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Journal of

MILK and FOOD TECHNOLOGY

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

“

Newbould and Barnum (1956) found that a farm using a chlorine compound for udder washing and teat cup dipping had much larger numbers of staphylococci on the teat cup liners than 2 farms which used chlorhexidine. The farm using chlorhexidine at 400 p.p.m. had an average count several times lower than that using the same substance at 250 p.p.m. Since there was little difference between the 3 herds in the number of staphylococci being shed in the milk, these authors concluded that chief source of contamination of the liners was the teat skin and that chlorhexidine was effective in reducing the numbers found there.

To test these hypotheses they changed the disinfectant used for udder washing to chlorhexidine on the first farm and to the chlorine compound on one of the others, while leaving the teat-cup dipping procedure unchanged. This was followed by a substantial and rapid fall in the number of staphylococci on the liners of the first farm and a rise in that on the liners of the second.

Confirmation of the efficacy of chlorhexidine as an udder wash was obtained by the present author in experiments with monozygous twins (Reports, 1958 and 1959). The object of these experiments was to determine whether sufficiently rigorous hygienic precautions at milking time would effectively control the transmission of staphylococci.

In an experiment on the control of staphylococci on the udder skin, 1:5,000 chlorhexidine was used as an udder wash in one group of cows, using a separate udder cloth for each cow, and the milking unit was flushed with running water after each cow was milked. In the control group, the udders were washed with water, again using a separate cloth for each cow, and the milking unit was transferred directly without rinsing.

This combination of precautions reduced the number of staphylococci found on the udder surface in the experimental group to less than one-eighth that in the control group.

In a further experiment, the cows were exposed to donor animals shedding a particular strain of staphylococcus in the milk. The donors were milked first and the same precautions were taken in the experimental group. The introduced staphylococcus caused mastitis in 5 of the 9 control cows but in none of those in the experimental group. As in the first experiment, there was a marked reduction in the number of staphylococci on the udder surface in the experimental group.

Thus, in these experiments, a combination of antibacterial udder wash, individual udder cloths and rinsing the milking unit with running cold water after milking each cow was effective in controlling the spread of infection and reducing the amount of mastitis.

Davidson, Ian: Staphylococcal mastitis:
its epidemiology, *Veterinary Record*
(London), 73, 43 (1961).

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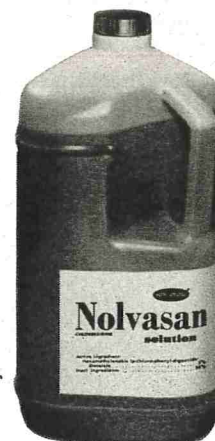
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Volume 26

October, 1963

Number 10

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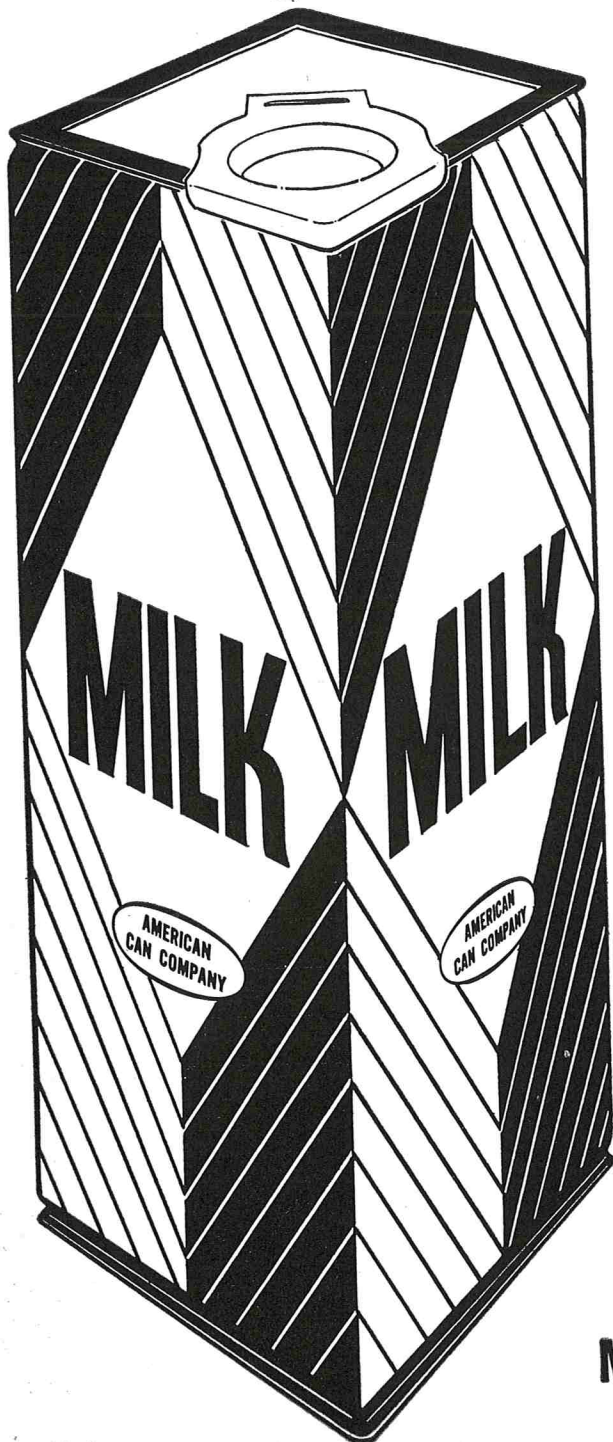
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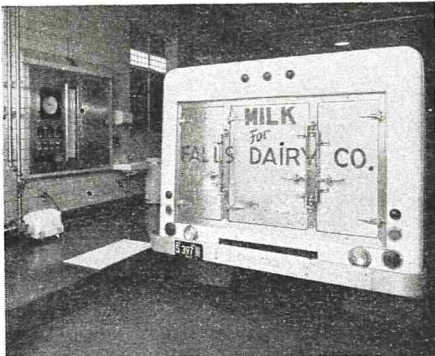
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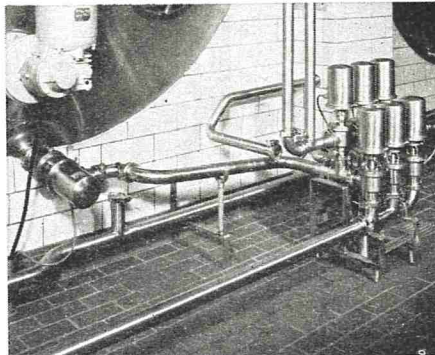
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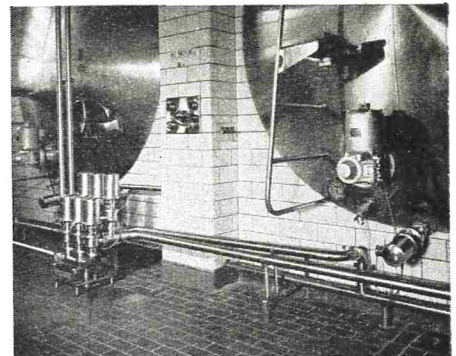
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For final line and valve cleaning operations, elbows at the tank outlets connect the fill-discharge line to the tank cleaning return line used as a tie-line.

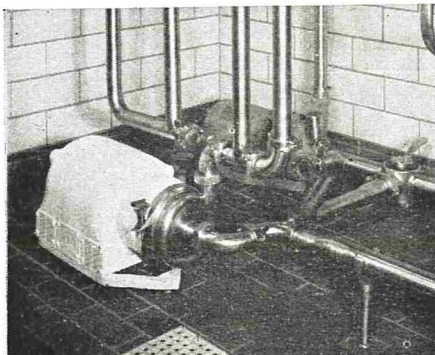


ORIENTATION OF LINES, VALVES, AND FITTINGS

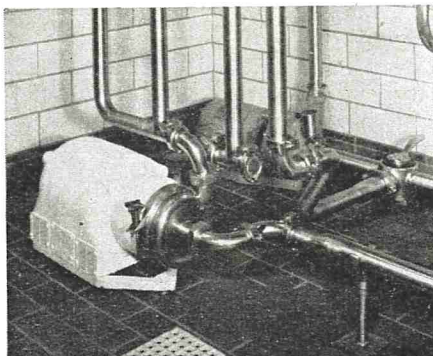
The greatest labor and product-saving advantages of CIP piping systems can be effected only when the piping system permits all production operations to be carried

on with a minimum of valve and line changes. The maximum amount of piping can then be cleaned in position with few CIP jumpers and return lines being neces-

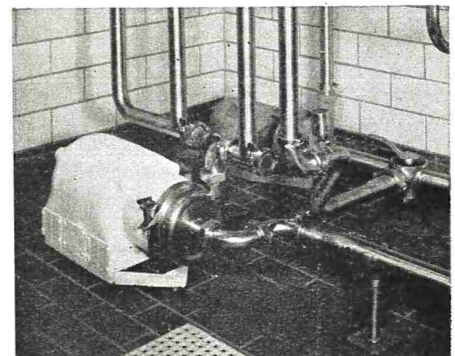
sary. This again points up the need for thorough knowledge of plant equipment, equipment layout, processing routines, and sanitation requirements.



A swing-elbow connects the load-out pump to the double load-out line, and . . .



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Report of the Coordinating Committee on Laboratory Methods

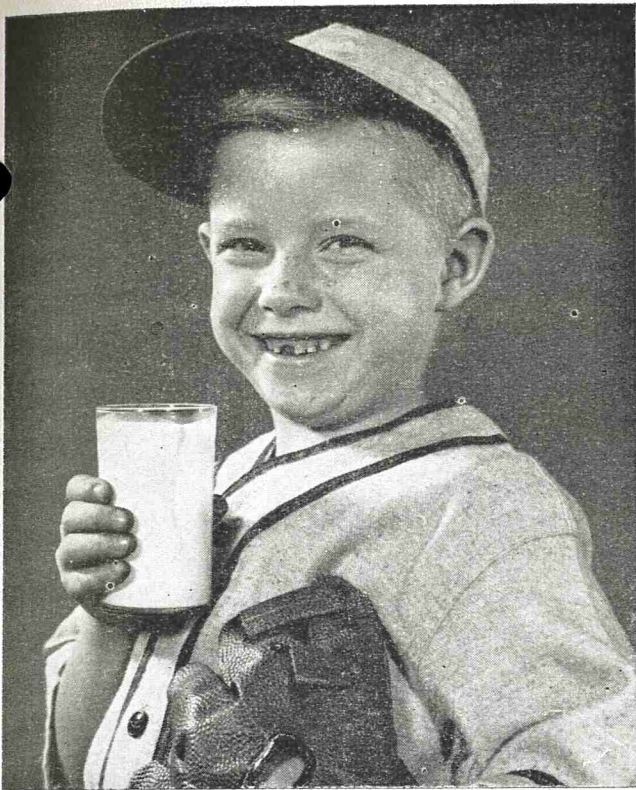
VOL. 53, NO. 8, A.J.P.H. 1305-1310, AUGUST, 1963

"It is recommended that media be used which has been tested by the APHA methods and bearing a label indicating that it has met the prescribed standards of the APHA."

This report of the Coordinating Committee on Laboratory Methods of the Committee on Evaluation and Standards (APHA) was approved by the Executive Board of the American Public Health Association on June 27, 1963.



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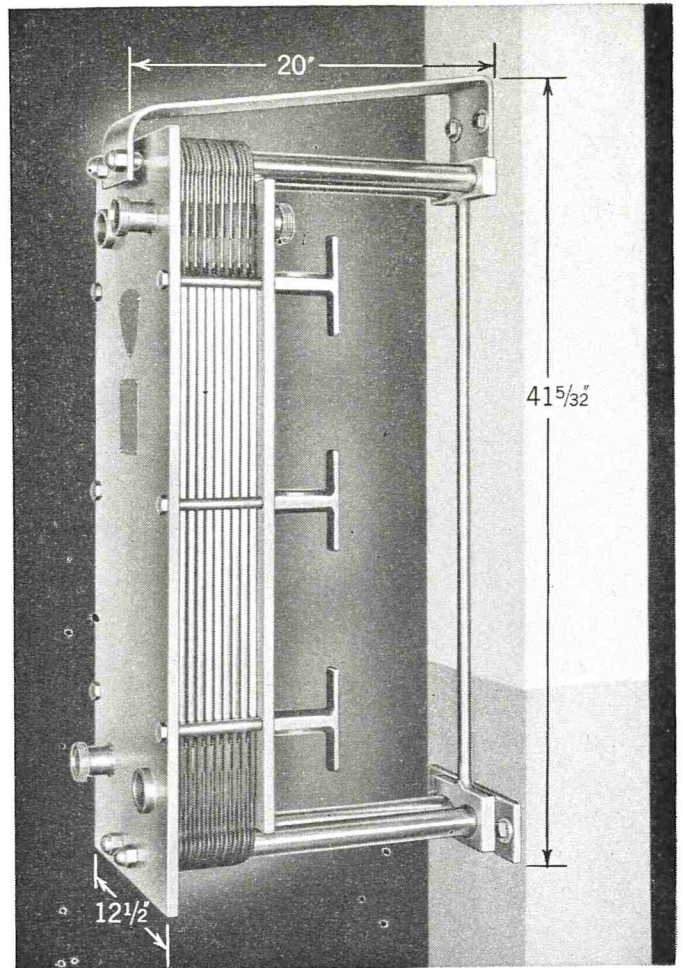
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COOLING MENU ITEMS BY AGITATION UNDER REFRIGERATION¹

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(Received for publication July 8, 1963)

SUMMARY

The present investigation was concerned with cooling menu items by agitation, under refrigeration. The aim was to investigate the effects on cooling times of foods of the following variables: the design of the agitator, the width of the scraper blade of the agitator, and the rate of agitation. Observations were made of changes in certain quality characteristics of the items cooled by agitation.

The cooling times of the agitated menu items were reduced to fractions of the time lengths required when comparable batches were cooled without agitation.

The design of the agitator and the rate of agitation had little effect on cooling time but had a strong effect on the physical quality of the entrées, especially stews. A simple frame agitator equipped with wide plastic scraper blades rotating at 8 rpm gave satisfactory results in that it effected fast cooling without rendering the item unacceptable in appearance.

Agitation under refrigeration may be looked upon as an efficient and feasible method of precooling menu items.

Large batches of foods cool slowly even under refrigeration creating temperature conditions favorable for bacterial growth (2, 5, 7). Research data are available which point toward agitation as a tool for speeding up cooling of food. Several methods of cooling large batches of food by agitation have been studied: manual agitation of the food (6); mechanical agitation using a food mixer at room temperature (3) and a U-shaped tube with cold water flowing through the tube (4, 8).

The present investigation was concerned with cooling menu items by agitation, under refrigeration. The aims were to investigate the effects on cooling times of foods of the following variables: the design of the agitator, the width of the scraper blade of the agitator, and the rate of agitation. Observations were made of changes in certain quality characteristics of the items cooled by agitation.

Preliminary to this investigation, agitators of various designs were tested to determine whether they were worthy of being included in this study. The determining criterion was that entrées containing cooked cubed vegetables should not be broken up and thus be rendered unacceptable for service.

EXPERIMENTAL PROCEDURE

There were four parts to this investigation. In Parts I, II and III, soft custards and puddings were used; in Part IV, soups and entrées. In Part I, the effect of the design of the agitator was studied; three designs were compared. In Part II, the effect of the width of the scraper blade of the agitator was studied; width of the scraper blade of rate of agitation. In Part III, the effect of rate of agitation. In Part IV, soups and entrées were agitated to test the feasibility of cooling by agitation some less homogeneous menu items, namely soups and entrées.

Control batches were allowed to cool under refrigeration without being agitated.

MATERIALS

The custards were made with 3 oz cornstarch²/gal milk and the puddings with 6 oz/gal milk. In both custards and puddings, 2 levels of egg and 2 levels of sugar were used: the levels of egg³ were 13 and 16.5 oz/gal milk⁴; the levels of sugar⁵ were 0 and 16 oz/gal milk. The items were prepared in 4-gal batches using the 2-step method as described in an earlier publication (8). In Part IV, 2-gal batches of soups and entrées were prepared following the formulas given in Wood and Harris (10).

EQUIPMENT

The custards and puddings were cooled in heavy-duty 25-qt aluminum stock pots, 13 in. high and 12 in. in diameter⁶. The soups and entrées were cooled in 15-qt stock pots 11 in. high and 10 in. in diameter⁶. The 55 cu ft refrigerator⁷ used has been described in an earlier publications (7). A variable-speed agitator was installed above, with the rotating agitator shaft entering through the ceiling of the upper left hand compartment. The stock pot was clamped to the floor of this compartment. The temperature of the

²Commercial brand.

³Dried whole egg, reconstituted in the proportion of 1 part egg to 3 parts water by weight.

⁴Spray low heat non-fat milk solids reconstituted in the proportion of 1 lb milk to 1 gal water.

⁵Wearever, No. 4252

⁶Wearever, No. 650

⁷Jewett, General Electric Model CS-450

¹This study was supported in part by Hatch Project No. 264, and in part by research grant No. EF-00245 from the National Institutes of Health.

refrigerator ranged from 32 F to 42 F. The experimental unit is pictured in Figure 1.

Agitators of four different designs, C, D, E and F (Fig 2) were used in this investigation. Models A and B were eliminated after preliminary tests. All agitators were made from sheet aluminum, 1/8 in. thick. Model B was designed from model A by cutting the 1½-in. width of the cross connections down to 3/4 in. A third agitator, model C, was designed with the aim of achieving good mixing throughout the mass and also at the surface. Model D was arrived at by cutting the 3/4-in. width of the cross connections of model C down to 1/4 in. and rounding the surfaces. Model E was fashioned after model D, but equipped with 1/4-in. wide non-beveled plastic⁸ scraper (1/16 in. thick), attached to both sides of the agitator, to provide for more efficient scraping from the periphery of the stock pot. In model F, the inside cross connections were cut away and a wider plastic⁷ blade (3 in. wide, 1/16 in. thick) was attached to the sides and bottom of the agitator.

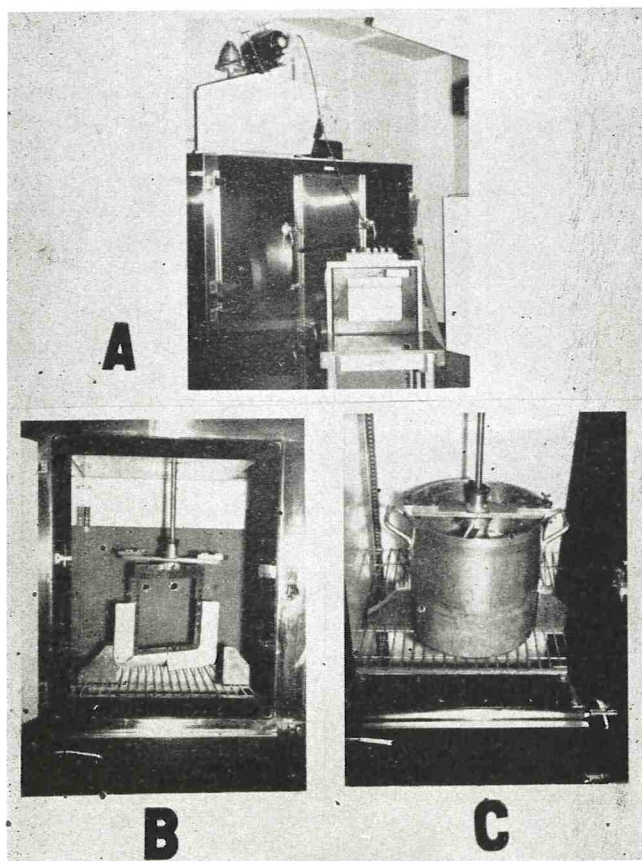


Figure 1. Experimental Unit.

A. Refrigerator, variable speed unit, and recording potentiometer.

B. Refrigerator compartment and agitator model F.

C. Refrigerator compartment with stockpot containing agitator model F. Stockpot is clamped to refrigerator shelf.

⁸Teflon

Two inches of this blade were curved forward to plow the food materials away from the periphery during agitation.

TEMPERATURE MEASUREMENTS

Throughout the cooling period temperatures were recorded in the batch at 10-min intervals using three thermocouples attached to a glass stirring rod. To measure the temperature in the agitated batches, agitation was stopped and the glass rod holding the thermocouples was inserted down the center of the batch. In the 4-gal batches of custards and puddings these thermocouples were located 1½-in., 4¼-in., and 7 in. from the surface of the mixture. In the 2-gal batches of menu items the thermocouples were located 1½ in. from the surface of the mixture and in the middle of the mass. Data representing total cooling times are based on the readings recorded in the warmest spot which was the middle of the mass. Temperature readings were also made in the refrigerator air in the upper left and right rear corners of the cooling compartment, and in the room approximately 4 ft in front of the refrigerator.

In Part I, the mixtures were cooled from an initial temperature of 140 F to a final temperature of 80 F. The final temperature of 80 F was chosen because in an earlier study involving the same refrigerator (7), it was found that when large amounts of food were precooled to 80 F before they were introduced into this same refrigerator, the refrigerator air temperature did not rise. In Parts II, III, and IV, the foods were cooled to 50 F. By choosing this lower final temperature, the period of agitation was considerably lengthened and an opportunity was afforded to determine possible consistency changes under more rigid conditions. Cooling to this low temperature should be rapid in order that the food will remain in the bacteriologically dangerous temperature zone (9) for a minimum length of time.

RELATIVE VISCOSITY

The relative viscosity of the custards and puddings was determined by measuring the radius of spread using a modification of the linespread method as described by Billings (1). The measurements were taken on two samples of the mixtures: one sample at a temperature of 140 F removed from the cooked mixture before agitation, and a second sample removed from the mixture that had been cooled to the desired endpoint and reheated to 140 F.

SUBJECTIVE OBSERVATIONS

In Parts I, II, and III, subjective observations were made by a panel of six judges from the staff of the Department of Institution Management. The judges

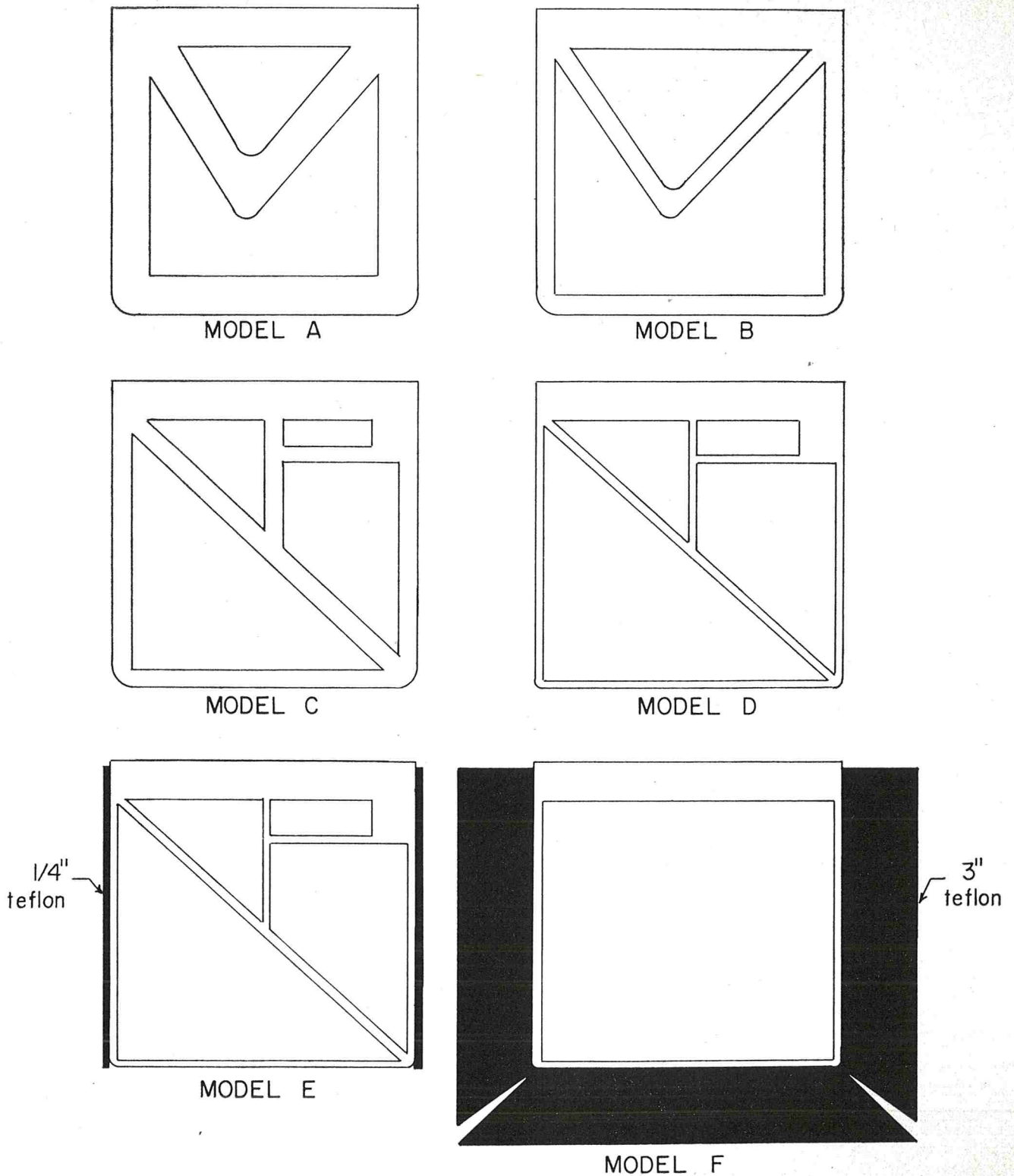


Figure 2. Experimental agitators.

were presented with two samples of the mixtures, one sample of the mixture was taken before treatment, the other after. The judges were asked to determine whether the consistency of each sample was acceptable for service.

In Part IV, subjective observations were made by

ten judges on the agitated menu items. The judges were asked to determine, by appearance only, whether the menu items were acceptable for service. When a certain proportion of the discrete pieces of meat and vegetables were broken up, the items were considered unacceptable.

RESULTS

Effect of Agitator Design (Part I)

Approximate cooling times in batches agitated by the models C, D, and E were similar, 90 min. The values for increase in radius of spread were the same, 4.5 mm. Level of egg and level of sugar had no effect on total cooling times and change in relative viscosity.

TABLE 1. EFFECT OF WIDTH OF SCRAPER BLADE: AVERAGE COOLING TIME AND AVERAGE INCREASE IN RADIUS OF SPREAD OF FOUR 4-GAL BATCHES OF CUSTARDS AND PUDDINGS AGITATED AT 38 RPM USING AGITATION BLADES OF TWO WIDTHS

Menu item ^a	Agitator model E (narrow blade)		Agitator model F (wide blade)	
	Total cooling time ^b (min)	Increase in radius of spread (mm)	Total cooling time ^b (min)	Increase in radius of spread (mm)
Custard	240	8.8	210	9.8
Pudding	265	11.5	230	10.1

^aCustards contained 3 oz cornstarch per gal milk; puddings, 6 oz.

^bFrom 140 F to 50 F.

TABLE 2. EFFECT OF RATE OF AGITATION: AVERAGE COOLING TIME AND AVERAGE INCREASE IN RADIUS OF SPREAD OF FOUR 4-GAL BATCHES OF CUSTARDS AND PUDDINGS AGITATED AT 8, 12, 16 AND 38 RPM. AGITATOR MODEL F WAS USED

Menu item ^a	Rate of agitation (rpm)	Agitator model F	
		Total cooling time ^b (min)	Increase in radius of spread (mm)
Custard	0	640	—
	8	220	4.38
	12	250	2.75
	16	230	5.13
	38	210	9.8
Pudding	0	670	—
	8	225	6.75
	12	210	6.38
	16	240	3.5
	38	230	10.1

^aCustards contained 3 oz cornstarch per gal milk; puddings 6 oz.

^bFrom 140 F to 50 F.

Effect of Size of Scraper Blade (Part II)

The data showing effect of size of scraper blade (Figure 2, E and F) on total cooling time and increase in radius of spread of the custards and puddings are presented in Table 1. The comparison was made on items cooled from 140 F to 50 F.

Average total cooling times achieved when model F was used were slightly shorter than the cooling times achieved when model E was used. The total

cooling times of the batches agitated with model F were less than 4 hrs. Increases in radius of spread were similar.

Effect of Rate of Agitation (Part III)

The data showing the effect of rate of agitation using model F on total cooling time and on increase of radius of spread of the custards and puddings are presented in Table 2. The mixtures were cooled from 140 F to 50 F.

In custards and puddings refrigerated without agitation, cooling times were approximately 10½ to 11 hrs. In the custards and puddings which were agitated under refrigeration, the cooling times were reduced to approximately 4 hrs. There was no consistent trend which showed a relationship of rate of agitation to cooling time when rates of 8, 12, 16 and 38 rpm were employed. The percent increase in radius of spread which indicates thinning, was highest in the custards and puddings agitated at 38 rpm. No effect on cooling time and change in radius of spread could be ascribed to level of egg and level of sugar.

Subjective Observations on Custards and Puddings

In some of the agitated mixtures thinning was noted by the judges. However, all the custards and puddings used in the experiments described under Parts I, II and III were considered acceptable for service. In general, the judges remarked on the smoothness and glossiness of the agitated mixtures.

Agitation of Soups and Entrées (Part IV)

In preliminary tests, agitator models A, B, and C were compared regarding destruction of cubed potatoes, celery, carrots, and meat. On the basis of these tests, models A and B were ruled out. These models did not effect fast cooling and they caused some destruction of cubed vegetables and considerable destruction of cubed meat.

The effect of agitation on the total cooling times and on the acceptability of soups and entrées are presented in Table 3.

Soups. The total cooling times of the soups agitated by model E at 38 rpm were 1/2 to 1/5 of the cooling times of comparable batches which were refrigerated without agitation. The longest cooling time observed was 40 min for the agitated items and 200 min for the non-agitated items. All of the soups were considered by the judges to be acceptable for service.

Entrées. When model E was used at 38 rpm, maximum total cooling time was 40 min. The entrées containing cubed meat (stews) were not considered acceptable for service.

Beef stew which was among the menu items which were rendered unacceptable by agitation with model E at 38 rpm, was again agitated using model F at

TABLE 3. AGITATING SOUPS AND ENTREES: COOLING TIMES AND ACCEPTABILITY JUDGMENTS (ITEMS WERE COOLED IN 2-GAL BATCHES)

Menu item	Agitator model	Rate of agitation (rpm)	Total cooling time ^a (min)	Acceptability judgments ^b	
				Yes	No
<i>(Soups)</i>					
Chicken gumbo	E	0	140	10	
	E	38	45	10	
Clam chowder (New England)	E	0	150	10	
	E	38	60	10	
Corn chowder	E	0	145	10	
	E	38	55	10	
Cream of asparagus	E	0	200	10	
	E	38	50	10	
Cream of chicken	E	0	200	10	
	E	38	50	10	
Creole	E	0	95	10	
	E	38	40	10	
Navy bean	E	0	120	10	
	E	38	45	10	
Stockless vegetable	E	0	185	10	
	E	38	50	10	
<i>(Entrées)</i>					
Chili con carne	E	38	60	10	
Chop suey	E	0	140	10	
	E	38	45	10	
Lamb stew	E	38	50		10
Raviola, Austrian	E	38	50		10
Meat and Vegetable Stew I	E	0	160	10	
	E	38	40		10
	F	38	35		10
	F	8	40		10

^aFrom 140 to 50 F.

^bMaximum of 10 judgments.

two rates of agitation, 38 rpm and 8 rpm. At an agitation rate of 38 rpm the stew was again unacceptably altered. However, when model F was used at a slow rate (8 rpm) excellent results were obtained in that the pieces of meat and vegetable retained their shapes well. The cooling time was similar to the cooling time achieved with model E.

CONCLUSIONS

Agitation under refrigeration may well be regarded as an efficient and feasible method of precooling menu items. Cooling times could be reduced to a fraction of the times required for cooling these items without agitation in the same refrigerator. Objectionable consistency changes could be avoided in

custards, puddings, soups and entrées provided that an appropriate type of agitator and an appropriate rate of agitation were used. The design of the agitator models compared in this study had little effect on cooling times, but had a considerable effect on objectionable consistency changes of some entrées. Since it was found that a simple frame equipped with wide plastic scraper blades effected fast cooling and kept cubed vegetables and meats intact, provided the rate of agitation was kept low, this latter type of agitator seems to have practical significance. In addition, the simple construction of this agitator has the advantage of easy cleaning and sanitizing.

Slow rates of agitation (16 rpm and 8 rpm) resulted in cooling times almost as brief as those achieved by applying the considerably higher agitation rate of 38 rpm; at the slow rates the danger of objectionable changes in consistency was much reduced. These facts have practical significance when cooling entrées which contain large but highly destructible pieces like cubed meat, vegetables, macaroni, spaghetti, etc.

A word of caution is in order. Some menu items may well have to be regarded as being not suitable for agitation because of the high proportion of solids they contain or because of degree of doneness. These items may be cooled in a manner commonly employed in the cooling of solid foods: spread out in shallow pans, precooled on ice, and refrigerated promptly.

The question of whether under practical conditions menu items should be cooled to a final temperature of 80 F or to lower temperatures, cannot be answered by the results of this study, because the answer depends on the specific conditions. Before all, the nature of the menu items being subjected to agitation must be considered, since in some items the changes brought about by prolonged agitation would be more objectionable than in others. In general, the food should be cooled to a temperature of 45 F (9) as rapidly as possible; but, as the temperature decreases, the rate of cooling slows down considerably even when agitation is employed. Therefore, prolonged agitation may not always prove the best decision.

Managerial aspects would play a role in setting up a unit for precooling menu items—in particular, the refrigerator space available and the number of items to be precooled. In many food service establishments, refrigerator space is gradually being released because of the general trend toward the use of frozen food items.

It seems then, that it would be rather easy to set up a precooling unit in a food service establishment: to designate a refrigerator, or a refrigerator area, to the purpose of precooling; to install one or more

agitator devices; and to set up a schedule for the precooling of those menu items which are known to belong to the group classified as being "potentially dangerous" from a public health standpoint.

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STATUS OF THE PREPARATION OF THE 12TH EDITION OF STANDARD METHODS FOR THE EXAMINATION OF DAIRY PRODUCTS^{1, 2}

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At the outset it might be well to point out that the frequent references to "Standard Methods for the Examination of Dairy Products" in ordinances and codes give the procedures outlined therein a definite quasilegal status. Whether a given lot of milk or milk product can enter into and move through most trade channels is determined to an appreciable degree on the basis of chemical and bacteriological tests made according to procedures outlined in "Standard Methods". Payments frequently are determined in considerable part by tests outlined in this publication. Industry control procedures also are based in many instances upon these "Standard Methods" laboratory procedures.

"Standard Methods for the Examination of Dairy Products" is a publication of the American Public Health Association. The committee responsible for preparation of the material of each edition really is a subcommittee of the Coordinating Committee on Laboratory Methods (CCLM) of the American Public Health Association. Dr. Howard Bodily is Chairman of the CCLM. In the past, certain chemical methodology has been reproduced exactly from "Official Methods of Analysis" of the Association of Official Agricultural Chemists, with due credit. Whether this arrangement can be continued for the 11th edition remains to be seen. About 2 years ago the Association of Official Agricultural Chemists (AOAC) adopted a resolution banning reproduction of material from their publication. However, in view of the longstanding arrangement for "Standard Methods", the possibility still exists that an exception may be made, so we will be permitted to continue the arrangement as in the past. We should know in the near future.

The American Dairy Science Association, the International Association of Milk, Food and Environmental Sanitarians, the National Association of Sanitarians, the Institute of Food Technologists and the American Society for Microbiology all have interests

in the area of "Standard Methods". However, none of these societies is officially represented in the revision. Many of those working on the revision are members of one or more of the societies just named and many are not members of the American Public Health Association. This situation does lead to broad unofficial representation and participation. Several ideas have been advanced for changing this situation. Certainly careful consideration should be given to modifications in the organization of the revision procedures that might strengthen "Standard Methods", but the time is past for significant change in sponsoring organizations for the twelfth edition.

The first edition of "Standard Methods" appeared in 1910. By the time of the fourth edition in 1923, 40 pages were needed for the publication, but no index was deemed necessary. In 1960 (37 years later), 448 pages, of which 26 were index, were used, in addition to 12 pages of so-called "front" material. Through the years many people have worked on the publication. Luther Black was Chairman for the 11th edition and did a very fine job, as did Archie Robertson for the tenth edition.

Coming to our current situation, the past year has been utilized in setting up the organization for work on the new 12th edition and in developing, or attempting to develop, some procedures and philosophies for subsequent work. As some of us tackle the problems of the 12th edition, we have a greater appreciation for the work which has been done on earlier editions. It is considerably easier to sit on the sidelines and say what should be done than it is to be on the firing line and have to participate more actively in making the decisions.

Included in this report is the make-up of the several sub-committees of the sub-committee. Attempts have been made to have the broadest possible representation commensurate with having a small group which could work effectively on a particular segment of methodology. A definite attempt has been made to have quality control people from industry, representatives of regulatory agencies and research-oriented university personnel on the several committees. The choice has been based on interest of the individual in a particular area and willingness

¹Invitational paper presented before the Manufacturing Section, American Dairy Science Association, Purdue University, June 19, 1963.

²Journal paper No. 829, Arizona Agricultural Experiment Station.

to take the time and make the effort to do the job well. Those of us who have been involved in this phase of the project feel that the people who have consented to work on the twelfth edition are very competent. We greatly appreciate their willingness to contribute to this cause and are looking forward to working with them.

The twelfth edition now is scheduled for publication in 1966. Although this seems far in the distance, the interval certainly is no greater than needed for the revision machinery to function properly. Each chapter subcommittee is being asked to have its proposals in outline form by November, 1963. A certain amount of decision making will need to follow this, as the situation would be nothing short of phenomenal if everybody agreed on just what to do and how to do it on the first try. First drafts of chapters are due in September, 1964. Again decisions will need to be reached. Integration of the parts into an acceptable whole, partially at a level of pure mechanics, will be necessary when the manuscripts are available. Once we are confident that the product is about the best the committee can do, the process of working it through a multiple-level acceptance procedure in the American Public Health Association will begin. Assuming clearance here, the manuscript will be subjected to final editing, typesetting, proof reading and all the other steps of physical publication. With good luck, the 12th edition in final form will see the light of day in 1966.

Now for a few remarks concerning what may be called the philosophy of the new edition. Those who were asked to work on this revision received a letter which stated: "We believe that no new method or modification of an old method should be introduced unless it has undergone careful comparative testing in several laboratories, with the data available to the committee and to any other interested parties, preferably by publication in a recognized scientific journal. Notice of intention to include or modify should appear in print in several places, with enough time to permit evidence for or against to be submitted with recommendations". J. C. Olson, Jr., Editor of the "Journal of Milk and Food Technology", has indicated a willingness to permit use of that journal as a sounding board for contemplated changes. Earl Borman, the editor of the new APHA Laboratory Section publication entitled "Proceedings of Laboratory Sciences", has indicated items relative to proposed changes would be welcome. Undoubtedly other journals also will cooperate in publication of suggested changes. All proposed items relative to publication of changes should be cleared through Dr. Walter, with copies to the chairman or vice-chairman who is concerned with your section.

This is a period for assembling of ideas, "brain-

storming" if you will. Changes should not be made for the sake of change. Rather, any modifications should have a basis in actual data. However, we should not be in the position of continuing a procedure or interpretation just because "it has always been done that way". If we do not improve as we go, we should get out a reprint, rather than a revision.

Ideas on organization of material are welcome at this stage. As you will observe, the same group is studying the Agar Plate Method as now covered in Chapter 3 and the Miscellaneous Microbiological Methods as now covered in Chapter 9. This does not mean that any decision to combine these two areas has been made, but rather that a suggestion has been made that the pros and cons be considered, with recommendations to be made after due consideration.

One of the big problems is whether "Standard Methods" should be a handbook, a textbook or, that most difficult hybrid of all, a combination handbook and textbook. Your opinions on this point would be appreciated. No simple answer seems to exist. My thinking is running somewhat to an outline of basic procedure, followed by a presentation of more detailed material of explanation, limitation, etc. Goss has used this method quite successfully in his book "Techniques of Dairy Plant Testing". If this format were to be combined with the placement of the really widely accepted "standard" tests in the body of the publication and the platform, screening and more experimental tests in an appendix, a more usable volume might result. Certainly we must indicate very clearly those tests acceptable for legal regulatory purposes and possibly segregate them appropriately. Just why certain tests that are used infrequently or are primarily historical should be included *in toto* escapes me, when a reference to a preceding edition would serve the occasional person who might be interested. Total elimination would be desirable in some cases. The same philosophy could be applied to literature citations not of current interest. Up-to-date literature citations are essential. This is particularly true where any new or modified methodology is being suggested.

Numerous people have suggested, with considerable reason, that we should have only one standard procedure for any one test, rather than several alternatives. When we have alternatives that are equivalent under one set of conditions, the results these two or more procedures yield under other conditions may be considerably less than equivalent. The permissive use of either 32 or 35° C. for plate incubation is an example. Most careful consideration should be given to elimination of one of these temperatures. I have some fairly strong opinions relative to the choice which is most desirable, but the de-

cision should be reached by a meeting of minds, based upon data from properly controlled experiments. Those of you who have data on this point (and I emphasize *data* as against *opinions*) would do well to furnish this material to the committee concerned. Likewise, selection from the presently permitted four media for determination of coliform bacteria is desirable, in my opinion. Again I emphasize that data are needed as a basis for logical decision.

New methods are needed for new situations. Probably we need to incorporate more information on detection of abnormalities due to mastitis, methods for detection of rancidity (particularly in bulk tank milk) and simplified procedures for milk proteins, just to mention a few of the more obvious possibilities in areas of increasing interest and importance.

I want to repeat, however, that change just for the sake of change is not indicated. On the other hand, changes needed to improve our ability to cope with modified situations are not only desirable but also essential.

Now, what can you individually do to help? First, offer suggestions, either for or against a particular point or points. If you would like to see something done differently, say so to the people concerned with that section. If you have an idea concerning the plate count of milk, send it to Dr. Lawton in triplicate, with a copy to Mr. McCaffrey. If the idea concerns butter, send it to Dr. H. C. Olson and me. If the idea concerns the over-all situation, please send it to Dr. Walter, Mr. McCaffrey and me. Every idea will be considered, although incorporation may turn out to be inadvisable for any one of several possible reasons.

Second, if you have data to support a point, please submit it to the proper people. If possible, get your data into print, so it will be available to the maximum number of people. Particularly if you have a new idea or modification of an old one, data for evaluation are essential.

Third, help test out new ideas that may be under consideration. The data from one area and one laboratory should be backed by testing under other, probably somewhat different, conditions.

All those who are concerned with the production, processing, marketing, and regulatory aspects of the dairy industry have an obligation to do their best to make "Standard Methods for the Examination of Dairy Products" the best compendium of accepted methodology that is available for use with this group of products. We who are active on this project hope that many of you who have experience in this area will give us the benefit of your thinking and experience, to the end that the twelfth edition of "Standard Methods" will fulfill its purpose to the greatest

possible degree. Your cooperation is invited, in fact, requested.

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SUGGESTED PROCEDURE FOR RAPID COUNTING OF VIABLE BACTERIA¹

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The standard plate count is generally employed to count viable bacteria in various foods and biological materials. However, the method has inherent disadvantages and limitations (1). A particular disadvantage is that a 24- to 48-hr incubation time is required prior to counting. This disadvantage is shared by several other viable count methods. The method described below offers advantages of simplicity and rapidity. It is hoped others will evaluate its use for whatever purpose that seems appropriate.

DESCRIPTION OF METHOD

In the proposed method one side of a sterile microscopic slide is divided into several squares (1 cm² each). The other side of the slide is coated with 5 ml of appropriate agar medium. This quantity appears to be the maximum which can be placed on a slide 1 x 3 inch in size. The agar used should be free of salts or other crystallizing material. Thereafter, the coated slide is dried under sterile conditions e.g., in a stream of filtered air. A measured volume (0.03 ml) of material to be tested (physiological fluids, blood, pus, milk, foods, etc.) is spread uniformly on the agar surface delineated by each square underneath. The plated slide is then immediately put into a covered petri dish. The agar film in each square swells and absorbs water from the bacterial suspensions leaving the bacteria filtered out on the surface of the square. Incubation at 35 C is done in a sterile petri dish containing moist filter paper at the bottom and a grid to support the microplate slides. The moist filter paper maintains the humidity

at approximately 100%. The living bacteria grow as small colonies which can be counted under the microscope at 150 or 600x magnification. Staining with one of the stains recommended for direct microscopic counts (1) was found helpful for counting. It is preferable to dry the microplates over a hot plate before counting.

Due to surface growth, bacteria grow rapidly and relatively uniformly. The colonies are counted after an incubation time of 4 or 8 hrs. After 4-hr incubation a 600x magnification can be used to count the colonies, while after 8 hr the magnification can be reduced to 150x.

ADVANTAGES

1. Sterile microplate slides prepared with selective media can be processed and stored, ready for use, for a long time.
2. Less time involved in preparing equipment.
3. Small storage space required for equipment.
4. For qualitative purposes, pipetting may not be necessary because it is feasible to simply dip slides into milk or other liquids.
5. Since each slide has 3 microplates on it, a control and duplicate samples can be run concurrently on one slide.
6. Results obtained rapidly (4 - 8 hr).

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STATISTICAL ANALYSIS OF STANDARD PLATE COUNTS OF A FOOD SAMPLE SPLIT AMONG LABORATORIES

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SUMMARY

Homogeneous one-gram samples of kitchen-contaminated egg salad were analyzed in nine public health laboratories on three successive days. Analysis of variance using a nested design was applied to estimate independently the major sources of variation both between and within laboratories. The variation between laboratories was found to be very great, but the variation within each laboratory was also substantial.

This study used a split-sample technique to study the variation in standard plate counts on a food specimen between and within laboratories. Each of nine laboratories (eight county and one state¹) in the San Francisco Bay Area analyzed portions of a "naturally contaminated" homogenized egg salad. It was not expected that the laboratories would agree closely with one another; rather, the goal was to assess the magnitude of the variation and compare it with variations in the results within each laboratory. The statistical technique used was analysis of variance of basically the same kind as that used by Donnelly et al. (2) in their study on split milk samples. The present analysis differs technically in using a nested design, as discussed by Scheffé (3), in order to obtain the within-laboratory components. The goal was to explore some of the difficulties involved in determining the bacteriological quality of foods rather than to establish any standards.

MATERIALS AND METHODS

An egg salad was made in a kitchen with certain purposeful errors in technique: some salad was contaminated in the sink and on the floor, and the whole mixture was allowed to stand about four hours in a warm room. There was no deliberate introduction of bacteriological culture material. The resulting salad was homogenized in a Waring Blender. Three 1-g samples were dispatched by car to each of the participating laboratories with dry ice as a refrigerant.

¹Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, and Sonoma County Laboratories and the California State Department of Public Health Laboratory.

Each laboratory was requested to analyze its samples on three successive days. Standard milk techniques (1) and a specified set of dilutions were used by all laboratories. Plate counts or estimates were reported for each of the two duplicate plates at the five dilutions (1:100 to 1:1,000,000). The microbiologists in these laboratories were all familiar with standard milk examination procedures and techniques for identifying the organisms commonly associated with food poisonings.

ANALYSIS AND RESULTS

The two dilutions with plate counts running closest to the range of 30 to 300 colonies per plate were selected from each laboratory's results (Table 1). The results of one dilution (10^6 on second day) in laboratory E were rejected as probably reflecting a technical error; the next best dilution was substituted. The logarithm of the standard plate count (SPC) was used, rather than the actual count, to make the variance independent of the level of the count.

Variation in the log SPC was assumed attributable to four components: (a) variation among laboratories; (b) variation among days within laboratories; (c) variation among dilutions within days within laboratories; and (d) variations between plates within dilutions within days within laboratories. These variance components are set out in symbolic form in Table 2.

Estimates of the variance components are given by the formulae:

$$\sigma^2_K = \frac{\text{Observed MS}_{\text{LABS}} - \text{Observed MS}_{\text{DAYS}}}{LMN}$$

$$\sigma^2_L = \frac{\text{Observed MS}_{\text{DAYS}} - \text{Observed MS}_{\text{DILUTIONS}}}{MN}$$

$$\sigma^2_M = \frac{\text{Observed MS}_{\text{DILUTIONS}} - \text{Observed MS}_{\text{PLATES}}}{N}$$

$$\sigma^2 = \text{Observed MS}_{\text{PLATES}}, \text{ where "MS" stands for "Mean Square."}$$

Other symbols are explained in Table 2.

The analysis of variance table in numerical form is shown in Table 3. All of the F tests are significant

TABLE 1. DATA FROM PARTICIPATING LABORATORIES (SPC/10⁶)

Day	I								II								III							
	10 ⁴		10 ⁵		10 ⁶		10 ⁴		10 ⁵		10 ⁶		10 ⁴		10 ⁵		10 ⁶							
	Plate	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2					
L a b o r a t o r y	A	2.9	2.9	2.5	10	—	—	2.2	1.6	4.7	3.2	—	—	1.5	1.3	1.0	2.0	—	—					
	B	—	—	21	38	6.0	6.0	2.4	2.7	2.8	2.8	—	—	—	—	18	15	20	19					
	C	—	—	4.7	6.8	5.0	12	—	—	72	65	6.0	9.0	3.9	4.5	5.2	5.3	—	—					
	D	—	—	17	22	6.0	3.0	—	—	26	29	15	11	15	11	4.0	5.2	—	—					
	E	4.6	4.7	5.2	5.6	—	—	47	57	330	370	—	—	4.2	4.0	5.9	6.0	—	—					
	F	—	—	120	98	85	87	—	—	65	72	82	93	—	—	190	200	180	170					
	G	—	—	370	410	300	310	—	—	160	140	150	110	—	—	150	190	150	160					
	H	—	—	200	180	160	200	—	—	270	270	320	300	—	—	180	170	190	210					
	I	—	—	310	320	280	250	—	—	260	240	240	210	—	—	190	180	150	170					

NOTE: Laboratories are arranged in order of their average SPC/10⁶ values. Only the two dilutions yielding plate counts nearest to the 30-300 range are tabled.

TABLE 2. ANALYSIS OF VARIANCE IN SYMBOLIC FORM

Source	Degrees of freedom	Expected mean squares
Laboratories	K-1	$\sigma^2 + N \sigma_M^2 + MN \sigma_L^2 + LMN \sigma_K^2$
Days	(L-1)K	$\sigma^2 + N \sigma_M^2 + MN \sigma_L^2$
Dilutions	(M-1)LK	$\sigma^2 + N \sigma_M^2$
Plates	(N-1)MLK	σ^2
Total	NMLK-1	

Symbols: K = number of laboratories
 L = number of days
 M = number of dilutions
 N = number of plates

σ_K^2 = variance component due to laboratories
 σ_L^2 = variance component due to days (within laboratories)
 σ_M^2 = variance component due to dilutions (within days within laboratories)
 σ^2 = variance component due to plates (within dilutions within days within laboratories)

TABLE 3. ANALYSIS OF VARIANCE IN NUMERICAL FORM

Source	Sums of squares	Degrees of freedom	Mean squares	F test	Variance component estimates
Laboratories	54.5884	8	6.8236	12.72	0.5239
Days	9.6548	18	0.5364	4.36	0.1034
Dilutions	3.3189	27	0.1229	22.09	0.0587
Plates	0.3004	54	0.0056	—	0.0056
Total	67.8625	107	0.6342	—	—

TABLE 4. DATA FROM LABORATORY G

Day	Dilution	Plate	(Log SPC)-6	Means		Lab
				Dilution	Day	
I	10 ⁵	1	2.568			
		2	2.613	2.590		
	10 ⁶	1	2.477			
		2	2.491	2.484	2.537	
II	10 ⁵	1	2.204			
		2	2.146	2.175		
	10 ⁶	1	2.176			
		2	2.041	2.108	2.142	
III	10 ⁵	1	2.176			
		2	2.279	2.228		
	10 ⁶	1	2.176			
		2	2.204	2.190	2.209	2.296

to at least the 5% level. Thus one obtains, as independent entities, significant components of variation for labs, days, and dilutions as well as an estimate of the "residual" or plate error.

DISCUSSION

To illustrate the utility of these results, let us compute standard errors for use by a laboratory in this study. Because we have a single laboratory using three independent samples involving a total of six dilutions leading to twelve plates altogether, the divisors (1, 3, 6, 12) are used:

SE of LAB MEAN =

$$\sqrt{(.5239/1) + (.1034/3) + (.0587/6) + (.0056/12)} = 0.754$$

For a single day's results within the laboratory:

$$\text{SE of DAY MEAN} = \sqrt{(.1034/1) + (.0587/2) + (.0056/2)} = 0.368$$

For results of a single dilution:

$$\text{SE of DILUTION MEAN} = \sqrt{(.0587/1) + (.0056/2)} = 0.248$$

For a single plate count:

$$\text{SE of PLATE COUNT} = \sqrt{(.0056/1)} = 0.075$$

As a specific example, the data for Laboratory G are given in Table 4. The standard error of the log of the geometric mean plate count is (from the above) 0.754. A 95% confidence interval would be obtained from the laboratory mean (2.296) as follows:

$$2.296 \pm 1.96 (0.754) = (0.818, 3.774)$$

Converting back from logarithms, the laboratory means and the 95% confidence interval are as follows:

$$\text{LABORATORY MEAN} = 1.98 \times 10^8$$

$$95\% \text{ CONFIDENCE INTERVAL} = 6.58 \times 10^6, 5.94 \times 10^9$$

It is important to note that this rather large confidence interval is almost entirely due to consistent differences between laboratories. If Laboratory G had run several more days' worth of samples, they could at best have reduced the standard error from 0.754 to 0.724 (the square root of 0.5239). By the same token, if the laboratory had run only two days' samples and had counted only one plate at one dilution each day, the lab standard error would have been:

$$\sqrt{(.5239/1) + (.1034/2) + (.0587/2) + (.0056/2)} = 0.779$$

If two laboratories did this simple routine, the standard errors would be reduced to:

$$\sqrt{(.5239/2) + (.1034/2) + (.0587/2) + (.0056/2)} = 0.587$$

Three laboratories participating would drive the standard error down to 0.508 and four to 0.463.

To the extent that this limited study permits generalizations, it seems clear that standardization of techniques among laboratories is the most important problem to tackle. Simply replicating results within laboratories will not overcome this barrier to establishment of food standards based on plate counts. Sending food samples to laboratories in several counties is hardly practical for everyday use.

Some of the suggested sources of variation between laboratories could have been: refrigeration failure in transporting specimens, differences in personnel, differences in water bath and incubator temperatures, differences in counting techniques (one lab used a dissecting scope), use of glass versus plastic petri dishes, and differences in media. Within laboratories, some sources of variation between days could have been: water bath and incubator temperatures, personnel, food samples, interactions between bacterial populations, and chance (often only part of the plate was counted). The smaller dilution and plate errors are probably purely technical. The predominance of pin-point colonies and the presence of tiny food particles in the lower dilutions were additional factors. The pin-point colonies were often hazy at 24 hr; in one laboratory, they were examined at 48 hr and were more distinct. Counting at 48 hr might

have improved the results. As to the petri dishes, the plastic ones had an inside area of about 57-58 cm² while the glass ones were 62-67 cm². All the laboratories assumed an area of 65 cm². Standard serological pipettes may not be the best for making dilutions of food materials. There may be a serious error due to deposition of food particles on the walls.

In a split sample study when the objective is to measure the major sources of variability within as well as among laboratories, a nested design may be appropriate. Such knowledge from samples processed in different laboratories would be helpful in setting up uniform procedures for standard plate counts on foods. When one is examining results within laboratories, the first day's results for all laboratories are not expected to be consistently different from the second or third day's results. The nested design is appropriate because it compares each day's results within a given laboratory with the average for the three days in that laboratory; similarly, dilutions are studied within days and plates within dilutions.

SUMMARY AND CONCLUSIONS

A split sample study on a kitchen-contaminated egg salad was done in nine public health laboratories. Each laboratory received three homogeneous 1-g samples to be analyzed on three successive days us-

ing a specified routine. All of the plate counts were reported. For statistical analysis, the best two of ten dilutions were selected on the basis of the 30 to 300 colonies per plate criterion. Analysis of variance (nested design) was used to estimate independently the major sources of variation. While the variation between labs was enormous, the variation within labs was also substantial. Much development work remains to be done before laboratories can reproduce each other's results to the extent that arbitrary SPC's can be established for different foods.

ACKNOWLEDGEMENT

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SOME OBSERVATIONS ON THE BACTERIOLOGICAL KEEPING QUALITY OF MILK PROCESSED BY HIGH TEMPERATURES WITH A 0.6 SECOND HOLDING TIME^{1 2}

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SUMMARY

Raw milk was processed through a commercial sized plate heat exchanger at temperatures of 160 F through 260 F with a 0.6 sec hold. Milk samples were collected at increments of 10 F during processing and analyzed for psychrophilic, mesophilic and thermophilic counts initially and at weekly intervals thereafter. All samples were held at 40 F after processing. Results indicated that temperatures of processing at 160 F and 170 F were not sufficient to impart acceptable keeping qualities to whole milk held at 40 F for a period of one week. By comparison, processing temperatures of 180 F through 210 F with 0.6 sec hold appeared to impart to whole milk keeping qualities which were approximately comparable to those observed in milk pasteurized according to present standards. When heat treatment in the range of 220 F through 260 F were used, it was indicated that bacteriological keeping quality of the milk was improved to an extent far beyond that experienced with present day commercial pasteurization. There appeared to be somewhat of a tendency for higher count raw milk related to the level of population in the processed product although the magnitude of this relationship was not clearly defined in all cases. It was evident that this process did not produce "commercially sterilized" milk at the processing temperatures and holding time used.

Within recent years considerable interest has been expressed in pasteurization processes for milk using time-temperature combinations that would give a greater bacterial thermal inactivation effect than is realized with present standards.

Undoubtedly, much of this enthusiasm has been motivated by a feeling that even though presently recognized pasteurization standards are adequate for destruction of pathogenic organisms, a more severe thermal process would aid materially in gaining an extended shelf life for milk, and thus economic savings could result through changes in handling and distribution of the processed product.

It is generally recognized that higher temperature milk pasteurization is practical provided a processor

is not interested in producing a creamline product. Without question, the necessary heat transfer equipment is available. It might be expected, however, that the bacteriological problems associated with higher temperature processes could present different patterns than are encountered in milk processed under present pasteurization standards.

Bacteriological studies relating to the keeping qualities of milk pasteurized at high temperature with a 0.6 sec hold are non-existent. Instead, it is necessary to review the limited work which has been done with the ultra high temperature processes to gain possible insight in this area.

Brown, et al. (2) indicated there were no surviving organisms found in samples of milk heated at 185 F for 0.4 sec and plated at 10^{-2} dilution when the original raw milk count was 25,000 per ml.

Using direct steam infusion and temperatures in the range of 165 F through 300 F with a hold of 11.2 sec, Hedrick (6) reported that milk pasteurized at 200 F and above gave plate counts in the range of from 136 per ml to 2 per ml when the original raw milk ranged in count from 12,000 to 430,000 per ml. He further reported that samples processed at 260 F and above showed no significant increase in count during 14 days of refrigerated storage.

Speck (7) concluded that the most difficult group of microorganisms to be destroyed by high temperature pasteurization processes would be the sporeformers, but that their effect on the milk could be minimized by storage under refrigeration conditions.

British investigators (3, 4, 5) have assessed the sporicidal efficiency of ultra high temperature (UHT) pasteurization using spores of *B. stearothermophilus* TH 24 and *B. subtilis* in a process which ranged from 266 F to 280 F with an approximate 2 sec hold. From results obtained they indicated there was a significant inhibition of the germination of spores of *B. stearothermophilus* TH 24 in milk treated by the UHT process. By extrapolation of their calculated death curve, obtained from experimentation, they concluded that in order to obtain a 99.99999% de-

¹A Contribution from the Massachusetts Agricultural Experiment Station, Amherst, Mass.

²This work was supported in part by grant EF 00121-04 from the National Institutes of Health, U. S. Public Health Service.

struction level of *B. stearothermophilus* spores would require a temperature of approximately 288 F under operating plant conditions.

The present study was but one of many and was undertaken to determine the nature and magnitude of bacterial changes which might occur in milk subjected to high heat, 0.6 sec hold pasteurization conditions in commercial heat exchange equipment.

PROCEDURE

Apparatus.

Throughout this investigation a Model HX, APV stainless steel plate heat exchanger operated at 4073 lb per hour with 80% regeneration and cooling was used. The unit was modified slightly to permit milk to enter the downstream side of the regenerator by direct pass from the heater section. This gave a calculated hold of 0.6 sec. at maximum temperature. Temperature regulation was maintained by pneumatic controls and was monitored in the heat exchanger by thermocouple recorders. Hot water, by direct steam infusion, was used as the heating medium to obtain final temperature in the heater section.

Experimental methods.

In each trial approximately 200 gal of raw milk was processed at temperatures in the range of 160 F through 260 F in increments of 10 F. Samples were aseptically collected in sterile containers at each temperature after the milk had passed from the cooling section of the heat exchanger. A raw milk sample was collected and used to obtain the initial raw milk count. In all trials the heat exchanger was operated at a capacity of 4073 lbs per hour with a calculated hold of 0.6 sec.

The calculated total come-up time from 100 F to maximum processing temperature in all cases was 16.5 sec. A 9.5 sec plateau occurred from the point of maximum temperature in the upside of the regenerator, through the timing pump and into the inlet of the heater section. The maximum temperatures attained in the upside of the regenerator for the 160 F, 170 F, 180 F, 190 F, 200 F, 210 F, 220 F, 230 F, 240 F, 250 F and 260 F processes were 125 F, 129 F, 135 F, 142 F, 150 F, 157 F, 167 F, 174 F, 182 F, 191 F, and 202 F, respectively. The cooling rate from maximum temperature to 100 F in all cases was calculated to be 7.0 sec.

After collection, the milk samples were subjected to bacteriological analysis for psychrophilic, mesophilic and thermophilic microorganisms using plate procedures and materials outlined in *Standard Methods for the Examination of Dairy Products* (1). These analyses were made initially on the date of collection and at weekly intervals thereafter until the individual samples were degenerated. All samples were held

in refrigerated storage at 40 F except when analyzed. A total of 20 trials were made using temperatures of 160 F through 240 F inclusive, and 14 trials each at 250 F and 260 F. Immediately prior to each trial the heat exchanger along with associated equipment and fittings through which milk passed were sanitized for 10 min with a 200 ppm available chlorine solution followed by hot water at 195 F at the outlet for 10 min.

RESULTS AND DISCUSSION

The results of the bacteriological keeping quality studies are summarized in Table 1. These data indicate the appearance of three characteristic plateaus of bacterial quality based on processing temperatures.

The first plateau occurred in those samples processed at 160 F and 170 F for 0.6 sec hold. In this range, it was observed there was a significant decrease initially in psychrophilic, mesophilic and thermophilic population in the processed milk as compared to the raw milk. However, after one week of storage at 40 F a significant increase was noted in the psychrophilic and mesophilic count of the milk. This increase was of sufficient magnitude to render the milk unwholesome if a maximum standard of 25,000 per ml for pasteurized milk was considered as acceptable. Further, it was observed that the psychrophilic population tended to increase at a proportionately greater rate in these samples than did the mesophilic population. The thermophilic counts, on the other hand, gave indications of a tendency for a slight decrease during the first week after processing followed by a tendency for a slight progressive increase after this time up to the fourth week. This observation was characteristic of all trials conducted at 160 F and 170 F, and possibly may have been the result of a prolonged lag phase in the growth curve and/or suppression of the thermophiles by the more rapid development of the psychrophiles and mesophiles during storage.

The second plateau was evident among those milk samples processed within the range of 180 F through 210 F inclusive. Results obtained from these samples indicated there was a substantial decrease initially in psychrophilic, mesophilic and thermophilic counts from the thermal process, in comparison to that observed in the raw milk. Nevertheless, it was noted that the psychrophilic and mesophilic organisms that survived the process were able to increase in numbers sufficiently to render the milk bacteriologically unacceptable within between two to three weeks time at 40 F storage; again based on a standard of 25,000 per ml. as being the maximum acceptable count. These results do not vary materially from

TABLE 3. INDIVIDUAL TRIAL RAW MILK AND INITIAL PROCESSED MILK COUNTS FOR MESOPHILIC ORGANISMS AT PROCESSING TEMPERATURES STUDIED

Trial	Raw milk count/ml	Initial processed milk count/ml at temperature indicated										
		160 F	170 F	180 F	190 F	200 F	210 F	220 F	230 F	240 F	250 F	260 F
1	22,000	15,000	2,800	230	220	180	130	18	13	<1	—	—
2	17,000	12,000	2,200	210	190	170	160	14	9	<1	—	—
3	6,000	2,200	800	110	130	92	73	4	<1	<1	—	—
4	43,000	11,000	3,900	330	270	210	180	11	12	<1	—	—
5	96,000	29,000	8,000	520	470	460	370	23	16	<1	—	—
6	21,000	13,000	6,600	270	280	200	170	13	11	<1	—	—
7	10,000	3,100	1,100	170	140	83	56	6	<1	<1	<1	<1
8	500,000	110,000	27,000	6,800	5,900	5,200	4,400	290	230	130	93	24
9	210,000	50,000	17,000	1,100	910	1,200	810	57	32	17	14	6
10	190,000	31,000	9,000	980	870	760	650	53	34	5	3	1
11	84,000	31,000	7,000	810	760	420	310	27	19	<1	<1	<1
12	65,000	22,000	9,600	730	680	590	470	24	17	<1	<1	<1
13	34,000	16,000	6,000	310	300	330	230	10	3	<1	<1	<1
14	120,000	39,000	9,000	560	530	470	400	31	15	3	2	<1
15	140,000	40,000	7,000	610	620	550	480	28	16	2	2	<1
16	220,000	41,000	13,000	2,300	1,600	1,600	1,500	93	65	28	17	7
17	300,000	50,000	18,000	2,800	2,200	1,800	1,700	91	73	24	28	8
18	400,000	66,000	21,000	3,900	3,200	2,400	2,500	110	83	34	25	10
19	92,000	27,000	8,000	670	530	480	420	33	14	<1	<1	<1
20	30,000	9,000	3,600	290	210	220	130	7	<1	<1	<1	<1

TABLE 4. INDIVIDUAL TRIAL RAW MILK AND INITIAL PROCESSED MILK COUNTS FOR THERMOPHILIC ORGANISMS AT PROCESSING TEMPERATURES STUDIED

Trial	Raw milk count/ml	Initial processed milk count/ml at temperature indicated										
		160 F	170 F	180 F	190 F	200 F	210 F	220 F	230 F	240 F	250 F	260 F
1	150	61	58	17	19	24	18	16	12	9	—	—
2	200	69	60	19	15	27	21	17	15	12	—	—
3	48	12	13	4	6	11	8	7	4	2	—	—
4	110	43	44	18	17	25	21	19	12	7	—	—
5	56	22	17	6	8	12	7	11	6	3	—	—
6	32	19	12	3	5	6	4	5	2	1	—	—
7	15	8	12	2	3	7	2	1	1	<1	<1	<1
8	3,500	1,800	1,400	220	200	240	230	210	170	150	140	78
9	210	82	81	17	12	20	22	18	15	16	9	2
10	180	77	65	14	8	9	11	9	5	6	2	<1
11	94	49	43	12	9	10	12	11	7	5	1	<1
12	100	53	51	15	10	22	14	16	11	10	5	<1
13	78	61	59	17	14	15	18	19	13	15	7	<1
14	63	41	37	9	11	18	20	13	8	9	3	<1
15	67	55	61	21	16	29	27	17	12	9	2	<1
16	99	59	52	18	19	25	19	22	16	13	7	<1
17	92	48	43	11	12	16	14	12	5	3	<1	<1
18	160	277	275	96	71	88	92	80	56	44	29	5
19	81	32	28	9	8	11	7	9	3	4	2	<1
20	55	37	39	10	12	15	12	8	4	2	<1	<1

tion process could prolong materially the bacterial shelf life of whole milk beyond the seven to ten day period observed in milk processed according to presently accepted pasteurization standards (7, 9).

Of course one can speculate on the degree of milk contamination resulting from equipment. This primarily is a factor of proper and adequate cleaning and sanitizing treatment of equipment and containers immediately prior to processing and packaging. In these experiments every attempt was made to reduce the possibility of equipment contamination to an

absolute minimum by chlorine and hot water treatment since it was felt equipment contamination could have a serious effect on results obtained.

Of further consideration in this process, was the bacteriological quality of the raw milk processed. The data in Table 1 indicate the raw milk gave mean counts of 5,000 per ml psychrophilic, 130,000 mesophilic and 270 thermophilic.

The data in Tables 2, 3 and 4 show the variations which occurred among the individual trials between the raw milk counts and the initial processed milk

counts for psychrophilic, mesophilic and thermophilic organisms respectively at the processing temperatures used.

These data indicate that there did not appear necessarily to be a correlation between relative high and low levels of psychrophiles, mesophiles and thermophiles to each other in the same lot of raw milk. Rather, it appeared that variation was the rule rather than the exception in this respect.

With regard to the thermal inactivation of organisms, the data show, that between individual trials, there did not appear to be a clearly fixed relationship between the raw milk counts for psychrophiles, mesophiles and thermophiles and the respective initial processed milk counts for these organisms in terms of the magnitude of kill in all cases. However, there appeared to be somewhat of a tendency for the higher count raw milk trials to be at a higher level of population after processing than was the case when raw milks of lower initial count were used, although the magnitude of change in count showed variation.

Regarding possible cause for the variations observed, it should be emphasized that this study was conducted over a two-year period throughout the various seasons of the year. In addition, the raw milk used for the individual trials ranged in storage age from twelve hours to ninety-six hours with no action being taken to control either the initial counts or storage conditions used. This was an attempt on our part to simulate the possible bacteriological quality of raw milk as it might be under commercial operating conditions.

With these factors in mind it could be expected that changes in the magnitude, nature and characteristics of the bacterial population would occur, and that these in turn might be reflected in the results obtained.

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NEWS AND EVENTS

Georgia Society Holds Annual Meeting Outstanding Sanitarians Chosen and Constitutional Changes Made

MILK SANITARIAN AWARD



Mr. J. H. Rigsby, President, Georgia Society of Registered Professional Sanitarians presenting a plaque to Dr. H. G. Bailey, Chief Milk Sanitarian, Chatham County Health Department, Savannah, Georgia for Milk Sanitarian Award. (Mr. Rigsby on left presenting plaque on behalf of Sealtest Foods, Atlanta).

Dr. H. G. Bailey, Chief Milk Sanitarian for the Chatham County Health Department, was named the outstanding milk sanitarian of the year in Georgia by the Georgia Society of Registered Professional Sanitarians at its annual meeting in Athens.

Dr. Bailey was chosen for this high honor because of the outstanding work he has done in Chatham County for the past 40 years in developing a milk supply that is considered one of the best in the country. It has received about 90% rating by the U. S. Public Health Service for many years.

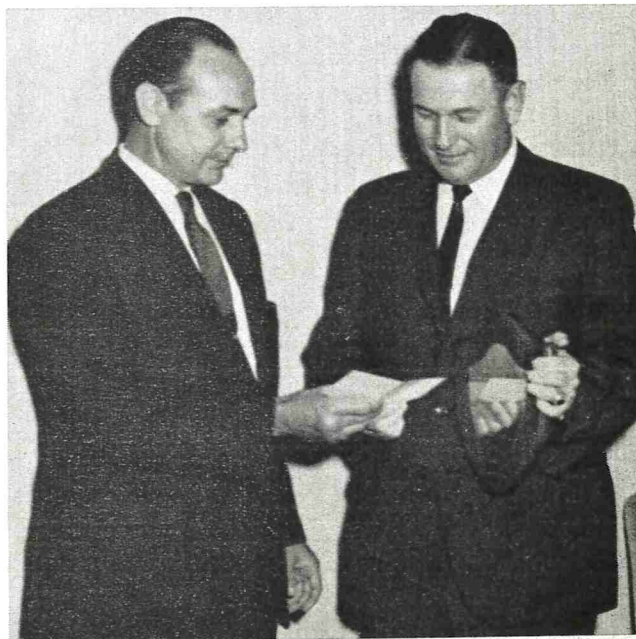
Under Dr. Bailey's supervision the inspection of milk plants, dairy farms, and related establishments has been carried out during the years when running water under pressure into a milk room or the concreting of floors in a dairy barn was considered a real accomplishment. Dr. Bailey was carrying on a program of milk sanitation in Savannah, establishing the pasteurization of milk as a prerequisite for human consumption even before the U. S. Public Health Service started developing a Milk Ordinance and

Code. Sometimes, it required a fist fight to get the required cooperation.

Dr. Bailey has served in many capacities in professional and civic organizations including the following: President of the Association of the local and state veterinary associations and was especially instrumental in the tuberculosis and Bangs disease eradication programs, Veterinary Officer of the famous Georgia Hussars, Executive Board of the Georgia Society of Registered Professional Sanitarians, and Georgia Public Health Association.

Dr. Bailey received his Doctor of Veterinary Medicine degree from the University of Georgia in 1922 and, except for military service, has been employed by the Chatham County Health Department all of his professional life. He is a member of St. John's Episcopal Church in Savannah.

FOOD SANITARIAN AWARD



Mr. Bob Bradshaw—First Vice President, Georgia Restaurant Association (left) presenting check to Mr. George Rice, Athens-Clark County Board of Health, Athens, Georgia for Food Sanitarian Award.

George W. Rice, Food Sanitarian of the Clarke County Health Department, was named the outstanding food sanitarian of the year in Georgia by

the Georgia Society of Registered Professional Sanitarians at its annual meeting in Athens.

Mr. Rice was chosen for his honor because of the outstanding work he has done, verified by the high public health ratings of the food establishments in Clarke County, his sincere dedication to the principles of public health, and the respect that he has gained from those who work with him.

The current program evaluation reveal the following record insofar as the level of compliance with food sanitation regulations in food service operations in Clarke County:

1962—Public School Lunchrooms—94.55% rating serving 6,485 meals daily.

1963—University of Georgia food service — 92.24% rating serving 7,600 meals daily.

1963—Medical Facilities food service including hospitals and nursing homes — 93.89% rating serving 1,387 meals daily.

1961—Commercial establishments — 84.29% rating.

In 1963, all facilities served an average of 35,622 meals daily and received a compliance rating of 88.24%.

This fine program was promoted by Mr. Rice with an absolute minimum of enforcement procedures. He was able to motivate voluntary compliance through diplomacy, excellent public health relations, and superb salesmanship.

Mr. Rice is a native of Royston, Georgia, and received his elementary education in that area. In 1951, he was graduated by the University of Georgia with a B.S.A. degree.

In September of this year, he will take a leave of absence from the Clarke County Health Department to work for a Masters of Public Health Degree from the University of North Carolina.

In token of the above honor, Mr. Rice was presented a plaque and citation by the Georgia Society of Registered Professional Sanitarians and a check by the Georgia Restaurant Association. Dr. J. H. Venable, Director, Georgia Department of Public Health made the presentations.

SIGNIFICANT CONSTITUTIONAL CHANGES

The following amendments to the constitution of the Georgia Association represent rather significant departures from the usual provisions of constitutions of various affiliate associations. The chapter adopted at their 1963 annual meeting are as follows:

1. The constitution of this organization is hereby amended to the effect that the name of this organization, from this date, shall be "The Georgia Society of Registered Professional Sanitarian".

2. Be it further amended that this society shall maintain official affiliation with the "International

Association of Milk, Food and Environmental Sanitarians".

3. Be it further provided that fully participating members must be registered professional sanitarians properly licensed under the provisions of the state law and shall also be members of the I. A. M. F. E. S.

4. Be it further amended that an associate membership be provided for the sanitarian-in-training (meaning new men entering the profession with all academic requirements satisfied but lacking time in service required for registration). Associate membership will also be available to those persons desiring to affiliate themselves with this society who may be registered in other professions and for other interested individuals desiring to associate themselves with this professional group.

A. Associate members shall enjoy all the privileges of the Society but are exempt from the responsibility of the vote and of holding an office in the Society.

B. Associate members shall also be members of I. A. M. F. E. S. There are no provisions for divided membership. All members of this society whether fully participating or associate, shall be members of I. A. M. F. E. S.

5. Current dues shall remain in effect for all classifications of members.

6. All members who, by virtue of our esteem and respect, have been or may be awarded "Life Time Honorary Membership" in this society are, by virtue of this same esteem and respect, automatically fully participating members of the Georgia Society of Registered Professional Sanitarians.

DR. KLEYN SUCCEEDS DR. LEAR AT RUTGERS UNIVERSITY

Dr. Dick H. Kleyn has begun his duties as an associate research specialist in dairy industry at the College of Agriculture, Rutgers University.

He succeeds the late Dr. Samuel A. Lear.

Dr. Kleyn, who was born in The Netherlands, received the B.S. degree from Ohio State University and the M.S. and Ph.D. degrees from Cornell University.

Following completion of his studies he was an assistant professor at the University of Florida and then became associated with General Foods as a food technologist. Before he joined the Rutgers staff Dr. Kleyn was an extension specialist in dairy technology at Ohio State University.

Dr. Kleyn is a member of Gamma Alpha graduate scientific society, Society of Sigma Xi, American Chemical Society, and American Dairy Science Association.

TODAY'S HIGHWAY BANDITS THE LITTERBUGS

The needless expenditure of a cool *hundred million dollars* each year is making a growing number of U. S. taxpayers hot under the collar.

Where does that tax money go?

"Literally, right on the trash heap."

This is the assertion of Federal Highway Administrator Rex M. Whitton, in estimating the nation's yearly highway clean-up bills.

Litter — in bits, pieces, handfuls, heaps and mounds — is adding up to a mountainous waste of public funds. "And why?" irate citizens might ask. The answer, from government officials and crusading individuals, is this: "Simply because the motoring public seems to consider the countryside its own private dumping ground."

A powerful enemy of the American litterbug, Secretary of Commerce Luther H. Hodges says, "More money, more cars, more good roads — together they spell more litter."

"Litter is a problem of an affluent society," he adds. "Today we have some 80 million trucks and automobiles. We can litterally — spelled with two T's — take our entire population of 189 million riding at the same time."

While most motorists consider their cars pretty well equipped when they have a clock, an FM radio, fancy seat covers, an air conditioner, even a telephone — most of them never think to add one of the most necessary accessories of all — a simple litterbag for their "travel trash."

"Why use a litterbag," seems to be the attitude, "when it's so easy to roll down the window and toss things out?"

It's no wonder a highway maintenance worker for the Arizona State Highway Department recently grumbled, "Some people drop things like this was the city dump."

From North Dallas, there's this comment: "It's a puzzling paradox that people whose houses and lawns are immaculate, whose cars shine inside and out, often are the ones who keep them clean by throwing out (their trash) everywhere they go . . . America, with scenery as lovely as any in the world, deserves better treatment."

States report their highway clean-up costs are staggering. Louisiana's highway director says they spent \$227,000 last year to pick up trash, with the average cost ranging from \$14 a mile to \$300 a mile per year in some busy areas. Maine spends over \$300,000 a year for street and highway litter removal, while Washington state tags its bill at \$400,000 annually.

Bleak as the picture is, there's reason for hope, according to Allen H. Seed, Jr., executive vice presi-

dent of Keep America Beautiful, Inc. This is the national non-profit organization spearheading litter-prevention programs with the aid and cooperation of government, industry, labor, and public-interest groups throughout the country.

"People are aroused," Allen Seed commented. "They're waking up to the fact that the careless habit of littering is not only defacing our priceless 'America the Beautiful' but it's draining off tax dollars that could better be spent for more schools and hospitals, added police and fire protection — all the services that are crying out for more funds."

While working with some 7,000 community groups and 18 statewide organizations in combatting the "litter blight" on highways and elsewhere, Keep America Beautiful has found certain basic needs that must be met.

"First off," says Allen Seed, "you have to be sure motorists have a place to *put* litter, instead of tossing it to the breeze. We encourage litterbags for cars. But litterbags have to be emptied, and so we encourage litterbarrels along highways and at service stations."

"We encourage erection of 'penalty warning' signs along highways telling motorists not to litter. If all else fails, we encourage law enforcement that shows its teeth. Many people don't know it, but actually all the 50 states have laws on their books against littering. We find that when the police and judges crack down, people suddenly get tidier."

As an example of what *can* be done, Keep America Beautiful cites Maryland, where highway clean-up costs have dropped 63% since the Keep Maryland Beautiful public education program started.

"In Connecticut, where the state highway department has lent its full support to an anti-litter drive, this year's litter removal costs for highways are down to *half* what they'd expected to spend," Mr. Seed remarked.

The moral, fellow taxpayers, is this: If you're tired of paying your share to the hundred million dollar highway hold-up, think twice the next time you roll down the car window with trash in your hand. You'll be buying it back — on next year's tax bills. It's a big price to pay for a little litter.

USDA ISSUES SECOND REPORT ON AUTOMATION IN DAIRY PLANTS

Dairy plants that process raw milk into market milk, half-and-half, buttermilk, chocolate drink, and coffee cream can reduce operating costs by using automation, according to a report issued today by the U. S. Department of Agriculture.

This is the second of six reports on a marketing research study being made under contract with USDA's Agricultural Marketing Service. Purpose of the study is to provide dairy plant operators with guidelines to use in building or remodeling plants and in operating them more efficiently. Officials said marketing research such as this is part of a continuing effort by AMS to find more efficient ways of handling the farmer's products during marketing, and in the process hold down costs to the consumer.

The larger of the two automated plants used as illustrations in this marketing research report handled 105,000 gallons of milk a week and could process about 175 gallons of milk per man-hour. A non-automated plant handling 105,000 gallons of milk a week could process only 109 gallons per man-hour, the report shows. Layouts and the equipment needed for the automated plant handling 105,000 gallons and for one handling 35,000 gallons are given in this report.

A free copy of Marketing Research Report No. 591, "Layouts and Operating Criteria for Automation of Dairy Plants Processing Milk, Half-and-Half, Cream, Chocolate Drink, and Buttermilk," can be obtained from the Office of Information, U. S. Department of Agriculture, Washington, D. C. 20250.

FDA APPROVES CORROSIN RESISTANT POLYESTER RESIN FOR FOOD PROCESSING EQUIPMENT

Equipment for storing, handling and processing foods can now be fabricated from or lined with corrosion resistant Atlac 382 bisphenol-A fumarate polyester resin, under a new regulation issued by the Food and Drug Administration. The regulation permits, for the first time, the broad use of reinforced polyester equipment in food processing applications. As stated in the regulation, Atlac 382 may be used "as articles or components of articles intended for repeated or continuous use in contact with foods".

The use of glass reinforced Atlac 382 equipment has been increasing in the pulp and paper, metalworking, and chemical process industries since its introduction about 10 years ago; usage in these areas has doubled in the last three years. Advantages claimed over the stainless steel, Monel or glass-lined equipment traditionally used in the food field are lower initial cost, ease of installation and maintenance, and excellent corrosion resistance to a broad line of acids and alkalis. According to James J. Coleman, Industrial Marketing Manager of Atlas, equipment of this type is bringing about significant reductions in the annual \$6,000,000,000 waste caused by corrosion.

Major use of such equipment by the food industry

is expected to be in storage and holding vessels, mixing tanks, and for the storage of acidic or alkaline cleaning and scouring agents.

Under the regulations, FDA approval for food use is limited to Atlac 382 and a flexible version of that material, Atlac 387. The same regulation specifies the additives and curing agents which may be used.

The Atlac resins are patented and manufactured by Atlas Chemical Industries, Inc., Wilmington, Delaware. Further details on the use of these materials in process and storage equipment, and a list of qualified fabricators, are available from Atlas.

LAND O'LAKES FIELDMAN RECEIVES MINNESOTA ASSOCIATION'S OUTSTANDING ACHIEVEMENT AWARD

Chester Ness, supervisor of Grade A milk procurement for Land O'Lakes Creameries, Inc., Minneapolis, Minnesota, was honored by the Minnesota Sanitarians Association at the Association's banquet following their annual meeting Thursday, September 12.

The Association's Outstanding Achievement Award was presented to Mr. Ness in recognition of his leadership in Association affairs and in developing the Grade A milk supplies of the Land O'Lakes organization. Mr. Ness began his association with Land O'Lakes as a fieldman and for the last several years has been in charge of the Grade A milk procurement program.

CHARLES HOLCOMBE OF MINNESOTA ASSOCIATION RETIRES

August 1, 1963 marked the retirement from the Minnesota Department of Agriculture of Mr. Charles Holcombe, a long time and active member of the International Association of Milk, Food and Environmental Sanitarians. Much of Mr. Holcombe's career has been in the area of quality and regulatory control of milk and milk products. Since 1950 Mr. Holcombe has been Director of the Inspection Division, Minnesota Department of Agriculture. During this period he was instrumental in developing a state-wide coordinated milk inspection and enforcement program and in establishing the Minnesota Grade A program as well as programs for milk for manufacturing purposes. As a result of these activities, he was asked to serve on many committees of state and national scope in the dairy and food field.

Recently Mr. Holcombe was honored at a gathering attended by some 150 of his friends. Numerous testimonies, on the part of co-workers, trade associations, the University, the United States Department of Agriculture, the Food Retailers and others, dis-

closed a feeling of deep gratitude and respect for his efforts during his service with the Minnesota Department of Agriculture.

DAIRY FIELDMEN'S AND DAIRY PLANT OPERATORS' CONFERENCES TO BE HELD AT PURDUE

J. L. Krider, Head of the Animal Sciences Department at Purdue University, and F. J. Babel, professor in charge of the Dairy Manufacturing Section, have announced two, one-day meetings to be held in November 1963. The Dairy Fieldmen's Conference will be held on November 19 and the Dairy Plant Operators' Conference on November 20, in the Memorial Center at Purdue University. The conferences are an annual affair sponsored in cooperation with the Indiana Dairy Products Association.

The Dairy Fieldmen's Conference will include papers on Sanitizers for Dairymen, by J. M. Jensen, Michigan State University; A Review of the Insecticide Residue Problem, by B. J. Liska, Animal Sciences Department, Purdue University; Mixed Milk Sediment Testing, by J. O. Young, Animal Sciences Department, Purdue University; A Review of Purdue's Dairy Production Research Program, by R. E. Erb, Animal Sciences Department, Purdue University; Loose Style Housing, by N. J. Moeller and John Mentzer, Animal Sciences and Agricultural Engineering Departments, Purdue University; Management Practices for Large Dairy Herds by Jack Albright, Animal Sciences Department, Purdue University; and Fertilization Practices as Related to Yield of Corn and Alfalfa Forage, by D. L. Hill, Animal Sciences Department, Purdue University.

The Dairy Plant Operators' Conference is to include reports on the Effect of Storage Time on Milk Processing Properties, by F. J. Babel, Animal Sciences Department, Purdue University; New Dairy Foods for Additional Sales, by J. M. Jensen, Michigan State University; New Frontiers in Animal Science, by J. L. Krider, Head of the Animal Sciences Department, Purdue University; Conversion of Manufacturing Grade Milk Producers to Bulk, by K. E. Mennen, Armour & Company, Springfield, Kentucky; Dairy Waste Disposal, by D. E. Bloodgood, Civil Engineering Department, Purdue University; Effective Supervision of Employees, by Ralph C. Lawson, Klondike School, Klondike, Indiana.

For further information concerning these conferences contact H. F. Ford, Smith Hall, Purdue University, Lafayette, Indiana.

ANNOUNCE NEW STRONTIUM 90 MONITORING RESEARCH PROJECT

The U. S. Public Health Service has announced a grant of \$56,168 to Loyola University, New Orleans, for a project making use of baby teeth of thousands of U. S. children as an indirect means of monitoring radioactivity in human bones. Over a five-year period the university will measure the strontium 90 content of the children's teeth.

The PHS stated, "Scientists believe the strontium 90 content of baby teeth, which are readily available for study, is an indicator of the fallout level of this radionuclide that has entered the life cycle during the prenatal period."

Also, the report added, "More than 125,000 baby teeth have been collected in a similar PHS-sponsored project conducted since 1959 in the St. Louis area."

NEW YORK ASSOCIATION HOLDS ANNUAL MEETING

Milk marketing, sanitation, atomic fallout and milk production in other countries were topics presented to milk sanitarians at their annual conference with Cornell University's department of dairy and food science in Hotel Syracuse, Syracuse, September 30-October 1-2.

About 500 dairy processors fieldmen, laboratory personnel, and health officials attended the 40th conference of the N. Y. State Association of Milk Sanitarians. This is the 11th year they have met jointly with the Cornell group.

The program included a panel on "The 1-2-3 of Frozen Food Sanitation" with Prof. Paul A. Buck, moderator. Prof. K. H. Steinkraus, food science and technology, N. Y. State Agricultural Experiment Station at Geneva, was a panelist.

Members of the N. Y. State College of Agriculture presenting papers or presiding at the meeting include Prof. Emeritus E. S. Guthrie, Profs. R. F. Holland, R. P. March, J. C. White, B. L. Herrington, and F. V. Kosikowski.

Other Cornell participants were Profs. K. L. Turk, director of international agricultural development; Leland Spencer, agricultural economics; J. D. Hartman and W. F. Wilkens, vegetable crops; and A. F. Sherf, rural civil defense specialist.

PROPOSE IDENTIFICATION TAGS TO HELP ELIMINATE BRUCELLOSIS

The U.S.D.A. has announced proposals for use of identification tags for cows moving from one state to another to help eliminate brucellosis in this country. The proposal, published in the Federal Register October 1, calls for tags that would identify the farms

or ranches animals came from.

The proposed amendment, on which views or comments may be submitted during the next 30 days, would require all female dairy cattle three years old and over to bear eartags (numbered according to the national eartagging plan) when moving interstate, with two exceptions:

1. Purebred dairy cows could move interstate with an eartag, backtag, or registration certificate.
2. Any dairy cow moving interstate for immediate slaughter would bear either eartag or backtag or both.

NOTED EDUCATORS TO ADDRESS EXECUTIVE FOOD FORUM

Twenty-one educators and representatives of industry and government will speak on vital new developments in food products, food law and food processing techniques at Food Update-Midwest Highlights, 1963, a seminar for executives of the food and allied industries, November 4-8, Ascot House, Chicago. The four-day short course is being held in the Midwest for the first time after three successful sessions in the East.

Food Update seminars are designed to provide a forum for discussion and solution of food industry problems to the benefit of the industry and ultimately of the consumer. The informative programs have proven equally valuable to people in the technical, production, sales and marketing areas of the food industry. The Chicago session has attracted nationwide interest with speakers from California, Illinois, Massachusetts, Missouri, New Jersey, New York, Ohio and Washington, D. C.

The seminars are held under the auspices of The Food Law Institute, New York City. The Chicago Chapter, Institute of Food Technologists, will be host for the November session. Information about the course can be obtained from Dr. Edward A. Nebesky, c/o The Food Law Institute, 205 East 42nd Street, New York, or phone at 201 - CH 7-1766, ext. 1476.

NEW BOOK ENGINEERING FOR DAIRY AND FOOD PRODUCTS

A new book, "Engineering For Dairy and Food Products," authored by Dr. Arthur W. Farrall of Michigan State University, has just been published by John Wiley and Sons. The book is an up-to-date presentation of basic engineering applications to the dairy and food industries. It has been written to serve not only as a textbook for school use, but also for use of plant operators involved with daily operations of dairy and food processing plants.

Features of the new book include complete coverage of individual processing units and the automated

systems in which they are found, sanitary phases of food processing, steam generation and utilization, refrigeration, freezing, pumping, homogenization, evaporation, condensing, and drying. The book also contains a wealth of tables, references, and numerous questions and illustrative problems for self-study.

Dr. Farrall is a former Director of Research for the Creamery Package Manufacturing Company, is the past National President of the American Society of Agricultural Engineers, and is presently Chairman of the Agricultural Engineering Department, Michigan State University, East Lansing, Michigan.

RAY SMITH RESIGNS AS DAIRY INSPECTOR¹

Ray M. Smith, Oregon Department of Agriculture dairy inspector for Baker, Malheur and Grant Counties, has submitted his resignation, effective August 1.

Smith, who joined the department July 10, 1945, is resigning because of ill health. A veteran of World War II, he has a service connected disability. Prior to his being employed with the Department of Agriculture, Smith managed creameries in Wyoming and Idaho.

Kenneth Carl, chief of the Dairy and Consumer's Services Division of the department, said a replacement will not be named for Smith, but his work will be taken over by other personnel through a reorganization in the division.

¹From Oregon Association Newsletter, "Sediment Catcher."

JOE GRAY NAMED ASSISTANT CHIEF¹

Joseph A. (Joe) Gray, the Galloping Gray Ghost who rolled up many a point on the Oregon State University side of the football scoreboard in the late 1930's, has been appointed assistant chief of the Dairy and Consumer Services Division of the Oregon Department of Agriculture.

The position filled by Gray, who has been a dairy specialist with the department, is newly created. As assistant chief Gray will have charge of food law enforcement. These laws cover regulations relating to bakeries, non-alcoholic beverages, eggs, food sanitation and labeling.

Gray, a dairy specialist since 1946, came to the department as a milk and cream grader in March, 1939, right after completing work for his bachelor of science degree at Oregon State University. He has been with the department since leaving school, but had military leave for four years and three months of duty with the Army in World War II. He served in the Pacific with the Seventh Division and was a captain when released from active duty.

Gray and his wife reside at 2555 Hollywood Drive N. E. They have a son, Mark, age 16, at home, and daughter, Joanne, 22, Portland.

¹From Oregon Association Newsletter, "Sediment Catcher."

FIRST FAO PANEL MEETING ON PAYMENT FOR MILK ON QUALITY HELD IN ROME



FAO Expert Panel on Payment for Milk on Quality Meeting in Rome, Italy, 27-29 August 1963. From Left to Right: Dr. Hans Pedersen, Chief FAO Dairy Branch, Dr. A. Lloyd Provan, Chairman, Chief Chemist British Milk Marketing Board, and Dr. Frank V. Kosikowski, FAO Secretariat.

The First Meeting of the FAO Expert Panel on Payment for Milk on Quality convened at the FAO Headquarters, Rome, 27-29 August 1963.

Proceedings were initiated by Mr. O. V. Wells, Deputy Director-General, FAO, who welcomed the members on behalf of the Director-General, FAO. He outlined, particularly, for developing countries of the world, the importance of competent technical and scientific guidance on improving milk quality. In his remarks, Mr. Wells stated that payment for milk on quality, both composition and hygiene, commands considerable attention throughout the world and that the organization of realistic incentive programs for better milk is of growing significance in the developing countries. He stated that these countries are striving to build basic dairy industries and urgently desire guidance in shaping policies which will provide their populaces with safe, fresh and good tasting milk while giving their farmers a tangible reason to obtain this objective. In his view, it would be particularly fitting for the Expert Panel to indicate those practices and programs most likely to lead to success and those that may lead to failure, and make recommendation accordingly.

Dr. A. Lloyd Provan (England) and Dr. K. K. Iya (India) were unanimously elected Chairman and Vice-Chairman, respectively, of the meeting. Essentially, the agenda items for the meeting included contemporary practices in paying for milk on quality; nutrition and composition considerations; characteristics and problems of quality milk programs in developing countries; hygiene requirements and organization of incentive programs, and plans for the

publication of a monograph on payment for milk on quality.

Before the start of discussions, Dr. Hans Pedersen, Chief, Dairy Branch, FAO, briefly described the forces at play in developing countries which necessitate a thorough and basic study of milk quality and suggested several possible new courses of action for the consideration of the Expert Panel.

3-A COMMITTEES AGREE ON STANDARDS FOR SILO TANKS, BATCH PROCESSORS, PASTEURIZERS, FILLING EQUIPMENT

Four new 3-A Sanitary Standards were completed at the semi-annual meeting of the 3-A Sanitary Standards Committees at the Sheraton-Gibson Hotel, Cincinnati, Ohio, October 1-3.

The new standards cover Silo-Type Storage Tanks, Fillers for Ice Cream and Cottage Cheese, Batch Pasteurizers, and Batch Processors.

The new standards now must be signed by representatives of the participating agencies and published in The Journal of Milk and Food Technology.

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They become effective one year after the signing, which will probably occur before the end of 1963. On and after the effective date, equipment meeting these standards will be eligible for application to bear the 3-A symbol as authorized by the 3-A Symbol Administrative Council.

The sessions also resulted in the completion of an amendment to the published 3-A Sanitary Standards for Transportation Tanks. This new amendment provides for the installation in tank trucks of a device which can serve the dual function of air agitation and in-place or mechanical cleaning.

Consideration of standards for silo tanks had held top priority for several months and efforts had been bent toward early completion of these standards due to the need for sanitary guidelines in the silo tank field. Regulatory sanitarians may especially welcome this new tool for the evaluation of cleanability and installation of these large vessels.

Two separate tentative standards for Ice Cream and Cottage Cheese fillers were combined into a single new 3-A Sanitary Standard which was approved.

The new standard for Batch Pasteurizers had been under study for several years. Recently increased interest and priority resulted in the completion of this standard at Cincinnati. At the same time, to provide for processing vats for other than pasteurization heating applications, a Batch Processor Standard was concluded separately.

Publication of the new documents will take place in the Journal of Milk and Food Technology three months prior to the effective date.

Other tentative standards reviewed at the Cincinnati 3-A meeting were those for welded pipelines, and recommendations regarding nickel alloy, and stainless steel. These tentative proposals were returned to the appropriate Task Committees with comment for further revision and re-scheduling at the next 3-A meeting, set for May, 1964, in Bal Harbor, Florida.

Approximately 100 dairy industry, regulatory and United States Public Health Service representatives participated in the Cincinnati sessions. The meetings were preceded by a guided tour of the USPHS Robert A. Talf Sanitary Engineering Center in Cincinnati.

The 3-A program, which is supported by every national dairy trade association, is an entirely voluntary undertaking which has resulted in standards being issued for 19 items of dairy industrial supplies or equipment. Generally speaking, 3-A standards are acceptable in public health jurisdictions in nearly every town, city, or state in the United States. The 3-A Sanitary Standards are cited in the recommended Milk Ordinance and Code of the U. S. Public Health Service.

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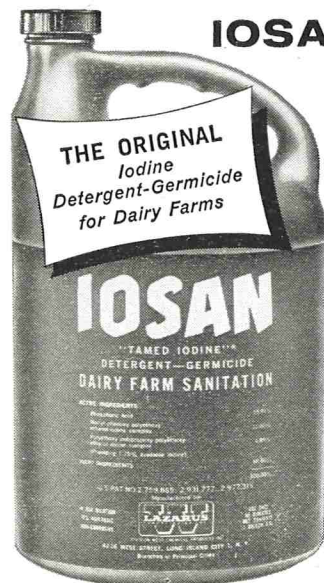
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TOXIN RESPONSIBLE FOR BOTULISM A DEADLY POISON

Scientists at The University of Michigan say the toxin responsible for botulism is the most powerful and deadly poison known to man.

Cobra venom, curare and arsenic are mild by comparison.

Controlled experiments on mice have shown that one 1-hundred billionth (1/100,000,000,000) part of a gram of pure botulism toxin will kill. It is so potent, it has long been recognized as a prospective

weapon for bacteriological warfare.

The poison itself is a protein substance produced by a microscopic organism called "Clostridium botulinum." Oddly, the protein content gives the deceptive signs of being a very good food. Bacteriologists say it is the peculiar arrangement of the amino acids in the protein that turns it into a lethal poison.

According to Dr. Walter J. Nungester, chairman of the U-M department of bacteriology, people can be immunized against the disease with an injection of the proper toxoid. It is customary for researchers to take such shots when they are going to work with the bacteria and its deadly by-product.

But because the disease is so rare, immunization has never been recommended for the general population.

The rare victim of the poison usually gets it by eating improperly canned foods — meat, fish or non-acid vegetables. Once in the body, the toxin is absorbed sluggishly by the intestines, but when it gets into the blood stream, the consequences are swift. The poison sets up "roadblocks" between nerves and muscles, causing paralysis. Breathing muscles are the first to suffer, then the heart.

Prof. Lloyd L. Kempe of the U-M College of Engineering has been working with botulism problems for some 10 years in a series of studies on the chemical engineering of food preservation. Kempe and research bacteriologist John T. Graikoski helped identify the strain of botulism that killed two Grosse Ile (Michigan) women earlier this year.

Their studies have shown that the bacteria can produce toxin at normal refrigerator temperature. The poison, however, can be rendered harmless by cooking it at about 150 degrees Fahrenheit for 15 minutes, although it takes 1 hour's cooking at 195 degrees to kill the poison-producing bacteria.

In a recent scientific report to the Society of

COMING EVENTS

November 3: Dairy Society International Annual Meeting, Statler-Hilton, Dallas Texas. Write: George W. Weigold, 1145 19th Street, N. W., Washington, D. C.

November 3-6: International Association of Ice Cream Manufacturers, 59th Annual Convention, Sheraton-Dallas Hotel, Dallas, Texas. Write: Robert H. North, 910 17th Street, N. W., Washington, D. C. 20006.

November 6-8: Milk Industry Foundation, Annual Convention, Statler Hilton Hotel, Dallas, Texas. Write: E. L. Peterson, 1145 19th Street, N. W., Washington, D. C.

November 18-22: PHS Training Course Chemical Analysis of Milk and Milk Products, Taft Engineering Center. Write: Director, Training Program, Robert A. Taft Engineering Center, 4676 Columbia Parkway, Cincinnati, Ohio. (No regis. fee charged).

November 19-20: Quality Check Dairy Products Association, Annual Meeting, Hotel Knickerbocker, Chicago, Illinois. Write: Harlie F. Zimmerman, P. O. Box 197, La Grange, Illinois.

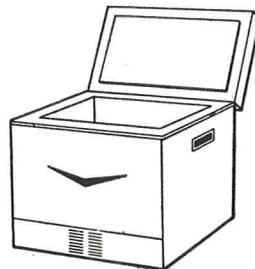
December 2-6: Public Health Service Training Course, Institutional Sanitary Food Service, Taft Engineering Center. Write: Director, Training Program, Robert A. Taft Engineering Center, 4676 Columbia Parkway, Cincinnati, Ohio. (No registration fee charged).

American Microbiologists, Kempe and Graikoski showed that type E botulina can grow and form toxin at temperatures below 40 degrees, whereas the temperature of the average refrigerator is just about 40 degrees. The U-M researchers noted that they can incubate the botulina for research in laboratory refrigerators.

Commented one public health scientists: "True it's the most powerful biological known to man. But it usually tastes and smells absolutely horrible. A contaminated food advertises its hazard in no uncertain terms. Sometimes cans and bottles explode under pressure of the gas generated by the bacteria, and the smell is ghastly."

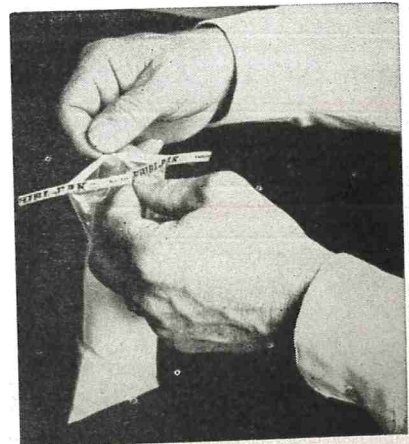
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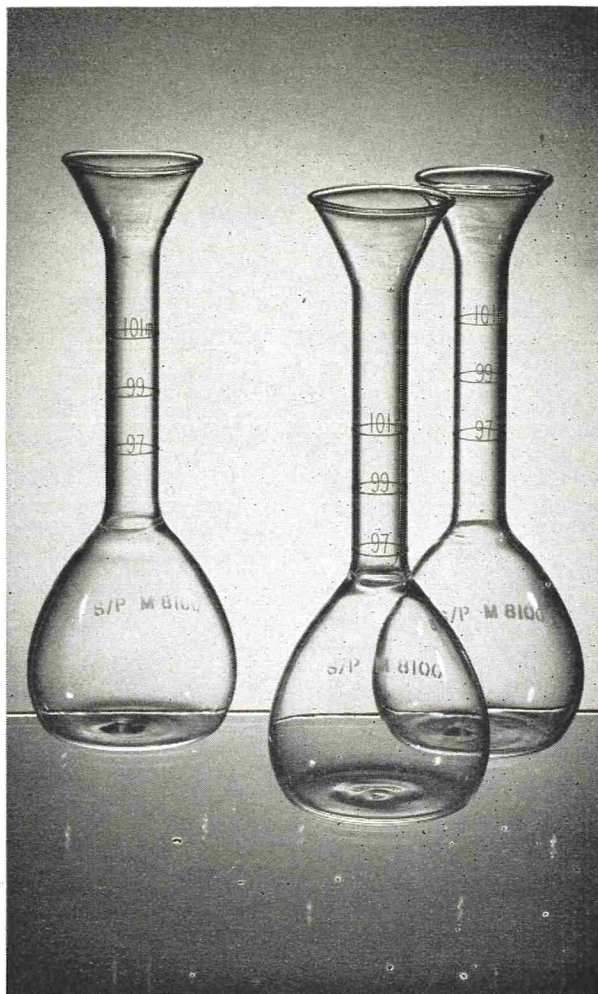
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* Design suggested by J. C. McCaffrey, Chief, Bureau of Sanitary Bacteriology, State of Illinois, Department of Public Health, Division of Laboratories.

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(act of October 23, 1962; Section 4369, Title 39, United States Code)

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H. L. Thomasson, Managing Editor

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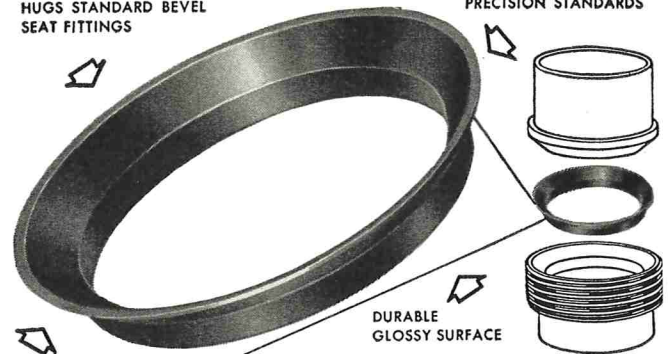


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THE TYPE IS SMALL, BUT THE MESSAGE IS BIG!

ANY MILKING MACHINE MANUFACTURER CAN SELL YOU A CHEAP MILKING MACHINE

If you are willing to sacrifice good cow milking and easy cleaning, you can buy a real cheap cow milker. A Dairyman must decide if he wants good cow milking; also he must decide if he wants real honest CLEANED IN PLACE WASHING . . . Most Dairymen know that anything short of good cow milking is going to be short on each milk check, month after month, year after year. This means the money you save on the purchase of your milking machine will be taken from you many times over so long as you use that cheaper machine.

BABSON BROS. COULD BUILD A MILK CLAW BUT WE WON'T

We understand the importance of the break in the column of milk that only a Surge Breaker Cup can give you. (There is no better way to understand why we use a Breaker Cup than to study the movies that the Patent Examiners in Washington studied before they awarded Babson Bros. Co. Patent #2709416. It takes eight minutes to view this movie and your Surge Dealer will be glad to arrange for you to see it.)

No milk claw can give you downward and forward Surge Tug and Pull. Almost every set of rules that has been written about good cow milking has some words written about this. Some Milking Machine manufacturers sell weights of various sizes to hang on milk claws . . . in a great many cases "Milking Stones" have been put to work by the Dairymen. Weights and Milking Stones will do some good, but they are clumsy and difficult for the Dairyman.

Dr. Charles Turner of the University of Missouri says it is important to drop the teat cup as each quarter is milked out. If you purchase a machine with a milk claw, this is difficult or near impossible to do.

THE TONGANOXIE MILKING SYSTEM IS JUST ABOUT THE BEST COW MILKING YOU WILL EVER SEE

A Dairyman should understand about the constant vacuum of the low milk line. He should know and understand how the dual pumping system isolates the pulsator movement from the end of the cow's teat . . . High speed movies make it possible to analyze the importance of differential . . . so differential is important to all Dairymen. These are things that the Dairyman who is buying a Milking Machine should thoroughly understand.

CONSTANT VACUUM IS IMPORTANT FOR THE CONTROL OF MASTITIS . . .

Research is recorded that confirms this . . . You can purchase an inadequate vacuum system for less money, but if this inadequate vacuum contributes to Garget in your herd and reduces your milk check every month, then no matter how little it costs, it will soon become high-priced.

CLEANED IN PLACE PIPELINE SYSTEMS ARE A MUST FOR TODAY'S DAIRYMEN

It's important that each Dairyman understand that real C.I.P. cleaning leaves nothing to chance . . . Hoping that the rinse water and the washing solution slops or sloshes into a vital spot is not good enough. There must be a positive, designed flow of solution over every milk contact area. The "zone of contamination" must be washed too . . . that's the area between the trap and the top of the milk receiver. It could save you up to \$150.00 or even more on an installation to ignore this . . . but don't do it. You may get a tank of milk rejected or you may reduce the flow of air so you get poor milking. Either way you will pay out dollars.

HOW ABOUT THE ELECTRICAL WORK

You can hire an electrician to wire up a pipeline milker and end up with a bunch of electrical equipment strung all over the milk house walls . . . or you can have a Surge Power Panel that is neat, and chances are it will cost less than it will to hire a man to string wires. But the wages of the electrician don't always show in the original price . . . These wages will sure be on your bill sooner or later.

COMPARE THE MILK VALVES

A good milk valve will cost money. It would be easy to make a rubber "dingus" to stop up a hole . . . but it can't be kept clean and it does leave milk contact area exposed to flies and dirt. When the valve nipple is exposed, it collects fly specks, which are rubbed off into the inside of the milk hose.

But cheap rubber "dinguses" are a good way to hold the price down when you sign an order (often they will be called a milk valve). Later you will be called on by your Milk Inspector to get a proper valve. Then you have the installation cost plus the valve cost to add to your original price. The time to get the right milk valves is at the time the original installation is made . . . it will cost much less to do it at that time.

YOU HAVE TO CONSIDER THE FILTER

We can't talk about pipeline milking without talking about the filtering of milk. Most Dairymen must filter their milk . . . the law requires that. Some milking systems use a "sock filter" . . . this is a filter that is placed in the line and all milk must pass through this sleeve or sock. Some systems use a circular filter disc . . . this disc may be mounted in a holder that fits in the milk hose or in the case of the Surge Breaker Cup it can be placed in the base of the Breaker Cup. Many areas require the milk to be filtered from each individual cow and where this requirement is in force, the round filter pad is used.

More recently the "OUTSIDE-THE-SYSTEM" Filter has been developed. This system removes all filter pads or "socks" from the milking system . . . this permits a free flow of air that can remove all the filtering apparatus from the milk lines. Thus the milk flow is not forced or sucked through the filter but flows slowly by gravity through the filter. Milking is not slowed down either by the filter or by the dirt that it might pick up. On an "OUTSIDE-THE-SYSTEM" Filter there is an electrical control device that lets you know if the filter is plugged. This same "OUTSIDE-THE-SYSTEM" Filter is a C.I.P. Filter which lets it fit into our concept of an "Honest Cleaned In Place System."

I stuck these words in here because when you buy a milking system, filtering should be considered. The "OUTSIDE-THE-SYSTEM" Filter is one way you can filter on a Surge System. If you live in an area where you are required to filter the milk from each cow, then you would put the filter in the bottom of each Breaker Cup. Those Dairymen who are using the "OUTSIDE-THE-SYSTEM" Filter are very loud about how much faster they milk. It would appear that getting the filter out of the milk line is a good idea.

A MILKING MACHINE IS ABOUT THE MOST IMPORTANT THING YOU WILL EVER BUY

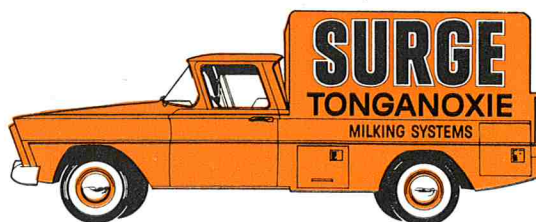
For over fifty years there have been companies springing up that offered a cheap way to milk your cows. If you look for some of these companies today, they are gone. Some went broke . . . Some found out that they couldn't sell a cheap machine and stay in business, so they got out of the milking machine business. Some hang around and try to convince dairymen that they have a new, different and cheaper way to milk cows.

There is always the "new guy" who is sure his promises will milk cows and he will take less money for his machine because "promises" are so much a part of it, and promises are very cheap. There always have been these "new guys" . . . they may disappear but there will be others who will come along.

NOT WILD BUT WISE

Buying a milking machine is a very important purchase to every Dairyman. I don't encourage wild spending . . . rather I encourage wise spending. Cheapness will not milk your cows . . . it could hurt them and it could hurt you. Take time to study very carefully what it is that is important to get when you buy a milking machine . . . then insist that you get it. It will be a very short time and you will know that the first cost was unimportant . . . but the profits that it will bring will be very important for every day, every week, every month and for many years.

Robert Mather



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