitary condition. Worn out equipment and lack of adequate equipment hinders plant operations, thereby subjecting and exposing the product to greater possibilities of contamination, adding materially to the problems of producing products within legal bacterial standards and jeopardizing its wholesomeness and keeping qualities. In this connection very close supervision is being given to the pasteurization of the product and to the sterilization of equipment.

Food Distribution Order No. 8 added many problems and headaches. California had a minimum total food solids per gallon requirement of 1.6 pounds. With the reduction in the amount of total milk solids in ice cream and the limitation placed on the milk fat and milk solids, in particular, our manufacturers of ice cream were confronted with a serious problem. To carry out the provisions of Order No. 8 it was practically impossible to produce an ice cream in conformity with our food solids requirement. If ice cream was made to conform to our state law, then manufacturers would run afoul of

the federal order. An immediate investigation was made to determine the food solids content per gallon in the ice cream made in conformity with the federal order. It was found that by limiting the over-run within the limits required to produce an ice cream with a food solids content per gallon of 1.6 pounds when normal mixes were used, an ice cream with 1.4 pounds food solids per gallon could be made under the Federal order. Accordingly our ice cream law was amended during the 1943 session of our Legislature by reducing the milk fat content in ice cream from 10 to 8 percent and the food solids standard was reduced from 1.6 to 1.4 pounds per gallon. At the same time, the total food solids content in ice milk was reduced from 1.3 to 1.1 pounds. This law, however, remains on the statutes or in effect until the 91st day after the final adjournment of the 56th regular session of the Legislature, or until the cessation of hostilities in all wars in which the United States is now engaged, which ever shall occur first.

Until the effective date of this amendment (August 4, 1943) we were guided by an opinion from the Attorney General of California to the effect that the federal order, an order having to do with the war efforts, took precedence over state standards. With the possibility of additional federal orders affecting ice cream, as well as other agricultural and dairy commodities, some of which may not be applicable, or issued under the guise of being necessary to win the war, thereby endangering a great industry, a law was passed by the last session of our Legislature providing for the adoption of any standard covered by federal orders only if they conflict with our state law. This can be determined only by proper investigation and hearings. In this manner at least some of our state rights are retained.

With the curtailment of milk solids in the manufacture of ice cream, manufacturers looked around for substitutes. Some of the things mentioned as possible substitutes were flours made from soy beans, rice, wheat, oats, and other cereals. However, the use of these products in ice cream is rather limited, and in California they can be used only as stabilizers in an amount not to exceed 0.6 of 1 percent. If used in greater amounts, the resulting product becomes an imitation, because stabilizers of this nature contain fats or oils other than milk fat. Our laws dealing with imitation ice cream and imitation ice milk are so stringent that it is almost next to impossible for a plant to remain in business, as imitation ice cream or imitation ice milk cannot be sold in bulk for purposes of resale and cannot be manufactured, processed, frozen, handled, distributed or sold in any place where ice cream or ice milk is manufactured, processed, frozen, handled, distributed or sold.

An enforcement problem dealing specifically with sherbet has to do with the acids used in bringing the acid content of sherbet to the minimum requirement of 0.35 percent calculated as citric. Citric acid was commonly used, but it is now becoming difficult to obtain. To comply with the minimum acid content, manufacturers looked for substitutes, with the result that many products and concoctions found their way into ice cream plants. In many instances the product is not labeled to indicate what it is or what it is composed of, therefore making it extremely difficult to say whether or not such acids are satisfactory. Before any action can be taken it is necessary to make certain analyses and, usually the product has been used for some period of time before it was discovered.

During the time when ample supplies and ingredients are available our laws look pretty good, but let a war or a depression come along and we soon find out the many loopholes which permit various substitutes to enter into our products. If legislation were enacted to require approval of all ingredients used in the manufacture of frozen dairy

products, many of our present day problems would have been solved before they made their appearance.

The effects of Federal Order No. 8 were also felt through problems dealing with proper labeling. It is only natural for an industry to maintain the normal volume of business, whether through the sale of ice cream or a combination of frozen products. Since the normal volume could not be maintained by following the Order, it was maintained by combining or mixing ice cream with ice milk or sherbet. This was accomplished by placing the two products in the one container, giving the product a marble or variegated appearance, and by encouraging the consumption of water ices and sherbets as such. These water ices are composed of sugar, water, flavor and stabilizer, and are designed to replace the use of ice cream or ice milk in milk shakes and similar drinks. Water ices not being controlled under our laws, are being sold under various trade names. When used in milk shakes, however, a consumer's problem is presented. It is natural for the consumer to believe when a milk shake is ordered that it contains ice cream or ice milk. Therefore, when a water ice is used it becomes a substitute for ice cream, and the customer must be properly informed that a substitute was used in the preparation of his milk shake. This is being done by the display of a sign indicating that water ice is being used in the preparation of milk shakes. The sale of such products must be controlled, and this is particularly true of water ices containing ingredients possessing fats or oils and which can be so made as to resemble a sherbet or ice milk in appearance, to prevent its sale and use in a false, misleading or deceptive manner.

back and profit by the results of prob-

When peace is again restored in this fast-moving world of ours we can sit lems and mistakes confronting us at this time. It is my belief that we shall see many changes made in our laws, not only those dealing with frozen dairy products, but other products as well. We, as regulatory officials, feel that present day conditions have presented many problems, but I do not believe they are as great as the many problems confronting our industry as a whole. The day is not far distant when members of the industry, as the result of problems confronting them, will sit down with regulatory officials throughout the country to formulate a legislative program in the various states, which will be of greater value and benefit to themselves as manufacturers, to regulatory officials and to the consumer.

ICE CREAM SANITATION PROBLEMS IN FLORIDA

JOHN M. SCOTT

Chief Dairy Supervisor, Florida State Department of Agriculture

It has been necessary for the Florida inspectors to intensify their supervision of the methods practiced in the ice cream manufacturing plants in this State and at the same time overlook unavoidable infractions of the Law and Regulations. The difficulties being experienced by the members of the industry during this wartime emergency are reflected in the work of the inspector.

Perhaps the greatest problem in ice cream plants today is the poor quality of labor. Wages paid in the dairy industry were always low, and at the time they were "frozen" by Government order they were out of line as compared to the wages paid in other industries, particularly defense industries. Many former ice cream plant employees have been attracted by high wages in munitions factories and shipyards; others have enlisted or been drafted into the armed forces. The results have been a high turn-over of

labor and a continual breaking in of new unskilled labor. These new employees have to be taught by the plant officials and by the inspector how to do their work and then continually watched to see that they follow instructions. Unless watched they will fail to dismantle pipe lines, freezers, and other ice cream manufacturing machinery to wash and sterilize them properly. Their previous jobs have not taught them that sanitation is vital in the handling of all dairy products.

Several plants in Florida have been using high school students through the summer vacation, and these workers have in most cases been fairly successful, particularly when the employer kept in mind the fact that they were still children and did not expect them to think and act like mature people. But at best this source of labor is only temporary, as the children will soon be back in school, and other workers will have to be trained to replace them.

Unskilled labor has caused a great deal of trouble to those in charge of the plants and to the inspector due to wasteful practices and bad methods. One case was found recently where careless labor had used moldy butter in making 200 gallons of ice cream mix; as a result, the mix had to be destroyed, as it was unfit for food. If the inspector had not been alert, this mix would probably have found its way to the consumer, and it might have caused illness. In this case the manager of the plant had been called out of town and so was not on hand to prevent such an occurrence.

It is almost impossible to obtain labor that is interested in the work they are doing. Sanitation has probably suffered more from a "don't care" attitude than from anything else. This frequently affects the quality of the product as well as being responsible for some of the mechanical trouble now occurring in over-worked equipment.

Most plants in Florida, and all those in military or naval zones, are overloaded. Plants in cities in which large war production plants and military and naval personnel are located are operating 24 hours a day. The result is that most of the equipment is beginning to show signs of wear and tear. Mechanical breakdowns are becoming more and more frequent. This is due not only to being overloaded but to loss of practically all good maintenance men and inability to obtain new parts for worn out ones. The equipment is not properly cared for, and repairs are only temporary. Worn-out equipment is harder to keep clean than equipment in perfect condition.

Another problem becoming all too evident is the lack of proper refrigeration in many plants. A great deal more refrigeration is needed when plants are operating around the clock than in normal times. Florida has very few large plants that manufacture ice cream only; practically all of them are combination milk and ice cream plants. Plants that were designed to handle 3,000 gallons of milk a day are handling over 10,000 gallons a day to try to supply the needs of the increased population and the personnel of the armed forces located in this State. Since expansion is restricted to a minimum by federal order, the mix is not being properly cooled and stored.

Food Distribution Order No. 8, issued by the Secretary of Agriculture, effective in February, 1943, restricted the use of total milk solids in frozen desserts to 65 percent of the amount used during the year ending November 30, 1942. This order and the scarcity of fluid milk and cream for manufacturing purposes have lowered to some extent the quality of the ice cream sold as compared to that sold in the past. The appearance, flavor, body, texture, and food value are not up to the standards established before this war started. The amount of fat has been cut between one and two percent. Formerly the base of a mix was whole milk, about 4 per cent of fat from the milk, and the remainder of the fat came from bottling-grade cream or plastic

cream. Today the base of the mix is frequently water, and the fat is derived from any dairy product available. The change in the solids not fat is just as decided; formerly the milk base supplied all but 3 percent of the solids not fat. Today solids not fat are supplied from the available forms of dairy products such as sweetened condensed, condensed skim, and milk powder. Sweeteners are now sugar, brown sugar, maple sugar, corn sugar, honey, invert sugar, or a mixture of these in different proportions.

The ice cream maker is fortunate that the consumer is fully aware that he cannot get the materials with which to make his usual quality of ice cream and also that most consumers are glad to get anything in the way of foods. We only hope they will demand the former high quality of ice cream during the post-war period so that competition will be a decided factor in bringing things back to normal in the industry; this will be of great help to the inspector in his work at that time. We have to overlook many things that are unavoidable during the emergency and at the same time see that the frozen desserts sold meet as nearly as possible the standards set by law and that the plants are kept clean in spite of the many difficulties.

Supplies for package goods are a problem, not only from the manufacturers angle but from the standpoint of enforcing labeling requirements. It is almost impossible to keep a stock of legally printed packages on hand. The result is that someone is violating the law most of the time. We are still managing to keep the labeling violations to a minimum, but it is becoming increasingly difficult for the dairy supply houses to supply the demand for cartons and cups.

Another problem confronting us is control of the practice of adding other ingredients to a legally compounded mix. There are many small ice cream manufacturers in Florida who do not have pasteurizers and therefore who must buy their mix. The limited quantity of mix that the manufacturer is permitted to sell this class of operator is so inadequate that he is sorely tempted to stretch his mix and increase the amount of ice cream for his customers by adding other ingredients to the mix. This lowers the quality of his product both by exposing it to contamination by tampering with the pasteurized mix furnished him and by bringing the fat and solids content below legal requirements. So far, a warning that this practice was against State regulations has been sufficient to bring the operator back in line.

Florida's problems in the ice cream industry are no doubt those of other states, and we join the control officials in the other states in hoping that this war will soon be over and conditions will return to normal.

WARTIME PROBLEMS OF THE HEALTH OFFICIAL

ANDREW J. KROG

Health Officer, Plainfield, N. J.

1. *Ice Cream under F. D. O. No. 8*

Recognition must be given this year to the extraordinary state of the ice cream industry due to regulation by the War Food Administration through Food Distribution Order No. 8, as well as by general economic conditions.

The curtailment of production of ice cream plants, as stipulated by F. D. O. No. 8, to 65 percent of that of the "base period," the reduction of serum solids to 80 percent of the butterfat content, the maintenance of the total dairy solids to below 22 percent of the mix, should not necessarily affect the sanitary quality of ice cream.

In addition to the legislated regulation by F. D. O. No. 8, however, the

ice cream industry has been regulated by the unlegislated economic condition of the country. When there are shortages of raw materials—manufacturers are almost forced to neglect quality—if they are to keep manufacturing they must take what is available, even if quality is inferior. Fluid milk consumption has increased approximately 13 per cent in the United States, since Pearl Harbor. With curtailed production, due to loss of farm labor and cattle population, with an increased demand for butter and milk powders (stimulated by lend-lease and Army purchases), the ice cream industry has been pushing hard to get even the raw materials permitted it under F. D. O. No. 8 limitations. In fact, it has been our observation that independently owned plants have had to curtail production for extended periods, just because of difficulties to obtain materials. Plants affiliated with organizations whose other subsidiaries manufacture butter and other concentrates are in a much more fortunate position.

The stipulations of F. D. O. No. 8 need not necessarily affect the bacteriological qualities of finished ice creams—although there is no doubt that tremendous effects on chemical constitution can be expected. In other words, proper cleaning of plant equipment will still do much to keep total bacterial counts low. Proper sterilization practices will still prohibit the entrance of coliform and hemolytic organisms.

2. *Substitution of Dairy Ingredients*

The present regulations governing the constitution of ice cream were developed after a number of years of study. Ice cream, as we know it, refers to dairy product or a combination of dairy products to which has been added sweetening and flavoring materials, and sometimes stabilizers. The concentration of stabilizers has generally been kept to below a definite point—0.5 percent. The mixture of these various ingredients referred to as the ice cream mix is frozen with or without the addition of fruits, nuts, or other materials of a flavoring nature.

The trade journals of the ice cream industry reflected the opinion of some to the effect that the lower solids contents of war-time ice creams might be counteracted by the addition of cereal products such as corn, oat, wheat and soy bean flours. These articles all recognized that the present interpretation of ice cream laws is such that the concentration of non-dairy, non-sweetening, non-flavoring materials (stabilizer contents) was limited to 0.5 percent — but these various cereal preparations were not considered as stabilizers—they do not possess adequate stabilizing properties; they were merely considered as fillers.

Since the very formulation of our ice cream laws was developed by the need to avoid fillers, it is obvious that the recommendations for the use of such cereal products is not helpful to ice cream as we know it.

It is true that from the appearance of the dairy market at this time, a further limitation of ice cream to civilians is to be expected. In the opinion of this member of the Ice Cream Committee, it would be better to have that material which is sold to the consumer as ice cream remain ice cream as we know it. If consumers' appetites for frozen desserts are not satisfied by the supply of ice cream, another type of dessert formulated from either a mixture of dairy and cereal products or from cereal products alone may be developed. But this certainly should not be marketed under the name of ice cream. Standards of identity for such new products could be developed when the need for them arises.

3. *Flavoring Ingredients*

The present economic situation has made it quite difficult to obtain adequate flavoring materials of natural origin. Vanilla is not obtainable in quantities sufficient to supply the market. Vanillin and coumarin are being

used to a much greater degree in the ice cream industry now, than ever before. Chocolate liquor is difficult to obtain—as are cocoa powders of satisfactory flavor and low fiber content. Vanilla and chocolate products have been imported in the past.

Even those flavoring materials which are strictly domestic in origin are difficult to obtain because of labor costs. The inability to pick berries, cherries, and peaches this year will make next year's fruit ice creams somewhat scanty as to fruit concentrations. To fortify the flavors we can expect a greater use of synthetics. The nut picking problem has also been acute.

Whereas during the past few years our Committee has advocated a specification requiring that cold packed fruits be certified free of coliform organisms, our attempt to do so this year would increase the hardships on ice cream manufacturers. Our recommendations this year should be instead that fruits to be added to the frozen mix be processed by a heat treatment to inactivate pathogens and coliforms. The heating of cold packed fruits to 180° F. and holding at that temperature for one minute will guarantee the destruction of these flora. Similarly, nuts should be processed to avoid the contamination of a proper mix through the addition of faulty nuts at the freezer.

4. *Packages for Consumers*

Retail outlets have discouraged, if not completely discontinued, the packing of bulk ice cream for consumption off the premises. This has thrown a lot of consumer trade to plant packaged items. Of these, "novelties," especially those featuring ice cream on a stick, have increased tremendously in sales in the metropolitan area.

The molds used under certain licenced processes and the manner of handling the cut brick in others, provide ample opportunities for contamination in the plant, unless plant sanitation standards are maintained. It is respectfully suggested that the Committee ask State and local health enforcement agencies to be extremely careful in their examination of plant facilities for the manufacture of such packages.

In connection with plant sanitation, a review of the superior wetting qualities imparted to hypochlorites by mixing with some inorganic salts or "unoxidizable" wetting agents and the particularly potent properties of some of the newly developed wetting agents will show how plant sterilization can be maintained, even under conditions of short-handedness.

F. W. FABIAN, *Chairman*
L. C. BULMER
W. C. CAMERON
H. L. DE LOZIER
O. A. GHIGGOILE
R. E. IRWIN
A. J. KROG
J. M. SCOTT

CONVERSION TABLE FOR MILK*

Pounds	*Gallons*	*Pounds*	*Gallons*	*Pounds*	*Gallons*
9	1	396	46	783	91
17	2	404	47	792	92
26	3	413	48	800	93
34	4	422	49	809	94
43	5	430	50	817	95
52	6	439	51	826	96
60	7	447	52	835	97
69	8	456	53	843	98
77	9	465	54	852	99
86	10	473	55	860	100
95	11	482	56	1,721	200
103	12	490	57	2,581	300
112	13	499	58	3,441	400
120	14	508	59	4,302	500
129	15	516	60	5,162	600
138	16	525	61	6,023	700
146	17	533	62	6,883	800
155	18	542	63	7,743	900
163	19	551	64	8,604	1,000
172	20	559	65	9,464	1,100
181	21	568	66	10,324	1,200
189	22	576	67	11,185	1,300
198	23	585	68	12,045	1,400
206	24	594	69	12,906	1,500
215	25	602	70	13,766	1,600
224	26	611	71	14,626	1,700
232	27	619	72	15,487	1,800
241	28	628	73	16,347	1,900
250	29	637	74	17,207	2,000
258	30	645	75	18,068	2,100
267	31	654	76	18,928	2,200
275	32	662	77	19,789	2,300
284	33	671	78	20,649	2,400
293	34	680	79	21,509	2,500
301	35	688	80	22,370	2,600
310	36	697	81	23,230	2,700
318	37	706	82	24,090	2,800
327	38	714	83	24,951	2,900
336	39	723	84	25,811	3,000
344	40	731	85	26,671	3,100
353	41	740	86	27,532	3,200
361	42	749	87	28,392	3,300
370	43	757	88	29,253	3,400
379	44	766	89	30,113	3,500
387	45	774	90	30,973	3,600

* Compiled by H. G. Oldfield, Minneapolis, Minnesota.

How to Make the Other Fellow Want to Cooperate With You*

R. C. BORDEN

The Borden Company, New York City

THE subject of how to win cooperation probably impressed you as a presumptuous one. Frankly, I don't know much about it but I *have* had an opportunity to watch the work of outstanding cooperation winners in a lot of different fields, and I have been interested through observations during the past ten years, to discover that all of them, without a single exception apply four basic rules.

I believe these four rules will be interesting to you, because I feel convinced that every milk inspector in this room would much rather win cooperation by effective persuasion than through the use of a "club" placed in his hand by some regulation.

PRINCIPLE 1. WIN COOPERATION LIKE A BALL PLAYER WINS HOME PLATE

Here is what the first rule means. When a ball player sets out to score, what does he do? Hit the ball? Sure. But that's only the beginning. Then he touches *first, second, third* and *only* when he's touched all those preliminary bases does he go on to home plate and score.

Do the same thing when you set out to win the cooperation of a farmer who is failing to comply with some regulation. Give him a touch-each-base story as to *why* his compliance is vital. Don't try to score by the mere statement of your compliance demand.

In the field of labor management, factory operators for a long time have been frantic because they post signs—"No Smoking." "Don't Wear Necktics"—and the workers pay no attention. Strikes have resulted because management didn't use the right technique in winning cooperation from their employees. The chaps who have solved that problem have done a simple thing. Before posting a sign like "No Smoking" they would hold a meeting and tell a touch-each-base story as to *why* the regulation was necessary for the benefit of everyone concerned, including America's fighting men counting on increased factory production.

I'd like to illustrate Principle 1 by a model War Bond sale. I'll be the salesman. Mr. Albee, here, will be my prospect. Mr. Weber will act as "announcer," broadcasting my "trip around the bases."

TOUCH EACH BASE SKIT

CAST: Borden Salesman

A Announcer
P Prospect

B: From now on until victory is won, I want you to pledge 10 percent of your income for the regular purchase of war bonds. *I want you to do that for four reasons.*

(P takes bond from Borden and examines front and rear of it while announcer is talking.)

A: By displaying his product Borden makes a hit. He starts for First.

B: First, when you buy a war bond, you get the greatest possible safety for your savings. Do you realize

* Presented at the Twentieth Annual Conference of the New York State Association of Milk Sanitarians, Albany, September 23, 24, and 25, 1942.

that a war bond is actually *safer than the money in your pocket?*

(P takes bill out of pocket and compares it with bond while announcer speaks.)

A: Borden touches First in a cloud of dust and heads for Second.

B: Second, when you buy a war bond, you get good interest on your savings. Three dollars at the end of ten years for every two dollars you invest now. Just look at the face of the bond and see how fast your money grows.

(P examines front of bond intently while announcer speaks.)

A: Puffin' a little, but still going, Borden touches Second and heads for Third.

B: Third, when you buy war bonds, you get rainy day insurance. Perhaps a year from now you might need some of your war bond money to meet an emergency expense. In that event you can *get* your money back. Just like that! All you do is sign the request for payment *on the back of the bond!*

(P hastily turns bond over and examines it while announcer talks.)

A: Puffin' like an old houn' dog, Borden touches Third and heads for Home. Will he *last?*

B: Lastly, when you buy a war bond, you buy a piece of victory. You buy ships, planes, tanks for our men in uniform. What do you say?

(P "I say YES!" Shakes hands with Borden while announcer speaks.)

A: Borden reaches Home Plate. Listen to that crowd CHEER.

(Audience cheers.)

Those farmers you call on may not exactly cheer when they agree to fix the barn but at least, you will have the satisfaction of knowing that probably you will get the cooperation you ask. Why will you get it? Because you followed the same simple, obvious technique that every good ball player follows—YOU TOUCH EACH BASE.

PRINCIPLE 2. WIN COOPERATION LIKE A DUCK HUNTER WINS DUCKS!

Last year, I used a somewhat different analogy—a moose call. Right here we are discussing substantially the same thing. If a duck hunter wants ducks to cooperate by flying down to a point near his blind, he doesn't make a noise like a hunter. No, sir! Instead, he takes out one of these duck calls that you buy at the sporting goods store, and talks the duck's language. (Borden demonstrates with duck call.) Now, you, too, can take a tip from that particular procedure. Don't make a noise like an inspector. Make a noise like a farmer.

I'm going to ask two members of the audience to volunteer to help me in a little skit. Will one of you take the part of Joe Farmer and another take this gadget and give the duck call each time I say "save you money"? (Two members of audience volunteer.)

DUCK CALL SKIT

CAST: Borden Inspector
F Farmer
S Sound Effects Man

B: Joe, I want you to do everything you can to detect the existence of mastitis in your cows as early as possible. Here's why. In the first place, early detection means you can get the veterinarian on the job early and protect yourself from serious loss of milk production. That's one way doing what I ask will SAVE YOU MONEY.

S: Blows Duck Call.

B: Another thing, Joe. By detection of the presence of mastitis early, will protect yourself against the possible loss of the animal itself.

That's another way doing what I ask will SAVE YOU MONEY.

S: Blows Duck Call.

B: Still another thing, Joe. By detecting the presence of mastitis as soon as possible, you can keep the condition from becoming chronic and so protect yourself against loss should you want to sell your cows. That's still another way doing what I want will SAVE YOU MONEY.

S: Blows Duck Call.

B: Lastly, Joe, by early detection, you safeguard yourself against the spread of infection to the other animals you have in your herd. That, too, will SAVE YOU MONEY.

S: Blows Duck Call.

Mr. Borden: I hope you will pardon the obvious barbarisms in my analogy. However, I think it fundamentally sound. Don't make a noise like an inspector. Make a noise like a farmer!

PRINCIPLE 3. WIN COOPERATION LIKE WILL ROGERS WON FRIENDS

Will Rogers won friends more easily and on a wider scale than any other man I had the pleasure of knowing. He had many reasons for that skill, but one very obvious reason for his success was the way he could put on his face, any time he wanted to, a friendly, heart-warming smile.

When the average man *tries* to smile, what actually goes on his face is one of the following expressions: (1) a sneer, (2) a snarl, (3) a rubber band smile that snaps back after using, (4) a forced smile that makes you look like a painted ant eater, (5) a strange half-smile, such as you see on the face of a baby about to have a gas burp. (Mr. Borden then staged a smile contest.)

PRINCIPLE 4. USE OLD-FASHIONED GARDEN VARIETY ENTHUSIASM

If someone is asking you for cooperation and if that someone spills over with obvious and enthusiastic belief in the truth of the proposal, you are *impelled* to cooperate. Contrast that kind of chap with the one who asks for cooperation in a dull, bored way, one who sounds as if he wanted to go out for a beer without waiting to hear the end of his own talk. (Mr. Borden then staged a simultaneous speaking enthusiasm contest.)

In summarizing, the technique of winning cooperation is especially important today. We want to keep our country a democracy based on persuasion instead of compulsion. So remember these four rules:

1. Win cooperation like a ball player wins home plate
2. Win cooperation like a duck hunter wins ducks
3. Win cooperation like Will Rogers won friends
4. Use old-fashioned garden variety enthusiasm.

Legal Aspects

Clean Premises Required *

City ordinance regarding maintenance of clean and habitable premises upheld.—(Maryland Court of Appeals; *Petrushansky* v. *State,* 32 A.2d 696; decided June 24, 1943.) A health ordinance of the city of Baltimore (No. 384, approved March 6, 1941) added to the city code eight new sections relating to the cleanliness and fitness for human habitation of dwellings. Briefly stated, the ordinance provided that every dwelling should be kept clean and free from any accumulation of dirt, filth, rubbish, garbage or similar matter, and vermin or rodent infestation; that no person should wilfully or maliciously deposit any material in any plumbing fixture which might result in the obstruction of a sanitary sewer; that every dwelling should be maintained in good repair and fit for human habitation; that the commissioner of health could order conditions found by him to be dangerous or detrimental to life or health to be remedied; and that the commissioner of health could order the vacation of dwellings found by him to be unfit for human habitation or dangerous to life or health. There were also other provisions having reference to the sending and posting of notices and orders by the health commissioner and the correction of unhealthful conditions by him through his own agents.

The appellant was charged with violating the ordinance by failing to abate a nuisance on certain premises owned and possessed by him after notice from the city health commissioner. On appeal to the Maryland Court of Appeals from his conviction in the lower court the appellant claimed that the ordinance was invalid on a number of grounds. His objections, which were rejected by the appellate court, were as follows: The ordinance was too vague and indefinite to be a valid criminal enactment; the ordinance was unreasonable and oppressive and beyond the charter powers of the city because it imposed liability upon owners out of possession and unreasonable burdens upon fiduciaries or agents; the ordinance unlawfully delegated to the health commissioner an arbitrary discretion whether or not to enforce it; no definite standards were defined in the ordinance for the health commissioner's guidance as to the conditions under which he was to act; the ordinance granted the health commissioner arbitrary discretion as to the corrective action to be taken; no adequate notice was provided by the ordinance; no review of an order of the health commissioner was permitted to test its validity or propriety; and the title of the ordinance was misleading.

The judgment appealed from was affirmed.

* *Pub. Health Reports,* Oct. 8, 1943.

Safe Drinking Water *

Safe drinking water at State institution—liability of State officials for failure to furnish.—(United States Circuit Court of Appeals, 7th Circuit; *People of State of Illinois, for use of Trust Co. of Chicago et al.* v. *Maryland Casualty Co. et al., Maryland Casualty Co. et al.* v. *Bowen et al.,* 132 F.2d 850; decided December 9, 1942.) Actions were brought against the sureties to recover upon the official bonds of certain officers of the State of Illinois for the death of and injuries to certain persons from typhoid fever alleged to have resulted from contaminated water at an Illinois mental hospital. The deceased and injured persons were not inmates of the hospital but were employed at construction work on the premises. The State officers concerned were the director and assistant director of the department of public welfare, the director of the department of public health, and the managing officer of the particular State hospital involved. Neither the said officers nor the departments were sued but the defendant-sureties as third party plaintiffs filed their petitions against such officers as third party defendants, seeking to hold the officers personally liable if their official bonds had been breached. The officers moved to dismiss both the original complaint and the third party complaint, and the trial court entered an order dismissing both complaints. On appeal to the United States Circuit Court of Appeals the question was presented whether such officers were liable for their alleged negligent, wanton, and willful failure to furnish safe drinking water at the hospital.

It was the contention of the plaintiffs that it was the officers' duty "to cause safe water to be furnished" at the hospital and that this duty stemmed from the statutes of Illinois creating the departments of public health and public welfare and providing for the powers and duties of the departments and their officers. No specific duty to furnish safe drinking water at the hospital was provided by statute. According to the appellate court the State, when it by statute defined the powers and described the duties of the

* *Pub. Health Repts.,* Aug. 6, 1943.

said officers, was not creating duties which the officers owed to the individuals who might constitute the general public of the State; it was merely outlining the State's assumed public duty. In such a situation, said the court, the law seemed to be clear that "if the duty discharged is a public duty and not a duty which the individuals owe to any particular person, then for their negligence or wanton or willful omission in the performance of this public duty, the officers are not liable, except to the State." Since the officers were discharging a public duty and not a duty which they owed the individuals in the instant case, the court held that there could be no liability on the part of the officers to such parties. Furthermore, since the officers were not liable to the plaintiffs for their conduct, it was also held that there could be no action by the plaintiffs upon the officers' official bonds.

Piggery Nuisance *

Piggery — held nuisance — operation enjoined.—(Michigan Supreme Court; *Mitchell et al.* v. *Hines et al.*, 9 N.W.2d 547; decided May 18, 1943.) Because of offensive odors from a piggery an action was brought to enjoin the defendants from operating the same. The plaintiffs were owners of residential properties located in the general vicinity of the farm on which the piggery was located. It was shown that since 1935 garbage collected from nearby cities was fed to the pigs, the number of which ranged from about 200 in 1935 to about 400 in 1940–41. The practice was to feed the garbage to the pigs in an open field and later to plow under the unconsumed portion. From an adverse decree in the trial court the defendants appealed to the Supreme Court of Michigan.

The latter court said that the case was not one where newcomers had moved into an unpleasant neighborhood and sought to change such neighborhood. Rather it was one where the piggery was conducted unobjectionably on a small scale for some years and then offensive odors were created through either the increased size of the piggery or the condition of the fields because of the continued dumping of garbage thereon, or both. The court was of the view that there was a nuisance justifying the issuance of an injunction. It was pointed out that, although a court of equity "is reluctant to bar the operation of a lawful business and will not do so if a remedy may be applied to the nuisance incidental thereto," tests did not show any satisfactory means of carrying on a large-scale garbage-feeding piggery. "No method of feeding garbage to pigs on a commercial scale, as is here the case, in a manner that will not constitute a nuisance has been disclosed by the proof."

* *Pub. Health Repts.*, Oct. 1, 1943.

Rat Poison in Bakery *

Typhus fever—contraction by bakery employee — liability of employer. — (Georgia Court of Appeals, Division No. 1; *Blair* v. *Fulton Bakery, Inc.*, 24 S.E.2d 598; decided March 6, 1943.) An action was brought against a bakery to recover damages for the alleged negligence of the defendant in failing to furnish the plaintiff with a safe and healthy place in which to work. The plaintiff, after working for about nine months for the defendant as a baker, contracted typhus fever. Among other things, the plaintiff alleged that after becoming ill he learned that the defendant had contracted with people in the business of exterminating rats to spread rat poison to kill rats that lived and bred in the bakery and that the defendant negligently allowed the rats so killed to remain under some old and unused machinery and pieces of metal. As a proximate result of the defendant's so doing, the plaintiff alleged that he was bitten by fleas from such dead rats and contracted typhus fever. Another averment was that when a rat dies the fleas "then leave" the body of the rat and seek out a live being on which to live and secure nourishment from said being's blood stream." The defendant demurred to the petition, thus admitting all facts well pleaded but challenging that they were legally sufficient to constitute a cause of action. The lower court found in the defendant's favor and its judgment was affirmed by the Court of Appeals of Georgia.

Following are some of the views expressed by the appellate court: An employer is not an insurer of the safety of his employees and is bound only to the exercise of reasonable care; it is as much a master's duty to use reasonable care to protect his servants against dangers of the employment which may reasonably be expected to produce disease as it is to use reasonable care to protect against dangers which may produce physical injuries; a master is bound to exercise ordinary care in furnishing the servant a safe place in which to work, but the latter must exercise like care in discovering any defects therein; a master is not liable unless by the exercise of ordinary care and diligence he could have reasonably apprehended that his negligence would or might result in injury to some one of his servants; and an employer is not bound to foresee and give warning of remote, improbable, and exceptional occurrences, his duty being limited to such perils as reasonably are to be anticipated.

The court of appeals said that "to require of the defendant the duty of finding each

* *Pub. Health Repts.*, Sept. 17, 1943.

dead rat and removing its body from the bakery before the fleas could leave the bodies. would be very much like demanding that the defendant do an impossible thing." According to the court there was nothing in the petition which constituted a sufficient allegation that the defendant knew or by the exercise of ordinary care should have known that any of its employees would contract typhus fever by reason of the rats being killed and left in the bakery.

Color in Orangeade or Orange Drinks

From: ANTON ROEGER, JR.,
Director, Bureau of Foods and Chemistry

Attached is a general notice issued to the beverage industry in connection with a far-reaching opinion recently rendered by the Superior Court of Pennsylvania whereby bottlers or manufacturers of beverages are prohibited, as is clearly set forth in Section 5 of the Carbonated Beverages and Still Drinks Law, from using color in orangeade or orange drinks which *may* tend to mislead the public by imitating or simulating the appearance of the natural juice of the orange.

The Department, at the trials of the issue, furnished incontrovertible professional evidence that orange drinks so colored were in violation of the express prohibition in the Act, and, of course, adequate proof was furnished to convince the County Court that the defendant's beverage, by reason of the addition of artificial color, did imitate and simulate the appearance of the natural juice of the orange and that there was every possibility that the public might be misled by the imitation. These arguments were proved beyond any reasonable doubt.

A variety of natural orange juices, and blends of juices, and separate and combined juices diluted with water, some with color added, superficially resembling each other, were introduced in evidence to substantiate our claim that the use of added color in the instant case did lend the orangeade the fictitious appearance of being much richer in orange juice than it actually was.

Counsel for the defendant made a futile attempt to convince the Court that the language of the Act *would* permit the use of artificial color in orangeade, so long as the public is not thereby deceived into believing the product to be *100 percent* orange juice. Both the Court below and the higher Court were in agreement that no reasonable, common sense construction of the statute would merit serious consideration to this sort of strained interpretation. Likewise, both courts, in their respective opinions, agreed that the language of the Act "which may tend to mislead the public" is broad and so clear that "he who runs may read." Had the legislature intended this much strained meaning, it could easily have expressed it," the Court below observed. Furthermore, the lower Court opinion states that even if the customer knew the rules of the State Board (Board of Consulting Chemists of the Bureau), the coloring would lead him to suppose the orangeade or orange beverage an unusually fine one, rich in the natural juice and that, in the instant case, the legend on the bottle cap "artificially colored" is self convicting.

This decision will not only have a salutary effect upon the industry, but will assure the promotion of honesty and fair dealing in the interest of consumers. I believe that the desire of consumers to purchase high quality foods, their general ignorance of the composition and value of foods, and their consequent inability to guard against the purchase of inferior or unsuitable foods, sufficiently support the Court's conclusions.

The text of the present statute plainly shows that its purpose was not restricted to a requirement of truthful and informative labeling—one that is inadequate to protect the consumer from "economic adulteration"—by which less expensive ingredients are substituted, or the proportion of more expensive ingredients diminished, so as to make the product inferior to that which the consumer expected to receive when purchasing a product with the name under which it is sold.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF AGRICULTURE
BUREAU OF FOODS AND CHEMISTRY
HARRISBURG, PA.

Important Notice to the Beverage Industry

ILLEGALITY OF ADDED COLOR IN ORANGEADE UPHELD BY SUPERIOR COURT OF PENNSYLVANIA

Of considerable importance to the beverage industry, particularly those in the industry who have effected registration of their products with this Department for manufacture and/or sale in Pennsylvania, is the opinion handed down by the Superior Court on April 21, 1943, in which the judgment of the Court of Quarter Sessions of Berks County, in a case involving the unlawful addition of color to orangeade, was affirmed.

The Commonwealth instituted prosecution against a Reading bottler, alleging the illegal use of artificial color in the manufacture of a "Green Spot" brand of orangeade, and that, by reason of the added color, the finished beverage imitated or simulated the appearance of the natural juice of the orange. Section 5 of the

Pennsylvania Carbonated Beverages and Still Drinks Law specifically prohibits the use of color in such cases. Furthermore, the Commonwealth contended that the addition of the artificial color did tend to mislead the public, at least into believing that the defendant-manufacturer's beverage contained far more orange juice than was the fact, and that the sole purpose of the inclusion of color was to give the product the fictitious appearance of enhanced richness. In a summary proceeding before an Alderman, the defendant was found guilty, and assessed the minimum penalty for the first offense of $50.00 plus the costs of prosecution. An appeal from the judgment of the Alderman was taken to the Quarter Sessions Court of Berks County. In a subsequent trial of the case, the Court sustained the conviction and handed down an opinion accordingly. This action was followed by a further appeal from the judgment of the County Court to the Superior Court of Pennsylvania.

In affirming the judgment of the lower Court, the opinion of the Superior Court reads, in part:

"As was found by the court below that the addition of the coloring matter does produce a simulation of the pure orange juice, the legend on the cap is self convicting.

"The court below correctly held that the legislature, in adopting the proviso of 1937 must be taken to have had before it and under consideration the existing laws upon the subject. When it enacted the proviso of 1937, prohibiting the addition of artificial color if it tended to mislead the public by imitating the natural juice, the legislature was necessarily strengthening and stiffening the regulations with regard to orange drink and orangeade. It intended to enhance the protection of the public with regard to these drinks beyond that obtained by the truthful labeling of the cap or bottle, in accordance with the act of 1925.

"Nothing can profitably be added to the able opinion of the court below."

P.S. In the Superior Court of Pennsylvania, Philadelphia District, No. 10, October Term 1943.

June 23, 1943

THE STORY OF CALCIUM *

Tell your customers the wonderful story of calcium, its value and the fact that it is found in most easily digestible form in dairy products.

The Daily Human Requirements of Calcium (Lime)

(As recommended by Sherman)

Individual	*Grams Calcium*
Normal adult	.95
Children (up to 13 yrs.)	1.40
Pregnant mother	1.60

(Total includes daily requirements plus safety and retention factors.)

The Amount of Calcium Present in the Ordinary Mixed Diet of Americans

Daily Food Intake	*Grams Calcium*
Regular serving of Meat, Bread, and Potato	.029
1–2 Eggs	.101
Regular serving of Fruits and Vegetables	.158
	.288
1 QUART MILK SUPPLIES	1.660
Total	1.948

(Milk supplies all the calcium needed, plus safety factor.)

Note the average diet of Americans is deficient in calcium unless milk is added. Milk and milk products are probably the most economical and practical source of calcium in our diet.

* Extracts from J. H. Frandsen's lecture on *Milk and New Dairy Products—How to Increase Their Sales.*

JOURNAL OF MILK TECHNOLOGY

Official Publication of the

International Association of Milk Sanitarians

(Association Organized 1911)

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AS THEIR OFFICIAL ORGAN

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Association News

Changes in Dairy Bacteriology at Iowa State

Dr. B. W. Hammer, who has been with the Iowa State College as Dairy Bacteriologist, is now associated with the Golden State Company, Ltd., 425 Battery Street, San Francisco, California, in their Research Department. He is succeeded by Dr. Frank E. Nelson, formerly Associate Professor of Bacteriology at Kansas State College.

Dr. Nelson, a native of Harlan, Iowa, has received the following honors: the bachelor of science degree "with distinction" and master's degree at the University of Minnesota, also holder of the Shevlin fellowship; the doctor of philosophy degree and Iowa State Brand Creameries fellowship at Iowa State College.

Dr. Nelson's training has been in dairy bacteriology and agricultural biochemistry. For two years he was instructor in dairy bacteriology at the University of Minnesota. He has published numerous research papers and recently he completed a review article for the *Journal of Dairy Science* on "An Evaluation of Methods of Determining the Bacterial Quality of Milk."

Massachusetts Milk Inspectors' Association

The Massachusetts Milk Inspectors' Association met at Springfield on October first in business session for the submission of reports and the election of officers.

A meeting was called by the Milk Control Board on November 5th to consider a request made by the Massachusetts Restaurant Association that establishments be allowed to sell cream containing less than 16 percent butterfat. On account of the well-known shortage of cream, the representatives of the several regulatory groups and the restauranteers agreed to the terms for selling cream as follows:

1. Eliminate the word "cream" from wall signs and menus.
2. Do not *offer* cream for sale as such.
3. Post the following sign in a conspicuous place in the restaurants:
   "Due to the shortage of cream and in the interest of conserving butterfat, we are now serving a blend of milk and cream, and our employees have been instructed accordingly."

It was agreed that no prosecutions would follow the use of this blend, provided the above terms were followed.

The annual two-day convention was held at Worcester on January 5th and 6th. The speakers were: Captain E. C. Garthe of the U.S.P.H.S. on "The Restaurant Sanitation Program"; Dr. Don C. Lightner of the Creamery Package Co. on "What the Equipment Manufacturers Can Do to Cooperate With the Milk Inspector"; Dr. J. H. Shrader on "Scientific Advances in the Dairy Industry as Reported in 1943"; Professor E. O. Anderson on "Mastitis"; Mr. Herbert M. Ewell of the Pennsylvania Salt Co. on "The Salt of the Earth"; and Mr. Robert C. Perriello of Attleboro on "A Gastroenteritis Outbreak From Food."

ROBERT E. BEMIS,
Secretary-Treasurer.

New York State Association of Milk Sanitarians

The work of preparing the annual report of the Association is well under way. With good cooperation from the printer it should be possible to get the report in the mails some time during February, 1944.

All indications at the present time are that there will be an annual meeting next year.

W. D. TIEDEMAN,
Secretary-Treasurer.

Michigan Association of Dairy and Milk Inspectors

The Michigan Association of Dairy and Milk Inspectors held their annual meeting at Michigan State College on November 5th. The Dairy Department held their Annual Dairyman's Conference on November 3rd, 4th and 5th. This year they added a special milk inspection day and provided several speakers who took part in each day of the three sessions. The program was as follows:

"Demonstration. Comparison of Several Dairy Cleaners." Dr. W. L. Mallman

"When You Strain Milk." Prof. K. D. Wekel

Business Meeting

"What a Plant Man Expects of a Milk Inspector." Dr. C. A. Iverson

"Tracing a Source of Contamination in Bottle Washing." Dr. C. S. Bryan

"Practical Methods of Quality Control in a Fluid Milk Supply." C. O. Woolbright

"Washing Milking Machines." Prof. J. M. Jensen.

President Albert C. Miller was inducted into the Army in June. He is now located at Camp McCoy, Wisconsin. He is the proud father of a baby daughter born on September 28th.

HAROLD J. BARNUM,
Secretary-Treasurer.

MISSOURI STATE BOARD OF HEALTH MILK SANITATION COUNCIL

In order that it may have at its command the advice of a comprehensive group of milk control officials and others interested in milk control work in this State, the State Board of Health of Missouri has appointed a board of consultants to be known as the "State Board of Health Milk Sanitation Council."

This Council consists of nine members, and includes representatives from the milk control divisions of different size cities in the State, as well as representatives from the College of Agriculture Dairy Department, the State Department of Agriculture, the State Board of Health Division of Engineering and Industrial Hygiene and the U. S. Public Health Service.

It is expected that this group will meet several times each year in the state office in Jefferson City, or in some other convenient place. The frequency of these meetings, however, will more or less be determined by the problems encountered which should be acted upon for the benefit of the state-wide milk sanitation program.

While this is the first attempt at having an advisory council on milk control work in this State, it is the consensus of opinion of those milk control officials thus far contacted that such a council can constructively aid all health officials in the State in securing a more unified milk control program.

RESOLUTION BY TEXAS CONCERNING MILK SHORTAGE

Regular Session of the Texas Association of Milk Sanitarians Assembled at Austin, Texas, November 4, 1943

WHEREAS, a shortage of milk has developed in Texas which is becoming more acute from day to day, and

WHEREAS, public health is being jeopardized on account of this shortage due to inadequacy of supply and lack of proper incentive to produce high sanitary quality milk, and

WHEREAS, the State Health Department and the many local health departments over the State of Texas have endeavored to keep up production and maintain the quality and in which they are making very little progress due to certain rules and regulations that have been set forth by Federal agencies;

THEREFORE BE IT RESOLVED, that we, the local milk enforcement officials in Texas joined by the State sanitarians in their Annual State Convention assembled at Austin, Texas, November 4, 1943, do hereby petition our several Federal agencies to meet with us or our committee with the view of bringing about a satisfactory adjustment on the granting of materials, designating the price ceilings or the use of such other machinery as will bring about increased production and more adequate protection of quality standards, based on differentials of price or subsidy payments as between Grade A and the lower grades of milk. By way of further suggestion, the Texas sanitarians and milk enforcement officials would appreciate some consideration given to representation of the milk producers on the Milk Section of the several Federal agencies such as the War Production Board, Office of Price Administration, Food Administration, Price Stabilization, and other allied agencies.

BE IT FURTHER RESOLVED, that we commend Dr. George W. Cox, State Health Officer of Texas, on his courageous stand in furthering the above mentioned objectives as well as the many other patriotic state and local officials, and furthermore, that a copy of this resolution be sent to the Honorable Donald Nelson of the War Production Board, the Honorable Marvin Jones of the Food Administration, the Honorable Chester Bowles of the Office of Price Administration, the Honorable James F. Byrnes, of Price Stabilization, with a request that immediate action be taken to alleviate existing conditions and thereby make this most important food available in sufficient quantities to both the military and civilian consumers in this State for the maintenance of health.

BE IT FURTHER RESOLVED, that a copy of this resolution be sent to the milk enforcement officials of the other Southern States, who are confronted with this same problem.

The Following Letter Was Sent to the Texas Delegation in Congress October 18, 1943, by Dr. Geo. W. Cox, Texas State Health Officer

DEAR SIR:

A serious milk shortage facing the consumers of Texas was revealed in a survey recently made by this Department through the local health departments of various large and small Texas cities. These reports, covering 57 towns and cities in all sections of the State, indicate a shortage of 254,276 quarts of milk a day and this situation will probably become worse during the winter months, which no doubt will contribute to lowered resistance and a corresponding increase in nutritional deficiency diseases. Unless something is done at once to correct this shortage and stop further decline in milk production, a serious public health menace will result, due to the fact that safe milk prevents disease and is one of the fundamental necessities for human life.

For twenty years, under the U. S. Public Health Service Milk Ordinance and program, which provides for inspection and grading of milk, this Department has labored diligently, in cooperation with the U. S. Public Health Service and the dairy industry, to build a clean, safe, adequate, and permanent supply of Grade A milk for this state with the result that great strides have been made in milk sanitation, and it is with regret that we see the possibility of this successful effort wrecked and twenty years of service wasted. It is my opinion that Texas rates high with the other states in the Union in its production of clean, safe milk. As a result of the present emergency, the demand on our milk supply has been increased many times. Texas is now attempting to meet the demand of all Army camps that have been established in this State, as well as the demand of our civilian population, including those that have come here for defense work. This Department, together with the milk industry, has taken every reasonable step to acquire more Grade A production in order that these most necessary demands be met.

At the beginning of the winter of 1942, it became evident that a shortage of Grade A milk was impending and at the request of the Surgeon General of the U. S. Public Health Service

after his conference with the U. S. Army Quartermaster Corps, Medical Department, W.P.B., O.P.A., and Agricultural Marketing Administration, I issued on October 20, 1942, an emergency bulletin recommending that health officers, in addition to retaining all Grade A, permit the sale of a sub-standard milk equivalent to Army Type III fluid milk specifications to supplement shortages of Grade A milk where such shortages exist.

But even this failed to produce a supply sufficient to meet our needs and reports indicate the continued disposal of our Grade A dairy herds. Temporary relief was secured last spring when price ceilings were more nearly commensurate with the cost of production. Now, however, reports indicate that the costs of milk production have increased, due to increased cost of labor and feed, too low in protein content, at high prices, which is resulting in a loss to the Grade A dairy farmer and a decline in milk production. The problem of the Texas dairy farmer arises largely from the lack of feed, lack of reasonable prices for feed, other rising costs, and lack of man power because they have to compete both with the armed forces and industry. This is particularly true in the production of high quality Grade A milk because of a lack of price differentials as to quality or grade. The production of high quality milk naturally costs more than for low grade or ungraded milk and the same price ceiling for all milk is tending to cause the disappearance of high quality milk to the detriment of public health. We now have in this State three principal classes of raw milk producers, namely, Grade A raw milk for pasteurization, raw milk produced according to the Army Type III raw milk specifications for pasteurization, and ungraded and unsupervised raw milk for manufacturing purposes. These are considered as to public health value in the order named. The lack of price ceiling differentials as to sanitary quality production is tending to undermine the entire structure of high quality milk which we have built up in this State over a period of twenty years. The same price ceilings for all grades presents the milk producer with no incentive to produce Grade A milk, and this results in their cutting costs to meet present ceiling prices at the sacrifice of sanitation. If price ceilings for Grade A milk were placed above present price ceilings for all grades, it would provide an inducement for Grade A dairymen to stay in business and the shrinkage of Grade A production cease. A raise in the price ceiling for Grade A raw milk would require a corresponding increase in Grade A pasteurized milk. I consider that the production and pasteurization of Grade A or high sanitary quality milk is an essential industry for war as well as peace and demands especial consideration in our food program because of its public health value.

The present proposal of a subsidy to milk producers, while yet untried, probably will produce some present relief, bnt there is a question as to whether it will solve this problem without taking into consideration the labor, and feed problem and quality price differentials also. Ceiling prices for Grade A milk above that for lower grades and ungraded milk would preserve our present Grade A supply and stimulate its greater production which in turn would prevent the destruction of our Texas program for clean and safe milk. Quality price ceiling differentials were requested of the O.P.A. in my letter of February 16, 1943, and if this had been granted then, we would not now have such a shortage of Grade A milk.

It is neither the intention nor perhaps the function of this Department to enter into a discussion of the economics of this serious situation, but I feel it my duty to call your attention to a condition which exists and may seriously endanger the health of our people.

I sincerely request that you do everything possible to alleviate this situation and assist in a program that will encourage the production of clean, safe milk.

A similar letter is being sent to all of the Texas delegation in Congress.

Correspondence Concerning Cans

MILK CONTROL DISTRICT NO. 1
ASSOCIATED SUBURBAN BOARDS OF HEALTH
TOWNSHIP BUILDING
ARDMORE, PA.

August 10, 1943.

Mr. Thomas Stitts, Chief,
Dairy, Poultry Division,
U. S. Department of Agriculture,
Washington, D. C.

Dear Mr. Stitts:

I am anxious to secure reconsideration of paragraph 4 of W.P.B. Order M-200 which restricted milk can manufacturers to the manufacture of can covers of the plug type.

This restriction, I believe, was imposed at the suggestion of the can manufacturers without consultation of health authorities. My observations have been that this type of lid favors the contamination of milk and in addition to being most difficult to clean in some can washers it collects water where icing in transit is undertaken. The saving in metal where the plug lid is substituted is quite insignificant, particularly in the case of replacements where lids are lost.

While plug type lids have commonly been used in the manufacturing areas of the middle west, they have practically disappeared in the East in favor of the cover of the umbrella type. There has been no abnormal demand for new or additional covers in the Eastern markets. Plug lids which now are on the increase will cause much trouble for the future if no relief can be granted promptly. There is inconvenience to the producer, to the milk plant, and I believe, health authorities generally condemn covers of this type.

While health authorities have tolerated the limiting order on can covers which applied to the manufacturers of new covers since last October, we are most anxious to secure sufficient modification of the order to permit the manufacture of lids with the umbrella cover. If this is done now much of the difficulties in our Eastern producing areas, where lids of the umbrella type are demanded, can be avoided.

Will you assist in having this matter reconsidered?

Very truly yours,

GEORGE W. GRIM

(Letter to Milk Handlers)

August 9, 1943.

Dear Sir:

Observation at various milk plants disclose that new type of can cover of a design which favors contamination to milk is being placed into use. In many cases it appears that the sunken-cup type cover, without umbrella, is being supplied by milk handlers who have obtained permits for the sale of milk upon the condition that they comply with their written agreement to conform fully with our sanitary requirements.

There is definite sanitary objection to the cup-type cover. These objections are borne out by observations in milk plants where covers of this type are coming into use. Therefore it must be considered that by selling, or in any way making available to patrons supplying you with milk covers of this type, you are committing an infraction of the agreement upon which approval of the permit of your supply of milk was based.

Sometime after October 1st, 1942, this office received certain details concerning a Conservation Order M-200 concerning shipping containers. This order, while restricting manufacture to certain construction details in the manufacture of new shipping containers and covers, did not in any way restrict the purchase of new containers and covers of the umbrella type already manufactured, or in jobber stock or warehouses throughout the country. Since October 1, 1942, investigation of supplies on hand by many small retail jobbing establishments reveal available supplies of containers and covers of the umbrella type still obtainable. There is nothing to indicate that the permit holder has made any extraordinary effort to secure the available covers of the umbrella type fre-

quently found in small lots in out of the way places. Notwithstanding this situation, considerable information has come to this office that large supplies of new sunken-cup type covers without umbrellas have been procured from manufacturers since October 1st by milk handlers operating under permits issued by this District and that covers of this type are actually being sold by such permit holders to their patrons.

The provisions of Food Conservation Order M-200, Paragraph 4 relating to covers was authorized apparently without consulting or in any way affording Sanitarians an opportunity to be heard or to express an opinion on the highly important matter concerning the sanitary quality of milk. The provisions of the Order, restricting the design of cover to the sunken-cup pattern, is generally condemned by the Sanitarian the country over.

It is difficult to determine whether the critical situation concerning metal, which prevailed a year ago, is still sufficiently serious to justify a continuation of this arbitrary order. It is therefore suggested, in case your patrons desire assistance in securing can covers, you immediately contact your supply house for the purpose of securing a review of any facts that might make possible sufficient relaxation of Order M-200, paragraph 4 to permit the manufacture of covers of the umbrella type in sufficient number to supply your needs. Pending such application and decision thereupon please refrain from any further distribution of container covers of types unacceptable to this District.

Very truly yours,

GEORGE W. GRIM,
Milk Control Officer,
Milk Control District No. 1

GWG/ME

(Letter to Can Manufacturers)

August 11, 1943.

Dear Sir:

We have been disappointed in the results we are getting where the umbrella type cover is being replaced by the cover of the plug type. The situation is aggravated where it has become necessary to ice milk during transportation.

I hope you will be interested in using your influence to secure a sufficient relaxation of paragraph 4 of Order M-200 to permit resumption in the manufacture of covers with umbrella lids.

A copy of a communication forwarded to milk handlers in this area is enclosed for your information.

Very truly yours,

GEORGE W. GRIM.

DEPARTMENT OF PUBLIC HEALTH
ROCKFORD, ILLINOIS

May 1, 1943

Mr. Walter D. Tiedeman, Chief
Bureau of Milk Sanitation
State Department of Health
Albany, New York

Dear Sir:

Milk Sanitarian, E. L. Johnson, Director of Laboratories, C. W. Anderson, and the undersigned have perused with much interest your article entitled *Laboratory Control of Milk under War Conditions*, A.P.H.J. for April, 1943, and earnestly hope that official steps can be taken ere long in substituting the direct microscopic count for the standard plate count in the examination of pasteurized milk and cream.

Do you think it is at all possible to have the International Association of Milk Sanitarians at its next regular convention take some specific action in this matter?

Just the procedure to follow in making this possible of course, is the problem, which prompts us to enclose a photostat copy of procedures followed in our rather circumscribed milk shed of anly 385 milk producers and all of the 9 pasteurizing plants located within easy access inside of the City of Rockford.

In this milk shed we have been using a plate count plus the Three Test System

(Phosphatase, Direct Microscopic and Coliform Test) for examining bottled milk supplies. We use a swab test for checking sterility of plant equipment. We believe the plate count and coliform tests are superfluous and give little if any information of real value as control measures.

The plate count has the weight of tradition and long usage. It has the disadvantage of requiring two days to complete, and gives very little information. The coliform test has been resurrected for the purpose of detecting contamination of pasteurized milk due to unclean and unsterilized equipment. This it can do to a very limited extent and subject to qualifications of performance technique and proper interpretation which render its actual usage in many laboratories of no value. The limitations and qualifications of the coliform test are well explained in the chapter devoted to the test in the 8th edition of standard methods and need not be repeated. However, they do not mention the difficulties involved in interpreting the test to the public. Even veterinarians in many instances insist a positive coliform test on pasteurized milk means fecal or manurial contamination of the milk after pasteurization. This attitude is a carry over from the interpretation of the presence of coliform bacteria in water supplies.

The coliform test is also used to a great extent as a substitute for the rinse method, contact plate method and swab tests which should be used regularly to check sterility of plant equipment. Of these three tests we have found the swab test to be the most practical, economical and efficient. Since it is already widely used for checking the sterility of glasses and eating utensils it can easily be adapted to milk plant work. A large number of swabs can be prepared in advance and sterilized in test tubes or glassine envelopes. The inspector can swab the important pieces of equipment. The swabs can then be smeared out immediately on sterile plates of nutrient agar or placed in 4 cc. of sterile water in test tubes and plated out in the laboratory. An optional method is to moisten the swab with a few drops of sterile skimmed milk, prepare smears on slides and make direct microscopic examinations. These tests are so simple and fast that they can be made routinely on all pasteurizing plants at periodic intervals. They are streamlined and well adapted to emergency wartime conditions. They do not require special equipment or training. It is not so important to determine the exact number of bacteria per square centimeter of the inside surface of a pasteurizing vat, raw milk vat or surface cooler as it is to know whether few bacteria are present or many.

We have found that when a swab test is made on a piece of equipment shortly after chlorine solution has been pumped through it prior to pasteurization, a very heavy growth is obtained when the equipment has not been cleaned properly. On these tests the swabs are streaked directly on nutrient agar plates. If these plates are streaked in the presence of the plant operator and shown to him after incubation the demonstration is very effective. If the swab tests are made in the morning before chlorine solution is run through the equipment the growth obtained is usually very heavy.

An important advantage of the swab test over the coliform test is the fact that the colon bacteria are easily destroyed by low concentrations of chlorine whereas the lactobacilli which are frequently found in plant equipment and constitute the bulk of the annoying heat resistant types are destroyed with difficulty even with much stronger concentrations. As an illustration of this point a pasteurizing plant was selling milk which had from forty to fifty million lactobacilli per cubic centimeter and was receiving a great many complaints about taste and keeping quality. This pasteurized milk was in almost every instance free from colon types. They were using from 50 to 100 p.p.m. chlorine solution to run through the equipment, sufficient to kill the colon organisms but without any effect on the lactobacilli which were present in almost pure culture. It was found necessary to use a chlorine solution of 300 cc. p.p.m. for two days to destroy these organisms. After this treatment there was no recurrence. In this instance as well as others the coliform test was valueless. The swab test and direct microscopic gave all the information necessary for control purposes.

It would seem that when a microscope is available the use of a direct microscopic test for examining both raw milk and pasteurized milk for bacterial content is of sufficient importance during the emergency to justify its use at least as a provisional method. Its use on pasteurized milk for detecting heat resistant types is almost as important as its use on raw milk to determine sources of contamination.

The swab test for detecting improperly cleaned and sterilized plant equipment is of the utmost simplicity, speed and economy. It is so practical that even non-technically trained personnel can be easily trained in its use on a routine periodic basis. It has been our experience that many health departments do not make plant checks unless something is wrong with the bottled supply. If the labor, time and material can be reduced and the technique simplified, plant checks on dairies would be made far more frequently than they are at present. This of course also holds true for examinations made on raw and bottled

milk. A majority of the small health departments doing routine milk control work do not have the time or personnel to evaluate the multiplicity of methods offered in the standard methods.

Yours truly,

N. O. GUNDERSON, M.D.,
Commissioner of Health

Originated by:

C. W. ANDERSON,
Director of Laboratories

CWA/b-r

STATE OF NEW YORK
DEPARTMENT OF HEALTH
DIVISION OF SANITATION

Albany 1, May 11, 1943

N. O. Gunderson, M.D.
Commissioner of Health
Rockford, Illinois

Attention: Mr. C. W. Anderson, Director of Laboratories

Dear Doctor:

This acknowledges receipt of your interesting letter of May 1, 1943, which arrived during my absence from the city on business. I am inclined to favor your suggestion that some action be taken officially to recognize the direct microscopic count on pasteurized milk and cream. However, I believe that additional experimental work will be needed to show to what extent heat killed organisms take the stain, before any general agreement can be reached on this point. Even after the recognition of the method by associations such as the International Association of Milk Sanitarians is secured it will be necessary for departments having legal jurisdiction to secure the amendment of laws and regulations to permit recognition of the test.

I am not familiar with the regulations under which you are working but perhaps it is possible for you to have them amended without waiting for further confirmation by association action.

Your program of procedures is very interesting. It appears to me as if its use should result in a good milk supply.

I note your comments on the use of the coliform test and agree with you that the test as now used has many shortcomings. However, I feel that the need for a test to determine possible contamination after pasteurization is so important as to justify further study of the test itself and of its interpretation with a view to making it more useful.

Our experience to date checks yours that counts on swab rinse samples give more information with less effort than do coliform determinations on such samples.

I have wanted to try swab rinsing using sterile skimmed milk or sterile broth for direct microscopic examination and am pleased to note that you have tried and like the method. If you have a series of comparison with plate counts I will be interested in seeing them. I agree that exact counts are not of much concern in this test.

The point you make about health departments needing more guidance in the selection of tests to be used has been argued back and forth at many meetings of the committee on standard methods for the examination of dairy products. The majority seem to feel that it is not the function of the association to direct their choice of methods or even to interpret the results of the tests. It was with hesitancy that the committee accepted the inclusion of suggestions as to the interpretation of the results of rinse tests.

If you can secure local action to accept the direct microscopic examination of pasteurized milk and cream with a clump count limit of about 200,000 on the milk and about 500,000 on the cream I can see no reason why you should not proceed without further association action which is certain to be slow in coming.

Very truly yours,

(sg'd) W. D. TIEDEMAN,
Chief, Bureau of Milk Sanitation

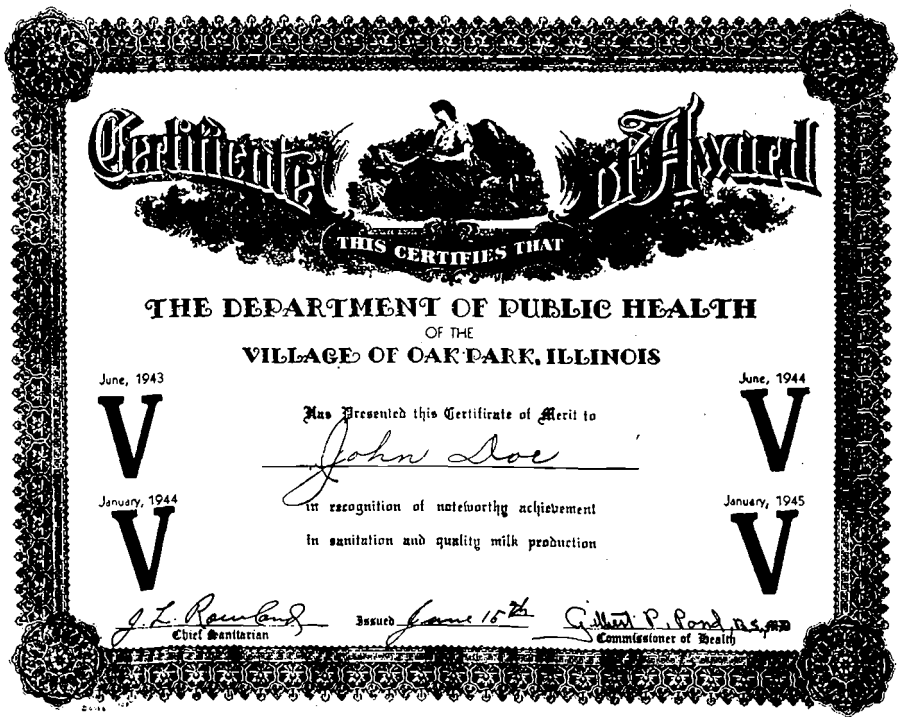
WDT/C/edm

Oak Park, Ill., Quality Program

In the latter part of 1942, the Oak Park Health Department saw that quality milk would become scarce as the war progressed, so Doctor Gilbert P. Pond, Commissioner of Health, and J. L. Rowland, Chief Sanitarian, worked out their "Health for Victory" program.

The general idea was to get the dairy farmers interested in producing a better quality of milk. This program is divided into two parts. A first place award for "Show Places" and a first place award for the average farmer. This placed the competition on a fair basis. The program has now been under way for six months, and the first awards were made on June 15th.

A survey shows that the program has improved the quality of milk almost 25 percent. The Oak Park Health Department feels that this is a good percentage, for the program only having been in operation for six months. The Department plans to carry the program for two years, making awards every six months.



DEPARTMENT OF HEALTH

MUNICIPAL BUILDING, OAK PARK, ILL.

Dear Producer:

Something for nothing? No sir! Anything worthwhile is worth working for. Our all out HEALTH FOR VICTORY program is now under way.

Just what does this program mean to you? Here is your answer. Better and higher production, more money from your milk check, due to your production of a better grade of milk. Also, you will receive a certificate of award. This certificate of award is well worth framing. It is one you will be proud to own.

What does this certificate do for you? It is a written recommendation from us to you. It is written evidence of the high type of producer you are, and should the milk inspector happen to arrive at your place on one of your "off days" (as only he can do), simply wave your certificate in his face, and he will forget that days inspection. (This is good for one time only for each grading period). Holders of our gold "V's" are entitled to have their entire herd tested for mastitis free of charge.

How do you win your certificate of award? Here's how. Maintain a blue test of six hours or over. If counts are made they must not be over 200,000. You must not have more than four checks on your inspection sheet for each grading period (grading period to be six months), in order to receive your certificate and your silver "V". However, if you have no checks, and your blue test is six hours or over, you will receive your certificate of award with a gold "V" of HEALTH FOR VICTORY.

Be number one and have your picture in the paper. Now, how about making us issue you YOUR certificate?

Health for Victory,
GILBERT P. POND, M.D.,
Commissioner of Health

J. L. R/AZ
per G. P. P.

New Members

INTERNATIONAL ASSOCIATION OF MILK SANITARIANS

ACTIVE

Shapiro, Maurice A., Assistant Sanitarian, U.S.P.H.S., c/o Bay County Health Department, P. O. Box 1228, Panama City, Fla.

ASSOCIATE

Burwell, Frederick A., Laboratory Technician, Ideal Pure Milk Co., 8th and Walnut St., Evansville, Ind.

Corley, Robert T., Quality Control Supervisor, United Farmers Cooperative Creamery Assn., Box 92, Morrisville, Vt.

Gundlach, G. P., Box 122, Norwood Station, Cincinnati, Ohio.

Hunt, Gertrude E., Laboratory Technician, General Dairy Service Corp., Delhi, N. Y.

Jacobsen, D. H., Quality Fieldman, Illinois Producers Creameries, Chicago, Ill.

Jamieson, Prof. Morley C., Asst. Prof. of Bacteriology, University of Manitoba, Winnipeg, Canada.

LaFrance, Dr. William, Dairy and Meat Inspector, 231 Water St., Binghamton, N. Y.

Nupson, H. Morris, Sales and Service Representative, B-K Div. of Penn. Salt Mfg. Co., 506 So. Washington St., Redwood Falls, Minn.

Peacock, Clinton J., Supt. and Fieldman, Queensboro Farm Products, Inc., Blossville, N. Y.

Roberts, Cecil B., Sales and Service Rep., Penn. Salt Mfg. Co., 3600 N.W. 24 St., Oklahoma City 7, Okla.

Smith, F. E. A., Managing Director, The Diversey Corp., Ltd., 100 Adelaide St. W., Toronto, 1, Ontario.

Weber, Dr. H. O., Dairy Inspector, Route 4, Atchison, Kansas.

Zilisch, Harry W., Quality Man, Pet Milk Co., Box 28, Denmark, Wis.

CHANGES IN ADDRESSES

Atkinson, Amelia M., is now Schmid, Mrs. Same address—Atlantic City, N. J.

Babcock, C. J., is now Major C. J. Babcock, Sn.C., S.G.O., Washington, D. C. (formerly with the U. S. Dept. of Agr., Washington, D. C.).

Carasso, Daniel, from 18 E. 96th St., New York City, to *410 E. 57th St.*, N. Y. C.

Curtis, Dr. L. R., from City Board of Health, Salt Lake City, to *President, Hi-Land Dairymen's Assn., Salt Lake City.*

Everett, Roberts, from 232 Madison Ave., New York City, to *Dairy Industries Supply Association, Washington, D. C.*

Fox, Irwin C., from 1409 Hurlbut St., Detroit, Mich., to *1291 Ashland St., Detroit 15, Mich.*

Gerner, Edward, now Assistant Health Officer, Orange, N. J. (formerly Sanitary Inspector).

Gilbert, J. Miles, from Atlanta, Ga., at *43½ Signal Hill Place, East St. Louis, Ill.*

Goforth, Howard I., from Minnehaha St., St. Paul, Minn., to *415 Grove St., St. Paul 1, Minn.*

Green, Tom R., from Milwaukee, Wis., to *Kewaskum Creamery Co., Kewaskum, Wis.*

Hilsdon, C. G., from Fargo Cap Corp., 150 Bay St., Jersey City, to *Standard Cap & Seal Corp., 629 Grove St., Jersey City 2, N. J.*

Jensen, Carl R., from 1112-7th St., Las Vegas, N. M., to *1037 7th St., Las Vegas, N. M.*

Kisselbrack, Hyatt, from King's Court Hotel, Poughkeepsie, to *63 Franklin St. Poughkeepsie, N. Y.*

Laubly, S., Sgt. C. S., from Tyndall Field, Fla., to *221 S. 21st Ave., Maywood, Ill.*

Lefton, 1st Lt. I. M., from Fort Bragg, N. C., to *184th Station, A.P.O. 937, c/o Postmaster, Seattle, Wash.*

Leonard, J. C., *Room 1800,* Wrigley Bldg., Chicago, Ill.

Little, Lawrence L., from Oklahoma City, Okla., to *Beatrice Creamery Co., 1526 S. State Ct., Chicago 5, Ill.*

Louthan, Howard S., from Herrin, Ill., to *Champaign-Urbana Health Dist., 505 S. Fifth St., Champaign, Ill.*

Marcus, Theodore, from Dorchester, Mass., to *513 Warren St., Roxbury 21, Mass.*

Morley, Lloyd, change address to *Box 1495, Anchorage, Alaska* (formerly Territorial Board of Health).

Pulkrabek, G. M., from Stockton, Ill., to *Commerce St., Galena, Ill.,* Kraft Cheese Co.

Quencer, Arthur B., to *542 E. 19th St., New York City,* Dairymen's League).

Robinson, Harold B., from Chicago, Ill., to *617 Colorado Bldg., 16th and California St., Denver, Colo.*

Rogers, J. C., from Goldsboro, N. C., to *City Health Department, Norfolk 10, Va.*

Tinklepaugh, Arthur, now *200 Ashland Ave.,* Buffalo, N. Y.

Tolins, Louis, from Long Island City to *105 Hudson St., New York City.*

Tyler, Max E., Lt. 0531712, Camp Detrick, Frederick, Md., for the duration. Formerly Fort Collins, Colo.

Walker, Burley, from Ada, Okla., to *716 N. East 13th St., Oklahoma City, Okla.*

Wheadon, W. S., to *68 A. Cedar St., Malden 48, Mass.*

NEW GLASS TANK DEVELOPMENTS

The recent development in the glass industry of the use of large sheets of flat glass for the construction of storage tanks and process tanks promises to be of great importance to the dairy industry. Glass tank linings lend themselves admirably to the maintenance of clean, sanitary conditions and afford a resistance to corrosive conditions encountered with milk products, detergents and sterilizing agents. Wide acceptance of this construction in the metal industry for acid pickling, electroplating, and cleaning baths has been experienced.

This development has been made possible by the use of Herculite, a heat tempered plate glass having several times the strength of normal plate glass, both in resistance to mechanical load or impact and to thermal shock. Relatively large plates of tempered glass of one-half inch thickness are placed as a lining in a wooden, steel or concrete shell. A mitered corner construction mechanically holds the plates in place while especially designed asphalt jointing compound is used as a cushion between the glass and tank shell and to seal the joints between plates. Jointing materials suitable for use under a wide variety of conditions have been developed for this application.

For use in contact with dairy products, a tasteless, odorless material unreactive chemically with milk and milk products, non-porous and susceptible of easy cleaning is essential. Glass is the ideal substance for meeting these requirements; combined with a suitable jointing compound, a tank structure nicely adapted to this use is available. Such a jointing compound has been developed and tested under conditions of exposure several hundred times as rigorous as those existing in commercial tanks. To provide maximum ease of cleaning, large polished plate glass surfaces are combined with a minimum length and width of joint, sealed with an inert jointing compound.

While clear Herculite is generally used, it is possible, if preferred, to supply opaque Carrara structural glass in white, black, or colors, this glass being similarly heat-treated for additional strength and greater thermal endurance. Specially designed tanks, with transparent walls where necessary, or with inserted windows, can be constructed. Thus, the opportunity to continuously observe what is going on in a tank may prove of considerable interest and value in some applications. Drains or outlets can be provided in the bottom or sides of the tanks and glass covers with manholes or inlets may be supplied.

Because of the wide variety of sizes and designs required to fit particular needs, these tanks are generally custom-built. Glass-lined tanks may be constructed complete in the factory and shipped ready for use or existing tanks may be lined in place by workmen skilled in the handling of glass for this use.

Because of the non-critical nature of the materials concerned in this type of construction, it is proving of definite war value in relieving the necessity for the use of critical materials. The type of construction and unreactive nature of the lining result in a tank of excellent quality and unusually long life. Extensive developments along this line may be expected.

"Doctor Jones" Says—*

IF you're interested at all in the milk line: has it occurred to you that you aren't hearing much, any more, about dairy and milk inspectors? Nowadays they're all milk sanitarians. And it ain't just a change in name, either. Their ideas and methods have changed. In fact the whole system is different.

Yes, in the old days they were policemen, more or less, those fellows. The word'd get passed around among the dairy farmers and milk plant men in some neighborhood: "The inspector's coming!" and it was like "Cheese it—the cop!" They'd scramble around to get things cleaned up and get stuff out of sight they didn't want him to see. And when he got there they'd go around wondering what he was going to catch 'em at this time. In fact I was reading about the early days in New York City: they used to ferry a lot of the milk over from the railroads in Jersey. And the City'd have inspectors on the ferry boats, along three or four o'clock in the morning, to keep 'em from putting river water in the milk cans on the way over. And they had to be tough hombres too, or they were liable to find 'emselves in river water.

But here not long ago I dropped into the pasteurizing plant over here—Witherbee's place. And I pointed out something that didn't look right to me: the temperature recorder didn't seem to be working right. "It ain't right," Frank says; "but I don't know just what to do about it. But the district milk sanitarian is due over here tomorrow," he says, "and he'll probably know." And he showed me a list of three or four things he was waiting to talk over with him—this milk sanitarian. These days they prefer to be helpful rather than critical—the better ones do: counselors and advisers instead of policemen. It gets better results in the long run, too. Of course they have to get after 'em once in awhile—the careless ones. But they find the majority are willing to do things when they understand the reasons for 'em—and why it's to their own interest to do 'em.

So the present day milk sanitarian: more and more of 'em are college graduates. If you're going to be an educator you've got to be educated. And they have to have what you might call a working knowledge of a lot of things: communicable diseases and how they spread, chemistry and bacteriology, animal diseases, farm and plant procedures and accounting, the engineering principles that enter into construction and operation of equipment and I don't know what all. Yes—and human psychology: understanding people and being able to get along with 'em and talk their language. It ain't a job any more for just anybody that belongs to the right party. It's a profession and a career.

PAUL B. BROOKS, M.D.

* *Health News*, New York State Department of Health, Albany, Nov. 29, 1943.