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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 the transactions.

The Role of the Laboratory in Milk Sanitation

HANGING, framed, in the office of the writer is a copy of an advertising circular sent out by a Philadelphia milk dealer, in 1880, to institutions in his city. The undersigned dealer, it announced, was prepared to supply "hygienic milk," it having been "submitted to the Centrifugal Process" as soon as possible after being received from the farmers. So thoroughly was it separated from the cream that "no portion of the cream remains in the milk" and by this means, it was announced, the milk was also "thoroughly cleansed, as the process removes a portion of offensive slime from all milk." "The advantages of . . . the insuring of perfect cleanliness of the milk," the dealer wisely observed, "is too obvious to require comment" and he advised recipients of his circular who were "aware of the advantage of a diet of milk prepared as above described" to communicate their orders promptly.

At about the time when this progressive milk distributor was considering that by removing the cream and "a portion of offensive slime" he was insuring the "perfect cleanliness" of his product, bacteriological work on milk was being undertaken for the first time. Sedgewick, within a few years, published a report of bacteriological examinations of the Boston milk supply, apparently the first report of its kind, and Professor Conn, of Connecticut, another pioneer, was discussing the source of the bacteria found in market milk.

Our present-day milk supplies are, as a whole, clean and safe to a degree which could scarcely have been foreseen at that early day. The progress which this change represents, while it has not kept pace with the development of applicable scientific knowledge and has moved by devious routes, has after all been great. Of the several factors involved in this progress, the one which quite certainly has contributed the most has been laboratory service.

The trend toward modern milk sanitation got its start sixty-odd years ago when the dairy bacteriologists began the practical application of their new-found knowledge. The objective then was to get the dirt out of milk and bacterial counts provided a tangible measure of cleanliness. Some of the medical bacteriologists very soon recognized that it was pathogenic bacteria in milk which were most important. But their limited knowledge of the relation of bacteria to disease found little practical application in milk sanitation.

That progress in milk sanitation has been slow and devious is not difficult to explain. Laboratory workers, being scientists, are conservative, disinclined to form and release new conclusions until the evidence is all in—as the evidence in scientific matters seldom is. When they speak, their language usually is not that of the man in the field. Even between the milk laboratories and the medical or clinical laboratories the liaison has not been as effective as it might have been. There has been a largely unfilled need for not-too-scientific interpreters between the bacteriologists, immunologists and epidemiologists and the field workers in milk sanitation whose job it is to see that the findings of the scientists are applied in practice. The present quite general lack of clear understanding of milk-borne hemolytic streptococcus infection, though the facts have been available for several years, is a case in point.

In short, the laboratory, over the years, has developed and accumulated the fund of scientific knowledge upon which modern milk sanitation is largely based. What is most needed now is more effective and complete translation into action of the applicable part of the accumulated knowledge. When we have that we can move on to our ultimate goal—a goal already in sight.

P. B. B.

Florida Milk Sanitarians Organize

THE old-timers in milk sanitation have noticed with interest and profit the progressiveness of the South in adopting effective milk control measures. We have observed that when a group of technically trained men are really "on their toes," they are eager to get together occasionally to increase their knowledge and professional ability. History says that Ponce de Leon failed to discover the fabled Fountain of Youth. So what! Our professional colleagues in Florida don't need it. Florida has forged ahead in food technology to such a degree that she now is one of the leaders in this field. The "boys" down there are doing a splendid job, and we are glad that they have joined the "family" of the *International Association of Milk Sanitarians,* constituting our latest affiliate. May we all catch some of the enthusiasm which this fine group is bringing into our midst.

J. H. S.

The Annual Meeting for 1945 has been canceled on account of the war-time restrictions.

A Correlation of the Resazurin Grade With the Standard Plate Count of Raw Milk*

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Introduction

The value of the resazurin test as compared with the methylene blue reduction test for grading the bacterial quality of raw milk has been extensively investigated in America (3, 15, 16, 21) and Great Britain (6, 8, 10) where the resazurin test has received governmental approval (9). An American investigator (4) found that, on the whole, there was close agreement between the resazurin grade and the plate count for determining the bacterial quality of raw milk. Collins et al. (5) reports a rather definite relationship to exist between the time required for the reduction of resazurin to pink and the plate count of milk. Other workers (3, 14) have made similar investigations, but unfortunately, their work was published before the change was made to the present medium of the Standard Agar Plate Method.(24)

The British Government has issued a provisional technique for the resazurin test and specifications for resazurin and resazurin tablets (17, 18). This technique calls for a set of glass color standards made by Tintometers, Ltd., Salisbury, which fit either the All-Purpose Lovibond Comparator[1] (13) or a cheaper, simpler comparator known as the Lovibond Flat-Type Resazurin Comparator.

The object of this paper is to correlate the resazurin grade read with an all-purpose Lovibond comparator at 10, 30, and 60 minutes with the bacterial count of raw milk as determined by the Standard Agar Plate Method, incubated at 37° C.

Methods

Comparator. The determinations used in this work were made with the all-purpose Lovibond comparator with the glass discs for the resazurin test. The all-purpose Lovibond comparator and the Lovibond flat-type resazurin comparator operate exactly the same for this test (13). These comparators enable the operator to match the color of the resazurin in milk against the permanent glass color discs in the comparator which operate over a tube of normal milk. The colors blue, lilac, mauve, pink-purple, purple-pink and pink are given the numbers 6 to 1 respectively and grade down from good to poor milk. A colorless glass disc, 0, is used for the completely reduced resazurin.

The relationship between the Lovibond comparators and the Munsell Resazurin Color Grader[2] is given for comparison. The Munsell grader consists of four standard color papers fitted in a test tube. These standard colors are given in the Munsell Book of

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[1] Lovibond All-Purpose Comparator made by the Tintometers Ltd., Salisbury, England. Sold through Eimer and Amend, Greenwich and Morton Sts., New York 14, N. Y.

[2] Resazurin Color Grader sold by the Munsell Color Company, Inc., 10 East Franklin St., Baltimore, Md.

Color (19). The four Munsell colors range from blue to mauve-pink and have been given the grades A, B, C, and D respectively with the midpoints expressed as A—, B—, and C— giving seven grades in all.

A graphic relationship of three hundred samples read on the Munsell color grader and the all-purpose Lovibond comparator is given in Figure 1. The points on Figure 1 are the mean of the Lovibond comparator readings for each Munsell grader reading. The relationships are shown in Table 1.

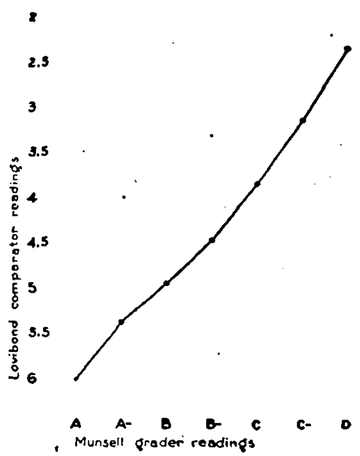

FIG. 1 - The Relationship between Readings on the All-Purpose Lovibond Comparator and the Munsell Color Grader Calculated from 300 Readings.

TABLE 1

RELATIONSHIP BETWEEN MUNSELL AND LOVIBOND COLOR GRADES

Munsell Notation (19)	*Munsell Color Grade*	*Lovibond All-purpose Comparator*
5PB (PB) 7/4	A	6.00
	A—	5.40
10PB (PBP) 7/5.5	B	4.95
	B—	4.50
5P (P) 7/4	C	3.85
	C—	3.15
10P (PRP) 7/8	D	2.35

Tests read with and without a comparator indicate that accurate color grades are not maintained, especially in the blue, mauve, and lilac range, where it is most critical, without using a definite set of color standards.

Resazurin. The dye used was put up by the National Aniline and Chemical Company, Inc., and sold by Eastman Kodak Co. as an indicator for reduction in milk. To have uniformity during the whole of the experiment, the resazurin was prepared in distilled water at a strength of 0.05 percent, ten times as strong as required for the test. Fifty ml. of this solution were added to each 4 oz. crown seal bottle, sealed hot, and sterilized in the autoclave. When required for use, the bottle was opened and the solution diluted to 500 ml. with sterile distilled water to make a 0.005 percent resazurin solution for the test.

Making the Test. The resazurin test was made according to the technique given by the Ministry of Agriculture and Fisheries (17), with the exception that no stoppers were used and the resazurin was added with a 1 ml. graduated dropper pipette. Mixing was done by shaking instead of by inverting.

Farmers' Samples of Milk. The farmers' raw milk samples used for the results expressed in Tables 2, 3, and 4 were from a local dairy, supplemented by thirty additional samples from a dairy in Spokane. All were taken during the winter period. When collected, most of these samples had a resazurin reading of 5 or 6 and a low bacterial count. In order to get readings below 5, it was necessary to incubate these samples. This, together with the fact that there were few farmers producing milk, entailed frequent repetition and greatly reduces the signicance of Tables 2, 3, and 4. There was, however, the advantage of being able to make as many dilutions as necessary when the counts were high.

In the spring, just as the weather was getting warm, a total of 1,352 samples were examined in Portland, Oregon. Work was done in cooperation with a commercial laboratory, whose plate counts were used to correlate with the resazurin tests run at that time. Milk from the same farm was not sampled more than twice in this investigation. Due to the large volume of samples examined daily in the laboratory, only one plate of the 1/1,000 dilution was made and therefore the plates from milk samples having a count of over 1,000,000 were very overcrowded and the counts only estimates. The plate counts of samples having resazurin readings of 5 and 6 at 30 minutes and readings of 4, 5 and 6 at 60 minutes, expressed in Tables 5 and 6 are satisfactory for commercial conditions.

Consideration should be given to the method of handling the samples. They were held in a household refrigerator 18 hours before being examined. The effect of cold storage and method of cooling of milk samples upon the resazurin test is discussed in the literature. Thomas and Davies (25) state that the increase of bacterial content which occurs during cold storage cannot be considered to have any signicant effect on the reduction time of resazurin and icing over night can thus be conveniently utilized. According to Davis (8), storage at 35–40° F. appeared to have little effect on reduction time. Frayer (14) states that efficient cooling seems definitely to retard the reduction of resazurin. His studies indicate that this is more the effect of the amount of surface exposed for oxygen absorption during the cooling period than of the temperature involved. This is also the opinion of Davis and Newland (11).

Rahn and Bigwood (20) and Sherman and Naylor (23) have made studies of the effect of aging without reproduction and the viability of young *Streptococcus lactis* cells at low temperature. They indicate that cold storage directly affects the viability of *S. lactis* in milk. However, both of these latter experiments were carried out at much lower temperatures, namely, 0° and 1° C. respectively, and for much longer periods of time than samples would be held normally for the resazurin test.

Since the samples used in this experiment were not held for any great period of time and at icebox temperature, it is to be supposed that the difference in resazurin grade caused by the cold storage would not be very signicant.

Expression of Data. The determination of the mean and standard deviation for each resazurin reading, 0 to 6 inclusive, hardly gives all of the practical information required, and a spot graph would be indefinite. Therefore, the data were expressed by giving the mean standard plate count under each grade, 0 to 6, and the distribution of the samples on a percentage basis of their plate count for each grade. It is considered that this method has the best practical application, and enables the factory that uses the resazurin test to estimate the bacterial content of its bulk raw milk. It also shows the advantages that might be gained by rejecting certain grades.

(Calculations were made on International Business Sorting and Adding Machines.)

RESULTS OBTAINED

Table 2. The ten minute test, which is considered as a rejection test for factory milk (1, 2, 7, 12 and 22) shows it has real value in rejecting very poor milk. Rejecting all the milk in Table 2 having a resazurin grade of below 5 would lower the average plate count for the accepted milk to less than 5,000,000 per ml. The average plate count for grades 5 and 6 is 2,668,000 per ml. The milk in grades 0, 1, 2, and 3, a total of 18 samples, all have a plate count of over 100,000,000 per ml. Grade 4 includes two samples out of 12 having a plate count of less than 10,000,000 per ml. With the 274 samples of accepted milk, grades 5 and 6, only two have a plate count of over 100,000,000 per ml.

TABLE 2

SAMPLES OF FARMERS' RAW MILK TAKEN DURING THE WINTER AND HELD TO INCREASE BACTERIAL COUNT

Bacterial Quality Determined on Each by the Standard Plate Method (37° C.) Correlated with the Resazurin Test Read at 10 Minutes with an All Purpose Lovibond Comparator

Resazurin grade	0	1	2	3	4	5	6
Number of samples	0	7	2	9	12	59	215
Mean standard plate count 1,000 per ml.	....	285,785	150,000	188,888	128,666	6,567	1.598
Percentage of samples having a plate count below							
Colonies per ml.							
100,000	....	....	....	....	....	6.8	50.7
1,000,000	....	....	....	....	8.3	40.7	84.2
10,000,000	....	....	....	....	16.7	84.7	98.1
100,000,000	....	....	....	....	58.3	98.3	99.5
1,000,000,000	....	100	100	100	100	100	100

Table 3 shows the change in distribution of the samples of milk by increasing the incubation period to 30 minutes. It is only in a few factories that a 30 minute holding period would be possible before the milk would be required for use, therefore, in general the 30 minute test could not be considered as a rejection test. Table 3 is included for the few factories which could hold their milk 30 minutes and thus obtain a greater refinement in grading. Accepting only grades 5 and 6 would give an average plate count of 640,000 per ml. including the 45 samples in grade 4 would raise the average plate count to 1,540,000 per ml.

Table 4 shows the advantages to be gained by increasing the incubation time to 60 minutes. Including the grades 5 and 6 gives an average plate count of 122,000 per ml. and including

TABLE 3

SAMPLES OF FARMERS' RAW MILK TAKEN DURING THE WINTER AND HELD TO INCREASE BACTERIAL COUNT

Bacterial Quality Determined on Each by the Standard Plate Method (37° C.) Correlated with the Resazurin Test Read at 30 Minutes with an All Purpose Lovibond Comparator

Resazurin grade	0	1	2	3	4	5	6
Number of samples	8	14	4	17	45	91	125
Mean standard plate count 1,000 per ml.	287,562	207,104	55,125	26,535	5,894	1,334	135
Percentage of samples having a plate count below							
Colonies per ml.							
100,000	....	....	....	....	2.2	24.1	72.0
1,000,000	....	....	25	....	33.3	74.7	97.6
10,000,000	....	....	25	47.1	88.9	97.8	100
100,000,000	....	....	75	94.1	97.8	100	....
1,000,000,000	100	100	100	100	100	....	....

TABLE 4

SAMPLES OF FARMERS' RAW MILK TAKEN DURING THE WINTER AND HELD TO INCREASE BACTERIAL COUNT

Bacterial Quality Determined on Each by the Standard Plate Method (37° C.) Correlated with the Resazurin Test Read at 60 Minutes with an All Purpose Lovibond Comparator

Resazurin grade	0	1	2	3	4	5	6
Number of samples	20	21	9	39	71	88	56
Mean standard plate count 1,000 per ml.	241,675	42,857	6,666	9,593	1,271	131	109
Percentage of samples having a plate count below							
Colonies per ml.							
100,000	....	....	....	2.6	15.5	67.0	75.0
1,000,000	....	9.5	....	28.2	71.8	97.7	100.0
10,000,000	....	52.4	66.7	82.1	98.6	100	....
100,000,000	5.0	76.2	100	97.4	100	....	....
1,000,000,000	100	100	....	....	....	....	....

the 71 samples in grade 4 increases the average plate count to 502,000 per ml. The 60 minute reading of the test is a great advantage in distributing the samples of milk over the complete grade range.

Table 5. In the Portland farmers' milk samples, read at 30 minutes, the higher counts do not follow in the pattern of the winter samples in Tables 2, 3, and 4, due to the 1/1,000 dilution used, but gradings of 4, 5, and 6 show much similarity. Because of the greater number of samples, it was feasible to separate these into narrower divisions of the plate count for each resazurin grade. The percentage of samples under a plate count of 1,000,000 using grades 5 and 6 was 91.2 percent, which is practically the same as was obtained for the winter samples in Table 3.

TABLE 5

SAMPLES OF FARMERS' RAW MILK TAKEN BY THE DAIRY COOPERATIVE ASSOCIATION, PORTLAND, OREGON

Bacterial Quality Determined on Each by the Standard Plate Method (37° C.) Correlated with the Resazurin Test Read at 30 Minutes with an All Purpose Lovibond Comparator

Resazurin grade	0	1	2	3	4	5	6
Number of samples	52	58	47	96	104	272	723
Mean standard plate count 1,000 per ml.	6,827	6,491	4,526	4,060	2,229	704	224
Percentage of samples having a plate count below							
Colonies per ml.							
10,000	....	....	....	....	1.9	5.1	23.5
50,000	....	....	....	....	3.8	25.0	51.7
100,000	....	....	....	....	4.8	29.8	59.3
500,000	....	....	2.1	....	8.7	57.7	87.7
1,000,000	....	....	4.3	6.3	26.0	76.8	96.5
5,000,000	21.2	24.1	57.5	58.3	89.4	98.9	100
10,000,000	82.7	77.6	95.7	99.0	100	100	....
50,000,000	100	100	100	100	....	....	....

TABLE 6

SAMPLES OF FARMERS' RAW MILK TAKEN BY THE DAIRY COOPERATIVE ASSOCIATION, PORTLAND, OREGON

Bacterial Quality Determined on Each by the Standard Plate Method (37° C.) Correlated with the Resazurin Test Read at 60 Minutes with an All Purpose Lovibond Comparator

Resazurin grade	0	1	2	3	4	5	6
Number of samples	78	123	73	99	187	377	415
Mean standard plate count 1,000 per ml.	6,469	5,070	3,194	2,578	731	304	124
Percentage of samples having a plate count below							
Colonies per ml.							
10,000	....	....	....	....	4.3	14.1	30.1
50,000	....	....	....	1.0	17.6	43.8	59.5
100,000	....	....	....	2.0	22.5	50.9	67.2
500,000	....	....	1.4	3.0	52.9	81.7	94.0
1,000,000	....	2.4	9.6	23.2	74.9	94.7	99.3
5,000,000	28.2	43.9	78.1	81.8	100	100	100
10,000,000	80.8	91.9	100	100	....	....	....
50,000,000	100	100	....	....	....	....	....

Table 6. The 60-minute incubation period with the Portland farmers' milk samples showed an agreement with Table 4. With a grade of 4, 74.9 percent of the samples were found to have a plate count below 1,000,000; with a grade of 5, 94.7 percent were below 1,000,000; with a grade of 6, less than one out of every 100 samples was above 1,000,000 and about one out of 20 above 500,000.

Considering the tables as a whole and recognizing the limitations of the data, we conclude that there is:

1. A good correlation between the results of the standard plate method and the resazurin test.
2. The results with widely different sources of milk are in close agreement.
3. Under the conditions cited, the 60-minute reading is the most desirable incubation time and likely to give the best results.

Knowing the class of milk that is to be accepted, the factory can compute from the tables the resazurin reading necessary to obtain that quality.

ACKNOWLEDGEMENTS

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WISCONSIN WINTER DAIRY COURSE

The Wisconsin Winter Dairy course which has been given for so many years will begin this year on September 24 and close on February 2, 1946. The first semester closes on November 3, 1945. Courses offered in this first semester are Dairy Bacteriology, Milk Composition and Tests, Arithmetic and Bookkeeping, Dairy Mechanics, Dairy Sanitation, Dairy Cattle Diseases, and Marketing. Students who complete this first semester are eligible to take any or all of the courses dealing with dairy manufacturing. Cheesemaking will be given November 5 to November 24; Buttermaking, November 26 to December 15; Ice Cream Making, December 17 to January 12; and Market Milk, January 14 to February 2. Individuals who want to go into dairy field work may take a third semester work of five weeks' duration beginning February 4, 1946, and ending March 9. The courses offered in this third semester are Livestock Sanitation, Dairy Cattle Breeding, Feeds and Feeding, Milk Secretion, Farm Management, Post-War Farm Buildings, and the Fieldman's Job and Related Work. This course of study will be open to those who have completed the first and second semesters' work in the Winter Dairy Course. Full information can be secured by writing to Professor H. C. Jackson, Chairman, Department of Dairy Industry, University of Wisconsin, Madison 6, Wisconsin.

The Program for Quality Control of Milk Supplies for Boston

A. C. Fay

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Introduction

For many years the city of Boston, Massachusetts, has enjoyed an enviable reputation for having an exceptionally well controlled milk sppply. Historically, the Boston Health Department was among the pioneers in blazing the trails in the then new science of controlling milk supplies for large metropolitan areas. By keeping abreast of each new advance in the dairy industry, and in some instances anticipating these advances, the Boston Health Department has stimulated the producers and dealers year after year to provide the city with an ever improved supply of milk. The emphasis from the beginning has been placed on those practical factors which aim directly at milk of excellent quality, with less emphasis on esthetic frills.

The principal purpose of this paper is to outline one of the more recent regulatory programs which has been an extremely important factor in maintaining the quality of the Boston milk supply during a war period when it might have been reasonable to expect an appreciable decline in the quality of milk.

The Mott Program

In May, 1940, Frank E. Mott, Inspector of Milk and Chemist for the city of Boston, and with the full support of Dr. H. F. R. Watts, then Commissioner of Health, published a new program for the control of the quality of milk to be sold in the city. The details of the requirements may be briefly summarized as follows:

Producer Permits

1. Each producer selling milk to any plant supplying milk for the city must have a permit issued by the Health Commissioner, and the dealer operating the plant must have a license issued by the Inspector of Milk, which license is limited to sources of milk that are listed on the dealer's license.

The application for the permit must give:

(a) Colonies of bacteria in one cubic centimeter before pasteurization,
(b) Colonies of bacteria in one cubic centimeter after pasteurization,

found in the milk from the dairy farm for which permission is requested.

2. Routine annual inspection of dairy farms to be done by the State as required by statute at least once a year, and a certificate of registration of the farm to be had by the producer before applying for the permit.

Laboratory Facilities Required

1. Each dealer must provide laboratory facilities approved by the Inspector of Milk for the analysis of milk at least once each month from each producer as follows:

(a) On the raw milk a standard plate count incubated at 32° C. or a direct microscopic clump-count.
(b) Standard plate count on a sample of milk pasteurized in the laboratory, known as a heat-resistant count or a laboratory-pasteurized count.

(c) A direct microscopic examination, particularly for evidence of mastitis.
(d) The temperature of the milk as delivered must be recorded.

2. The approval of the 23 laboratories at country receiving stations is based on an annual inspection by the Inspector of Milk and assures adequate equipment accurately operated, and the use of uniform standard methods. Inspection also includes the accuracy of the thermometers used and the pH of the agar medium employed in bacteriological work.

Warning Notice to Producer

1. If the milk from a given producer is found to exceed the established bacterial limits for the plate count (400,000 on the raw milk or 20,000 on the pasteurized milk), the dealer must immediately send a "Warning Notice" to the producer, on an official form provided by the Boston Health Department, and signed by the dealer.

2. The producer is then given a period of ten days to locate and rectify the condition responsible for the high bacterial count. He may call for the cooperation of the dealer's field man to inspect his farm and, if necessary, take samples to aid in locating the cause of trouble not readily detectable by inspection. The responsibility, however, is on the producer to correct the condition. In fairness, the producer is not excluded from the market during this period of grace. Nothing in this program prevents a dealer from dropping a producer at any time.

Stop Notice to Producer

1. After a period of ten days and before fifteen days, the dealer is then required to take an official sample to verify the fact that the condition has been corrected. If this test shows that the condition still exists and the milk is sub-legal, the dealer is then obligated to send the producer an official "Stop Notice," to cease immediately receiving the milk, and to notify the Inspector of Milk of Boston so that the producer's permit can be revoked.

2. If microscopic examination reveals sufficient evidence of mastitis to show up in a pooled sample from the weigh can, a "Stop Notice" is immediately sent to the producer. There is no grace period in this case. In order to have the producer's permit reinstated, the dealer must examine the milk and find it free from evidence of mastitis.

3. If the temperature of the night's milk is above 50° F. or of the morning's milk delivered after 10:00 A.M. War Time is above 50° F., the producer is sent a "Warning Notice," and if on recheck within a few days, the milk is still improperly cooled, a "Stop Notice" is sent to the producer.

Re-instatement of Producer

1. In order for a producer to have his permit re-instated, once he has been excluded from the market by a "Stop Notice," he must submit satisfactory evidence that the condition for which he was excluded has been corrected. In cases of excessive bacterial count, the dealer must take samples on the farm for bacterial analysis, and submit the results to the Inspector of Milk for his consideration. In case of exclusion because of poor cooling, the dealer must inspect the farm and submit a report of his findings. Re-instatement because of mastitis has already been described. In general it usually requires about ten days before a producer can regain his market. In the interim he must find some other outlet for his milk, such as a cheese factory or by-products plant, or feeding the milk to livestock on his farm. No other dealer who holds a license to sell fluid milk in the city of Boston or in the Commonwealth of Massachusetts is allowed to accept this milk during the exclusion period, even though the dealer may be making by-products in his plant at the time. By cooperation of the State Department of Agriculture, Division of Dairying and Animal Husbandry, the

revocation of the producer's permit by Boston automatically revokes the state certificate of registraion.

2. Once a producer's permit has been revoked, he can only be re-instated through the same dealer to whom he was selling at the time of exclusion. Furthermore, when the permit is restored, the producer must continue to sell his milk to that same dealer for 60 days. This is essential to the practical working of the program. Without this provision, producers who have been penalized by exclusion would be skipping from one dealer to another. Station operators who were conscientiously following the program would soon find themselves penalized by a loss of volume in the plant. To be sure, the producer may shift his supply to another dealer after a period of 60 days if he is still dissatisfied, and some of them do, but in general the producers find during that time that the dealer is playing fair and that it pays to produce quality milk if it is to be sold on the Boston Market.

Quality Records Required

Each dealer is required to have available for the inspector at the receiving station at all times a complete record of all of the routine analyses of milk from each producer. These must be arranged in an approved form which shows at a glance the present and past record of the producer, whether or not a "Warning Notice" was sent after each infraction, the results of the follow-up tests, whether or not the "Stop Notice" was sent in those cases where necessary, and if so, the date on which the producer ceased to deliver milk to the plant. Repeated offenders whose records reveal many exclusions may be permanently excluded from the market.

Inspection of Receiving Stations and Quality Records

Milk receiving stations holding permits to sell in Boston are frequently visited by inspectors from the Dairy Division of the Boston Health Department. Very critical attention is first given to the Quality Book, not only to survey the quality of the milk from the various producers, but more particularly to make sure that the dealer is living up to the program in absolute detail. The slightest evidence that the dealer is not following the program in detail calls for immediate and drastic action by the Health Department. Strict and rigid enforcement without fear or favor and without accepting any excuses, has been the key-note of the success of this program. In addition to checking the Quality Book, the inspectors make check tests in the laboratory, either with the microscope or with the plate count of milk currently being received. The results are compared with the records in the Quality Book as a check on the laboratory. Spot inspections are made of farms with the field men, visiting particularly those producers whose records indicate they need help, but also visiting some of the producers whose records are good; this is done as a check on the field men. Since the responsibility for the routine farm inspection is with the State Department of Agriculture, the Boston Health Department focuses its attention on the quality of the milk delivered and spends only sufficient time on farm visitation to insure reasonable compliance with sanitary requirements.

The Conflict Between Volume and Quality of Milk

The principal effect of the program is that only milk of acceptable quality can be shipped into the market. When something goes wrong with the quality of the milk on the farm, when mastitis becomes rampant in the herd, when the milk is not being properly cooled, the producer has no alternative but to correct the condition. He can not solve his quality problem by merely seeking another dealer, because the other dealer is operating under the same quality program. The dealer likewise has no alternative but to insist upon quality milk because the program is as rigidly enforced on him as it is on the producer. The dealer is not placed at a competitive disadvantage in his demands for quality milk since any nearby stations that may be bidding for the milk must live up to the same rigid requirements. In effect this program strikes at the very root of the conflict between the dealer's efforts to maintain quality and at the same time maintain a sufficient volume to warrant the operation of a receiving station.

THE RESULTS

The data in the table show the average bacteria counts reported by the Boston Health Department, by months, for all of the dealers selling milk in the city of Boston during the six calendar years 1939 to 1944, inclusive. It is significant that these are arithmetical averages which may easily be distorted by a few extremely high counts. Approximately 18,000 bacterial analyses of milk are made each year by the Boston Health Department. These data reflect a remarkable consistency in the quality of the milk as measured by bacteria counts and are to no small degree the result of unrelenting follow-up by the Inspector of Milk and by the Dairy Inspection Division of the Boston Health Department.

ARITHMETICAL AVERAGE COUNTS OF MILK SOLD IN BOSTON COMPUTED FROM MONTHLY SURVEYS. FIGURES ARE THOUSANDS OF COLONIES OF BACTERIA IN ONE CUBIC CENTIMETER. A.P.H.A. STANDARD PLATE COUNT INCUBATED AT 32° C.

About Eighteen Thousand Samples Yearly Total

	Grade A Milk						*Milk—Pasteurized*					
	1939	*1940*	*1941*	*1942*	*1943*	*1944*	*1939*	*1940*	*1941*	*1942*	*1943*	*1944*
Jan.	2.5*	0.9	0.7	1.4	1.4	2.4	6.9*	7.1	4.4	8.2	6.3	4.6
Feb.	2.3*	1.2	0.7	0.9	1.2	1.8	5.8*	7.9	3.9	4.2	5.4	3.8
Mar.	2.5*	1.2	0.9	0.9	1.2	1.2	6.8*	12.1	6.9	4.9	6.9	5.1
Apr.	3.8	1.3	0.8	1.2	1.5	2.1	20.0	5.6	6.9	3.9	6.1	7.8
May	3.4	1.1	1.3	1.1	1.4	2.0	12.0	7.1	5.5	10.8	12.6	7.9
June	3.0	1.7	0.8	1.9	2.4	4.7	5.7	8.9	8.5	13.7	12.0	18.2
July	3.7	1.3	1.1	1.7	4.5	3.5	14.3	7.3	6.2	9.9	7.2	14.5
Aug.	3.0	1.2	1.7	2.2	6.5	3.1	13.2	6.9	8.6	8.3	19.9	13.7
Sept.	3.7	1.4	1.4	1.4	3.0	2.3	11.4	9.2	7.0	6.4	11.1	10.5
Oct.	2.7	0.6	1.2	1.3	2.0	1.7	10.2	6.4	14.0	3.6	6.4	10.1
Nov.	2.1	0.7	0.8	2.6	2.2	1.4	8.9	4.8	6.5	8.7	5.9	6.1
Dec.	2.4	0.8	1.1	0.8	1.6	1.0	9.6	7.2	4.3	5.3	4.5	4.9
Year	2.9	1.1	1.0	1.4	2.4	2.3	10.4	7.5	6.8	7.3	8.7	8.9

* *Old style A.P.H.A. agar incubated at 37° C.*

Those who particularly favor the direct microscopic method may regard the low plate counts reported in the above table as not truly indicative of bacteriologically low-count milk. During the twelve months of 1944 the Inspector of Milk made parallel determinations on all samples of milk by the direct microscopic clump count and the standard plate count on plates incubated 48 hours at 32° C. The following data furnished by the Inspector of Milk are especially interesting in the relationship between these two methods of analysis.

1. Of the pasteurized milk samples having standard plate counts (32° C.) of less than 10,000,
   (a) 85.5 percent showed microscopic clump counts of less than 10,000, and
   (b) 14.5 percent showed microscopic clump counts of more than 10,000.
2. Of the pasteurized milk samples having standard plate counts (32° C.) less than 20,000,

(a) 85.0 percent showed microscopic clump counts of less than 20,000,
(b) 15.0 percent showed microscopic clump counts of more than 20,000.

3. Of all of the pasteurized milk samples analyzed:
(a) 2.5 percent had standard plate counts (32° C.) over 20,000,
(b) 15.0 percent had microscopic clump counts over 20,000.

It would appear from these data that the low bacteria counts of Boston milk supply as measured by the standard plate counts (32° C.) are likewise found to be low when measured by the direct microscopic clump count.

Enviable records such as these do not just happen; they are the result of the cooperative efforts of various health agencies in the community, the state departments, the dealers, and the producers. They reflect the fruit of many years of steady improvement, brought about slowly by educational and regulatory procedures.

THE IMPACT OF THE WAR AND ITS EFFECT ON QUALITY OF MILK

Perhaps the most convincing evidence of the effectiveness of the program has been the maintenance of quality of milk sold on the Boston market during war time. The shortage of farm help, the difficulty of replacing equipment, and the fact that milk has been on a seller's market have all contrived to increase the quality control problems. A study of the data in the table shows that the product delivered in Boston during the war years has remained remarkably uniform in quality as measured by bacterial plate counts.

The program was inaugurated before the war, and was well established in the market before the various impacts of the war were felt; there has been no compromise of the program during the emergency. It is to the everlasting credit of the producers that they have taken the necessary steps to continue to produce milk of satisfactory quality even though it may have been accomplished under trying circumstances and seemingly insurmountable obstacles.

It would be a mistake to say, or even to imply, that the milk coming into the Boston market has all measured up to the very high quality records which were made just prior to the war under this program. It is not incorrect to state that any decline in the quality of milk has been very slight. If a curve were plotted of the average bacteria counts of milk for several years prior to the war, that curve would go downward steadily; if the curve were continued for the war years it would, to be sure, turn upward, but only slightly. The significant thing is that the people of Boston have continued to obtain milk of exceptional quality during a time when one might reasonably expect serious regression. That the Mott program has been a very important if not a dominating factor is indisputable. This program commends itself to serious consideration in other markets, but only in those markets where absolute and unqualified enforcement can be assured.

The Annual Meeting for 1945 has been canceled on account of the war-time restrictions.

The Army Milk Control Program*

RAYMOND RANDALL

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It is a pleasure for me to appear before this Association as a representative of the Office of The Surgeon General, United States Army, and on behalf of this office I wish to thank the civilian milk control officials for their cooperation in assisting the Army to obtain a safe and adequate fluid milk supply under the present wartime conditions.

It has been stated that soldier morale begins and ends in the mess hall. Those responsible for the subsistence of our soldiers appreciate this view and in order to maintain our Army at highest efficiency strive to supply them with an adequate, well-balanced and wholesome ration. As a result of their efforts our soldiers are the best fed in the world.

Because of their high nutritional value, milk and milk products constitute an integral part of the soldier's ration which is arranged to include one or more dairy products in each meal. The amount of fluid milk consumed by the military establishment within the continental limits of the United States for the twelve month period ending 30 June 1944 aggregated 850,000,000 pounds and provided at least one half pint of fluid milk daily per man.

CONTROL RESPONSIBILITY

The procurement of milk, like other subsistence items, requires full co-operation between the Office of The Quartermaster General and that of The Surgeon General. It is the function of the Quartermaster Corps to purchase milk for the Army on contracts drawn in accordance with the provisions of pertinent Federal Specifications. The Army Medical Department is charged with the responsibility of maintaining the health of the military establishment and of carrying out such measures and procedures as are considered necessary for the control and prevention of disease in the Army. This includes investigation of the character and wholesomeness of the Army's food supply.

The inspection of meat, meat-food, and dairy products is the function of the Veterinary Corps, a component of the Army Medical Department. Accordingly, the Veterinary Corps assumes an important role in protecting the health of the Army by preventing the purchase or issue of meat and milk products which by reason of their source, nature, handling, or condition may be unsafe or of lower quality than that specified in the contract.

In carrying out inspection procedures pertaining to milk the Medical Department does not undertake to duplicate the activities or to replace the functions of local health or milk control organizations. Where such local supervision is found to be adequate and efficient, the functions of the Army are limited to check inspections which determine whether a contracting dairy plant is acceptable from all standpoints, including that of the raw milk supply. In addition to these periodic check inspections, routine

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bacteriological and chemical examinations of delivered products are made to insure that the satisfactory situation is maintained.

With the present acute milk shortage, Army personnel endeavor to assist in improving certain milk supply sources so that they will meet Army standards of acceptability. In these instances it is incumbent upon the plant and milk control officials to give their full cooperation. Usually excellent cooperation is given, but on the other hand there are localities where this is not the case and there the Army is doing essentially all of the control work in the plant and on the dairy farm as well. Also in some of the smaller communities the more rigid requirements of the Army may be in conflict with the practices of local health officials.

Quality Requirements

Prior to the present war, milk of acceptable quality was available in ample amounts in areas adjacent to military installations. As our Army expanded it became impossible in many instances to obtain sufficient amounts of acceptable milk locally thus making it necessary either to extend the milk sheds or to bring in pasteurized milk from other areas.

In 1942 the shortage of fluid milk for Army use became so critical in some sections of the country, especially where milk production had always been relatively small, that it was decided to amend the Federal Specifications for fluid milk. Accordingly, under date of 5 October 1942, the specifications under which the Army is now procuring milk were promulgated and are as follows:

"Types.

Type I. Certified milk:
- a. Raw
- b. Pasteurized

Type II. Pasteurized milk:
- a. No. 1
- b. No. 2

Type III. Pasteurized milk."

As the Army does not ordinarily buy certified milk, contracts are let for the following types:

"Type II, No. 1, or Type II, No. 2, pasteurized milk shall be purchased when available in adequate quantity. Type III pasteurized milk shall be purchased whenever Type II, No. 1, or Type II, No. 2, pasteurized milk is not available in adequate quantity.

Type II, No. 1, pasteurized milk shall conform to all specifications for Grade A pasteurized milk as defined in the current requirements of the United States Public Health Milk Ordinance and Code. For the purpose of this directive, only Grade A milk produced in a locality which has formally adopted the U. S. Public Health Milk Ordinance and Code shall be accepted as Type II, No. 1, pasteurized milk.

Type II, No. 2, pasteurized milk shall conform to the specifications for Type III pasteurized milk with the exception that the bacterial count per cubic centimeter shall not exceed 30,000 at any time after pasteurization and, in addition thereto, to the specifications for the local, first quality, pasteurized milk as defined in the current requirements of the milk ordinances of the locality of the point of delivery, provided that those ordinances require the production of a higher quality milk than that specified herein as Type III. 'First quality,' as used in the preceding sentence, shall mean the highest quality of fluid milk that is consumed by a majority of the population in the locality of the point of delivery. Milk from other localities may be accepted when such milk is equal in quality to the milk required by this paragraph for the locality of the point of delivery."

Type III milk is in general comparable to Grade B milk as defined in the United States Public Health Service Milk Ordinance. However, instead of specifying the exact equipment necessary for its production, it is required that it shall be produced on premises on which buildings, installations, equipment, water supply, facilities, methods and procedures incident to the production, handling, storage and transportation of raw milk are such as to assure that wholesome milk is delivered to the pasteurizing plant. The object of this change was to enable the Army to divert the better quality of milk from manufacturing channels to pasteurization plants. The requirements of the United States Public Health Service Ordinance covering Grade B milk which deals with equipment on farms were not included because of the difficulty in obtaining sufficient additional equipment in each instance.

Although the designation Type III pasteurized milk has been used in Federal Specifications for many years to designate an acceptable second grade milk this nomenclature is unfortunate. Even though the bacterial requirements are the same as those for Grade B pasteurized milk under the United States Public Health Service Ordinance. there has been a tendency, especially in those sections operating under the United States Public Health Service Ordinance to regard the designation "Army Type III milk" and "Grade C milk" as interchangeable. This is far from the truth. Furthermore, in those sections where these terms were applied synonymously, the Army was frequently accused of lowering prevailing standards by permitting the use of milk having a bacterial count up to 1,000,000 per cubic centimeter prior to pasteurization. These specifications, including those of Type III pasteurized milk were agreed upon only after several conferences of representatives of the United States Army Quartermaster Corps and Medical Department, War Production Board, Office of Price Administration, Agricultural Marketing Administration, and the United States Public Health Service. These changes were made in order to provide an important item in the soldier's diet as it is a War Department policy that every effort be made to furnish an adequate supply of safe, wholesome pasteurized milk. In this directive it is stated that due to shortages of critical materials, improvement in the milk supply from dairy farms must be accomplished largely by emphasis on more sanitary methods and practices in the production and handling of milk. We all know that regardless of the amount and kind of equipment on a dairy farm the proper use of available facilities by the farmer himself largely governs the quality of raw milk.

EXAMINATIION OF SAMPLES

The milk inspection activities of the Army are usually performed by Medical Department personnel of the camps, posts, and stations receiving the milk. To avoid having more than one veterinarian inspect a plant, and its source of raw milk it is now arranged so that one officer is responsible for the inspection of a designated plant and that this inspection is accepted by the Veterinary Officers stationed at posts receiving milk from this plant. At each post samples are taken for chemical and bacteriological examinations to insure that the milk as delivered meets the prescribed requirements. If the milk fails to meet these requirements the inspecting officer is informed and the matter is referred to the contracting plant for the institution of corrective measures. Supervisory jurisdiction over milk inspection in each Service Command is exercised by the Service Command Surgeon's Office which has at its disposal excellent laboratory facilities and the services of personnel with special training and experience in milk control work. Moreover, a milk expert, formerly of the Bureau of Dairy Industry, U. S. Department of Agriculture, is on duty in the Veterinary Division, Surgeon General's Office. His services are utilized for making surveys of milk supply sources and for coordinating the Army's milk control program.

As has been repeatedly stated, proper pasteurization is the most important single safeguard applied to milk. After determining whether the milk plant is properly equipped and maintained, a final evaluation of the quality of the products must rest upon the results of laboratory examinations. Samples of milk as delivered are taken once a week and more often when deemed necessary and submitted to the post laboratory for examination. In addition, samples are sent each month to the designated Service Command laboratory which is fully equipped for more detailed examinations than are usually possible in post laboratories.

Routine laboratory examinations include determinations of fat content, solids not fat, sediment, phosphatase, and the standard plate count.

Practically no trouble has been encountered in obtaining milk that conforms to the fat and solids requirements. Bacterial counts have generally been satisfactory. When counts exceed the permissible limits the contracting plant is visited and those in charge advised of the situation and corrective measures initiated. Action by the inspector may include the taking of line samples and washed bottles for bacteriological examination to endeavor to find the cause of the excessive bacterial counts.

As the Army is using only pasteurized milk the phosphatase test assumes great importance in the detection of improper pasteurization or contamination with raw milk.

The coliform test is used by the Army as a standard procedure in milk control work. Although it is not a requirement of the United States Public Health Service Milk Ordinance, this test is believed to have a definite place in evaluating a milk supply.

If the phosphatase test is negative and coliform organisms are found, laboratory tests are conducted to determine whether the organisms are heat resistant. A positive test is most often caused by contamination after pasteurization. Proper bottle washing and thorough cleaning and sterilization of all equipment with which milk comes into contact after pasteurization will usually eliminate organisms of the coliform group. The application of these measures has in most instances enabled the Army posts to obtain milk relatively free from coliform organisms.

In conclusion, let me emphasize that with the cooperation of the civilian milk control officials, the Medical Department has been enabled to exercise adequate and efficient sanitary control over the Army's milk supply. This can best be attested by the fact that although approximately 850,000,000 pounds of fluid milk have been consumed annually within the continental limits of the United States, no serious outbreaks of milk-borne diseases have occurred.

Further, the Army control measures have been instrumental in improving the sanitation of milk production and processing in many communities. The inclusion of fluid milk in the soldier's ration, where an acceptable supply is obtainable, has educated many of our soldiers in the nutritional value of milk and milk products and an increased milk consumption may be expected in the days following demobilization.

The Annual Meeting for 1945 has been canceled on account of the war-time restrictions.

Why Milk Sanitarians Are Interested in Better Milking

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In general, the duties of a Milk Sanitarian are to supervise the production and handling of milk from the farm to the consuming public. To improve and maintain quality in the milk supply is their constant aim. This is accomplished essentially through education of the producer and distributor.

The term *quality* as it pertains to milk has a very broad meaning. It includes safety, cleanliness, appearance, palatability, flavor and keeping qualities.

Milk should be produced only from healthy and clean cows, with clean equipment. The quality of milk can be no better than the health of the udder from which it is obtained. Diseased udders are responsible for much of the abnormal and low-grade milk rejected at plant receiving platforms. It requires constant vigilance on the part of the dairyman to maintain udder health.

More dairy cows are sold because of mastitis than for any other reason. Trauma of the udder is no doubt the underlying cause of mastitis, with bacterial invasion being secondary. It is difficult to define what constitutes trauma of the udder, as it has been developed to such a high degree of specialization. Improper milking may cause trauma of the udder.

In years gone by little or no attention was paid to the manner in which cows were milked, other than to require that the hands be clean and dry, and that the mechanical milker be in a clean and sanitary condition.

Dairymen, scientists and dairy physiologists during the past several years have given much study to the phenomenon of milk secretion and have definitely proven that the manner in which a cow is milked is reflected in udder health, production, and length of lactation period. Observations in the field have proven this to be true. This being the case, it is only natural that milk sanitarians are interested in "Better Milking."

"Better Milking" may be defined as that method of milking cows which will milk the greatest number in the least time, maintaining udder health and maximum production of milk and fat.

Milking cows by machine is the modern method; it has now become a science, requiring thoughtful planning and a definite routine for every dairy barn.

The milking operation may be compared to an assembly line in a modern industrial plant. The cows are arranged in the milking line in the order in which they will respond best; the younger animals first, as these milk more quickly, and then the older ones. The older ones are milked last, as what they see and hear may induce them to milk better and faster.

Problem cows must be placed where they will not interrupt or stop this important "assembly line of production."

The man who operates the mechanical milker is worthy of his title—the "milking machine technician." His work requires the highest skill, as the success of the dairyman depends upon the production of his dairy herd. It is only through the milk pail that the final harvest is made. The tilling of the land, planting, cultivating and storage of the crops are only intermediary steps in dairy farming. The final and important harvest comes when the crops are fed to the cattle and converted into milk. The proper milking of cows will increase milk production as much as 10 per cent.

It is a natural instinct for a cow to be suckled. The act of milking, however, is a substitute for the calf's nursing action and if performed in the correct manner will be received by the cow with splendid response. It should always be kept in mind that a cow *likes to be milked* if she is handled correctly and is in the proper environment.

Only persons who appreciate cows should milk them. This qualification is quickly recognized as being beyond the scope of possibility in many instances on a vast number of dairy farms. The value of such employees should never be underestimated in better milk production.

Certain conveniences, such as a low cart to carry timers, milk pails, stripping pails, water to wash udders, teat-cup dip water, strip cup, teat-cup dipper, etc., help to speed up the operation and eliminate the necessity of the operator's carrying the equipment as he milks down a line of cows.

Every dairy barn requires some originality of thought in planning a milking routine, as they all differ in construction, arrangement of cows and location of the milk house. The general procedure, however, is similar.

The following simple rules, if observed, will result in producing a higher quality milk. Why is this true? The average dairy farmer will more gladly follow measures which will enable him to produce more milk and to milk his cows more quickly than he will for the purpose of improving quality. Does it matter too much for what reason he pursues the task so long as the desired results are obtained? Obviously, the answer is "no."

Rule No. 1

Milk at the same time every milking. Cows are creatures of habit and react favorably to regularity. This practice also is important in maintaining uniform daily production, particularly with three-times-a-day milking.

Last but not least in importance, the daily milk harvest will always be ready for the trucks, to be taken to the receiving plant.

Rule No. 2

All milking equipment should be in readiness before the milking is begun. Covers of milk cans should be loosened and properly arranged for filling. Strainers should be placed on the first cans to be filled. The milking machine should be assembled and placed in the rear of the first cows to be milked. Transfer pails with slip covers should be placed in proper position for convenient transfer of the operating head.

This proper preparation makes for easy and quick handling of the milk in the dairy barn and milk house, with less chance of contamination.

Once milking starts, no attempt should be made to do other jobs at the same time. Milking is no longer a "chore" but a full-time job, and requires the operator's entire attention during the milking period.

Rule No. 3

Cows should not be fed during the milking act. Under natural conditions the cow never grazes when the calf suckles. The milking act also requires the animal's full attention and cooperation.

Feeding cows during milking only serves to divert their attention, and is also liable to cause feed odors and flavors in the milk, which is always objectionable.

Rule No. 4

The preparation of the udder for milking is exceedingly important for "better milking," as well as for the production of a clean milk. A minute before application of the milking machine the udder should be washed or wiped with an individual towel moistened in a warm chlorine water of 130° F. with 250 p.p.m. of available chlorine.

This operation cleanses the udder and insures clean milk. The manipulation of the udder with hot water is a substitute for the nursing action of the calf's warm, moist mouth.

Manipulating the udder results in the sending of an impulse or message to the brain, which in turn releases a hormone which enters the blood stream, and upon reaching the udder causes the smooth musculature to contract and squeeze out the milk into the teat and gland cistern. This is more generally spoken of as the cow *letting down* her milk. This act is necessary for proper milking.

As the milk is made within the udder it is held in minute drops in millions of alveoli and recesses. Each alveolus, containing only a fraction of a drop of milk, is drained by ducts which coalesce with other ducts until they enter larger ducts and finally the cisterns above each teat. The droplet in each alveolus is too tiny to flow out of its own accord, so some pressure exerted from the outside of the alveolus is necessary to force it out.

Surrounding each alveolus are small muscle cells that squeeze and expel these tiny droplets.

The "letting down" of milk may be described as a conditioned reflex, and directly due to a high-intra-glandular pressure caused by the presence of active oxytocin in the blood, which is responsible for the contraction of the alveoli and small ductule muscle.

On the other hand, the failure to "let down" milk is due to the presence of adrenalin in the blood, which prevents the muscular contractions that are responsible for the high intra-glandular pressure.

When the teats and lower portion of the udder become turgid it is an indication of full "let down." Another indication commonly seen in dairy barns is cows "leaking" milk.

Cows should never be prepared too far in advance of milking as the muscles within the udder become tired or fatigued because the hormone within the blood stream is dissipated; thus milking cannot be complete.

The greatest volume of milk is taken away immediately after "let down." consequently this task of preparation is important to udder health, in that it encourages the gland to function normally.

Many milk ordinances require that the udder be wiped with a damp cloth immersed in a chlorine solution. No mention is made as to temperature of the water. Experience has shown that the water was cold or of atmospheric temperature, actually hindering milk "let down." Cleansing results obtained are also questionable.

RULE No. 5

Just before the teat-cups are applied a few streams of milk are drawn from each teat into a strip cup. This opens the natural seal on the ends of the teats, which permits the machine immediately to take milk from the udder, and shortens the milking time by at least a minute. Foremilk, which is low in fat and higher in bacteria, is also eliminated from the general supply.

The aforementioned steps take approximately a minute per cow. It is obvious, however, that this preparation actually saves time in the end.

RULE No. 6

Teat-cups must be applied quickly, without the loss of vacuum. This is necessary for the proper functioning of the other milker units in operation and important in keeping sediment out of the milk.

Most cows will milk out in three minutes. This is determined by examination and feeling of the udder. The gland will become soft and flaccid, depending somewhat on the udder structure.

Do not permit the cups to climb to the base of the teats, or at least to remain there, as some of the more delicate tissues may be irritated.

As the udder starts to collapse, a small amount of pull is placed on the unit with one hand, while the quarters are manipulated with the other hand. Only a few seconds are required to carry out this operation and to remove what residual milk may be left in the gland sinus. This is called machine stripping, a method which is rapidly gaining in popularity. Some Health Departments are recommending its adoption, as less sediment gets into the milk.

Hand stripping is satisfactory if conducted quickly and with full hand squeezes. Slow hand stripping will lead to slow milking habits in cows. The major objection from a quality standpoint is the large amount of sediment.

THE TRANSFER PAIL

The transfer pail is essential for speed, convenience, and eliminates the necessity of pouring milk in the dairy barn, which is unsanitary and contrary to sanitary regulations.

As the unit is taken from the cow, the operating head is transferred to the empty pail and the slip cover is placed on the pail containing milk. While the unit is being applied to the next cow, there is no danger of cats, dogs or dirt getting into the milk from the previous cow before it is taken to the milk house.

TEAT-CUP SANITATION

It is important to dip the teat-cups first in a pail of clean water and then in chlorine water (250 p.p.m.) between cows, in order to sanitize the cups so that no bacteria will be carried from cow to cow. This act also keeps the cups clean and consequently there is less sediment in the milk. The water and chlorine should be changed every 12 to 15 cows, or more often if necessary.

UDDER SANITATION

After the cows have been milked the teats are dipped in a chlorine solution of 250 p.p.m. The milking surface of the teats will be rinsed clean of milk, eliminating the possibility of bacterial growth which might gain entrance into the teat duct.

Contrary to the belief of some, it prevents chapping, cowpox, and promotes skin health. Overly strong antiseptic solution may cause dermatitis, however.

PROBLEM COWS

In nearly every dairy there may be one or two cows that are slow or hard milkers. They take longer to milk due to some anatomical or physiological reason.

Such cows are placed in the milking line so that they will be milked when it will not interfere with the milking of other cows. These cows require special attention and this cannot be given simultaneously with the proper milking of the rest of the herd.

DISEASED UDDERS

Cows with diseased udders must be handled separately. If milked by machine the units must be sterilized with hot water of at least 180° F.

All too frequently the milker is not properly sterilized at the conclusion of milking, and is applied on healthy udders at the next milking.

Some dairymen maintain a separate unit for infected udders and thus eliminate the possibility of carrying infection to healthy cows. Others say if such cows are milked by hand it makes those in charge more conscious that they are dealing with infected animals.

TRAINING HEIFERS TO FIRST MILKING

The manner in which heifers are first milked is often the determining factor as to whether or not they will be satisfactory milkers.

Do not subject them to the following milking procedure, as many dairymen do: first the calf; second, milking by hand; third, machine milking. By so doing the heifer will have gone through three transitory periods.

Milk her first by machine and she will respond splendidly. The colostrum will not adhere to the milk surfaces if the milker is promptly rinsed.

MILK IN THE AIR LINES

Milk in the air lines is always of concern to the milk sanitarian. The most frequent cause is over-filling the milker unit, due to milking two cows into a single unit. The installation of a stall cock for every cow will correct this objectionable habit. It also eliminates additional steps and permits every cow to be milked on the right side, regardless of where she is placed in the herd—an important asset in good herd management.

CARE AND MAINTENANCE OF MACHINE IMPORTANT TO UDDER HEALTH AND QUALITY MILK

Care of and attention to the milking machine to keep it in perfect shape is most important to better milking. Low or high vacuum is a frequent cause of incomplete milking.

The usual causes of low vacuum are a worn pump, clogged pipe line, worn or leaky stall cocks, or even a cracked pipe line.

High vacuum is usually caused by a worn vacuum controller.

Even though both conditions cause incomplete milking, they act differently in doing so. Low vacuum will not open up the meatus of the teat sufficiently to allow a large stream of milk to flow, nor will it take what milk there is away with sufficient speed.

High vacuum may cause enough congestion and irritation on the ends of the teats so that cows will not let down their milk. Also, high vacuum used over an extended period of time will cause a chronic thickening of the end of the teat, resulting in what is sometimes called a spray teat, or a partial obstruction of the teat opening.

Frequent checking of the vacuum with a tested gauge is very important and should be done occasionally.

The teat-cups are the only part of the milker that comes in direct contact with the cow's udder and teats, and should be given special attention. The liners should be kept at the correct tension so that the cows are milked in the same way every day. Two sets of liners should always be used, rotating the sets every seven days. Two sets used in this manner will not only milk much better but should last longer than three sets used continuously.

Cows respond to the minutest change, such as a gradual change in the loss of elasticity in the liners. The change is so gradual that it may not be noticed by the operator until its effect is shown after a period of time.

Unfortunately cows cannot be relieved or broken of their bad milking habits as quickly as the mechanical condition can be corrected. It is much more satisfactory to keep the equipment in good repair and save the time and energy of training the animals over again.

Hot water is a prerequisite in producing quality milk. It has been a misnomer to call the majority of equipment on the farm for heating water *hot water heaters;* they are more nearly *warm* water heaters.

Dairymen deserve to be told the limitations of such equipment.

KEEPING MILKERS CLEAN

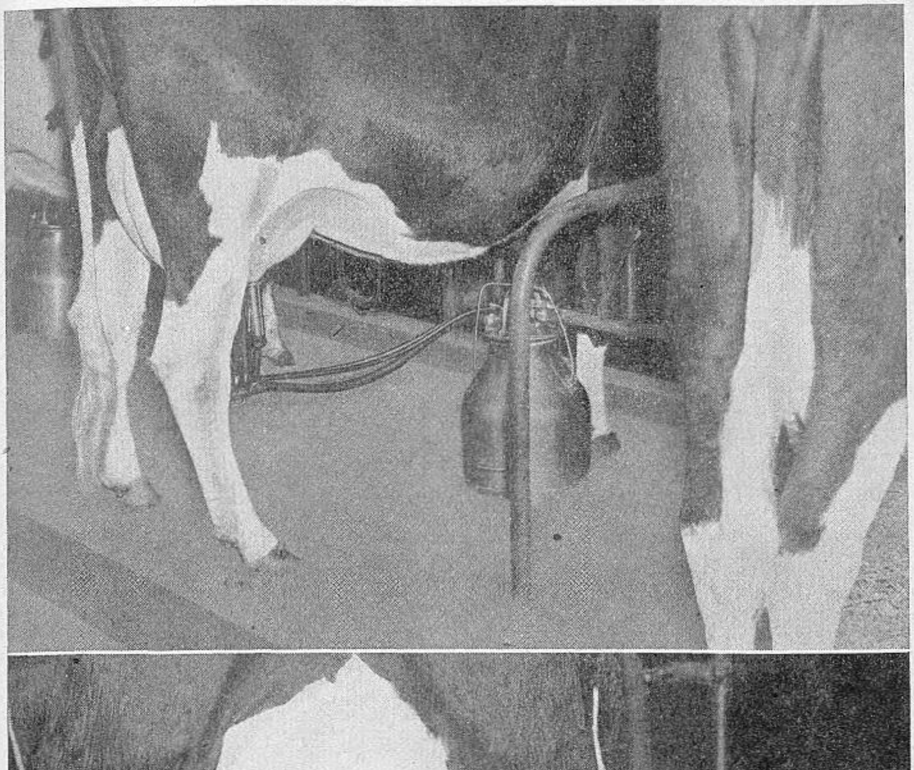
The secret of clean milking machines is to *keep them clean* and not let them get dirty.

Prompt rinsing after use with plenty of clean water for each unit is the one biggest factor in keeping them clean. Sufficient brushing after each milking, to keep the units clean, is also necessary.

The mutual interest of the milk sanitarian and the dairyman in this important and popular subject of "Better Milking" is certain to do much in improving quality milk production.

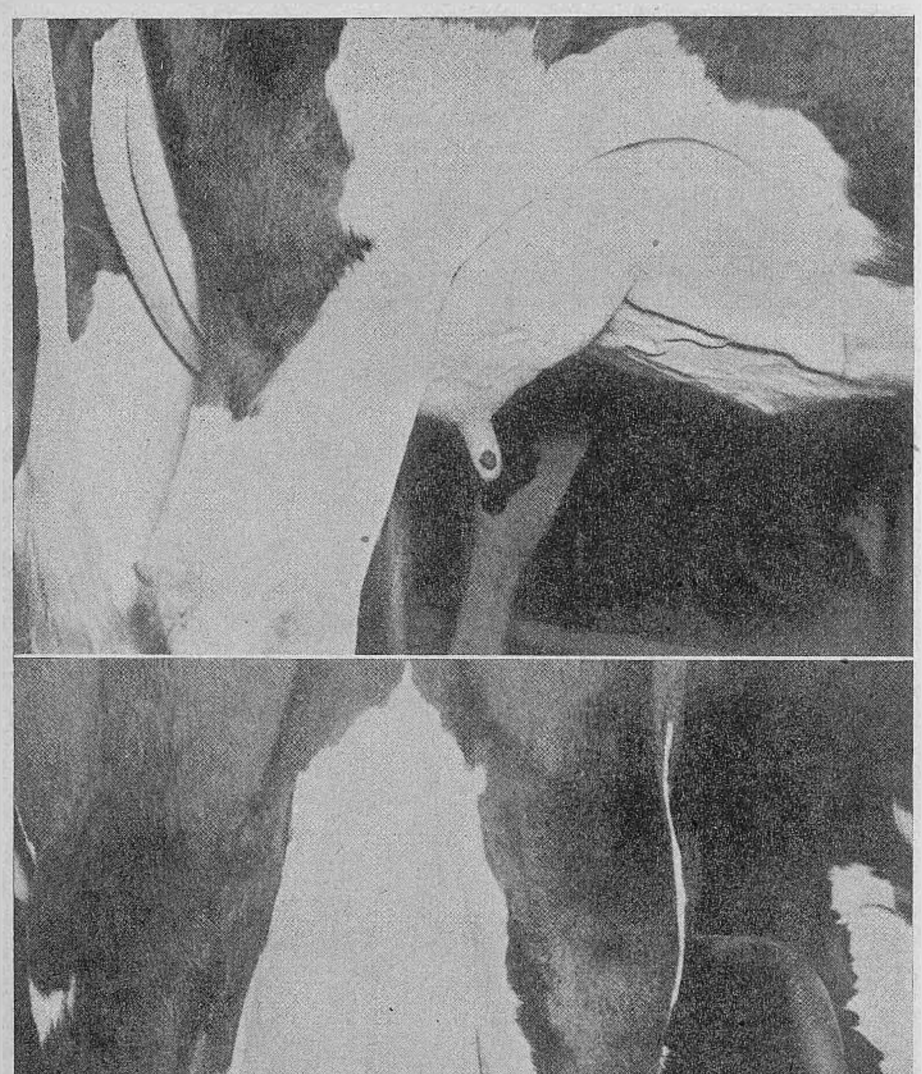
Above—Washing scene conducted at annual meeting of the International Association of Milk Sanitarians.

Below—Equipment used for Better Milking Demonstration at the same meeting.



Above—Close-up of milker properly applied to cow's udder. Note position of teat-cups and udder. Sight glass indicates perfect "let-down" of milk.

Below—Beautiful example of perfect udder with satisfactory "let-down." Note distention at the base of the udder almost equal to the distention at the floor of the udder.

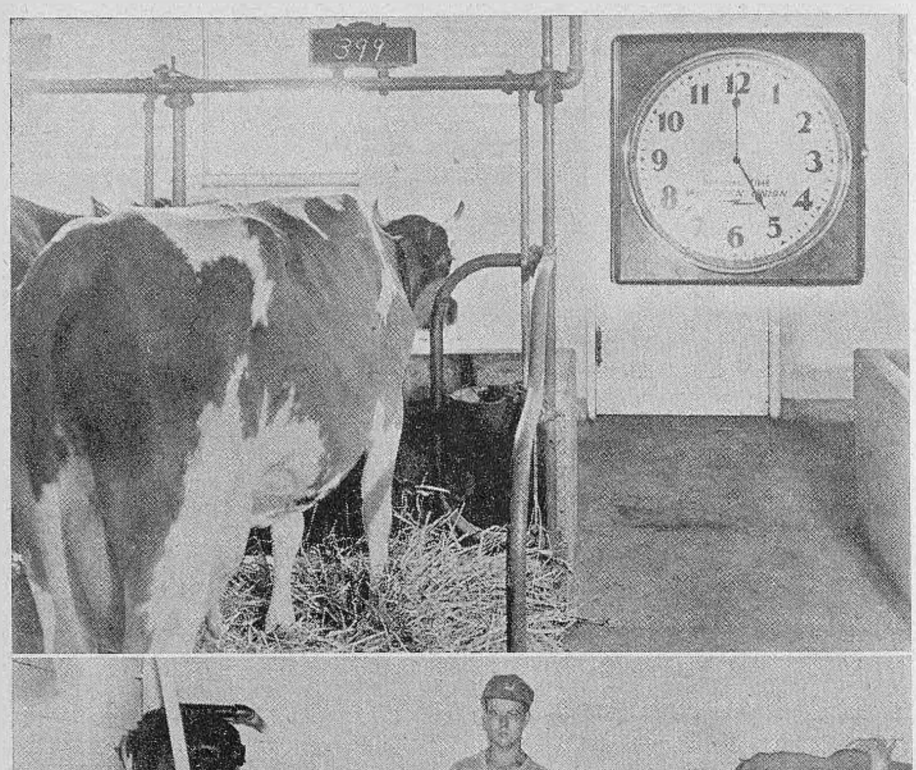


Above—Side view of the same animal indicating proper "let-down."

Below—Complete collapse of udder after 3-minute milking. Portrays perfectly how a normal udder should appear when completely milked.

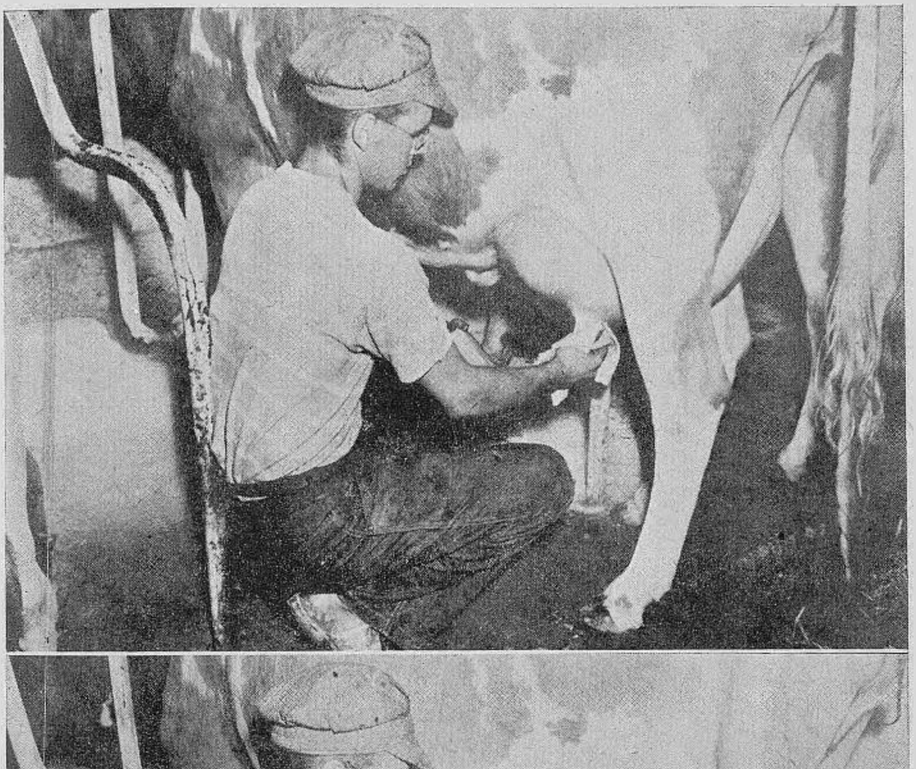
Above—Side view of same animal after milking portraying complete disappearance of the posterior view of the udder.

Below—Close-up showing an udder that has been completely milked out and time that the units should be removed. Note the collapse of the udder tissue above the teat-cups which is an indication that the cow has been milked out.



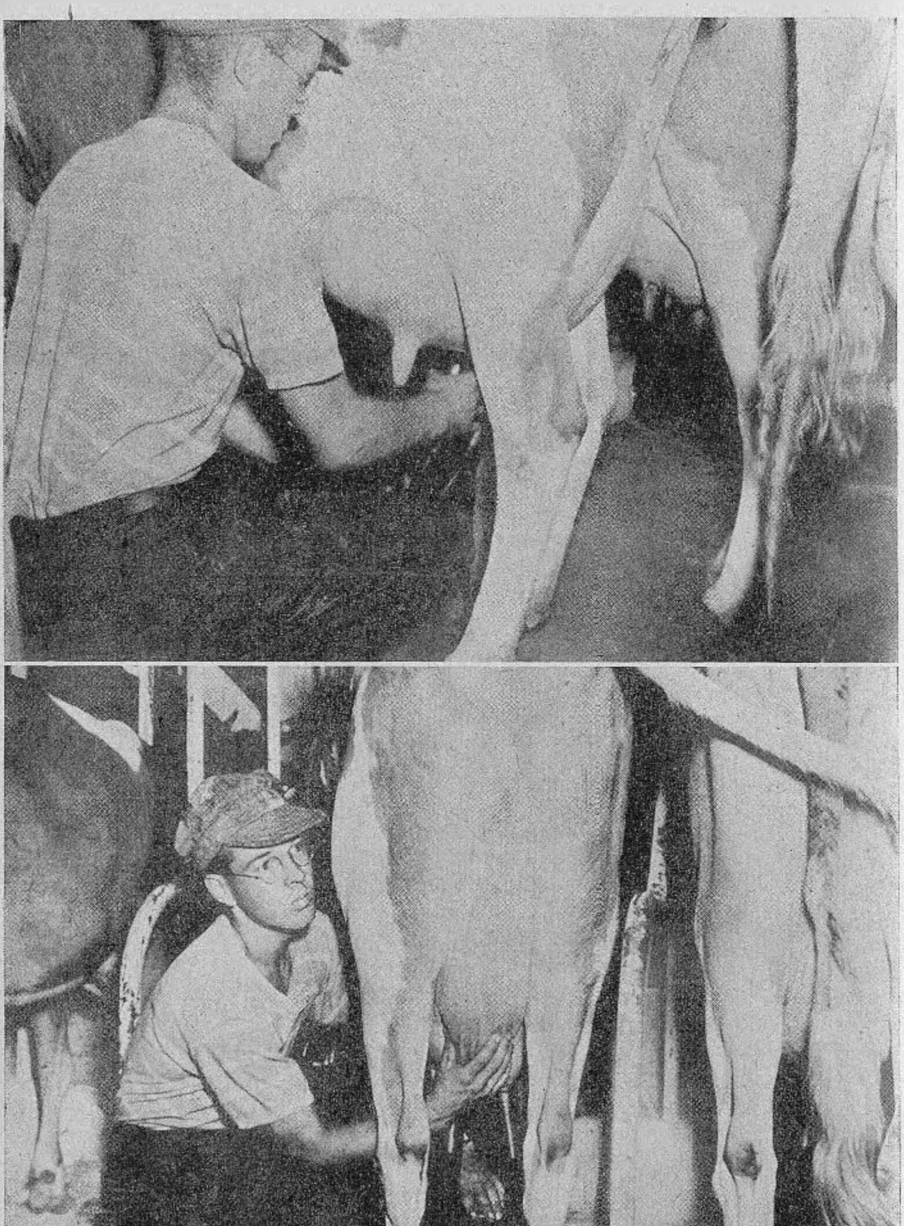
Above—Milk at same time every milking—cows are creatures of habit.

Below—Have everything in readiness to start. Avoide noise and confusion. (Operator is Mr. Paul Lovelace, Clinton Corners, N. Y.)



Above—Wipe each udder with cloth and good warm water (130° F.) containing 250 p.p.m. of chlorine.

Below—Draw a few streams from each quarter into strip cup. Inspect for abnormal milk.



Above—Next apply teat-cups immediately. Handle cups properly to avoid loss of vacuum.

Below—Remove teat-cups at end of 3–4 minutes. Strip briefly by hand or machine.

Coliform Organisms in Pasteurized Milk*

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A more appropriate title to this paper would be "Coliform organisms *not* in pasteurized milk." At least that is the goal which we desire to reach. The technic for performing the coliform tests is given in the eighth edition of *Standard Methods for the Examination of Dairy Products* together with a bibliography of a number of the outstanding papers. The literature is full of articles on the technical aspects of the characteristics of the organisms of this group, but little has been published on the application of this test in routine milk control work. I will try to explain how we are applying the tests for the purpose of improving the quality of our pasteurized milk supply. In so doing, I will attempt to give you our answers to a number of questions:

Question 1: What are the two general types of tests used to measure the presence of the coliform group?

Answer:

1. A fermentation test in a liquid medium in which the production of gas is considered a positive test.
2. A plate count on a solid medium in which the presence of typical colonies is considered a postive test.

Question 2: What is meant by the "coliform group"?

Answer:

The "coliform group" is considered to include all organisms which give a positive reaction in either of the above tests. This is a broader interpretation than that given in Standard Methods, but we run only the presumptive test and not the completed test.

Question 3: What is the basis for the coliform test of pasteurized milk?

Answer:

(a) The test is based on the assumption that all prepasteurized milk contains organisms of the group, (b) that proper pasteurization reduces the population of this group below that which will be detected by the test, and (c) that contamination of the pasteurized milk introduces a sufficient number of the group to result in a positive test.

Question 4: What is the significance of a negative test of pasteurized milk?

Answer:

It means that the organisms of the group were not detected in the particular volume tested. The greater the care in processing, the greater the care in washing and sterilizing the equipment, and the greater the care in protecting the equipment and milk from contamination, the greater is the chance that the milk will show a negative test.

Question 5: What is the significance of a positive test?

Answer:

A positive test is generally considered to mean that the milk was contaminated after pasteurization from improperly washed or sterilized equipment, or the milk or equipment was contaminated from the air, water, insects, rodents, or humans. On rare occasions a positive test may be due to improper pasteurization particularly when raw milk by-passes the pasteur-

* Presented at the 19th Annual Meeting of the Connecticut Association of Dairy and Milk Inspectors, Jan. 9, 1945, Bridgeport, Conn.

ization operation. Positive coliform tests have uncovered improper operation of outlet valves which was not detected by phosphatase tests. The important fact is that if the coliform organisms gained entrance to the pasteurized milk, the portals were open for the entrance of more dangerous organisms.

Question 6: Do false positive tests ever occur?

Answer:

Yes! But so rarely that in our routine field application of the test we assume that false positive tests never occur. This interpretation is based on the fact that for several years when we were using our mobile laboratories, several thousand samples of milk collected from the pasteurizers at the end of the holding period never gave a positive test except where the pasteurizer design or operation were defective. In all these thousands of samples, I believe there were only two or three positive tests. One of these positive samples was collected from a pasteurizer with the cover mounted with a piano hinge. Condensation from green verdigris in this hinge dripped into the milk and this drippage gave a positive test. Similar explanations were found for the several other positive findings.

Many workers have reported that certain strains of *Escherichia coli* resist the temperature of pasteurization. However, these studies were carried on under laboratory conditions using heavy inoculum in artificial media, sterile skim milk or in other dairy products such as ice cream mix or butter. The medium in which the culture is tested has a bearing on the organism's thermal resistance. Organisms are killed in an orderly process. The greater the initial population the higher is the absolute thermal death point. For these reasons the laboratory controlled findings cannot be applied to commercial pasteurization of raw milk.

The presumptive test for the coliform group results in some positive findings which may be due to organisms other than those of the colon-aerogenes group. The thermal resistance of these organisms has not been carefully studied but our negative findings from thousands of samples collected at the end of the holding period indicate that they do not result in false positive tests.

Question 7: Do false negative tests ever occur?

Answer:

Yes—and undoubtedly more often than false positive tests. A number of workers have shown that at times certain organisms of the group fail to produce gas in the fermentation test or fail to produce typical or recognizable colonies on plates.

Question 8: In addition to the false positive and false negative findings what are some of the other limitations of the test?

Answer:

Probably the greatest limitation of the test (and this is true of all other bacteriological tests applied to milk) is the fact that only an infinitesimal amount of the supply under question can be analyzed and this small sample is not an aliquot of the whole. When three 1 ml. portions of a quart of milk are tested and found negative it only means that coliform organisms were not found in those 3 ml. It does not mean that there were no coliform organisms in the quart. Even if the entire quart were analyzed and found negative, this is no guarantee that the entire supply would be negative. In fact, some of the first milk bottled may have been very badly contaminated. The processing of milk within a single day's operation varies constantly resulting in a fluctuation in the bacterial flora between each final container.

A second limitation of this or any other test of the final product is the fact that the fault or defect can only be detected after it occurs. In the case of the coliform test the product is consumed before the results of the test is obtained. In other words, it is a diagnostic rather than a preventive test.

Third, a negative test does not give absolute assurance that the product has been properly protected from contamination. As an extreme example an operator with a streptococcal sore throat may cough or sneeze over filled bottles of milk before they are capped. Such dangerous contamination would not be detected by the coliform tests. It has been suggested that equipment badly coated with milk-stone may be sterilized to a degree where it would not contribute to the coliform content of the milk handled therein, but may markedly increase the thermoduric or thermophilic content. However, experience has shown that it is very difficult to render such dirty equipment coliform free by any method of sterilization. Further, a laboratory test is not needed to bring to light such an unsatisfactory condition.

Question 9: What, if any, tolerance should be permitted in the interpretation of coliform tests?

Answer:

From the standpoint of this test an ideal pasteurized milk would be one in which the entire supply is free from coliforms. In practice this ideal is not obtainable at this time. In fairness to the industry we must admit that equipment, plant practices, or plant personnel have not reached the degree of perfection where they can be depended upon to keep properly pasteurized milk protected from coliform contamination at all times. In fact, this is the most sensitive of all tests applied to milk, to factors beyond the practical control of the operator. Very few pieces of equipment are air tight, and coliform organisms may be air-borne. Samples are exposed to air when collected or analyzed. Bottle caps may be subject to hand contamination both in the paper factory and the milk plant. Such uncontrollable factors would not affect the results of phosphatase tests or bacterial count determinations.

For these reasons, I believe that it is logical to allow some tolerance in the interpretation of coliform tests. At present we have no coliform requirement in our Sanitary Code. The test is used only as a diagnostic aid to faulty plant conditions and practices. We insist on correction of the cause and have plenty of authority under the code to enforce correction of the unsatisfactory conditions.

In our requirement of total bacterial count the code specifies that when two or more of four successive counts are higher than the limit preecribed for the grade, the milk shall be considered not to meet the grade requirement. If the coliform fermentation test should be used for the purpose of official grading, I believe that at least two of four successive tests should be positive in all three tubes before the milk should be degraded or two of four successive counts should be above a specified limit of about 10 per ml.

Question 10: What is the natural habitat of the coliform group?

Answer:

The coliform group is present in all natural soil and in the intestinal tract of all warm blooded animals including man and in the intestinal tract of some cold blooded animals, including flies.

Question 11: How does properly pasteurized milk become contaminated with the coliform group?

Answer:

The equipment with which pasteurized milk comes in contact probably accounts for most of the contamination. To a minor degree some contamination enters the milk directly by contact with human hands, by contact with insects, by air-borne dust, and by condensed moisture. The relative importance of the various modes of contamination has not been determined. But how do these organisms get on the equipment? At the end of a day's run most or all of these organisms have been rinsed off the equipment by the flow of milk. Then the equipment is washed with potable water and wash compounds both of which are free from coliforms. The operator's hands may contribute a few but the number would be so small that they would seldom be detected in the milk subsequently processed. There is, however, one large stream down which they are carried to the equipment every day the plant is operated. The raw milk entering the plant always contains some coliform organisms and usually contains from 100 to 10,000 per ml. The average coliform content of prepasteurized milk is probably in the low thousands. But you say that the equipment used for pasteurized milk should not be used for raw milk. In most small plants, and many large ones, all pipes, pumps, filters, and so forth used for raw milk are washed in the same vat and with the pasteurized milk-handling equipment. In large plants and, especially those using high-temperature short-time pasteurizers, it is the practice at the end of the day's operation to pump cold water through the entire equipment starting at the raw or upstream end of the system for the purpose of flushing out the unit and to cool it off. This practice actually does a good job of seeding the pasteurized milk-handling equipment with coliform organisms. Maybe this is what we want for if the equipment is heavily contaminated, a thorough job of sterilization is necessary to secure negative coliform tests of subsequently handled pasteurized milk.

I think you will agree with me that on the average, utensils used in public eating places are not sanitized as well as the equipment in our milk plants. Yet, the number of positive coliform findings of these utensils is far lower than the positive coliform findings of pasteurized milk. Utensils in public eating places are subject to as much insect and air-borne contamination and far more direct human contact contamination than dairy equipment. The difference in positive findings is undoubtedly due to the fact that you do not have a constant source of heavy coliform contamination of your eating utensils.

If a milk plant operator should eliminate the positive coliform tests of his pasteurized milk by preventing the contamination of his equipment from prepasteurized milk, he may lower the significance of the coliform tests but he would increase the relative safety of his product by preventing the most constant source of potentially dangerous contamination, namely raw milk.

Question 12: How can you protect properly pasteurized milk from contamination with the coliform organisms?

Answer:

I anticipated this question when I answered question 9 by saying that we should be tolerant to a certain degree. It is very difficult if not impossible to operate a commercial plant over a long period of time without contaminating some of the milk occasionally. However, we do have some plants under supervision which have not had a positive test of a pasteurized milk for more than a year, whether sampled by our staff or the local health departments.

As previously stated, the greatest amount of contamination is probably from the equipment with which the pasteurized milk comes in contact. The more thoroughly this equipment is cleaned, the easier it will be to sterilize. After the equipment is thoroughly washed and reassembled it may be sterilized either by heat or chemicals or a combination of both. Let us assume that the equipment in a small plant is to be sterilized with a chlorine solution of proper strength and activity. Every milk contact surface from the pasteurizer to the final container should be subjected to the chlorine treatment. This sounds easy. Just place the chlorine solution in the pasteurizer and pump it through all the equipment. But pumping the solution through the equipment does not bring it in contact with all the surfaces that the milk will later contact.

What surfaces did we miss?

(a) The chlorine solution will not penetrate as deeply into the pipe joints as the milk. To prove this, flush some pipes which have previousuy been used for milk until the water appears to be absolutely free from milk. Then open some of the joints and you will find undiluted milk which has penetrated into those joints.

(b) The chlorine solution will not fill dead end tees in pine lines but the milk gradually absorbs or displaces the air in these dead ends and the milk reaches the surfaces which have not been chlorinated.

(c) the chlorine solution may not fill the spreader pipe or lower trough of a surface cooler but the milk may foam or be backed up by a valve which will cause it to rise and contact surfaces which have not been chlorinated.

(d) The chlorine solution usually does not contact the inner surfaces of the cooler covers but the milk spatters on these surfaces and drains back into the lower trough.

(e) The surface cooler may be provided with diverting fins to prevent the milk from flowing out onto the headers. These fins may function as intended when the chlorine solution is flowing, but when cooling milk, these fins often frost over and the milk drains down over the unsterilized headers.

(f) The chlorine solution does not contact the inner surface of the bottler cover but the milk spatters up from the air tubes onto this surface.

(g) The chlorine solution does not contact all of the surfaces of the filler valves with which milk comes in contact when bottles are being filled.

(h) The chlorine solution does not contact the outside of the filler bowl but when cold milk is placed in the bowl condensation forms on the outside of the bowl and drains down on the filler valves. Even if the valves are equipped with drip flanges, the condensation may drain back on the lower side of these flanges onto the valve the same way cream runs down the side of a cream pitcher from the spout.

(i) The chlorine solution does not contact the bottle cappers but milk spatters into the capper and drains back into the bottles.

There are probably other surfaces with which milk comes in contact which do not receive adequate sterilization treatment.

Hot water sterilization has many of the same drawbacks of chlorine sterilization in that it fails to reach and heat all milk contact surfaces. Furthermore, a large volume of very hot water is needed, if the water at the down stream end of the system is to be sufficiently hot to be effective. Steam sterilization is inefficient and ineffective in that many surfaces are not adequately heated.

If none of these methods is consistently effective how should this equipment be sterilized? From my field experience I would recommend the following:

(a) The equipment should be as free from joints as possible. Many improvements in equipment design are needed to overcome this defect. Joints in pipe lines should be left loose at the beginning of the sterilization treatment, and tightened during the sterilization treatment. Valves should be loosened, so all surfaces receive treatment.

(b) All surfaces should be thoroughly cleaned before sterilization.

(c) Flush all milk contact surfaces with hot water containing a good chemical sterilizing agent, such as chlorine or quarternary ammonia compounds. Heat increases the activity of the chemical and the heat is transferred to some surfaces not contacted by the chemical.

(d) Immerse small parts such as bottle filler valves in the sterilizing solution and assemble while both the parts and operator's hands are wet with the solution.

(e) Have all equipment as air tight as possible. Covers of equipment which are not air tight should be kept closed.

Question 13: Does the season of the year affect the results of coliform tests?

Answer:

A detailed report on this subject was given at the New York State Association of Milk Sanitarians' 18th Annual Meeting by this writer.

A study of more than 10,000 analyses of pasteurized milk made by three different health departments showed that there was a marked seasonal fluctuation of the percentage of positive coliform tests. The curve of the positive findings parallels the curve of the mean atmospheric temperature. The percentage of positive findings during the third quarter of the year (July, August and September) was more than twice as high as for the first quarter of the year.

Question 14: What is the explanation for this seasonal fluctuation?

Answer:

There are only two possible causes for positive coliform tests of pasteurized milk. Either the contamination is great enough to be detected by the test or the small but undetectable contamination grows to the point where it can be detected. If the rise in positive findings with a rise in seasonal temperature is due to growth of coliform organisms in the milk, then you would expect growth of the mixed flora and a rise in the standard plate count. A study of over 10,000 such counts of pasteurized milk showed that there was practically no seasonal fluctuation of the percentage of counts above 30,000.

If the seasonal fluctuation of the positive coliform tests is not accounted for by the growth of the organisms in the milk, the only other explanation is that there must be a fluctuation in the degree of contamination.

Question 15: What are the reasonable explanations for a greater degree of contamination during the warm seasons?

Answer:

(a) The organisms may grow on the warm equipment and especially containers between use, making effective sterilization more difficult.

(b) Air-borne dust is greater and with windows and doors left open the equipment and milk is subject to more contamination.

(c) The insect population, especially flies, increases tremendously and they undoubtedly add to the amount of contamination.

(d) Condensation on cold equipment, such as the outside of the bottle filler bowl, is greater and this condensation drips or drains into the equipment and the milk.

Question 16: What conclusions can be drawn as to the value of the coliform test?

Answer:

The test is simple to run both as to the equipment needed and time required. It gives a good indication as to whether or not the milk after pasteurization has been protected from contamination. Good plant practices result in a product which is consistently free from measurable numbers of coliform organisms. The application of the positive findings of the test in locating and correcting faulty plant practices will result in an improvement in the quality of pasteurized milk supply of many plants. Our experience over a period of years shows that a common sense application of the results of this test undoubtedly has improved the quality of our pasteurized milk.

A Phosphatase Test for Cheddar Cheese*

A METHOD has just been developed in the laboratories of the Bureau of Dairy Industry for testing Cheddar cheese to determine whether or not the milk used in making the cheese was pasteurized. The method is a modification of the phosphatase test commonly used in testing milk to determine the adequacy of pasteurization.

This report is a description of the procedure used in testing cheese with only a brief discussion of the details of the method and its development. A summary of the results of applying the test to a large number of cheeses of various ages is also given. Complete details of the development of the method will be available later.

The Method in Brief

Buffer and precipitant: Mix 18.0 g. of C. P. barium hydroxide with 8.0 g. of C. P. boric acid, add distilled water to bring the volume to 1 liter, warm and stir until as much as possible of the material has dissolved, and filter. The pH of the barium borate-hydroxide filtrate is approximately 10.2, and that of a mixture of 10 ml. of it with 0.5 g. of Cheddar cheese is approximately 9.5.

For adjusting the pH in preparing the standards and in extracting free phenol from the disodium phenyl phosphate, a buffer with a pH value of approximately 9.75 is prepared as follows: Mix 13.0 g. of barium hydroxide with 6.5 g. of boric acid, make up to 1 liter, warm, stir, and filter as described above.

A mixture of 9 ml. of this buffer with 1 ml. of milk has a pH value of approximately 9.5, and it is suitable for tests on milk.

Butyl alcohol: Specify n-butyl alcohol, B.P. 116–118° C., for making standards and for quantitative work. The cheaper grade of the alcohol can be used for routine testing. Add 5 ml. of 0.1 *N* sodium hydroxide per liter, to adjust the pH within the proper range.

2, 6 — dibromoquinonechloroimide (BQC) solution (Gibbs reagent): Dissolve a BQC tablet (Scharer test), or 20 mg. of the pure substance, in 5 ml. of methyl alcohol, transfer to a dark-colored dropper bottle, and keep in a refrigerator. Prepare a fresh solution every few days or when it begins to turn brown.

Disodium phenyl phosphate substrate: Specify phenol-free, crystalline disodium phenyl phosphate. Keep it in a refrigerator. Even when it is kept under these conditions a trace of phenol will be liberated. The reagent may be partially purified at this point by washing several times with ethyl ether, filtering each time, and drying in a desiccator. Prepare a stock solution by dissolving 1 g. in 8.0 ml. of distilled water, adjusting the pH by adding 1.0 ml. of buffer, developing the color by adding 4 drops of BQC and incubating for 30 minutes at 37°–38° C., and extracting the color with 5 ml. of n-butyl alcohol (Scharer extraction method). The extraction may need to be repeated by using 2 drops of BQC and extracting with 5 ml. of the alcohol, it being essential to extract until the alcohol layer is free of blue color. This stock solution should be kept in a refrigerator and re-extracted daily before use. Each day, for use, prepare fresh buffer substrate by adding 1 ml. of this stock solution to 100 ml. of buffer. The trace of phosphate precipitate that appears may be removed by filtering.

* By George P. Sanders and Oscar S. Sager, Division of Dairy Research Laboratories.

Phenol standards: Weigh exactly 1 g. of warmed phenol and make up to about 900 ml. with distilled water in a liter flask. Add 4 ml. of *N* sodium hydroxide to form sodium phenolate, which is more stable than phenol. Add 3 ml. of chloroform and water to the 1,000-ml. graduation, and mix. One ml. of this stock solution contains 1 mg. (0.001 g.) of phenol. Put 1 ml. of the stock solution in a liter flask, add water to the 1,000-ml. graduation, and mix. One ml. of this standard solution contains 1 mcg. (0.000001 g., or 1 unit) of phenol. Prepare additional standards containing 2, 5, 10, 20 and 40 mcg. of phenol per ml., by diluting 2 ml. of the stock solution to 1,000, 5 to 1,000, 5 to 500. 10 to 500, and 20 to 500 ml., respectively. From these, measure appropriate quantities into a series of about 12 tubes (graduated at 5, 10, and 15 ml.) to provide a suitable range of phenol standards containing from 0.5 to 40 units. Add distilled water to the 5-ml. graduation, 0.25 ml. of buffer, and water to the 10-ml. graduation. (It is preferable to use buffered filtrate from boiled cheese, instead of water, in which case it is not necessary to add additional buffer.) Develop the color and extract with butyl alcohol in the manner described for the laboratory test.

Sampling: Take a sample, by means of a *clean* Roquefort trier, from the interior of the cheese, place it in a small tube, stopper the tube, and keep it in a refrigerator.

Laboratory test: Weigh, on a *clean* balance pan or watch glass, 0.5 g. of cheese and place in a culture tube 16 or 18x150 mm. Macerate the sample by means of a glass rod about 8x180 mm., add 1 ml. of buffer substrate, complete the maceration, add 9 ml. more of buffer substrate, mix the contents thoroughly by means of the rod, and stopper the tube. Incubate in a water bath at 37°–38° C. for 1 hour, shaking the tube occasionally. Place the tube in boiling water and allow to boil until the proteins are seen to separate and bubbles begin to appear, then turn off the heat and allow to remain for about 5 minutes. Place in a rack in cold, running water and cool to the temperature of the water. Filter through 9-cm. analytical filter paper in a 5-cm. funnel, into a tube graduated at 5, 10, and 15 ml. (bottom of meniscus). Draw off filtrate to the 5-ml. graduation, add distilled water to the 10-ml. graduation, add 4 drops (0.08 ml.) of BQC reagent, mix thoroughly, and incubate at 37°–38° C. for 30 minutes.

At this point, the blue color in tests with phosphatase values of about 10 or more units can be detected easily in the aqueous solution.

For samples with lower values, and for quantitative results, add n-butyl alcohol (Scharer extraction method) to the 15-ml. graduation and invert the tube slowly several times. Compare the blue color in the alcohol layer with colors of a set of standards prepared similarly, or measure the color by means of a photometer.

Since 0.5 g. of cheese is used in the test and the quantity of filtrate collected is equal to one-half the quantity of buffer substrate used, the result is recorded as units of color or phenol equivalents (mcg.) per 0.25 g. of cheese.

It is highly desirable to conduct a blank test daily using a 0.5 g. sample of cheese, macerating and boiling it in the tube before adding the buffer substrate.

For samples that are observed during the color development to be strongly positive (e.g., between approximately 40 and 500 units), in which the quantity of BQC specified is not sufficient to combine with all of the phenol, make dilutions as follows: While the color is developing, draw off and discard exactly half the contents by means of a suction tube attached by a rubber tube to a vacuum flask, or by means of pipette with a rubber bulb on the top.

Dilute with distilled water to the original volume, add 2 drops more BQC, and replace in the bath. Repeat this one-half dilution procedure as many times as necessary to reduce the color at the end of the development period to conform with the range of the standards or of the photometer. As many as 4 dilutions (factor, x16) may be required with raw-milk cheese.

Field test: The field test is conducted in the same manner as the laboratory test, except that the sample is incubated for 30 minutes, the color is developed for 15 minutes (one-half the time intervals of the laboratory test), and the mixture is not filtered.

It is desirable, when the test is completed in the original tube, to have additional graduations on the tube at points 0.5 ml. above those mentioned, so that provision is made for the volume of the sample.

For roughly quantitative results, the tube is shaken thoroughly and one-half of the contents is removed by means of a suction tube when the first incubation is completed, and the amount removed is replaced with distilled water before the BQC is added.

Photometric determination: After adding butyl alcohol and extracting the color, centrifuge the sample for 5 minutes to break the emulsion and to remove the moisture suspended in the alcohol layer. A Babcock centrifuge can be adapted for this purpose by making special tube holders as follows: Slice a section one-fourth inch thick from a rubber stopper of suitable diameter to fit in the bottom of the centrifuge cup. Glue together two cork stoppers of appropriate diameter, bore through the center a hole of proper size to hold the tube snugly, and inhert the double cork section in the cup. After centrifuging, remove nearly all of the butyl alcohol by means of a pipette with a rubber bulb on the top end. Filter the alcohol into the photometer cell and read with filters having a wave length of 650 millimicrons.

If more than approximately 4 ml. is required for the particular photometer used, the test is conducted in the larger culture tube (18 mm. diameter), the tube is graduated at 5, 10, and 20 ml., and the color is extracted with 10 instead of 5 ml. of the alcohol.

Precautions: The principal cause for erroneous values is the presence of free phenol in the buffer substrate. The stock solution of disodium phenyl phosphate should be extracted daily before use, more than once if necessary, until the butyl alcohol layer is perfectly colorless.

Because of the danger of contamination from samples taken previously, the trier and the sample-weighing surface must be cleaned and wiped thoroughly before each sampling and weighing.

The pipettes, tubes, and stoppers should be scrupulously clean and it is desirable also to soak them in hot, running water after cleaning.

Small plugs of cotton may be inserted in the upper ends of the pipettes to prevent the possibility of saliva contaminating the tests.

The solid barium hydroxide and the buffer must be kept stoppered tightly to prevent absorption of carbon dioxide.

Discussion

The buffer described fulfills the following important requirements: It adjusts the pH value within the proper range, and it also precipitates proteins, phosphates, and carbonates — all of which interfere in the test if present in solution.

Work is being done to develop a satisfactory buffer in solid form.

Standards prepared with buytl alcohol as described above and kept in a cool, dark place are sufficiently stable for use for a few weeks. The stability of the standards can be increased so that they may be used for as long as 2 months, by centrifuging, removing the alcohol layer, filtering it, adding a few drops of chloroform, and storing in a refrigerator.

Inorganic standards, prepared as described in the literature, are of course more stable than standards in butyl alcohol. However, the colors of the inorganic standards do not match photometrically the colors of the standards in the alcohol. Moreover, the colors developed in tests by the present method are more intense than those developed by the earlier laboratory methods for milk. Therefore, if inorganic standards are used with this method, adjustment of their formulas will be necessary.

The interfering red color, resulting from the presence of excess BQC reagent in both visual comparisons and photometric measurements, is one of the serious factors affecting the accuracy of the test. There is no way of knowing in advance how much BQC to add to an unknown sample to develop the maximum color without interference. With a given quantity of BQC, the amount of interfering color is inversely proportional to the amount of phenol present.

The use of the dilution method described under the laboratory test avoids a large excess of the interfering red color. It provides sufficient BQC to produce blue indophenol from all the phenol present so that highly positive tests can be evaluated quantitatively, and yet provides only a slight excess of BQC in all tests so that the amount of interference is reasonably uniform.

In making the determinations in aqueous solution by means of a photometer, filters transmitting light with a wave length of approximately 610 millimicrons should be used. When the color is measured in aqueous solution, either visually or by means of a photometer, the interfering color from the BQC reagent makes it practically impossible to estimate, with reasonable accuracy, equivalents below about 5 mcg. Butyl alcohol extracts nearly all of the blue indophenol and leaves most of the interfering compound in the aqueous layer. In butyl alcohol extractions read at a wave length of 650 millimicrons, the interference is largely eliminated, the blue color is intensified, and the results are much more accurate than in water.

RESULTS OF APPLYING THE TEST TO CHEESE

More than 340 samples of Cheddar cheese, for which records of the milk treatment were available, were tested by this method. All samples of cheese made from raw milk or under-pasteurized milk gave results that were positive in varying degree, and none of the cheese made from milk pasteurized at 143° F., or higher, for 30 minutes, or at 162° for 15 seconds, gave values greater than 5 units, regardless of the age of the cheese. It was found that the addition of as little as 0.1 percent of raw milk to properly pasteurized milk, or a decrease of 2° in pasteurizing temperature for 30 minutes, could be detected in the cheese test. One raw-milk cheese that was more than 5 years old and several that were more than 3 years old gave strongly positive values, comparable to those of current raw-milk cheese.

On the basis of our results to date, it is suggested tentatively that values slightly higher than 5 units be considered as indicating slight under-pasteurization, and values of 8 to 10 units or more as indicating definite under-pasteurization.

CONTROLS REVOKED ON MILK CAN DISTRIBUTION

The last controls on the distribution of milk cans have been revoked, the Department of Agriculture has announced. War Food Order 104, which stipulated distribution procedures for manufacturers, became inoperative July 1.

Rationing of milk cans was ended a year ago after most of the heavy demand resulting from the operation of new milk processing plants, had been satisfied. After rationing was discontinued, WFO 104 provided rules safeguarding supplies of milk cans for each State individually. The percentage of a manufacturer's production which could be distributed in any State was restricted, and each manufacturer was required to hold a reserve with which special requirements could be met.

Distribution controls were revoked simultaneously with the War Production Board's revocation of restrictions on the manufacture of milk cans.

(Copy)

WAR PRODUCTION BOARD

WASHINGTON 25, D. C.

July 3, 1945

Federal Security Agency
U. S. Public Health Service
Washington 14, D. C.

Attention: A. W. Fuchs

GENTLEMEN:

With reference to your letter of February 22, 1945, you are advised that Conservation Order M-200, which restricted the production of umbrella covers for milk shipping cans, has been revoked as of July 2, 1945.

We trust this is the information that you desire.

Very truly yours,

(s) D. W. NASH
Chief, Steel Drum Section
Containers Division

PROGRESS AGAINST BRUCELLOSIS IN CATTLE

In spite of many wartime difficulties, accentuated by a serious shortage of veterinary inspectors, the campaign against bovine brucellosis, one of the Nation's most serious cattle diseases, continues to go forward.

A statistical summary of progress just issued by the U. S. Bureau of Animal Industry reports the blood testing of 5,235,912 cattle during the fiscal year 1944, which is about 50,000 more than during the previous year. The testing disclosed 226,079 reactors to the test, indicating the presence of the infection. This figure is larger than the number of reacting cattle disclosed during any of the preceding 5 years.

The report shows that 592 counties in 21 States had been accredited as Bang's disease (brucellosis) free areas up to September 1, 1944. The number represents a gain of 10 since June 30, 1943.

The vaccination of calves as a preventive of brucellosis increased greatly in popularity among cattle breeders. Altogether 392,232 calves were vaccinated during the last year which is 14,000 more than the number vaccinated during the 2½ years that this practice has been in effect. New York State led all others in calf vaccinations with a total of 77,814. Vermont was second with 40,971, and Wisconsin third with 27,349.

The average appraised value of cattle slaughtered as a result of the test was $143.34, the highest on record. Average Federal and State indemnities were $19.30 and $22.54 respectively, which were the highest of any during the last 5 years. The average salvage value of reactors was $59.75, the second highest figure on record. Officials in charge of the campaign against brucellosis point out that most of the figures, except those for indemnity, are averages for the 48 States and Puerto Rico. The Federal Government makes indemnity payments only in States and territories, now numbering 41, which have enacted the necessary legislation for part reimbursing owners for losses sustained from the slaughter of reacting cattle.

BOVINE TUBERCULOSIS SCORES ZERO IN TWO STATES AND D. C.

In a recent report of the U. S. Bureau of Animal Industry, summarizing progress in the campaign against bovine tuberculosis, 3 significant zeros appear in a tabulation of official testing. The zeros represent the entire absence of tuberculin-test reactors in Georgia, Nevada, and the District of Columbia, for the year ended June 30, 1944.

Though these areas represent a relatively small part of the United States, they support the belief of high veterinary officials that bovine tuberculosis can be entirely eradicated by continued testing and removal of reactors, under a program supported by public opinion. Several other States almost reached the same goal.

Following is a summary of the States in which bovine tuberculosis is now practically non-existent, according to the year's report.

State	*Cattle Tested*	*Reactors Found*	*Percent Reactors*
Georgia	17,454	0	0
Nevada	2,926	0	0
Dist. of Col.	639	0	0
Mississippi	28,019	3	.01
Montana	26,399	7	.02
Missouri	24,914	9	.04
Tennessee	15,131	6	.04
Maine	23,574	11	.05
Florida	60,077	33	.05

In 5 additional States—Delaware, Idaho, Ohio, Oklahoma, and West Virginia—the degree of infection was also less than a tenth of 1 percent. The average figure for the 48 States, Hawaii, and Puerto Rico was only 0.21 percent.

VACCINATION SPEEDS PROGRESS OF BRUCELLOSIS CAMPAIGN

Vaccination against bovine brucellosis, or Bang's disease, is hastening the suppression of this costly cattle malady, Dr. A. W. Miller, Chief of the Bureau of Animal Industry in the U. S. Department of Agriculture told members of the United States Livestock Sanitary Association, at their annual meeting in Chicago, December 6.

Since 1940 when the vaccination of calves was first adopted as a supplementary means of combating the disease, other beneficial uses have been found for the vaccine. Further research, Dr. Miller said, has shown that vaccination is as effective in adult cattle as in calves, and that the vaccination of entire herds has given good results in stopping the spread of infection. This procedure is of special advantage in beef herds in which calf production is the principal requirement, and in the so-called "problem herds" where other methods of control have failed.

The main disadvantage of vaccination is its interference with the normal reactions to the diagnostic blood test which is the basis of brucellosis eradication under the control program. In calves the interfering effects usually last only a few months and seldom over a year, but in older cattle they may persist for long periods.

Illustrating the interest of cattle owners in calf vaccination, Dr. Miller cited the case of the original group of herds on which the vaccine was used experimentally, beginning in 1936. The owners of 171 of 179 such herds, still in existence, are continuing the use of the vaccine and are well pleased with the results, he said.

Because of such technical aspects, the Bureau of Animal Industry recommends close cooperation between herd owners and State livestock officials in order that the method of control best suited for individual cases may be used. The choice is commonly influenced by the degree of past and present infection, size and type of herd, management facilities, and possible exposure to infection from other premises in the neighborhood.

When the herd is small or when the infection is light and of long-standing, the best procedure is to follow the test-and-slaughter plan. Dr. Miller said that the national incidence of bovine brucellosis was reduced by this method 50 per cent during the first seven years of the program, through the removal of more than 2,000,000 reactors. But with the advent of a successful vaccine and as an aid to increased production, the slaughter program has been modified, he explained, to permit retention of reactors in some infected herds. These are maintained under state quarantine until vaccinated replacements become available.

Owing to variable conditions and types of cattle raising in different states, the Bureau of Animal Industry does not recommend one fixed plan. Rather, Dr. Miller said, it has provided several from which states may make selections. They are (1) the test-and-slaughter plan, (2) test-and-slaughter with calfhood vaccination, and (3) test-and-retention of reactors, with calfhood vaccination.

Indemnities are paid for reactors in only the first two of these plans. In addition, Bureau officials and research workers have assembled results obtained from the vaccination of adult animals and entire herds so that such methods may be used, under proper supervision, as the campaign develops.

BETTER BRONZE FOR INDUSTRY

Bronze with greatly increased strength and toughness can be made from common grades of tin and copper without the purchase of new or special equipment. The process is the result of several years of research and is now disclosed in the two latest publications of the Tin Reserch Institute, Nos. 120 and 121, which are reprints from the *Journal of the Institute of Metals* (Vol. 70, 1944, 127–147 and 275–289).

Publication No. 120, by Dr. W. T. Pell-Walpole, describes the development of a flux de-gassing process which enables tin bronzes and phosphor bronze to be produced successfully from ordinary commercial grades of metal, or from scrap, where previously high grade metal was essential. This is achieved by using a simple flux containing borax, sand, and copper oxide. Bronzes containing 10 per cent tin, suitably cast, can be extruded and subsequently cold rolled and cold drawn. For example, a 10 per cent tin phosphor-bronze gave 24 to 28 tons per sq. in. tensile and 10 to 20 per cent elongation on 2 in. The specification of the comparable commercial alloy (2B8) calls for only 16 tons tensile and 1½ to 4 per cent elongation.

Bronzes with 10 to 14 per cent tin, when made by the new method, can be hot or cold rolled, and the wrought products have exceptional mechanical properties. A 10 per cent tin bronze, extruded and cold rolled, gave 75 tons tensile with 18 per cent extension.

The method of casting giving the maximum tensile and rolling properties is described in Publication No. 121, by Dr. W. T. Pell-Walpole and Dr. V. Kondic. The authors show that variation in casting procedure has a considerable effect on the quality of degassed chill-cast 10 per cent tin bronze. By adopting the procedure recommended, a bronze which can be extruded, hot-rolled, forged or hot-stamped is readily obtained. Such bronze will meet many long-felt needs in the engineering world, and bronze bars or strip which can be worked up to 75 tons tensile and yet retain their toughness provide what is virtually a new product with a wide potential field of usefulness.

Owing to the paper shortage, only limited numbers of these reprints are available, but copies will be supplied so far as possible to enquirers interested in the new bronzes on application to the Tin Research Institute, Fraser Road, Greenford, Middlesex, England.

The U. S. Public Health Service has compiled a list of 176 references on restaurant sanitation. As long as the supply will last, copies may be obtained from the Sanitary Engineering Division, Milk and Food Section. —Editor.

RESTAURANT SANITARY EQUIPMENT

Conference of State and Territorial Health Authorities
Report of Committee on Interstate and Foreign Quarantine 4/11/45

THE report of the Committee on Interstate and Foreign Quarantine, approved by the Conference of State and Territorial Health Authorities in Washington, D. C., April 11, 1945, included the following item:

Certification of restaurant equipment needs by local health officers

Disease outbreaks from foods have increased steadily since the start of the war. In 1940, 218 outbreaks were reported with 5,588 cases; in 1943 there were 285 outbreaks with 13,938 cases. A similar increase is reported in all forms of dysentery: for the first 12 weeks of 1945 there were 7,794 cases as compared with 3,414 for the corresponding period of 1944. At the same time sanitation in food establishments has suffered as a result of wartime restrictions which have made difficult the procurement of essential equipment and utensils for restaurants.

In cooperation with the U. S. Public Health Service, the Office of Civilian Requirements of the War Production Board has prepared a plan to enlist the aid of the State and local health authorities in certifying the need for specific equipment items essential in the maintenance of minimum sanitary standards. This plan is explained in detail in the attached letter of March 31, 1945, from the War Production Board. Copies of the letter were presented to the Conference on Monday. Additional copies will be sent to all State and Territorial health officers, with the request that they in turn transmit the information to the local health departments in their respective States. The Committee recommends that all State health authorities cooperate fully in promoting the success of this plan.

DR. HENRY HANSON (Fla.),
Chairman

WAR PRODUCTION BOARD

WASHINGTON 25, D. C.

March 31, 1945

Dr. Thomas Parran
Surgeon General
U. S. Public Health Service
Washington, D. C.

DEAR DR. PARRAN:

Outlined for your consideration is a plan to enlist the aid of the State and local health authorities in certifying the need for sanitary equipment for restaurants.

To put this into effect, would you kindly acquaint the State and Territorial Health Officers with the plan and request that they in turn transmit the information to the local boards or departments of public health in their respective states.

This, in brief, is the plan. For the purpose of assisting restaurant operators to obtain approval on priority requests for equipment items which are essential in the maintenance of minimum sanitary standards, such requests will be certified to by the local health authorities.

The need for specific items of restaurant equipment essential in the maintenance of minimum sanitary standards will be known to the local boards or departments of public health as a result of their regular inspections. Upon the request of a restaurant operator the local board or department of public health will "certify" as to the essentiality of the specific items of equipment needed by the restaurant, by providing a letter or a form similar to the one attached herewith which the applicant will present to the War Production Board along with his application for the equipment.

The restaurant operator concerned, should send his WPB application for the needed equipment on the proper form, to the nearest field office of the War Production Board, attaching only the original of the completed "certification".

A copy of this completed "certification" shall then be sent by the local board or department of public health, to the nearest District Office of the U. S. Public Health Service for endorsement and transmittal to the U. S. Public Health Service in Washington, D. C., and from there to the Restaurant Section, Service Trades Division, War Production Board, in Washington. D. C. The reason for routing the copy thus, is for informational purposes and particularly to provide this Section with first hand and authoritative evidence of needs for programming and allotment purposes. It should be pointed out that the "certification" will not constitute a guarantee that the WPB application will be approved or, that if approved, the equipment will be available. However, it will be a guide to the War Production Board analyst and, as stated above, will enable a closer correlation between the production of such equipment and the proportionate quantity allocated for civilian use based on public health necessity.

In the determination of minimum sanitary standards for restaurants, we assume that the representatives of the local health departments will cooperate with the local representatives of the Office of Civilian Requirements, War Production Board and the Secretary of the local Restaurant Associations.

We understand that a conference of State and Territorial Health Officers is scheduled to take place in Washington, D. C., starting April 9, 1945. If your agenda will permit, would you care to present this plan to the assembled delegates at that time? A meeting of the War Production Board Restaurant Industry Advisory Committee is also being held in Washington, by coincidence, on April 9. The endorsement of the restaurant men will be requested on that date. A simultaneous endorsement by the two groups would have considerable significance.

We shall appreciate your cooperation and comments on this plan and are of the opinion that the evidences of need sent to us will bear weight in facilitating the procurement of essential equipment for restaurants and of equal importance would be the stimulation of consciousness, on the part of all concerned as to the importance of sanitation in restaurants, which, unfortunately has suffered as a result of war-time restrictions.

Very truly yours,

(s) Ross WILLIAMS

Ross Williams, Director
Service Trades Division
Office of Civilian Requirements

PROPOSED FORM

CERTIFICATION OF NEED FOR SANITARY EQUIPMENT FOR RESTAURANTS

STATE:	NAME OF RESTAURANT: ....
CITY OR COUNTY:	TYPE: ....
HEALTH INSPECTOR:	ADDRESS: ....
	DATE: ....

EQUIPMENT ITEMS NEEDED	QUANTITY	SIZE

CERTIFICATION STATEMENT:

We hereby certify that the above items of equipment, as indicated, are essential for this restaurant in the interest of public health and the maintenance of minimum sanitary standards.

SIGNED: ....
Health Officer (City, County or State)

Colorado's Cheese Regulations

RULES AND REGULATIONS COVERING THE PRODUCTION, TRANSPORTATION, PROCESSING, MANUFACTURING, AND LABELING OF CHEESE IN THE STATE OF COLORADO

All milk used in the manufacture of all types of cheese shall be produced under conditions conforming with the following items of sanitation. The addition of harmless coloring matter is permitted except in the manufacture of cottage cheese.

1. Production:

a. All cows and goats shall be healthy and free from contagious and infectious diseases, and from any physical condition which might render them unfit for the production of milk for human consumption or cheese manufacturing.

b. Barns shall be well lighted, ventilated, and cleaned daily. Walls and ceilings shall be painted or white-washed yearly. Milk stools shall be clean and stored above floor; corral kept clean, and sanitary toilets provided.

c. Cows and goats shall be kept clean. The flanks, bellies, and tails of all milking cows and goats shall be free from visible dirt. Udders and teats shall be clean from sediment at time of milking.

d. Wet-hand milking is prohibited.

e. All milk pails and cans shall be in good repair, of smooth heavy-gage material, easily cleanable shape, joints soldered flush, no woven wire cloth. It is recommended that milk pails be of small-mouth design.

f. Only filter type strainers equipped with sterilized, single-service pads shall be used. All equipment and utensils must be stored in milk house or other satisfactory place, protected from contamination.

g. Milk must be cooled immediately after completion of milking to 70 degrees Fahrenheit, or less, and maintained at that average temperature to insure the milk reaching the factory at a satisfactory temperature but not to exceed 70 degrees Fahrenheit. Milk, if delivered within two hours after completion of milking, need not be cooled. Sanitary cooling facilities shall be provided on the producing farms.

2. Transportation:

a. All milk shall be delivered daily to the cheese plant.

b. All vehicles used for the transportation of milk or milk products shall be closed or covered with tarpaulin to protect the milk or milk products from the sun and from contamination. Such vehicles shall be kept clean and free from sediment or odor on the inside.

c. No substance capable of contaminating milk or milk products shall be transported with milk or milk products.

3. Cheese Factory Requirements:

a. Examination of Milk:

(1) No milk shall be accepted that exceeds 70 degrees Fahrenheit in temperature, except milk delivered within two hours after completion of milking.

(2) Sediment tests shall be made at two-week intervals on the milk of each producer, and milk which reveals a dirty sediment shall be rejected and no further deliveries shall be accepted until the farm conditions have been improved and the sediment pad is free from dirt.

(3) The sediment test shall be taken from the bottom of an individual can by a sediment tester at least twenty-five inches long equipped with a one and one-fourth inch filter disc. The instrument shall be inserted into each can in such manner as not to disturb the milk. Sediment discs shall be returned to each producer.

(4) Adequate and complete records shall be kept by the processor for a period of ninety days showing the following facts concerning each producer: Name and address of each producer; inspection records; date sediment test was run; classification of sediment test; date delivery is rejected and date reinstated; the amount of milk delivered; and the butterfat test; and other records as deemed necessary.

b. Factory Building:

(1) Interior walls, ceiling and floors shall be of tight construction and be kept in good repair and in a clean and sanitary condition. Floors shall be of concrete or other impervious material.

(2) All openings from rooms where milk or other dairy products are exposed or handled shall be effectively screened, and doors provided with self-closing devices, unless other effective means are provided to prevent the access of flies.

(3) All rooms in which milk is handled or manufactured into milk products shall be well lighted and ventilated. Ventilation equipment supplementary to window and door is to be provided if necessary.

(4) The intake room shall be a separate room for the receiving, sampling, weighing of milk, and the washing of cans. All openings between intake and processing room shall be properly screened or closed.

(5) All cans shall be immediately washed, and thoroughly cleansed and drained or dried before being returned to the producer.

c. Curing Room:

(1) Separate room of adequate size and equipped with facilities for reasonable temperature control.

(2) Shelving shall be so constructed as to be readily taken down for cleaning.

(3) Only cap cloths that have been washed and boiled or subjected to bactericidal treatment may be used.

d. Salt and Salting Room:

(1) All salt used in the manufacture of cheese shall be tested for sediment and makers or users thereof are required to furnish and keep salt in a sanitary condition.

(2) Salt barrels shall be kept covered at all times to prevent sediment from entering the barrel. Sack salt shall be stored above the floor.

(3) Salting table shall be in good repair and kept clean.

(4) Salt brine tanks shall be in good repair, clean, and brine changed as often as necessary, kept clean and of full strength.

e. Storage Room:

(1) Storage room shall be in good repair; orderly, kept clean and free from unnecessary materials and unused equipment. Cheese must be stored on shelving above floor.

(2) Cloth and all other materials used in the manufacturing process shall be kept in a clean and sanitary manner.

f. Boiler Room:

(1) Shall be separated from the processing room and other rooms where dairy products or dairy supplies are handled or stored, with tight partitions and self-closing doors.

g. Toilet Facilities:

(1) Convenient hand washing facilities shall be provided, including warm water, soap, and sanitary towels.

(2) Toilet rooms shall not open directly into any room where milk is exposed or dairy products manufactured or stored. The doors of toilet rooms shall be self-closing. Toilet rooms shall be kept clean, in good repair, and well ventilated. Durable, legible signs shall be posted conspicuously in each toilet room directing employees to wash their hands before returning to work.

(3) Outdoor toilet, if used, shall be of a sanitary type, properly located, and maintained in accordance with the requirements of the State Department of Public Health.

h. Processing and Manufacturing of Cheese:

(1) All containers and equipment for which milk and milk products come in contact shall be constructed in such manner as to be easily cleaned and shall be kept in good repair.

(2) All containers and other equipment shall be in good repair, free of breaks, open seams or corrosion.

(3) All new equipment which is installed shall be seamless or have soldered, welded, or properly expanded joints.

(4) All parts of interior surface of pumps, pipelines, or fittings (including valve fittings and connections) shall be of such size and shape as to be accessible either to the sight or touch, making it possible to determine whether they are clean. Bent or dented piping which interferes with cleaning to the slightest degree shall not be considered as complying with this provision. This includes couplings and other types of fittings, the joints of which are not visible for inspection.

(5) All piping used to conduct milk or milk products shall be sanitary milk piping of a type which can be easily cleaned with a brush. Pasteurized milk and milk products shall be conducted from one piece of equipment to another through sanitary milk piping.

(6) All equipment and utensils used in the production or handling of milk products shall be properly washed and rinsed and subjected to bactericidal treatment immediately after using and shall be stored in a dry, clean place when not in use.

(7) All equipment when assembled shall be subjected immediately before each usage to a bactericidal treatment such as steam, hot water, not less than 180 degrees Fahrenheit or a chlorine solution of at least fifty parts per million at the outlet.

(8) A drip pan shall be placed beneath all mechanical agitators or other machinery so located in the factory to prevent dry oil, grease, or other extraneous matter from dropping into the vats or into the cheese.

(9) Proper equipment shall be provided for carrying "starter" cultures.

i. Pasteurization:

(1) All cheese manufactured in the State of Colorado shall be pasteurized or manufactured from cream, milk, or skim milk which has been properly pasteurized in approved equipment or any other process which has been demonstrated to be equally efficient and is approved by the State Health Authorities, except cheese which has been allowed to ripen or cure for a minimum period of 120 days, or longer if deemed necessary.

(2) Definition: The term pasteurization and similar terms shall be taken to refer to the process of heating every particle of milk or milk products to at least 143 degrees Fahrenheit and holding at such temperature for at least 30 minutes or at least 160 degrees and holding at such temperature for at least 15 seconds in approved and properly operated equipment.

j. Disposal of Wastes:

(1) All wastes shall be properly disposed of. Trash and garbage kept in covered containers. In the absence of a public sewer all wastes shall be disposed of by a method approved by the State Health Department.

k. Water Supply:

(1) The water supply shall be properly located, constructed and operated and shall be easily accessible, adequate, and of a safe, sanitary quality, and approved by the State Health Department.

l. Whey Tank:

(1) Shall be of ample size and elevated out of doors over concrete base with drain, free from odors and thoroughly cleaned weekly. When whey is returned to the producers, it is recommended that cans other than the ones used for the fluid milk be used, otherwise milk is likely to become contaminated.

m. Personal Cleanliness and Health:

(1) All persons coming in contact with milk and milk products, containers, or equipment, shall wear washable, clean outer garments, and hands shall be clean.

(2) Every person employed at a cheese manufacturing plant whose work brings him in contact with the processing, handling, or storage of milk or milk products shall be examined by a physician and no person with infected wounds or lesions or a communicable disease shall be employed by any cheese manufacturer.

Samples of cheese shall be taken by the health officer or any authorized representative of the State Division of Public Health at frequent intervals or when deemed necessary and if upon microscopic examination it is found to contain rodent hairs, metallic fragments, animal or insect fragments, or excreta or nondescript filth will be prima facie evidence of contamination with filth or of insanitary operations or both and shall classify the product as unfit for human consumption.

Each cake or keg of cheese must bear date of manufacturing and initial or code number, which will indicate the name of manufacturer, and shall be labeled correctly as to the contents.

No cheese shall be offered for sale or resale that does not comply with Section 10, Chapter 69, Colorado Statutes Annotated, 1935, prohibiting the adulteration and misbranding of articles of food.

The foregoing rules and regulations shall be in force and effect beginning January 1, 1945.

Amendments to the New York State Sanitary Code

Regulation 34. Definitions relating to cheese. The term "cheese" as used in regulations 34, 35, 36, 37 and 38 of this chapter shall mean cheddar type cheese in its original form or "processed" including that made from stirred or washed curd. The terms "milk," "skim milk," and "cream" shall mean, respectively, cow's or goat's milk and skim milk or cream derived therefrom. Pasteurization shall mean subjecting every particle of milk, skim milk, cream or cheese to a temperature of not less than 143 degrees Fahrenheit continuously for 30 minutes or more or to a temperature of not less than 160 degrees Fahrenheit for 15 seconds or more or if approved in writing by the state commissioner of health to a temperature for a length of time which in his judgment gives equivalent treatment.

Regulation 25. Cheese to be pasteurized or aged. No person manufacturing cheese or handling cheese as a wholesaler, assembler or broker in the state of New York and no person obtaining cheese from outside the state shall release any cheese to the retail trade or to consumer's unless such cheese has been pasteurized or had been allowed to ripen or cure at a temperature of not less than 35 degrees Fahrenheit for a period of not less than 60 days from date of manufacture or has been manufactured from milk, skim milk or cream which has been pasteurized.

Regulation 36. Cheese to be labeled. Each cheese shall have the name and address of the manufacturer or an equivalent identifying number or symbol imprinted on each quarter, together with the word "pasteurized" if said cheese is pasteurized or is made from pasteurized milk, skim milk or cream, or, if not pasteurized, with the date of manufacture. Packaged cheese shall have such information imprinted on each box, carton, jar and package. All labels shall be affixed by the manufacturer at the place of manufacture, provided, however, that when a cheese is repackaged or divided into wholesale cuts, or processed, the packer, assembler, processor or wholesaler shall affix a label to each package bearing the name and address of said packer or wholesaler in addition to the other information required to appear on the original label.

Regulation 37. Milk and milk products for cheese making. All milk and milk products derived therefrom used in the manufacture of cheese shall be clean and wholesome.

Regulation 38. Water supply. All water used in the manufacture of cheese shall be of a safe sanitary quality.

New Books and Other Publications

Metals and Alloys Dictionary, by M. Merlub-Sobel. Published by Chemical Publishing Company, Inc., Brooklyn N. Y. 1944. v+238 pages. $4.50.

This dictionary is a compilation of data from the literature plus some unpublished data from the author's experience. The definitions are concise and clearly stated, comprising over 10,000 useful metallurgical terms, properties, and uses of the important commercial alloys. It gives the physical constants and properties of the chemical elements, description of processes and machinery used in modern metallurgy, together with tests, standards, and many items encountered by persons interested in the industrial and control aspects of the metals—hence, food control inspectors, technologists, and equipment people.

Flavor, by E. C. Crocker. Published by McGraw-Hill Book Company, Inc., New York. vii+172 pages. 1945. $2.50.

The dearth of books in this field is so acute that the present volume fills a long-felt need. Flavor sensations are analyzed physically, chemically, physiologically, and psychologically. The flavors of many kinds of natural products are described, and then follow the essential oils of flavor interest, methods of describing them, effects of processing and storage on flavor, organoleptic technique, commercial practices in taste appraisal of beverages, and commercial quality scoring. A list of over one hundred references to the literature is appended. This is an interesting, though not profound, treatment of the extremely important organoleptic aspect of food technology.

The Chemical Process Industries, by R. N. Shreve. Published by McGraw-Hill Book Co., Inc., New York, N. Y. 1945. xiii+957 pages. $7.50.

The author states that he has sought to bridge the gap between industrial chemistry and chemical engineering. The presentation of each subject is built up on the unit process (chemical change) involved; the unit operation (physical change); physical chemistry (equilibria and reaction rates); economics (costs, statistics, consumption); and energy power (chemical, electrical, mechanical). The text is clearly written, well arranged for student use, provided with problems, replete with charts and tables, and enriched with good references to the more detailed literature at the end of each chapter. Throughout the whole book, industrial data are well presented on costs, yields, markets, and products. The chemical industrial field is so broadly and usefully covered and the character of presentation is so pleasantly readable that practicing chemists and chemical engineers will find the volume useful, especially those engaged in sales, executive, and management positions. Food technologists will find it useful by reason of its authoritative handling of the present practices and underlying principles in the field of chemical engineering which is the basis on which food technology is developed.

Trichinosis, by S. E. Gould. Published by Charles C. Thomas, Springfield, Illinois. ix+356 pages. 1944. $5.00.

This book is written to assist workers in the fields of medicine, public health, and meat packing to detect this disease with more precision and to facilitate its control. The text is illustrated with many excellent photographs and drawings, and enriched with 128 figures and charts. The chapters: historical, life cycle, morphology, epidemiology, trichinosis in animals, pathology, immunology, laboratory diagnostic methods, symptomatology, diagnosis, treatment, prognosis, and control measures, with bibliography of over six hundred references. The book is written in an interesting and even fascinating style, and the format is excellent. This book is a valuable contribution to the growing literature on food control.

Microanalysis of Food and Drug Products, prepared by the Microanalytical Division, Food and Drug Administration, Federal Security Agency, Food and Drug Circular, No. 1. For sale by the Superintendent of Documents, Washington, D. C. 1944. 171 pages. Illustrated.

The discussion of microanalysis in this book is an extension of the previously published Part I of the Manual of Microanalytical Methods, dealing with the current methods for the microscopy of foods and drugs.

WAR COMMITTEE ON CONVENTIONS

WASHINGTON 25, D. C.

July 23, 1945

Mr. C. S. Leete, Secretary-Treasurer
International Association of Milk Sanitarians, Inc.
State Department of Health
Albany, New York

DEAR MR. LEETE:

Thank you for your letter of July 10, in which you advise us that your Association has deferred their annual meeting in view of the present group meeting restrictions.

We are most appreciative of this cooperation upon your part and the cancellation of your convention is a direct and worth while contribution towards relief of our present heavy transportation overload.

Very truly yours,
FRANK PERRIN
Secretary

JOURNAL OF MILK TECHNOLOGY

Official Publication of the

International Association of Milk Sanitarians

(Association Organized 1911)

The JOURNAL OF MILK TECHNOLOGY is issued bimonthly beginning with the January number. Each volume comprises six numbers. It is published by the International Association of Milk Sanitarians, and is printed by The William Boyd Printing Co., Inc., Albany, N. Y., U. S. A.

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Manuscripts: All correspondence regarding manuscripts, editorials, news items, announcements, and other reading material should be addressed to the Editor, J. H. SHRADER, 23 EAST ELM AVE., WOLLASTON, MASS.

Membership and Dues: Active membership in the Association is $3.00 per year, and Associate membership is $2.00 per year, including respectively all issues of the JOURNAL OF MILK TECHNOLOGY. All correspondence concerning membership in the INTERNATIONAL ASSOCIATION OF MILK SANITARIANS, including applications for membership, remittances for dues, failure to receive copies of the JOURNAL OF MILK TECHNOLOGY, and other such matters should be addressed to the Secretary of the Association, C. SIDNEY LEETE, STATE DEPARTMENT OF HEALTH, ALBANY, N. Y.

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JOURNAL OF MILK TECHNOLOGY
As Their Official Organ

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Association News

Florida Association of Milk Sanitarians

A one-week course for Florida milk sanitarians was held this spring at the Dairy Products Laboratory, Florida Agricultural Experiment Station, Gainesville, Florida. The short course, directed by Dr. E. L. Fouts, was well attended by city, county, and state inspection officials.

Through the cooperation of personnel from the State Board of Health, the State Department of Agriculture, the U. S. Public Health Service, city health departments, the University of Florida, and others, a program of varied interest was presented. The practical and timely value of the material was evidenced by the enthusiastic response from the officials attending the meetings.

Twenty-two speakers delivered 30 papers on such subjects as dairy cattle diseases, milk production and sanitary care on the farm, processing of milk and sanitary control in the plant, chemical and bacteriological analysis of milk, and other topics of special interest to milk control officials. Included in the program was an inspection trip to local dairies in the Gainesville area.

An important event connected with the short course was the organization of the Florida Association of Milk Sanitarians. Officers elected to serve for the first year are as follows: *President,* Mr. Ben Northrup, City Chemist, St. Petersburg; *Vice-President,* Mr. W. H. Brown, City Health Department, Jacksonville; *Secretary-Treasurer,* Dr. T. R. Freemaan, Agricultural Experiment Station, Gainesville. This organization will become an affiliate of the INTERNATIONAL ASSOCIATION OF MILK SANITARIANS.

It is believed that the formation of this new organization will have far-reaching influence on the dairy industry of Florida, inasmuch as its object is "to develop uniform and proper supervision and inspection of dairy farms, milk and milk products establishments, and milk and milk products; to encourage the improvement in quality and dairy products and the technological development of dairy equipment and supplies; and to disseminate useful information regarding dairy sanitation, technology, inspection, and administration."

Missouri Association of Milk Sanitarians

The thirteenth annual Milk Control Short Course was held at the Dairy Department, University of Missouri, Columbia, Missouri, on May 2–3, 1945. The State Board of Health, the Missouri Association of Milk Sanitarians, and the Dairy Department, University of Missouri, Columbia, Missouri, cooperated in conducting the course.

A part of the program this year was devoted to food sanitation, and a considerable number of food sanitarians were in attendance.

A short business meeting of the Missouri Association of Milk Sanitarians was held on the evening of May 2nd. Action was taken at this meeting to change the name of the Association to the "Missouri Association of Milk and Food Sanitarians." A committee was named to prepare the necessary changes in the constitution and by-laws, and will report at the next annual meeting, when a vote will be taken to decide whether or not the name of the association will be changed.

The following officers were elected: *President*—Mr. Arthur Gould, Kansas City Health Department, Kansas City, Missouri; *Vice-President*—Mr. Jack K. Smith, Jackson County Health Dept., Independence, Mo.; *Secretary-Treasurer*—Mr. Glenn M. Young, Jefferson City, Missouri.

GLENN M. YOUNG,
Secretary-Treasurer.

INTERNATIONAL ASSOCIATION OF MILK SANITARIANS

OFFICERS 1944–1945 *

President: Russell R. Palmer, Detroit Department of Health, Detroit, Mich.

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- F. D. Holford, 161 South Broadway, White Plains, N. Y.
- J. W. Yates, Box 960, R.F.D. 3, Independence, Mo.

* Transportation difficulties probably will preclude the Association's 1945 meeting. Officers and committees will continue therefore until the next annual meeting.

COMMITTEES

Advisory Committee to the War Production Board

- A. W. Fuchs, *Chairman,* U. S. Public Health Service, Washington, D. C.
- Milton R. Fisher, Division of Health, Department of Public Welfare, St. Louis, Mo.
- George W. Grim, Board of Health, Ardmore, Pa.
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- Ernest Kelly, U. S. Department of Agriculture, Washington, D. C.
- S. V. Layson, 413 E. Kelsey St., Bloomington, Ill.
- M. M. Miller, U.S.P.H.S., 4318 N. Fairfax Drive, Arlington, Va.
- Wm. B. Palmer, Milk Association of the Oranges, Orange, N. J.
- Horatio N. Parker, Department of Health, Jacksonville, Fla.
- Sol Pincus, New York City Health Department, New York, N. Y.

R. G. Ross, Tulsa Department of Health, Tulsa, Okla.
John M. Scott, State Department of Agriculture, Gainesville, Fla.
W. D. Tiedeman, State Department of Health, Albany 1, N. Y.
Glenn M. Young, State Board of Health, Jefferson City, Mo.

Applied Laboratory Methods

K. G. Weckel, *Chairman,* University of Wisconsin, Madison 6, Wis.
Milton R. Fisher, Division of Health, Dept. of Public Welfare, St. Louis, Mo.
V. C. Stebnitz, Chicago Dairy and Food Laboratories, Chicago, Ill.

Communicable Diseases Affecting Man—Their Relation to Public Milk Supplies

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R. F. Cowley, National Technical Milk Commission, Havana, Cuba
R. G. Flood, San Francisco Medical Milk Commission. San Francisco 2, Cal.
W. P. S. Hall, Department of Health, Toledo, Ohio
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A. R. B. Richmond, Department of Public Health, Toronto, Ontario

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W. D. Tiedeman, State Department of Health, Albany 1, N. Y.
K. G. Weckel, University of Wisconsin, Madison 6, Wis.

Dairy Farm Methods

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T. A. Evans, State Board of Health, Pierre, South Dakota
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Geo. H. Hopson. DeLaval Separator Co., New York City
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Frozen Desserts Sanitation

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W. C. Cameron, Department of Agriculture, Ottawa, Canada
O. A. Ghiggoile, State Department of Agriculture, Sacramento, Cal.
Ralph E. Irwin, State Department of Health, Harrisburg, Pa.
Andrew J. Krog, Health Officer, Plainfield, N. J.
John M. Scott, State Department of Agriculture, Gainesville, Fla.

Committee on Local Arrangements

L. H. Burgwald, *Chairman,* Ohio State University, Columbus, Ohio

Committee to Study Milk Ordinances and Regulations

W. D. Tiedeman, *Chairman,* New York State Health Department, Albany 1, N. Y.
C. A. Abele, Board of Health, Chicago, Ill.
C. J. Babcock, Department of Agriculture, Washington, D. C.
H. L. DeLozier, City Health Department, Louisville, Ky.
Herbert J. Dunsmore, Battle Creek Health Department, Battle Creek, Mich.
A. W. Fuchs, U. S. Public Health Service, Washington, D. C.
O. A. Ghiggoile, State Department of Agriculture, Sacramento, Cal.
J. W. Yates, Box 960, R.F.D. 3, Independence, Mo.

Committee on Resolutions

Ernest Kelly, *Chairman,* U. S. Department of Agriculture, Washington, D. C.
All ex-presidents of the Association in attendance at the Convention.

Sanitary Procedure

- C. A. Abele, *Chairman,* Board of Health, Chicago, Ill.
- C. B. Dalzell, Cherry-Burrell Corp., Little Falls, N. Y.
- H. C. Eriksen, Deputy Health Officer, Santa Barbara, Cal.
- A. C. Fay, H. P. Hood & Sons, Boston, Mass.
- Milton R. Fisher, Division of Health, Dept. of Public Welfare, St. Louis, Mo.
- A. W. Fuchs, U. S. Public Health Service, Washington, D. C.
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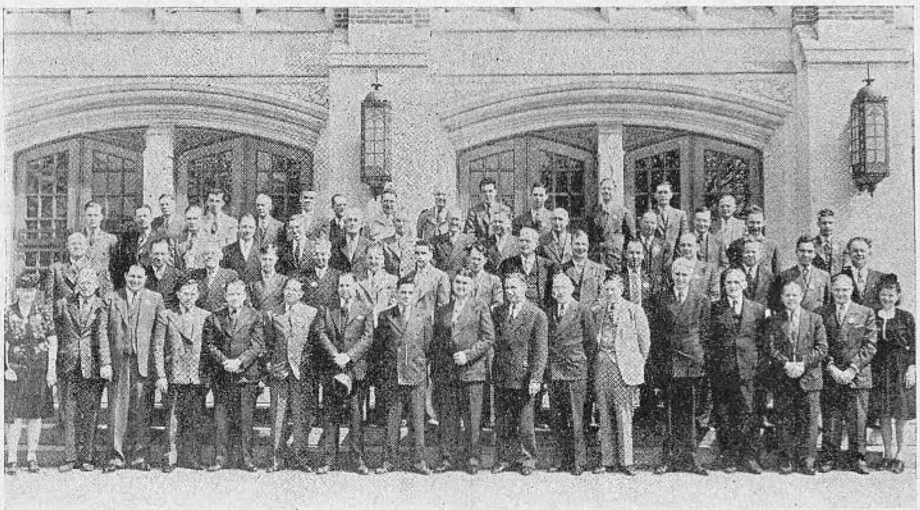
- M. E. Parker, 110 N. Franklin St., Chicago, Ill.
- Sol Pincus, New York City Health Department, New York City
- George W. Putnam, Creamery Package Mfg. Co., Chicago 7, Ill.
- C. W. Weber, State Health Department, Albany, N. Y.
- Harold Wainess, State Board of Health, Portland, Oregon



Second Annual Dairy Inspectors' and Sanitarians' School, East Lansing Michigan, April 9–13, 1945

Front Row—from left: Ella Wood, Herbert J. Dunsmore, Charles E. Gotta, J. Milo Wilson, Harold Harrison, Ernest Mandt, G. J. Turney, C. H. Jefferson, R. J. Werdon, E. G. McKibben, P. S. Lucas, Russell R. Palmer, Victor Armitage, D. M. Hendrickson. K. C. Bandeen, H. S. Edwards, Charlotte Kooiker.

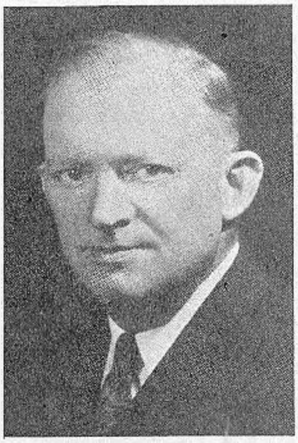
Second Row Front—from left: G. M. Trout, W. W. Snyder, M. V. States. A. R. Drury, Raymond Felt, Claude Landstra, Dave Falconer, G. K. Caldwell, Ben Wiersema, John H. Wyma, Frank J. Driedric, Edward J. Horschak, Fred S. Anderson, Mason I. Smith, Rheinhold Hugel.

Third Row from Front—from left: P. N. Owens. Walter E. Ash, H. P. Johnson, U. B. Shoemaker, W. V. Kennedy, Don J. McDonell, Merlin R. Perrine, Roy H. Cromley, J. L. Littlefield, A. J. Harvey, W. A. Hendrickson, Theodore Goetz, Emil E. Niemi, Dick Vanderwal.

Back Row—from left: Vernon Wait, Alfred O. Broome, L. H. Begeman, Philip Shirley, Guy C. Eccleston, Clarence Lincoln, Kenneth Kerr, John Pomeroy. Arthur Wolcott, Donald L. Bubb, Frank N. Mitchell, C. ·Kistler.

Industrial Notes

J. Lloyd Barron



H. G. Schlaman

Barron Joins National Biscuit Company

J. Lloyd Barron, C.E., for the past twenty-two years engaged in the public health engineering field, has recently become the Sanitary Engineer of the National Biscuit Company. Mr. Barron has been active in milk and food control work in the New York metropolitan area for fifteen years, serving Westchester County as Sanitary Engineer from 1930 to 1938 and, since then, holding a similar position in Nassau County. In each of these counties Mr. Barron had the task of organizing new divisions of sanitation and setting up regulatory procedures covering milk, foods, water supply, sewage disposal, and related aspects of environmental sanitation.

The new work undertaken by Mr. Barron includes the setting up of a department in National Biscuit Company dealing with sanitation in all of the food factories and other operations of the Company throughout the United States. His office will be in New York City.

Schlaman Becomes Divisional Sales Manager for Corn Products

The appointment of H. G. Schlaman as Sales Manager of the Baking and Dairy Industries Products Division is announced by Corn Products Refining Company.

In his new position, Mr. Schlaman will be in charge of national distribution of all bulk products used in these industries. He joined Corn Products in 1935 and prior to his appointment as Sales Manager of this division, he was a member of the Technical Sales Department.

Mr. Schlaman, who holds the degree of Chemical Engineer, has been connected with the baking industry for twenty years in production, sales and teachnical service.

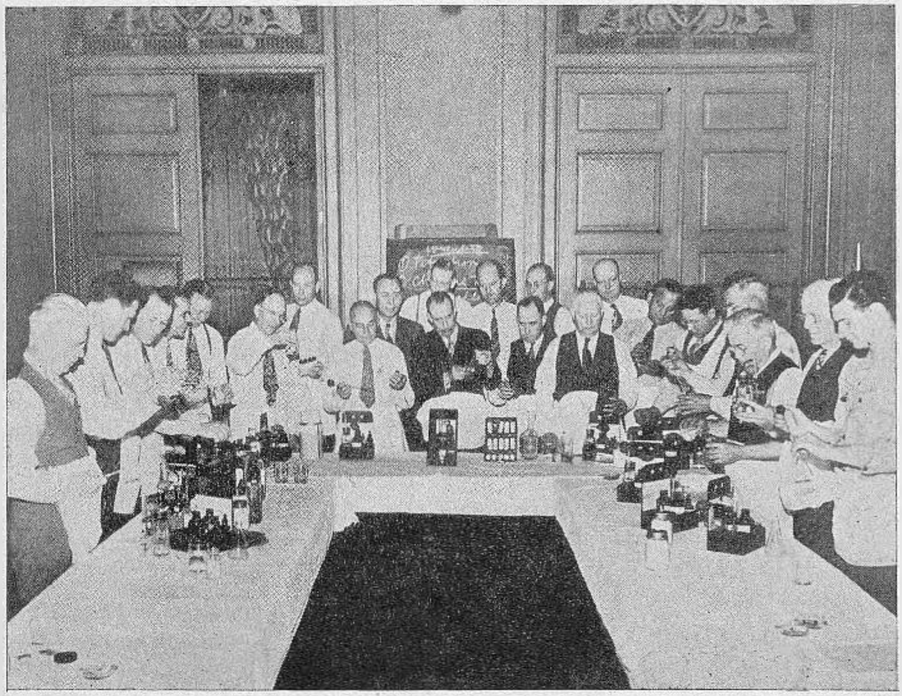
New Sanitation and Mold Control Material

A basically new three-function chemical development combining deodorizing, cleaning and germicidal properties in one material, is announced by Oakite Products, Inc. The material, Oakite TRI-SAN, is a white powder which is dissolved in water and applied to surfaces in the same manner as any cleaning agent. Primarily designed to simplify plant hygiene procedures, the material, due to its marked germicidal and fungi-static activity, is reported to be highly effective in discouraging and preventing mold growth on wall surfaces. In curing rooms in cheese factories, mold control on aging shelves and racks has been successfully inhibited for long periods. A new 20-page manual gives formulae and directions for using and describes the many applications of Oakite TRI-SAN in different industries. A free copy may be obtained by writing to Oakite Products, Inc., 38C Thames Street, New York 6, N. Y.—Adv.

Wyandotte Representatives Check Their Service Methods at Sectional Meeting

Representatives of the J. B. Ford Division of Wyandotte Chemicals Corporation have been attending sectional meetings at which they are studying and rechecking their service methods. Each Wyandotte representative spends several hours under the direction of home office technical service executives performing the same testing operations that he uses in plants on service calls.

This "selling through service" theme is basic with J. B. Ford Division Wyandotte Representatives. To keep Wyandotte Service for customers practical and scientific has been the reason for holding the recent "sales schools"—one of which is pictured here.



Pacific Coast Wyandotte Representatives of the J. B. Ford Division recently checked their service methods at a four day school and conference at the Sir Francis Drake Hotel in San Francisco. Titration was the subject of the "refresher" course when this photograph was made. Carter B. Robinson, Vice President in Charge of Sales, J. B. Ford Division, is shown at the head of the instruction table (wearing coat). Also shown are Vern R. Jones, Manager Food and Beverage Dept., P. S. Spencer, Pacific Coast Regional Supervisor for the J. B. Ford Division of Wyandotte Chemicals Corporation, Lee Minor, Assistant Director of Technical Service for the J. B. Ford Division, and Wyandotte service representatives. Similar sales-service "schools" have been held at other cities.

President—F. W. Tanner, Head of Department of Bacteriology, University of Illinois, Urbana, Ill.

Vice-President—Victor Conquest, Director of Research and Development, Armour and Company, Chicago, Ill.

Secretary-Treasurer—George J. Hucker, New York Agricultural Experiment Station, Geneva, N. Y.

The Institute of Food Technologists now has nine chartered regional sections. The newly chartered groups are:

1. Western New York Section with meetings at Rochester, N. Y. Its newly elected officers are:

Chairman—K. G. Dykstra, Snider-Birdseye Div., General Foods Corp., Albion. N. Y.

Vice-Chairman—J. C. Moyer, New York Agricultural Experiment Station, Geneva, N. Y.

Secretary-Treasurer—Frank A. Lee, New York Agricultural Experiment Station, Geneva, N. Y.

Since its initial meeting less than 15 months ago, the group has grown to an active membership of approximately 100 food technologists.

2. Great Lakes Section with meetings at Detroit, Mich. Its re-elected organizational officers are:

Chairman—F. W. Fabian, Michigan State College, East Lansing, Mich.

Vice-Chairman—C. Olin Ball, Owens-Illinois Glass Co., Toledo, Ohio

Secretary—J. A. Dunn, Diamond Crystal Salt Co., Inc., St. Clair, Mich.

Treasurer—James C. Sanford, Basic Food Materials, Inc., Cleveland, Ohio

Its active membership has grown in one year to some 50 food technologists in Michigan, Northern Ohio and Indiana, and Southern Canada.

3. Florida Section with an active membership of approximately 50 throughout the state of Florida. Its organizational officers are:

Chairman—J. L. Heid, Florida Citrus Fruit Canners Cooperative, Inc., Lake Wales, Fla.

Vice-Chairman—J. J. R. Bristow, Citrus Concentrates, Inc., Dunedin, Fla.

Secretary-Treasurer—M. K. Veldhuis, U. S. Citrus Products Station, Winter Haven, Fla.

Section officers and Council members under the charter are to be elected in the near future.

Further vigorous growth, which the Institute has evidenced since its organization in 1939, is indicated by the continued formation of regional groups seeking attainment of charter status. A measure of the growth of the Institute is found in its increase in membership from approximately 1,400 a year ago to more than 1,800 at the present. This growth has been stimulated materially by the chartered regional sections which prior to May 20 were: 1. Chicago, 2. Northwest, 3. Northern California, 4. Southern California, 5. St. Louis, and 6. New York.

Although the Annual Conference of the Institute of Food Technologists scheduled to be held at Rochester, N. Y., in May was cancelled to avoid over-crowding of transportation and hotel facilities, the program originally scheduled for that Conference has been largely presented before meetings of regional sections in which the authors of papers reside. As has been the custom of previous years these papers will be published by the Institute as its 1945 Proceedings and sent to all members of the Institute in good standing.

New Members

ACTIVE

Chapman, V. F., City Hall, Dubuque, Iowa (Milk Inspection Div.)

Silva, Dr. Conrado, Chief of City Laboratory, Departmento Health, Fray Bentos, Uruguay, S. A.

Talty, Nick, City Hall, Waterloo, Iowa

Williams, Joseph E.: Sanitarian, State Health Department, Raleigh County Health Department, Beckley, West Va.

ASSOCIATE

Bangerd, James E., City Milk Inspector, Health Department, 624½ Frederick St., Cumberland, Md.
Becker, M. A., Partner, Falls Chemical Co.. Oconto Falls, Wis.
Bayes, H. A., District Health Service, Centerville, Iowa
Behnke, C. E., 1103 Grand, Ames, Iowa
Benson, William, Wyanet Dairy, Route 2, Davenport, Iowa
Blumenthal. Milton, Health Inspector, New York City Department of Health, 638 East 2nd St., Brooklyn, N. Y.
Eisenman, Vernon A., Plant Supt., Babcock Dairy Co., 945 Berden Ave., Toledo, Ohio
Erb, J. Hoffman, Asst. Director of Production. The Borden Co., 165 N. Washington Ave., Columbus, Ohio
Ford, Fred, 200 13th St., S. E., Cedar Rapids, Iowa
Franke, George L., Instructor, State Institute of Agriculture, Farmingdale, N. Y.
Griffiths, Laverne, Fieldman and Plant Manager, Carnation Co., Gratiot, Wis.
Hall, Hugh F., Milk Relations. Safeway Stores, Inc., 975 National Press Bldg., Washington 4, D. C.
Hipsley, J. H., Box 36, New Market, Iowa
Hogan, A. C., New Hampton. Iowa
Hove, A. P., Des Moines Coop. Dairy, Des Moines, Iowa
Kennedy, Ed., City Hall, Charles City, Iowa
Kimzey, Glenn, Murray, Iowa
Knickel, E. H., Branch Mgr., Consolidated Badger Coop., 1205 N. Mason St., Appleton, Wis.
Knowles, George W.. Vice-President and Gen'l Mgr., Hygienic Dairy, Ltd., 66 So. Queen St., Honolulu 16, T. H.
Laske, Theodore H., Instructor in Cheese Making and Milk Inspector, Kraft Cheese Co., 305 Edna St., Plymouth, Wis.
Lemke, Myron J., Fieldman, Dairy Improvement Co-op of Iowa County Dodgeville, Wis.
Lovrien, H. A., Box 276, Humboldt, Iowa
Micheel, H. A., Micheel Bros. Dairy, Davenport, Iowa
Moldenhauer, Harvey W.. Quality Man, Carnation Co., 744 Spring St., Berlin, Wis.
Morgan, Francis, Chief Chemist, Lockwood & Son, Ltd., 97 Ghuznee St., Wellington, New Zealand
Nelson, Elmer W., Manager, Dairy State Supply Co., 1106 E. North St., Appleton, Wis.
Oswood, Cecil, Box 713, Iowa Falls, Iowa
Palmer, Albert M., Sales-Service Engineer, Trumbull Elec. Mfg. Co., 223 Helen St., Hamden 14, Conn.
Palmer, H. C., Plant Supt., The Borden Co., P. O. Box 581, Texarkana, Texas
Reed, Elmer, 533 Reber Ave., Waterloo, Iowa
Robertson, A. E., Box 275, Oskaloosa, Iowa
Schultz, Ben, Box 346, Spencer, Iowa
Stober, Jas., City Health Dept., Sioux City, Iowa
Such, E. J., Johnston, Iowa
Teller, Donald G., Sanitarian, Otero County Health Department, 17 W. Fourth St., La Junta, Colorado
Townsend, Bergen F., Plant Manager, Pet Milk Co., Shullsburg, Wis.
Thomas, Lieut. Robert H., 823 Rollins St., Columbia, Mo.
Van Devender, Pfc. Virgil C., Jr., ASN 34477007, Laboratory Technician, U. S. Army, Sqd. E (Veterinary), 3704 AAF Base Unit, Keesler Field, Miss.
Walker, Max, Rockford, Iowa
Wharton, George, Prestige Products Co., 555 Crown St., Brooklyn 13, N. Y.
White, Robert, 2223 So. Patterson St., Sioux City, Iowa
Willits, Burr, 106 N. 2nd Ave., Marshalltown, Iowa
Young, Paul A., Supply & Producer Relations. National Dairy Products Corp., 230 Park Ave., New York 17, N. Y.

CHANGES IN ADDRESS

Adams, J. V., 150 E. Spring St., New Albany, Ind. Lt. (JG) J. V. Adams, U.S.N.R., Main Dispensary, Epid. Unit 21, Corpus Christi, Texas
Brooks, Cpl. Paul L., 532 Park Ave. Columbus, Wis. 546 Manning St., Columbus, Wis.
Call, Ara O., Madison, Wis. Western Condensing Co., 935 E. John St., Appleton, Wis.
Dunn, Ralph W., Tulsa, Okla. City Hall, Carroll, Iowa
M. M. Miller, Bethesda, Md. 4318 N. Fairfax Drive, Arlington, Va.
Patterson, Francis, Rocky Mount, N. C., Fieldman, Southern Dairies. 593 Glen Iris Drive, Atlanta 1, Ga.
Spicer, Glen S., 210 N. Broad St., Sullivan, Ind. 4500 S. Bloomington Ave., Minneapolis, Minn.

ERRATUM

Petursson, O. B., Hamilton, Bermuda, was misspelled "Pertusson." We are sorry.

"Doctor Jones" Says—*

An address I was reading—a public relations man connected with a social service center—he said he'd been " shocked " to hear an officer of a large nursing organization say they couldn't " afford public relations." I s'pose actually what they meant was they couldn't afford to employ an expert. But he went on to say: they couldn't avoid " public relations " (that kind of an organization) if they tried to. But if they wanted to be appreciated and continue to get active public support, then they needed to have a pretty good understanding of human psychology and apply intelligence and common sense in their contacts with the people they're working for and with. That's " public relations "—part of it, anyway.

It's like " Mark Time " says, in the *New Jersey Public Health News.* " Take a public health official—an inspector for example," he says, " he has to deal with all sorts of people. To most of 'em he is the health department." If they think he's fair and honest and reasonable then, so far as they're concerned, his department is O.K.—and vice versa.

I know a Congressman that has a regular column in the important newspapers in his district (the ones, anyway, that favor his brand of politics). He tells 'em about pending bills and all that and he has his picture on it, always with a pleasant smile. That's " public relations ": the kind that produces returns. But the drug salesman that, the first time he ever called on me, told me my house needed painting—that kind of " public relations " gets results, too. The results in the case of that fellow were that the company lost standing with people he called on and he eventually lost his job.

Yes, us people in public health work—nurses, sanitarians, doctors—we sometimes overlook the fact that whatever professional relation we have with patients, appropriating bodies and other agencies, even those we occasionally have to " go to law " with—that's all " public relations."

And one of the main things, as this fellow pointed out, (this public relations man): if we want to stand well and do well we've got to be understood: we've got to speak a language the folks we're dealing with can understand. In the words of the Apostle Paul: " . . . except ye utter by the tongue words easy to be understood, how shall it be known what is spoken? For ye shall speak into the air."

Paul B. Brooks, M.D.

* Reprinted from *Health News*, New York State Department of Health, Albany, N. Y., June 11, 1945.

The Annual Meeting for 1945 has been canceled on account of the war-time restrictions.