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Editorials

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Widening Opportunities for Service in 1940

Our Association, as it enters its twenty-ninth year, looks upon ever widening horizons, within and beyond which lie opportunity: opportunity for achievement, influence and distinction but, above all, opportunity for service.

Largely because two veteran members have seen a vision and given of their time and energy to a degree setting a new high in association effort, an attractive journal now is spreading our message. We have entered upon a period of unprecedented expansion. The development of the journal and growth of the association will go together and be interacting. While increase in both is highly desirable, we must not forget that a large membership and publication of a successful journal are means to an end and not ends in themselves. Strength will lie in numbers only if they are bound together by a community of interests and motivated by the spirit of service. The journal should be an instrument of the association in the accomplishment of its ends.

The "International" is not a guild or protective association but a service organization. The work already done by the Committee on Sanitary Procedure has demonstrated our capability and opportunity in the field of standardization. But if we are to function broadly and fully our efforts to secure new members should be, in a measure, selective. For example, since the fundamental purpose of milk sanitation is the prevention of human infection, we need more medical milk sanitarians.

Never should our association be allowed to become a political organization in which offices are but stepping stones for personal ambitions. Consciousness of strength must not obscure our ideals. Always must the motivating power be that spirit of service with which our founders endowed us and which, like charity, "vaunteth not itself, is not puffed up".

PAUL B. BROOKS, *President.*

The Frozen Desserts Ordinance Recommended by the U. S. Public Health Service

In this number appears the Frozen Desserts Ordinance recently issued by the U. S. Public Health Service and recommended for adoption by States and communities in order to encourage a greater uniformity and a higher level of excellence in the sanitary control of frozen desserts.

The November 1939 edition is the culmination of three years' effort represented by five earlier drafts only one of which, the tentative edition of March 1938, was publicly distributed. The ordinance embodies the best information at present available to the Public Health Service Sanitation Advisory Board on frozen-desserts-control legislation, but it should be considered subject to change as improvements are developed. In view of the accumulated demand from health officers for the early publication of a frozen desserts ordinance by the Public Health Service, the present edition was made available before the interpretative code to accompany it could be prepared, but the latter will be issued in the near future.

Various viewpoints had to be coordinated in drafting an ordinance that would be generally applicable. A number of questions were at issue. Should the ordinance provide for grading, or should it merely contain minimum requirements? Should production control of dairy products used as ingredients be provided, or is platform control at the frozen desserts plant all that is practicable at this time? Should the grade requirements or the minimum requirements apply to the frozen desserts plant or to the product itself? Under what conditions should counter freezers be permitted?

The question of grading was settled by offering two forms of the ordinance: one, a grading type which permits enforcement by degrading or permit revocation or both; the other, a non-grading minimum-requirements type enforceable by permit revocation only. The Public Health Service recommends the grading type because it offers the health officer a choice of enforcement devices and because experience with the milk ordinance indicates that violations are more likely to be punished if degrading is provided than if the only recourse is to permit revocation. The sanitation requirements for grade A frozen desserts plants in the grading form of the ordinance are identical with the minimum requirements in the non-grading form. Section 8 of the grading form offers each community the choice of recognizing both grade A and grade B plants, or only grade A plants.

While some communities staunchly advocate production control of ingredients used by grade A plants, and believe such a requirement would be practical if the ordinance allowed the industry a reasonable time to develop its ingredients shed, it was the opinion of the Advisory Board that for many communities all that is practicable at the present time is platform control at the frozen desserts plant. However, the Public Health Service urges communities which are in position to do so to undertake production control of ingredients, and a wording is suggested to implement this recommendation.

Grading of the product itself instead of the frozen desserts plant was disapproved by the Board on the grounds that the consumer judges the quality of the product by its flavor and texture, which might be different from the quality as based on sanitation requirements and might therefore discredit the latter. On the other hand, some communities believe that grading the product and permitting a plant to sell more than one grade would enable even the largest manufacturer to obtain at least a portion of his milk products from approved sources and thus permit him to produce some grade A frozen desserts, thereby removing the chief objection to production control of ingredients. A product-grading form of the ordinance can be obtained with relatively few changes, and communities desiring this form will be furnished a list of such changes by the Public Health Service.

On the sanitation requirements for the frozen desserts plant there was practically unanimous agreement. The ordinance provides special exemptions for counter freezer plants, permitting them to aspire to the highest grade. It was hoped that single-batch containers could be required for transporting mix from the place of pasteurization to the place of freezing, but this has not proved practicable to date. Pasteurization is required of all mix at 155° F. for 30 minutes.

The Frozen Desserts Ordinance recommended by the Public Health Service deserves careful consideration by all communities. It is suitable for adoption by large cities as well as small, by those which advocate grading as well as those which prefer minimum requirements, and by communities which are in position to inaugurate production control of ingredients as well as those which must for the present be satisfied with platform control.

A. W. F.

Quality Standard for the Consumer

In its inception, the public health movement was motivated by the necessity to provide safety. It was essentially an effort to combat infection, and to eliminate the ravages of disease. The discovery of vitamins and the subsequent accumulation of the present knowledge of nutrition have opened new fields in public health practice which would otherwise be mostly confined to the pursuit of its primary function of eliminating communicable disease. Instead, the objective has now become twofold, for in addition to sanitation the sound insurance of the public health has come to embody not merely adequate but rather optimal nutrition. A vigorous nation is not one protected from infection of disease only, but rather one with a stamina that is the fruition of proper diet and nutrition.

With this advent of nutrition as an essential factor in the furtherance of public health, the quality of food products has assumed an ever increasing importance. As the age of a consumer increases, his discrimination and preferences increase. Therefore, in view of the fact that population trends indicate that the average age of consumers will increase during the next few decades, the public demand for quality is on the rise.

In judging the quality of a food product, the average consumer can be influenced by the attractiveness of its price, the neatness of its appearance, not to mention its flavor or taste. While he will demand safety, his controlling indices will continue to be flavor, price, and appearance. Therefore, to attempt to tell him that milk is low in bacterial count and free from sediment will be an unconvincing argument if it does not taste right.

For example the oxidized or cappy flavors prevalent in many a low count Grade "A" milk supply were responsible for loss of patronage. Acidolphilus milk has therapeutic values universally recognized by physicians, yet unless the patient can acquire a taste for such a product, its consumption is seldom continued long enough for effective results. Soft curd milk also has advantages, particularly to those with impaired digestive systems. Yet, most dairymen recognize that homogenized milk is the best advocated form on the grounds that its processing enhances its palatability.

It is a well established trade axiom that a dairy product that is pleasing to the taste will extend the market by increasing the quantity consumed. Most of the cheesy surface taints in creamery butter during recent years have been traced to an infection from chlorinated water supplies which were safe from a public health stand-

point (and, incidentally low in standard plate count and free from coliform bacteria also). Yet such water has contaminated butter to the degree that no one could ever be convinced that such butter is fit to eat even though it is safe from a public health standpoint.

These observations all point to a danger in accepting a low bacterial count as a completely reliable index of the quality of a dairy product. Rather, they seem to indicate the need for qualitative bacteriological methods that will suggest the cause for quality defects. It is the responsibility of the milk sanitarians, as well as the industry, to insure both quality and safety. Unless they are provided, the consumption of more dairy products for more people, consistent with the objective of optimal public health, can never be accomplished. In applying the essential tests, let no one overlook the fact that the final judgment will be made not by the expert but by the consumer.

M. E. P.

Medical Examination of Food-Handlers

The routine examination of food-handlers has not given the results hoped for, and the practice has fallen somewhat into disrepute. First one community, then another have discontinued it because administration has been costly out of all proportion to the benefits derived in the protection of the public health. Dr. W. C. Earle, Champaign-Urbana (Illinois) Health District, has recently inaugurated a practice which deserves the careful consideration of all practical milk sanitarians and other health officers (1).

At the recent Dairy Manufacturers' Conference at the University of Illinois, Dr. Earle pointed out that the present trend in thought seems to be that the old medical certificate issued at more or less frequent intervals is of little value. Even if the medical examination is conscientiously made, it cannot absolutely rule out disease. "An examination of the chest with the stethoscope does not rule out tuberculosis. One or even several examinations of the stool do not necessarily rule out the typhoid-carrier state." He holds that raw milk handlers or workers in milk pasteurization plants should show a history that they have never had typhoid fever. If they have, they should be discouraged from working around the bottling, capping machines, and other places where contamination might take place. "Routine examination against typhoid would probably be worth while to prevent the worker from coming down with the disease, for he might continue to work for a week or more in the early stages and cause considerable difficulty."

By application of the tuberculin test and x-raying the positives, it would be possible to eliminate open tuberculosis. The Schick test would indicate those persons susceptible to diphtheria, and they could then be immunized. Use of the Dick technique would determine susceptibility to scarlet fever with a rash, but could not be effective for those cases which many consider to be scarlet fever without a rash.

He considers that these last two tests should be extended to the families of the employees, also. In the first days of illness, diagnosis is difficult at times, and he does not want a man to continue at his occupation while waiting for a diagnosis in his children. An added reason for including the families in the immunization is to relieve these persons from the economic burden which falls particularly severely on milk-handlers when quarantine regulations must be invoked.

This program is only just starting, so there are no data to report yet. The actual results in the Champaign-Urbana district will be awaited with interest.

J. H. S.

(1) Responsibilities of the health officer as related to the sanitary control of milk, by W. C. Earle, Dairy Manufacturers' Conference Manual, University of Illinois, Urbana, Nov. 13, 1939, p. 211.

Farm Pasteurization *

Arthur H. Williamson

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Every health official worthy of the name promotes the use of pasteurized milk. All well informed persons are spreading the gospel of safe milk, which, in the final analysis, means "pasteurized milk," because pasteurized milk is the acme of perfection in milks and is the only milk *really safe* for human consumption.

The foregoing remarks are predicated, however, on the assumption that it is properly pasteurized and subsequently protected from contamination. If it is not, the health official who recommends its use is derelict in his duty and the consuming public is laboring under a false sense of security.

In the larger cities which have full time health officers and sufficient adequately trained personnel to man a properly constituted health department, the problem of securing correctly pasteurized milk is not so great, but it is quite another matter when we consider the status of health control agencies in the average small American municipality. In these cities and towns there exist, more often than not, a part time health officer with no special training in public health and certainly no training in the technical phases of pasteurization. If he should have a sanitary officer under his supervision, more probable than not the officer is a political appointee placed on the job without regard to his qualifications, but rather because of political expediency. Upon these unqualified persons rests the responsibility of seeing that the milk supply for their particular city or town is properly processed and properly handled. This is not an isolated case, for in far too many of our smaller municipalities the situation is the same. We have plenty of so-called "pasteurized" milk in these localities, but very little *properly* pasteurized milk. This is no wonder under the circumstances, and is to be expected. Doctors, nurses, P. T. A. officials, teachers, and others in these localities are constantly urging the use of pasteurized milk, but how many "investigate" before they "recommend"? The truth is this: they know (through health education programs and in other ways) that pasteurized milk is *safe milk* and they blindly recommend its use without thought or knowledge of whether it is *properly* pasteurized. I say, here, that this tendency is dangerous to public health and particularly dangerous to pasteurization as an institution.

One of the worst milk-borne epidemics of this generation resulted from the use of so-called "pasteurized" milk. It is all right for us to make excuses and say that it was raw milk that caused the trouble in this case, and technically that is so, but what does the public think? The milk bore a pasteurized label and yet a great many persons developed typhoid fever from its use and a great many died as a result. It is entirely reasonable to suppose that public confidence in that community in pasteurized milk was severely shaken. If this sort of thing occurs often enough, even on a smaller scale, it will ultimately undermine public confidence in general and the program will inevitably suffer. I reiterate—if we are to preserve pasteurization as an institution (and this we can do only by gaining and retaining public confidence in pasteurized milk), we had better here and now "look to our laurels" and develop a system of supervision which will prevent raw milk, technically speaking, from masquerading under a pasteurized label.

Pasteurization is a technical process and even though pasteurization equipment is

* Read before the 28th Annual Meeting of the International Association of Milk Sanitarians, Jacksonville, Florida, October 25-27, 1939.

relatively simple to operate, it requires above-the-average intelligence to put out a pasteurized product with the proper cream line, with no scorched or off flavors, and which has been properly protected from contamination from the pasteurizer to the consumer. These things must be done if the program is to progress and if public confidence is to be maintained. The large city distributors usually employ competent and sufficient personnel because their large operations justify the expenditure, but what about the small operator who produces and pasteurizes his milk on the farm? It is he who deserves our special attention.

I do not know of any retail raw milk producer who has inaugurated pasteurization solely because of his interest in public health. He usually believes that his milk is the best to be procured and only resorts to pasteurization because of public demand. More than that, he is sorry for the misguided fools who prefer cooked milk (with all of its vitamins killed) to his clean fresh product just as it comes from the cow. It is no wonder then with this line of reasoning that he fails to regard seriously a variance of a few degrees from pasteurization temperature or five or ten minutes from holding time. He figures that this is the same milk which he has been selling raw for so many years, so why get excited about trifles.

PROBLEMS OF HEALTH OFFICER

The first problem then with the farm pasteurization plant operator is psychological. It is our first job as health officials not just to try, but to *change* this viewpoint. A dairy farm-hand's compensation (in the South at least) will run from seven dollars per week or even less to twenty-five or thirty-five dollars in isolated cases, the average being probably ten or twelve dollars a week. In addition, he is usually given a house, garden, milk for the family, water, lights, and wood. For this compensation, he is expected to work long hours—ten, twelve, or maybe fourteen—because more often than not the dairy farms are short-handed and this becomes necessary if the work is to be accomplished. It takes an extraordinary person indeed (more extraordinary than you and I, I fear) working under these conditions, to pay sufficient attention to plant detail to insure a properly processed and protected product. This is true even if the farm laborer is qualified by education and experience to handle the job. As a matter of fact, however, the farm hands who usually perform this part of the work are totally unqualified to handle pasteurization equipment properly and should not be entrusted with it. Another problem then concerning the farm pasteurization plant is the question of sufficient personnel and qualified personnel.

Still another problem concerning the farm pasteurization plant is the matter of adequate and proper equipment, and the upkeep of that equipment. It is quite a task as a rule to sell the farm plant owner on the idea of buying sufficient equipment to fill his needs properly. He wants to know right away if it is absolutely necessary for him to purchase this or that in order to be able to sell graded milk. It is evident from the start that he is purchasing these things not because he thinks they are necessary for the proper protection of his product, but because he *has* to do so to comply with regulations. If and when he is finally equipped and operating, it is something else again to get him to replace or repair equipment. I could not in fairness to the producer-distributor say that *all* this reluctance is due to his "psychology" or to his miserly instincts. It very often happens that these dairymen, who more often than not have been forced into the pasteurized milk business by public demand and competition, are operating on a "shoe-string" so to speak, and cannot without great sacrifice meet the demands of the exacting health officer. Under such extenuating circumstances, we as health officials are prone to "wink at" delinquency and tolerate misbranding (whether we will admit it or not).

Then, too, the question of personal hygiene is ever a problem at the small dairy farm plant. Usually there are no lockers, dressing rooms, or showers. The dairy employees do general farm work as a rule, and where this is the case it is next to impossible to get them to bathe and change clothing before starting plant operations. Such procedure takes time, and time is money on any dairy farm. They at times will not even slip on coats, aprons, or overalls to cover the dust of the fields or cotton seed meal from the feeding barns. Plant practice is the hardest item on our list of "musts" to control, and particularly is this true when the plants are small and located at divergent points and isolated places. This is the main problem (with which health officers have to contend) on farm pasteurization plants.

From the foregoing remarks I might be judged as being unfavorable to farm pasteurization. Quite to the contrary, I believe that the best pasteurized milk to be had could come from the farm plant. A producer-distributor who produces his entire supply according to accepted standards, who watches the feed of the cows and the flavor of the milk, who buys sufficient approved machinery to fill his needs, who is sufficiently and properly instructed by competent milk sanitarians, and who is painstaking in plant practices, most assuredly can put out a superb product. Where such circumstances prevail, I am heartily in favor of pasteurization on the farm, but where inspection service is totally lacking or where inspection personnel is limited or inadequately trained in milk sanitation and where adverse circumstances prevail generally, I firmly believe that farm pasteurization is a "farce" imposing on public confidence and is inimical to the best interests of our general pasteurization program. We will try to paint for you a word picture to illustrate this point. We want it distinctly understood that this picture is hypothetical. It refers to no specific town or community, either living or dead, and if it should resemble conditions in a great many communities, we assure you it is entirely coincidental. Here is the picture.

HYPOTHETICAL ILLUSTRATION

It often happens that our farm pasteurization plant operator knows nothing whatever about pasteurization except that there is a demand for pasteurized milk and that he has lost several good customers because he has been unable to supply it. The first thing he does then is to get in touch with a dairy supply salesman who has equipment to sell but who is not perchance particularly interested in the health phases of the situation. The salesman tells the farmer that pasteurization is simple—nothing to it at all!

"All you have to do," he says, "is to buy our little pasteurizer (on easy terms), a little 24-inch cooler (also on easy terms), and use the filler that you already have."

The question of a recording thermometer and cooler covers comes up too, but the farmer is assured that it is all right to dispense with these for they cost considerable money and are not at all necessary anyway. And so on with the milk pump, pipe lines, and filler covers. An air space heater is not even mentioned because the salesman possibly never saw or heard of one—so the deal is completed and the machinery installed. Up to this point the part-time health officer and the politically appointed milk inspector have not even been consulted. The shrewd dairyman, however, wants the endorsement of the health officials (for obvious reasons) so he gets them to go out and look the situation over. Well, things look all right to them except that the cow lot fence must be moved back 148½ feet, and the manure pile back to 100 yards. The manure too must be hauled away every fourteen to twenty-one days to prevent the breeding of flies. The health officials also look at the spring. It is in a marsh at the bottom of the hill and the marsh overflows at times, but the water has been tested and it stacks up all right—so that's all settled. Then, too, there must be a sanitary privy on the premises—so the W. P. A. builds that. He is now ready to do business, for his Grade "A" Pasteurized milk caps were

ordered the very first thing. So he proceeds.

He pours the milk into his little pasteurizer and turns on the heat. He casts his eye eventually at the *one* thermometer, and sees that it is registering somewhere in the neighborhood of 140°. That's close enough, for *this* milk is good enough to be sold raw anyway. He then holds it for a "spell" (he doesn't know how long for he hasn't a watch nor has he a recording thermometer), but not *too* long because he has a cold and a sore throat and this coughing and sneezing he is doing is getting bothersome. He hurries in order that he can go to the house to eat some sugar saturated with kerosene oil and turpentine for he knows this is a "sure shot" remedy for colds. He has no sanitary milk pump or piping so he reaches out for the most convenient receptacle for catching the milk as it comes from the pasteurizer. This happens to be a covered milk pail recently used in the milking barn. He rinses this out with cold water and proceeds to fill it with pasteurized milk. This he transports across the room or maybe into another room and pours it over an open cooler. He always turns his head away from the cooler when coughing or sneezing, however. He then catches the cold milk from the cooler in a three-gallon can and transports it back across the room and pours it into an open bottle filler. He caps the milk with a three-colored pasteurized milk cap, and to be *sure* the milk is properly protected, puts a cellophane hood over that. There is just one other thing he has to do now before delivering that milk to the 5th Street Graded School. He goes into the house and gets his laboratory report showing that his bacterial count is 1763. He is going to show this to the School Board and to the Parent-Teacher Association officials, for to his mind *and theirs* this is *conclusive* evidence that this is milk "par excellence". They *know* it is safe milk because it is *pasteurized*.

New Food, Drug, and Cosmetic Act and Regulations

The U. S. Department of Agriculture has recently published the text of the Federal Food, Drug, and Cosmetic Act, as amended, together with general regulations for its enforcement. The publication also contains the texts of the acts of July 24, 1919, March 4, 1923, and August 27, 1935, respectively, defining wrapped meats as in package form, defining butter and providing a standard therefor, and providing for the inspection of sea food. These latter acts remain in force, and are applicable to the provisions of the Federal Food, Drug, and Cosmetic Act.

Separate publications, to be issued from time to time, will contain special regulations with respect to definitions and standards for products and procedures covered by the Act.

Copies of this publication can be purchased from the Superintendent of Documents, Washington, D. C., price 10 cents.

Flavors and Odors of Milk *

C. J. Babcock

Bureau of Dairy Industry, U. S. Department of Agriculture

The milk inspector is primarily interested in the flavor of milk because of its direct relation to the consumption of milk. Off-flavored milk may be safe for human consumption but such milk will not be consumed in sufficient quantity to improve or even maintain the health of our nation. The daily per capita consumption of milk in this country today is approximately 0.7 of 1 pint. It is agreed by health authorities and dietitians that this is too low. Furthermore, we owe a large proportion of this per capita consumption to the medical profession. They have insisted that the diet of infants and children shall be made up largely of milk. Were it not for this fact I shudder to think of what the per capita consumption would be. In other words, we owe our present per capita consumption of milk largely to those who have no choice in the matter. If we are to increase the per capita consumption of milk, we must extend its use among those who select their own diets. Placing on the market milk of such flavor that it appeals to the appetite would tend to stimulate increased consumption of milk.

If the milk inspector is to fulfill his responsibility and aid in increasing the use of milk by improving its flavor, he must become familiar with the off flavors frequently encountered in milk and how to avoid them.

In discussing flavors in milk it should be remembered that abnormal flavors in milk are due to one of four causes: 1, physical condition of the individual cow; 2, highly flavored feeds and weeds; 3, odors absorbed by the milk during or after milking; and 4, biological and chemical changes in the milk. For the purpose of determining the source of abnormal flavors these four causes may be divided into two groups, for those flavors caused by the physical condition of the individual cow and by highly flavored feeds and weeds are present as soon as the milk is drawn, whereas those caused by absorbed odors and by biological or chemical changes usually do not appear until some time has elapsed after the milk has been produced.

ABNORMAL FLAVORS

Of these four causes of abnormal flavors in milk, strong-flavored feeds and weeds are the cause of a large percentage of the off flavors found in milk as delivered by producers. There are a great number of feeds and weeds that impart their flavor to milk. Experimental work conducted in the Bureau of Dairy Industry has brought out several interesting facts concerning the transmission of feed and weed flavors to milk (3). Other research workers (4), using some of the same as well as other feeds, have verified the results obtained in the Bureau.

It has been shown that: Most feed flavors are more pronounced in the cream than in the milk from which the cream is taken. Proper aeration reduces strong off flavors and odors in milk caused by feeding highly flavored feeds, and some of the slight off flavors and odors may be eliminated. Feed flavors generally are less pronounced in pasteurized milk than in the same milk before pasteurization. Of greater importance, however, is the fact that feed flavors are transmitted to milk mainly through the body of the cow and, as a rule, only for a few hours after the cows consume the feed. Because of this fact most highly flavored feeds can be fed immediately after milking without affecting the flavor of the milk produced

* Read before the New York State Association of Dairy and Milk Inspectors, Syracuse, N. Y., September 27-29, 1939.

at the next milking. In fact, in the case of green alfalfa, it has been shown that changing the time of feeding from one hour before milking to three hours before milking, decreased the intensity of the abnormal flavor, and feeding five hours before milking practically eliminated it. On the other hand, large quantities of feeds like cabbage and turnips, even though fed immediately after milking, may at times slightly taint the flavor of the milk produced at the next milking. These taints, however, are slight and would seldom be noticed by the average consumer. Feeds that had only a slight effect when fed before milking had no detrimental effect when fed after milking.

Feeding experiments with garlic (5) showed more conclusively that feed flavors enter milk mainly through the body of the cow. These experiments also showed the time required for flavors to enter the milk. This work showed that garlic flavor and odor can be detected in the milk when the milk samples are taken one minute after garlic is fed. The intensity of the garlic flavor increases and at ten minutes after feeding a high degree of intensity is reached. Garlic flavor is present to a very objectionable degree in milk from cows that have consumed one-half pound of garlic four hours before milking. Milk drawn seven hours after the cows consume one-half pound of garlic is practically free from garlic flavor. Strong garlic flavor is found in milk drawn two minutes after the cows inhale garlic odor for ten minutes and practically disappears in ninety minutes after such inhalation. Garlic odor is readily perceived in samples of blood drawn thirty minutes after the cows are fed two pounds of garlic tops, and strong garlic odor is present in the blood drawn forty-five minutes after such feeding, indicating that the flavor is transmitted by the blood to the udder.

Work with bitterweed further confirmed the fact that flavors enter milk mainly through the body of the cow. This weed is frequently found in southern pastures and although it is practically odorless, it imparts its flavor to the milk when the cows eat it. Work with this weed also showed it to be an exception to the usual rule "That feed flavors are more pronounced in cream than in the milk from which the cream is taken," the flavor produced by bitterweed being more pronounced in skim milk than in whole milk and much less pronounced in the cream than in the skim milk. It further showed that there also may be exceptions to the rule that "feed flavors are not imparted to milk except for a few hours after feeding." When cows consume ten pounds of bitterweed, the flavor is present in the milk produced twenty-four hours later, but milk produced twenty-seven hours later is practically free from a bitter flavor.

In our opinion the absorption of odors as a source of abnormal flavors in milk has been over-emphasized. Experimental work has shown that even under extreme conditions milk produced in a silage permeated atmosphere was seldom sufficiently tainted so that a silage flavor could be detected in the milk. If under extreme conditions sufficient silage is not absorbed so that it can be identified in the milk, it appears as though we should encounter but little trouble from this source when milk is produced under normal conditions. This does not mean, however, that we should neglect this source of abnormal flavored milk, for milk does absorb odors.

The physical condition of the individual cow may be the source of various abnormal flavors in milk. A salty taste is frequently observed in milk from certain cows that are advanced in lactation and also from one or more quarters of udders previously affected with mastitis. The first type of salty milk may be detected by examining for taste the milk of all cows advanced in lactation. After cows producing such milk are identified they should be removed from the milking herd. Saltiness of milk resulting from mastitis is more easily detected from the appearance of the milk itself, and it goes without saying that mastitis milk should be eliminated. We seldom find mixed milk with a salty taste because of the dilution of abnormal with normal milk.

Individual cows are frequently encountered that produce milk which becomes rancid a few hours after production. This is usually cows which have been milked for longer than the usual lactation period, but occasionally appears in the first month of lactation.

This rancidity is caused by the enzyme lipase. Cows producing such milk should be detected and removed from the herd; for, unlike salty milk, which loses its identity, rancid milk will cause a much larger volume of milk to become rancid.

Biological action is the source of more abnormal flavors in milk than the physical condition of the individual cow. But the flavors produced are similar in that they vary over a wide range and it is impossible to tell what flavor may be expected from biological action. The flavors most frequently produced by biological action are usually termed bitter and unclean. The flavor is most frequently due to putrefying bacteria and these usually find their way into the milk from unclean utensils or through other insanitary methods of production. The remedy therefore is to see that all utensils with which milk comes into contact are thoroughly washed and treated to kill bacteria and to use other sanitary methods of production.

Briefly summarizing, abnormal flavors in milk, as delivered by the producer, may be prevented by adopting the following practices: Feed all highly flavored feeds immediately after, never just before, milking. Remove cows from weed-infested pastures from 4 to 7 hours before milking. Use dairy utensils which have been properly washed and treated to kill bacteria. Milk in a clean, well-ventilated stable and properly aerate the milk immediately after milking. At frequent intervals examine for flavor the milk of individual cows and remove from the milking herd all cows producing abnormally flavored milk.

OXIDIZED FLAVOR

A discussion of flavors in milk would not be complete without mentioning oxidized flavor. This flavor was formerly referred to as cappy, cardboard, metallic, etc. At present this flavor is undoubtedly causing more grief in the milk business than any other one flavor. It is comparatively new. A few years ago it was seldom encountered except in certified or other high-quality milk. With an improvement in the bacterial quality of our milk supplies it has gained prominence with pasteurized milk. I believe that it is retarding the use of pasteurized milk in our smaller communities. I know that in some of these communities an oxidized flavor is associated with pasteurization to such an extent that it is believed that this flavor is typical of pasteurized milk. As long as this condition prevails, consumers are not going to take kindly to pasteurized milk.

An oxidized flavor in milk is most frequently due to contamination with copper, the copper acting as a catalyst which brings about the oxidation. Greenbank (7) is of the opinion that the flavor is due to a mild chemical oxidation controlled by the oxidation reduction potential of the milk. The copper functions by increasing the oxidation reduction potential to a point where oxidation takes place. Formerly it was believed that the butterfat of the milk was oxidized. At the present time it is a debatable question among research workers as to just what constituent of milk is oxidized. Evidence now points to the fact that it is not the fat (7, 11). Thurston and coworkers (15) have postulated that the lecithin of the adsorbed layers on the fat globules is the substance affected, and Greenbank (7) concluded that it was probably due to the oxidation of one of the minor constituents of milk which may be associated with the fat phase.

Kende (12), Guthrie and Brueckner (8), Greenbank (7), Brown, Thurston and Dustman (6), and others have shown that some milks develop oxidized flavor without contamination with metal. This has led to the belief that there are causes other than metals for the development of this flavor. Kende (12) believed that an enzyme which he called oleinase to be necessary for oxidation and Thurston

(17) suggests that the enzyme found by Sharp (14) to cause the oxidation of vitamin C might also be concerned in the development of oxidized flavor.

It is therefore evident that as yet we are not in a position to state exactly what happens when milk develops an oxidized flavor. Further research is necessary before we can definitely state what constituent or constituents of milk are oxidized. Likewise further research is necessary before we can enumerate all of the conditions under which milk may develop an oxidized flavor.

Considerable research has been done to determine ways and means of preventing an oxidized flavor in milk. In many cases the results of different workers seem to be in conflict. As a rule, however, closer analysis shows that each has accomplished the same general result but in a different manner.

PREVENTION OF OXIDIZED FLAVOR

Some of the methods which have been advanced for preventing oxidized flavor in milk are as follows: Kende (12) found that oxidized flavor could be prevented by the growth of micro-organisms. Tracy et al. (18) have shown that the incubation of either raw or pasteurized milk at either 68° or 80° F. for a few hours greatly reduces its susceptibility to oxidized flavor development. Anderson et al. (1) concluded that oxidized flavor in pasteurized milk may be associated with the apparent acidity of milk. That neutralizing high-acid milk to 0.145 percent acidity or lower was effective in the prevention of oxidized flavor in pasteurized milk. Several investigators, including Tracy, Ramsey, and Ruehe (18), Thurston and coworkers (16), and Ross (13), have shown that homogenization either prevents oxidized flavor or reduces the susceptibility of milk to this flavor. Many investigators have noted that the oxidized flavor was less prevalent during the summer months than during the winter months and have concluded that green feed, usually pasture, has the effect of reducing or eliminating susceptibility. Anderson (2) eliminates oxidized flavors in milk by controlling the feed of the cow and believes that carotene or vitamin A is the controlling factor. He further states "We feel vitamin C, ascorbic acid, is not the factor responsible for good milk." On the other hand, Brown et al. (6) report that the feeding of tomato juice or lemon juice reduces or eliminates susceptibility and have explained this effect on the basis of the vitamin C contained therein, since they found that the feeding of 0.5 gram of ascorbic acid daily greatly reduced susceptibility. Methods of handling or processing the milk have also been considered. Greenbank (7), from his work, concluded that aeration and pasteurization prevent the development of the flavor unless excessive amounts of copper are present. Guthrie, Hand, and Sharp (9) found that the destruction of ascorbic acid and the development of the oxidized flavor are largely or completely prevented by removing the dissolved oxygen from the milk. They are now perfecting a commercial deaerator.

Time will not be taken to discuss the merits of these various methods of reducing the susceptibility of milk to the development of an oxidized flavor. It is evident that some of them must fail to meet the approval of the milk inspector. The practicability of others may be questioned. Each of the methods, however, has contributed to our knowledge concerning this flavor. In nearly every case what has happened is that the copper tolerance of milk has been increased so that it will withstand slight contamination with copper without developing an oxidized flavor. The fact still remains, however, that although one milk may be more susceptible to oxidation than another, all milk will develop an oxidized flavor in the presence of a sufficient quantity of copper.

It is evident that more research work is necessary before the question of oxidized flavor in milk is completely solved. Meanwhile, we must use our available knowledge to keep that flavor under control. We know that copper is the chief source of this trouble and that some other metals

(10) have a similar effect on milk. We know that it takes more copper to produce an oxidized flavor in some milk than it does in other milk. We know that the milk from some individual cows develops an oxidized flavor without the presence of added copper. Mixed milk, however, as received at a milk plant very seldom develops an oxidized flavor unless there is some contamination of the milk with copper. Therefore our best preventative at the present time is to prevent our milk supplies from becoming contaminated with copper or any of the other metals which may be the source of this flavor.

It is sometimes difficult to locate the source of oxidized-flavored milk. It may be a copper union in the milk pipe line. It may be due to the use of a copper alloy which has been used in some piece of equipment. The flavor may appear intermittently, depending upon the temperature of the milk at the time it comes into contact with a copper or copper-alloy surface. If the milk is what may be termed "susceptible" to the development of an oxidized flavor, minute quantities of copper will be sufficient to bring about the flavor. Manufacturers of dairy equipment are rapidly getting away from the use of metals which are likely to promote the development of this flavor. Dairy inspectors should encourage the discarding of utensils and equipment which may contribute to the development of an oxidized flavor, both on the farm and in the plant.

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Precision in Reading the Results of the Phosphatase Test *

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The sensitivity and precision of the phosphatase test as a routine procedure for the detection of pasteurization of milk have been well established by general use throughout the country. The technic as at present developed requires a colorimetric determination of the amount of phenol liberated by the active phosphatase enzyme in a given sample and thus of the degree of pasteurizing treatment. The color developed in the test is a blue varying in intensity but not in shade with changes in the amount of phenol released.

Several different methods of recording this color have been suggested (1, 2, 3). Kay and his collaborators (1,2) recommend the use of a Lovibond tintometer to measure the number of units of color in a test portion. The technic adopted as a tentative standard method by the Association of Official Agricultural Chemists (3) substitutes for the tintometer a set of permanent color standards prepared by blending inorganic colored solutions. The colors so obtained are not exactly the same as those resulting from treatment of known phenol solutions with the Folin reagent but have been prepared so that there is equal light absorption through a depth of solution of exactly 13 mm. in both test portion and standards. Any variation from this depth will lead to erroneous results, since the rate of light absorption is not the same for standard and test portion at any other point. Standards prepared from a phenol solution of known concentration provide a more satisfactory color comparison, but unfortunately they fade rapidly. The use of the permanent standards is facilitated if comparisons are made against an opaque blue glass plate to reflect the light from either a natural source or from a daylight electric lamp through both standards and test portion. They may be stored for long periods without deterioration. Unfortunately, they are difficult to prepare since they require the use of three solutions that must be made and blended with great precision.

As with all colorimetric tests, the accuracy of the readings is dependent upon the sensitivity of the eye in detecting minor variations in depth of shade. The routine use of these standards, however, has proved their value, particularly when used by persons not experienced in colorimetric comparisons. Standards prepared from calibrated phenol solutions or the permanent color standards can be used with the usual type of laboratory colorimeter. Although the results are perhaps more precise than those made with the eye, the procedure is time-consuming and not well adapted to routine work, and, as with the tintometer, the colorimeter is often not available in many laboratories.

A photoelectric colorimeter has frequently been advocated for reading results of the phosphatase test (4, 5) since it eliminates possible error due to lack of sensitivity of the eye to detect color differences. Burgwald has reported its satisfactory use with the official test of the Association of Official Agricultural Chemists and, also, that with some variations in the technic, similar results were obtained with the modified test of Scharer. He further indicated that it was not a more effective means of color comparison than the use of color standards, but if properly calibrated it eliminated possible error due to the human element.

The General Electric Company has recently developed a small photoelectric colorimeter known as a "Luximeter" for use in making color comparisons required by the phosphatase test. This instrument consists of a photoelectric cell, a screen for filtering the light, a tube for holding the sample, and a light meter with a scale graduated from 0 to 100 for indicating the amount of light transmitted through the sample. The source of current can be either a three-cell dry battery or the usual lighting circuit reduced in voltage by use of a suitable transformer. The apparatus permits of examination of one test portion at a time.

Through the courtesy of the General Electric Company, a Luximeter was made available to the Division of Laboratories and Research for study. To calibrate the instrument, it is first necessary to adjust the light meter to the reading of maximum light transmission (100 on the scale), using a tube of distilled water in place of a sample. Solutions of varying phenol concentration in distilled water were prepared from a stock solution of phenol accurately standardized by the method of Koppeschaar. They were treated with Folin reagent, using the technic of the official test, and the values of each on the light meter in the Luximeter noted. The results of this study are shown in Table 1 and have also been prepared graphically in Diagram 1. Analysis of the table indicates that, using the Luximeter, it is possible to determine amounts of phenol varying from 0 milligram to 0.15 milligram per 0.5 ml. of milk, and that the changes in the Luximeter reading for increments of phenol concentration are sufficiently great to permit interpolation between the amounts represented by the permanent standards. To determine whether any difference in the standardization of the instrument would occur when the source of current was a dry cell battery or the lighting circuit, both were used. The results are also shown in Table 1 and indicate no significant difference in the Luximeter readings with the two sources of electric current.

This instrument has been used for reading the results of the phosphatase test in comparison with permanent standards and a blue glass plate for reflecting the light from a daylight lamp. The results given in Table 2 show a very close comparison between the two readings. The readings with the colorimeter are not sufficiently more precise to be of significance, but do

* Presented at annual meeting of the New York State Association of Dairy and Milk Inspectors, Syracuse, New York, September 27, 1939.

TABLE 1

Calibration of Luximeter

Tentative standard method of Association of Official Agricultural Chemists			Rapid phosphatase test Health Department of the City of New York		
Phenol	Scale readings		Phosphatase	Scale readings at 15 minutes	
Mg./0.5 ml.	Dry cell battery	Transformer	Units	Dry cell battery	Transformer
0.0	85	84	1.0	86	86
0.01	73	72	2.0	80	80
0.02	64	63	3.5	74	73
0.03	56	56	5.0	66	66
0.04	50	50	7.5	57	58
0.05	45	45	10.0	51	51
0.06	40	40	15.0	41	42
0.09	29	29	20.0	37	36
0.12	20	20	25.0	33	33
0.15	15	14	50.0	26	26
			100.0	22	22
			500.0	20	20

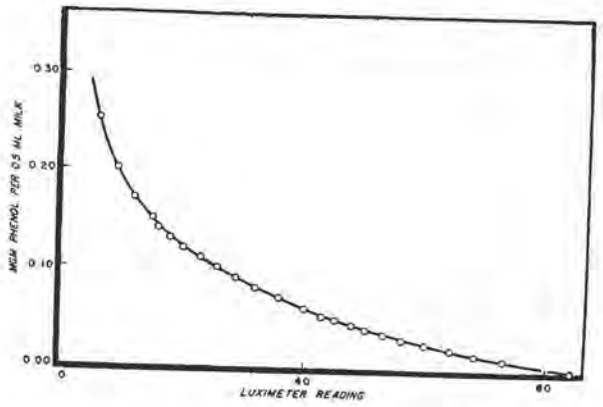

Diagram 1
Calibration of Luximeter. Tentative standard method of Association of Official Agricultural Chemists.

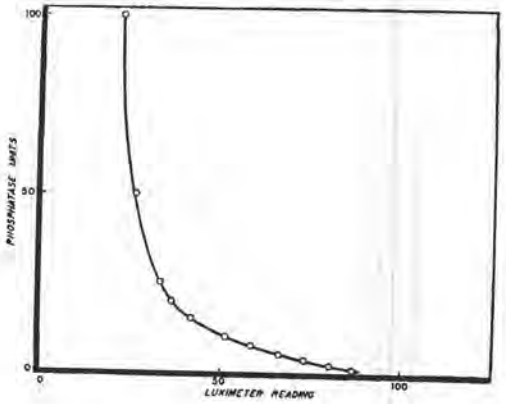

Diagram 2
Calibration of Luximeter. Rapid phosphatase test, Health Department of the City of New York.

TABLE 2

Comparative results of phosphatase test
Tentative standard method of Association of Official Agricultural Chemists

Readings with permanent standards		Readings with Luximeter					
		Scale readings			Phenol Mg./0.5 ml.		
Number of samples	Phenol Mg./0.5 ml.	Max.	Min.	Aver.	Max.	Min.	Aver.
11	0.01 to 0.02	70	58	66	0.025	0.015	0.017
2	0.025 to 0.03	57	56	56.5	0.03	0.03	0.03
2	0.04	50	50	50	0.04	0.04	0.04
2	0.05	45	44	44.5	0.05	0.05	0.05
3	0.07	34	31	33	0.08	0.07	0.075
8	0.08	32	28	30	0.09	0.08	0.09
3	0.13	21	19	20	0.12	0.12	0.12
2	0.15 to 0.16	15	14	14.5	0.15	0.15	0.15
3	0.19	10	9	9	0.20	0.20	0.20

eliminate possible error due to inability to detect blue color accurately, or to fading or other change in the standards.

The Luximeter has not been in use long enough to indicate any possible change in the standardization due to deterioration of the photoelectric cell. If the battery is used, it has been found that when this is nearly exhausted there is a distinct fluctuation in the readings. If the house circuit with transformer is used, such error will not occur.

Further use of the Luximeter has indicated another possible error in readings, since if the tube used to contain the test portion is not scrupulously clean or if it is scratched or etched, the amount of light transmitted will be altered and thus incorrect results will be obtained. Table 3 illustrates the effect of using such etched tubes. As would be anticipated, the error is greater in the lower concentrations of phenol. Unfortunately the Luximeter as at present constructed does not eliminate possible scratching of the glass tube as it is inserted into or removed from the socket of the instrument. Differences in the color and thickness of the glass of individual test tubes will also contribute to variations in the readings.

The value of the phosphatase test lies in the differentiation of pasteurized milk from that which has been undertreated for five or more minutes, at a lowered temperature of one or more degrees, or to which small amounts of raw milk have been added. Experience to date has indicated that these variations in treatment can readily be detected by the use of the permanent color standards. Pasteurized milk containing 0.1 percent or less of raw milk cannot always be detected, however, and if the determination of this small quantity of added raw milk is considered of importance, it is possible that a slight difference between the color of such samples and that of milk completely pasteurized can more readily be detected with a photoelectric colorimeter than by use of the standards.

The Luximeter has also been used for reading results of the modified phosphatase test developed by Scharer, and since the color developed in this test is also a blue, it has been found to give satisfactory results, as shown in Table 4, when

TABLE 3

Effect of test tubes on precision of Luximeter readings

Phenol Mg./0.5 ml.	Luximeter scale readings										
	Clean tube	Etched or soiled tubes									
		1	2	3	4	5	6	7	8	9	10
0.04	50	44	43	43	44	45	43	46	45	44	46
0.07	37	36	35	34	35	34	37	35	34	35	35
0.13	17	16	16	15	16	16	14	16	16	15	16
Distilled water	100	94	95	94	96	98	92	94	98	92	98

TABLE 4

Comparative results of rapid phosphatase test
Health Department of the City of New York

Readings with permanent standards		Readings with Luximeter					
		Scale readings			Phosphatase units		
Number of samples	Phosphatase units	Max.	Min.	Aver.	Max.	Min.	Aver.
16	<2.0	82	72	78	3.5	2.0	2.3
2	2.0	76	73	74.5	3.5	3.5	3.5
1	2.5			76			3.5
2	3.0	76	71	73.5	3.5	3.5	3.5
6	3.5	79	74	76	3.5	2.0	3.3
7	4.0	72	69	71	3.5	3.5	3.5
3	4.5	68	66	67	5.0	5.0	5.0
12	5.0	69	62	64	5.0	3.5	4.9
5	6.0	68	48	60	10.0	5.0	7.0
3	7.5	58	53	55	10.0	7.5	8.3

the details of the technic, particularly the reaction time of the indicator and the phenol, are followed strictly. The standardization of the instrument for the New York City laboratory test is shown in Table 1 and Diagram 2.

SUMMARY

The various methods for making the colorimetric determinations required by the phosphatase test have been studied. The use of permanent standards prepared from inorganic colored solutions has been found to yield accurate results when the essential conditions of depth of color solution and a blue glass plate for reading the colors are observed. Variations from these conditions and lack of sensitivity of the eye to detect color differences will lead to errors in the results.

The use of a photoelectric colorimeter for reading the final results will eliminate error due to the human element and to fading or other changes in color standards. A simple photoelectric colorimeter for use with the phosphatase test, developed by the General Electric Company and known as the "Luximeter", has been calibrated in terms of milligrams of phenol per 0.5 ml. of milk and also in terms of the enzyme units used for reporting the results of the phosphatase test modified by the Department of Health of the City of New York. This instrument has been found to give results with the official and modified phosphatase tests that agree closely with those obtained with the permanent color standards.

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Dr. Workman Appointed Deputy Dairy and Food Commissioner of Connecticut

Dr. T. W. Workman, an associate in the Department of Bacteriology at Yale University and a graduate student there, has been appointed Deputy Dairy and Food Commissioner of the State of Connecticut by Governor Raymond E. Baldwin. At present Dr. Workman is doing research work on the pasteurization of milk in cooperation with the Milk Research Council (see this Journal, 2, 214). He is also associated with Professor Leo F. Rettger in the bacteriological department of Sterling Hall of Medicine at Yale. Dairy and Food Commissioner E. G. Woodward states that Dr. Workman, who has had practical experience in farming, will direct most of his attention to research work. He will handle specific problems of the milk industry, with special attention to bacteriological studies. Dr. Workman assumes full time incumbency on January 1, 1940.

Inasmuch as the Dairy and Food Commission is so closely related with the Connecticut Association of Dairy and Milk Inspectors, it is particularly gratifying to note that this position is being filled by so capable a scientist who has shown his interest and understanding of dairy problems from the standpoints of the laboratory as well as the industry.

The Training of Personnel for the Field of Milk Sanitation

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NECESSITY FOR TRAINED PERSONNEL

The very best of legislative acts are worthless if means are not provided for carrying them out properly. This applies in the field of milk sanitation as well as elsewhere. The most perfectly worded codes and ordinances drafted by the best minds are valueless in furthering milk sanitation and the quality control program of the milk industry unless means are supplied for their execution and enforcement. To most people this means appropriate funds; yet, although funds are an invaluable complement to proper means, they are valueless if not put to use by a trained staff of workers. On the other hand, a trained personnel in a milk control division or creamery can do much to further milk sanitation even with quite limited budgets. Of first importance, then, in a milk control program is a trained staff; second, sound laws for it to administer, and third, adequate funds for their execution.

Administrative bodies and the dairy industry itself are coming to realize more and more that sanitarians, local and state inspectors and supervisors, and the key men in the now highly-mechanized milk plants and creameries must be men trained in their profession if the great program of improvement in milk and dairy sanitation is to continue in this country. No longer is it desirable to require a general inspector to inspect meat and poultry on Monday, restaurants on Tuesday, and creameries on Wednesday. For each kind of work, a trained inspector is essential to an efficient health department. The milk and dairy inspector must be especially trained to do a proper job. He must not only be thoroughly familiar with the general aspects of the dairy industry, but it is becoming increasingly important that he have a firm grasp of the complicated technical aspects of creamery and dairy operations. He must know what is good and what is bad construction and hook-up of milk plant equipment. He must have a clear conception of the theory and practice of pasteurization, and be thoroughly versed in modern methods of sterilization. The day of the milk inspector or supervising inspector, serving as a political appointee with little knowledge and real interest in the important field of milk sanitation, is definitely past. Today, the work requires men who have an intelligent grasp of the basic theories and principles which underlie the sanitary laws they are to enforce.

The milk industry faces similar conditions. The pasteurizer operator who does not understand thoroughly the theory and practice of the pasteurization process is a liability. Milk companies that install new and expensive equipment and expend money in advertising safe milk should not entrust the pasteurizing process, the one operation in the entire plant which has the greatest public health significance, to an individual who may not realize the potential danger of reduced holding time or insufficient temperature. If he does a poor job, it probably is not his fault but due to lack of intelligent understanding of and adequate training for the work. The same thought applies to the laboratory technician doing quality control work in the milk plant day after day. He may turn out a great deal of work but its potential value in actually helping to control the quality of the plant's products is too often lowered by slight but important errors in methods. The personnel doing quality control work

must not only know what to do but how to carry out each step properly.

It seems strange, in view of the great forward strides in methods of production which the industry has taken in the past decade and the strides science has made in ways and means of control, that so little attention has been paid to putting this knowledge to work by trained personnel. Strange that it is still possible to find the laboratory man in good creameries blindly following Standard Methods but never realizing that letting his samples stand over the noon hour in the dilution water is seriously affecting his results. Strange to find the pasteurizer operator who does not have any idea why he holds 30 minutes, who never heard of standard thermometers for checking and calibrating working instruments. Strange to find the city inspector who never learned to use a chlorine test kit, who does not understand the essentials of the phosphatase test, who is not familiar enough with the assembling of equipment to demand proper dismantling for inspection. The field is full of honest, willing, but untrained workers.

TEXAS REQUIREMENTS

The powers that be, industry and legislative bodies, have a dual responsibility. First, to see that there are licensing and permit laws to prevent the untrained worker from entering the field of milk and dairy inspection; second, to supply the means for the inadequately trained worker now employed to secure such training as is necessary to qualify him for good work.

Among the many states beginning to realize this responsibility is Texas. To administer efficiently her uniform code law, she acknowledges the need of an adequately trained staff. Therefore, training schools for milk inspectors were established and registration offered those who possessed the proper qualifications.

Three grades of registered inspectors were created; full grade, associate grade, and assistant grade. Registration is dependent upon the passing of a voluntary examination with a rating of not less than 70 percent. This examination is divided into three sections: a weight of 25 percent is allowed for appropriate education; 25 percent for experience; and 50 percent for a written test based on the U. S. Public Health Service Milk Ordinance and Code. For the full grade, the candidate must be a college graduate with work in milk sanitation and analysis, and must have had at least five years experience in inspectional work, at least two of which must have been in Standard Ordinance work. For the beginning or assistant grade, education may consist of the minimum of a high school education including work in science and chemistry. The experience requirement is waived but a satisfactory grade must be made in the written test.

In the spring of 1938, the first examinations were offered following three-day short courses at both Texas Technological College and Texas A. and M. College. In October 1938, the examinations were held in connection with the T. P. H. A. annual meeting and again in the spring of this year following short course periods of instruction at the colleges. To date, 23 individuals have successfully completed requirements for full grade sanitarian, 13 for associate grade, and 101 for assistant grade, and are on the state's list of Registered Dairy and Milk Inspectors. There is no obligation on the part of a municipality to hire registered inspectors, although something of the sort will undoubtedly come in time. It is only pointed out that these men are probably best fitted to do a satisfactory job and, are therefore, recommended for preference in placement. Further schools are being planned so that those inspectors now in service, as well as new candidates, may have the advantage of specific training in the methods of inspection which Texas has chosen.

In keeping with the idea of a trained personnel, Texas has in the past sent promising young men for graduate study in Sanitary Engineering at Harvard University, and others to the course for sanitarians at Vanderbilt University. Nurses have been sent to George Peabody College for specific public health training. Counting those who entered classes the past fall, Texas has sent 45 individuals for special health training. All expenses are paid and a living salary besides. These people return to be placed in the State Department of Health or in County Health Units so that eventually the entire Health Department field staff will have had specialized training for their work. The course at Vanderbilt includes milk sanitation and milk inspection, and from this group the District Health Milk Sanitarians are selected.

Supplementing this out-of-state training, the Health Department in cooperation with the Department of Vocational Education and the Texas Technological College last summer sponsored an eleven weeks school in Public Health for county and city health workers, and this year the school is being repeated. Milk Sanitation is one of the many subjects studied, and a total of 28 persons attended the first session of the school. This year San Antonio has two general sanitarians and one milk sanitarian attending this school on pay.

Still another educational program is that of the Department of Vocational Education which sponsors itinerant instructors who give series of nightly lectures in one city after another over the state. These series usually consist of six lectures each on various public health subjects and consume about two weeks. Milk sanitation is one of the subjects discussed and, as an inducement for faithful attendance, this is rewarded by issuance of a certificate. In this way local inspectors and the men in the industry interested in inspectional work have an opportunity to hear the latest information and to discuss their problems with an authority.

In these ways Texas is attempting to train her personnel and educate her industry in proper milk control and sanitation. What of other states?

PRACTICES ELSEWHERE

Some of them have similar systems of training workers. In general, public health education is progressing rapidly. While in 1936 only 134 individuals received higher degrees in Public Health from institutions in the United States and Canada, in 1937 their number increased to 356. Indications are that the figure will be still higher for 1938. However, Baltimore was the only city of which we could learn with a functioning training school for dairy inspectors.

Baltimore's system is unique and interesting. Her city milk ordinance requires that all milk plants shall establish a plant inspection system approved by the Commissioner of Health. Under their system, the representatives of the various milk plants are approved after they have satisfactorily passed an examination at the completion of their training course. We are advised that in practice this system has been fairly successful although the constant movement of employees from one plant to another is beyond the city's control. Their training course is given annually, and covers, besides a study of the local ordinances, such subjects as: the physiology of milk production; creamery sanitation; pasteurization and its relation to public health; thermometers, their construction and use; proper washing and sterilizing methods; creamery equipment operation; milk and cream sampling; and the practical bacteriology of milk. Epidemics are also studied in relation to milk production, and the personal qualifications of a good inspector are frankly discussed. This is a very comprehensive course which cannot fail to raise the standards of milk sanitation in a city.

We understand that Portland, Oregon, contemplates a similar school but as yet has not been able to organize one. Also Michigan has given the subject much thought even to the extent of formulating an unofficial outline of study including the following subjects: dairy bacteriology; sterilization; milk borne diseases; clean milk production; and pasteurization. In mentioning these particular instances, we do not mean to slight other states or cities which may have made similar progress but we do wish to stress the point that a trained inspectional force is indispensable to a completely

satisfactory milk control program and that local health authorities have some responsibility in making the necessary training available.

LICENSING REQUIREMENTS

At present it is too early to require licensed personnel everywhere but that step must come eventually if the program is to go on. Dairy and milk inspection and sanitation is today a specialized, technical subject, requiring adequate and specialized training, together with experience. To insure this, licensing seems the obvious method. Competent men must carry out this work if the public health is to be protected. In the last analysis, that is the prime moving reason for all milk ordinances and dairy inspections. The protection of public health is the basic reason for the existence of milk sanitarians. Elaborate books full of "dos" and "don'ts" help but little if the most important link in the chain of safe milk production has been neglected.

A certain city holds examinations for milk plant operators and one of the questions is: "Who is the most important plant employee in guarding Public Health"? And they give the correct answer as "The pasteurizer". All previous inspections, all future care is to no avail if he does not perform his task correctly. The responsibility upon his shoulders is great. To carry this, not only should he know the correct mechanical operation of his equipment but he should be conversant with the reasons for and the actual methods of pasteurization. Do we examine him to see if he meets these requirements? Unfortunately, no. A milk plant employs a licensed Babcock tester, engineer, weigh-master. These men can save or lose money for the company; they enter the economic picture. Imagine the folly of employing an incompetent fat tester! But the man who deals in health is most often neglected.

It was stated that nothing was being done about this. That is not strictly true. Texas as yet has only thought about licensing pasteurization equipment operators. There are many complications such as securing the support of the industry, working out a system of training schools and fair requirements, but the state is seriously interested in the idea and will develop it as rapidly as possible.

The subject is one which is receiving attention in many places. The great wonder is that it has been neglected for so long. So far as we could determine no state has a pasteurizer operator's licensing law. However, we understand that Michigan favors something of the sort and that Wisconsin, having licensed her cheesemakers and buttermakers and found that the practice helped to drive out inefficiency and carelessness in these vocations, is also in favor of licensing pasteurization equipment operators.

The Advisory Board of the United States Public Health Service recognizing a need for trained men in the pasteurization room took the matter under consideration last year with the result that the mimeographed copy of the 1939 revision of the United States Public Health Service Milk Code carries on page 101 the following recommendation.

"It is of the utmost importance that the superintendent or chief operator of a pasteurization plant be familiar with the pasteurization requirements of the ordinance and code, with the operation of pasteurization equipment, and with the diseases that may be transmitted through milk. State milk control officials are urged to survey their educational facilities for the purpose of developing a training program for pasteurization plant operators with a view to future licensing of such operators."

This means that cities and states operating under the Standard Ordinance should begin thinking about means of training their operators, for it is our opinion that where specialized training is demanded, some responsibility for making it available falls upon the regulatory body.

Dallas, Texas, has a provision in its milk ordinance to the effect that,

". . . . it shall be unlawful for any person to engage in . . . operating a pasteurizer . . . unless he shall have first obtained a permit issued by the Department of Public Health of the City of Dallas, Texas. . . . the applicant (for permit) shall satisfy the Health Officer that he is fully qualified and that he possesses a thorough knowledge of all provisions of law applicable and pertaining to pasteurization as contained in the United States Public Health Service Milk Ordinance and Code . . ."

However, we are informed that examination of operators has not been completed which we interpret as meaning that as yet this paragraph of the code is not being enforced.

New York State also held schools for operators in 1937 in two cities, though licensing is as yet not mandatory. There is no provision for the licensing of pasteurizers in the Mayor Kelly Milk Ordinance of Chicago and as a matter of fact the only functioning ordinance and training school we were able to locate was in Oakland, California.

This ordinance requirement is identical with that quoted above from the Dallas ordinance but has been in effect since 1933 with complete satisfaction. Applicants for licensing receive a set of instructions covering the subject of pasteurization and its public health aspects. These are studied by the applicant who, when prepared, takes an examination of the completion type. In this, statements are made with a choice of three words given to fill in some important word in the sentence. Oakland finds this type of examination superior to either the straight question and answer type or the true and false statement, in examining the high percentage of foreigners who apply. In the past three years they have had but two or three failures out of over eighty examinations annually.

The examination is a comprehensive one covering bacteriology, plant operation, pasteurization, sterilization, and the diseases of milk borne epidemics. Last year it contained 93 separate questions. The applicant also gets a grade on education and experience. Ten percent of the final grade is allowed for this and ninety percent for the written test. In education one-half percent is allowed for each year of high school work completed although no high school credit is given to college graduates. The highest credit is given for agricultural college diplomas, five percent, and one percent is allowed for each full year of experience up to five.

Both courses of instruction and examinations have been prepared in increasing stages of difficulty and scope of subject matter in order to prevent throwing older men of long experience out of work on account of failures, and to gradually train the new men over an approximate three year period. The next instruction sheet in addition to market milk and cream is planned to include churning cream, ice cream mix, skim milk, and butter milk, and will contain still more detail in bacteriology and the science of pasteurization.

So successful has this method of licensing been that it has been adopted by the City of San Jose and the San Joaquin Local Health District of Stockton, California.

LABORATORY TECHNICIANS

All that has been said about the licensing of pasteurizer operators applies equally to plant and health department laboratory technicians. There is just as much carelessness, ignorance, and malpractice in this field as in the former yet, without reliable laboratory records, the milk sanitarian and dairy inspector is seriously handicapped. This aspect of milk control is perhaps still further in the future but it will have to come eventually. Even today the California Agricultural Code, and perhaps those of some other states, requires the licensing of all technicians upon whose bacterial counts payment is made for milk and cream. It should apply also to those performing bacterial analysis by any means for the grading of dairies for permits, and to those making tests for the quality of dairy products where the results of such tests will directly affect the grade of the dairy or creamery.

For only with ordinances administered all the way down the line by trained, competent personnel will the milk control program continue to advance; will the public's health be made increasingly safer from disease.

Findings in Comparative Studies of Old and New Culture Media

C. A. Abele

State Department of Public Health, Montgomery, Ala.

The questions of modification in composition of the culture medium used in making plate counts of milk and milk products, and of incubation at 32° C. instead of at 37° C., are of long standing before this Association. I recall hearing Dr. A. H. Robertson discuss them at the Atlantic City meeting, three years ago. They have been discussed by bacteriologists at meetings of their organizations, and in the literature, for at least five years. Nevertheless, in order that all here may attend this discussion without handicap, I shall very briefly set forth the principal arguments for change in medium composition and temperature of incubation.

1. Counting of plates is facilitated, and accuracy is enhanced, because colonies are larger and more readily seen against the more opaque background of the medium, when milk is included.

2. Mastitis streptococci are said to grow better on a medium containing tryptone.

3. Incubation on modified agar at 32° C. results in greater uniformity in the counts of divided samples, and appears to favor the development on the plates of the types of organisms found in incompletely cleaned milk vessels, and those predominating in improperly-cooled milk.

The advantage of ready identification of streptococci and other organisms of an especially undesirable nature in milk is obvious, and the possibility of its attainment merely by modification of a routine procedure is, to say the least, intriguing.

The action of the American Public Health Association Committee on Standard Methods for the Examination of Milk and Dairy Products, limiting the modification of the procedure to the change from standard nutrient agar to tryptone-glucose-beef extract-skimmilk (T-G-E-M) agar, effective July 1, 1939, is generally known. The use of the T-G-E-M medium tends to increase plate counts, possibly quite considerably; but low count milk and milk products are not greatly affected. The reports of Kelly (2), Robertson (3), and Bradfield (4), confirmed the general impression that the "improved" medium, even at 37° C., instead of 32° C., incubation, would result in material increases in plate counts.

The fact that the media used in the studies reported by Kelly (2), Robertson (3), and Bradfield (4) differed somewhat from T-G-E-M agar, now the standard agar, is beside the point. The impression that plate counts will uniformly be higher, probably necessitating a liberalization of viewpoint as to the significance of higher counts—reflected perhaps in altered standards and limits—has become quite general. In some cases the use of T-G-E-M Agar has been deferred because of the fear that grading procedure will be adversely affected or confused.

For a period of approximately fifteen months it has been, first, my function as referee on the Committee on Standard Methods, then my avocation or hobby, to gather data on comparative counts resulting from the plating of split samples of milk and milk products on standard nutrient agar and on T-G-E-M agar, henceforth to be termed "old standard" and "new standard" agars. In the summer and fall of 1938, usable comparative results on 248 samples were obtained from seven laboratories, for the Committee on Standard Methods study; during the summer of 1939 comparative results on 1000 samples of raw milk, examined at the Montgomery Laboratory of the Alabama State Board of Health, were tabulated and analyzed, and within the past several months 275 results from six laboratories of Sealtest, Inc., and an additional 189 results from the Montgomery Laboratory, making a grand total of 1712 results, pertaining to raw milk and cream, pasteurized milk and cream, and ice cream and mix,—have been tabulated, analyzed, and charted. Compared to the numbers of individual results studied by Kelly (2) (25,000), Yale (5) (24,000), and others, this number is relatively small, but is better adapted to graphic presentation.

It would be possible to spend hours in an analysis of the average behavior—that is, increase or decrease of count on new standard agar, as compared with the count on old standard agar—of each type of sample in each range of count magnitude. I am convinced, however, from the analysis of the comparative results of 1000 samples of raw milk, reported in the September number of the Journal of Milk Technology (6), that such figures are of little value. The average increase in count of other groups of samples of similar size might, and probably would, be somewhat different.

I wish to take the liberty of digressing at this point for a brief space. I find that in analyzing and discussing bacterial plate counts I must continually keep a curb upon my inclination to consider them definite, concrete, stable numerical magnitudes, like the dollars and cents of daily bank clearings, the number of barrels of flour, cement, or other commodity produced in a given period, the number of beans in a jar, etc.; a number that has been checked, and can be checked again and proved correct. I suspect that many of you are subject to the same inclination. But plate counts are not of that stable nature; they are, at best, estimates—and sometimes very rough ones. If, therefore, we forget the nature of plate counts, and place a value upon the percentage of difference between two such estimates, we are very likely to mislead ourselves.

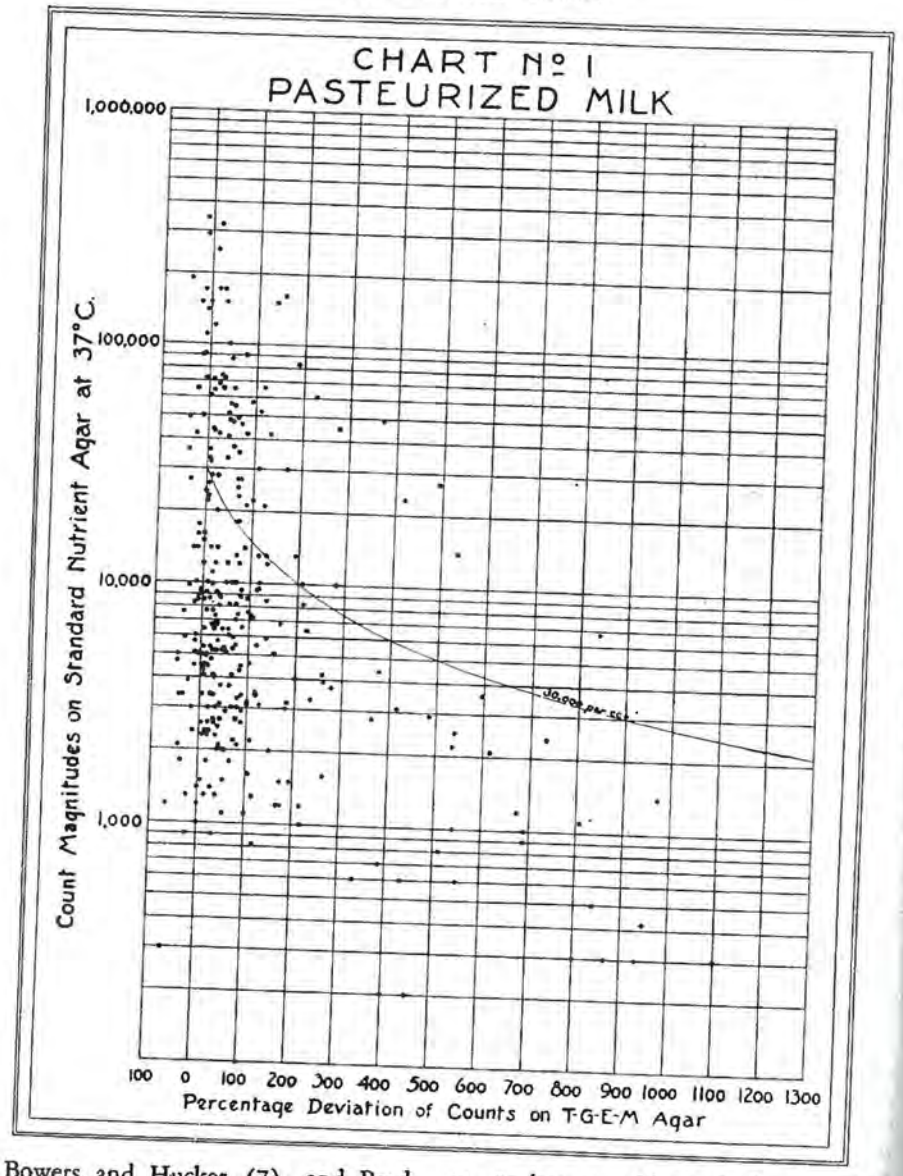
The real, and I suspect the only question in the minds of milk control officials and policy-determining public health authorities, with respect to the use of the new standard medium is: "How many milk or milk products supplies now deemed acceptable, are likely to become illegal, or fall into a lower grade, because of increased plate counts obtained by the use of the new standard agar?" If the proportion of supplies so degraded is likely to be high, milk producers, milk distributors, ice cream manufacturers, and milk control officials will face difficulties; legal count limits may have to be altered, and that is a complicated procedure!

I believe we may all be reassured as to the inevitability of the latter eventuality, as I shall attempt to prove.

Five charts have been prepared, to present the effect of the use of the new standard agar upon the plate counts of (1) pasteurized milk, (2) pasteurized cream, (3) raw milk (including a few samples of Certified Milk), (4) raw cream, and (5) frozen ice cream and unfrozen mix, all pasteurized.

The mechanism of these charts is simple. We have the two plate counts, for example, of a sample of pasteurized milk. On old standard agar the count is, let us say, 10,000 per cc.; on new standard agar it is 20,000 per cc. The increase in count is 10,000 per cc., or exactly 100 per cent. This result, then, is spotted on the chart on the level (abscissa) of 10,000 on standard nutrient agar, but to the right of the "norm", on the 100 per cent line. The "norm" is the line representing no change. Had the count on the new standard agar been 8,000 per cc., there would have been a reduction of 2,000 per cc., or 20 per cent, and the point would have fallen to the left of the "norm".

Chart No. 1 presents the results on 323 samples of pasteurized milk. Note that by far the greater proportion of increases are less than 100 per cent, and that there is a fair proportion of decreases in count resulting from the use of the new agar. Note also that, contrary to the findings



of Bowers and Hucker (7), and Bradfield (4), the greatest percentage increases in count occurred, in this series, in milks of low count on old standard agar.

The curve represents the limit in percentage increase in count which may take place at any level of magnitude, while the count still does not exceed 30,000 per cc. All points on or below the 30,000 per cc. abscissa, but to the right of the curve, represent counts of 30,000 per cc., or less, on old standard agar, which were in excess of 30,000 per cc. on new standard agar. In this series of 323 counts, 285 were 30,000 per cc., or less, on old standard agar; less than 8.1 per cent of this latter number exceeded 30,000 per cc. on the new standard agar, although in 13 instances the percentage of increase in count was in excess of 1000 per cent.

It is also significant that the old standard agar counts of 8 of these 23 samples, which were thrown out of grade because of their new standard agar counts, were between 25,000 and 30,000, inclusive, per cc. If these 8 comparative counts be disregarded, because of the likelihood that the counts on duplicate plates on any medium would have varied more than 5000 per cc., the percentage of counts increased to exceed 30,000 per cc., is 5.4.

Chart No. 2 presents the results on 92 samples of pasteurized cream. A more general higher increase in count, resulting from the use of new standard agar, is apparent. The curve represents the 60,000 per cc. limit in count, set by the U. S. Public Health Service Milk Ordinance for the average count of Grade A Pasteurized Cream. Of the 72 samples with a count of 60,000 per cc. or less, on old standard agar, 7, or 9.7 per cent, had counts in excess of that limit, on new standard agar.

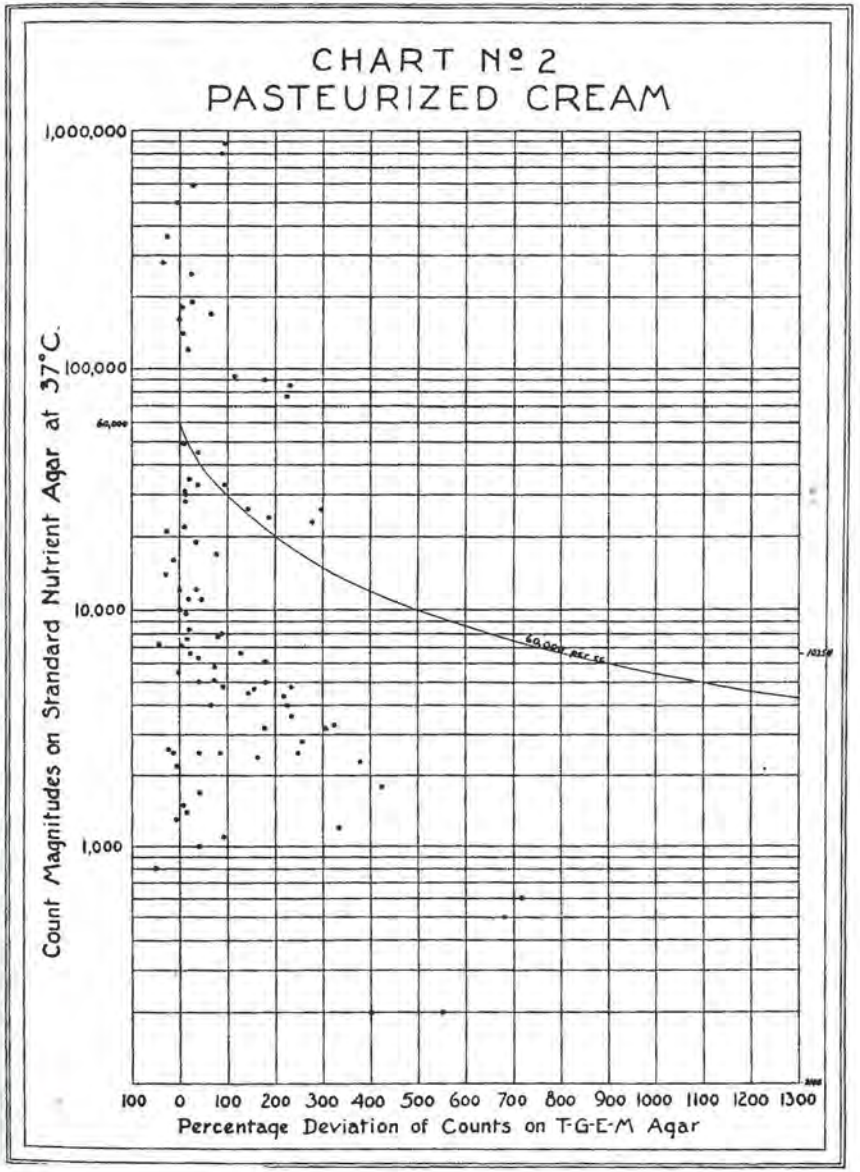


Chart No. 3 presents the results on 1134 samples of raw milk.

The characteristics of this chart, raw milk, differ markedly from those of pasteurized milk and pasteurized cream, particularly the former. Note the comparatively high percentage of instances (12.4 per cent) in which the new standard agar count of pasteurized milk was 500 per cent, (400 per cent deviation) or more, of the old standard agar count. In the case of pasteurized cream 6.5 per cent of the counts on new standard agar were 500 per cent, or more, of the old standard agar count. In the case of raw milk, on the other hand, only 0.8 per cent of the counts on new standard agar were 500 per cent, or more, of those on old standard agar.

Note also that in the cases of pasteurized milk and cream these large percentage increases in count, on the new standard agar, occurred in samples the old standard agar count of which was 10,000 per cc. or less. In the case of raw milk, however, these large increases occurred in samples the old standard agar count magnitudes of which ranged from 3,000 to 310,000 per cc.

In the specifications of the U. S. Public Health Service Milk Ordinance there are fixed average upper plate count limits for three grades of retail raw milk: 50,000 per cc. for Grade A; 200,000 per cc. for Grade B; and 1,000,000 per cc. for Grade C.

Obviously, because of the fact that the actual sources of few of the samples were known, it was impossible to group results so that average counts on particular supplies on both agars might be computed. Therefore, only individual counts can be considered in relation to these plate count limits.

Of 425 retail raw milk samples with old standard agar counts of 50,000, or less, per cc., 29, or 6.8 per cent, exceeded 50,000 per cc. on the new standard agar. One count in exceess of 50,000 per cc. on the old agar, was under this limit on the new, thereby making the net percentage of counts thrown out of grade because of the use of the new agar 6.6 per cent. Of 110 counts in Grade B (51,000 to 200,000 per cc.) on the old agar, 7, or 6.4 per cent were thrown into Grade C by the use of the new agar. And of the 62 counts in the Grade C range (210,000 to 1,000,000 per cc.) on the old agar, 2, or 3.2 per cent, were beyond this limit by the use of the new agar.

In the case of raw milk for pasteurization (wholesale), of 478 samples with counts, on the old agar, not in excess of 200,000 per cc. (Grade A for pasteurization), 14, or 2.9 per cent would have been thrown into Grade B for pasteurization, by use of the new agar. And 2.4 per cent of the Grade B supplies would have been thrown into Grade C.

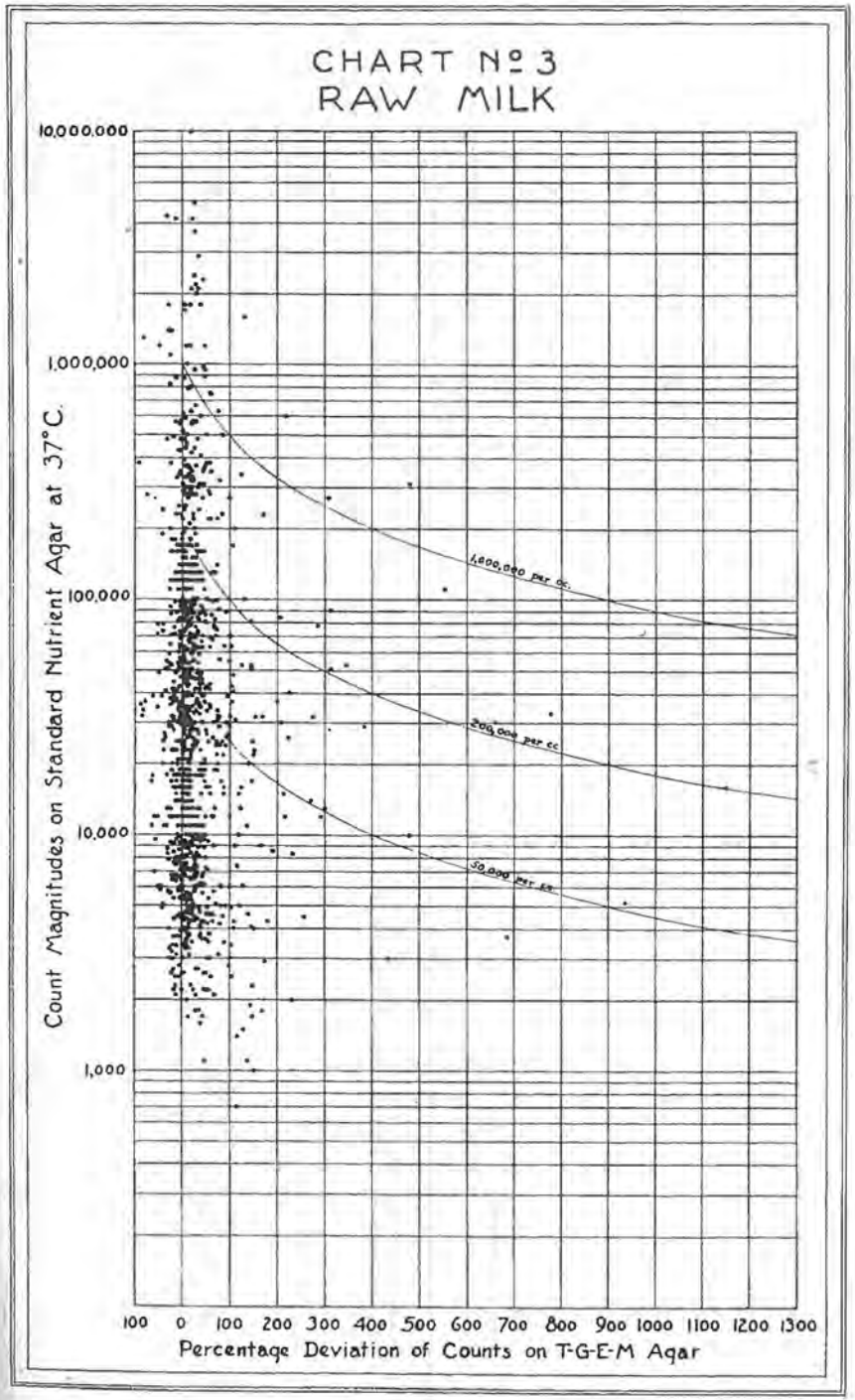
It is very interesting to note that of the samples the grade of which would have been changed by the use of the new agar, a large percentage of the counts on the old agar were fairly close to the upper limit of the range for that grade. A glance at Chart No. 3 will confirm the fact that only a small percentage increase is necessary to carry a count between 40,000 and 50,000 per cc., between 170,000 and 200,000 per cc., or between 800,000 and 1,000,000 per cc., over these respective limits.

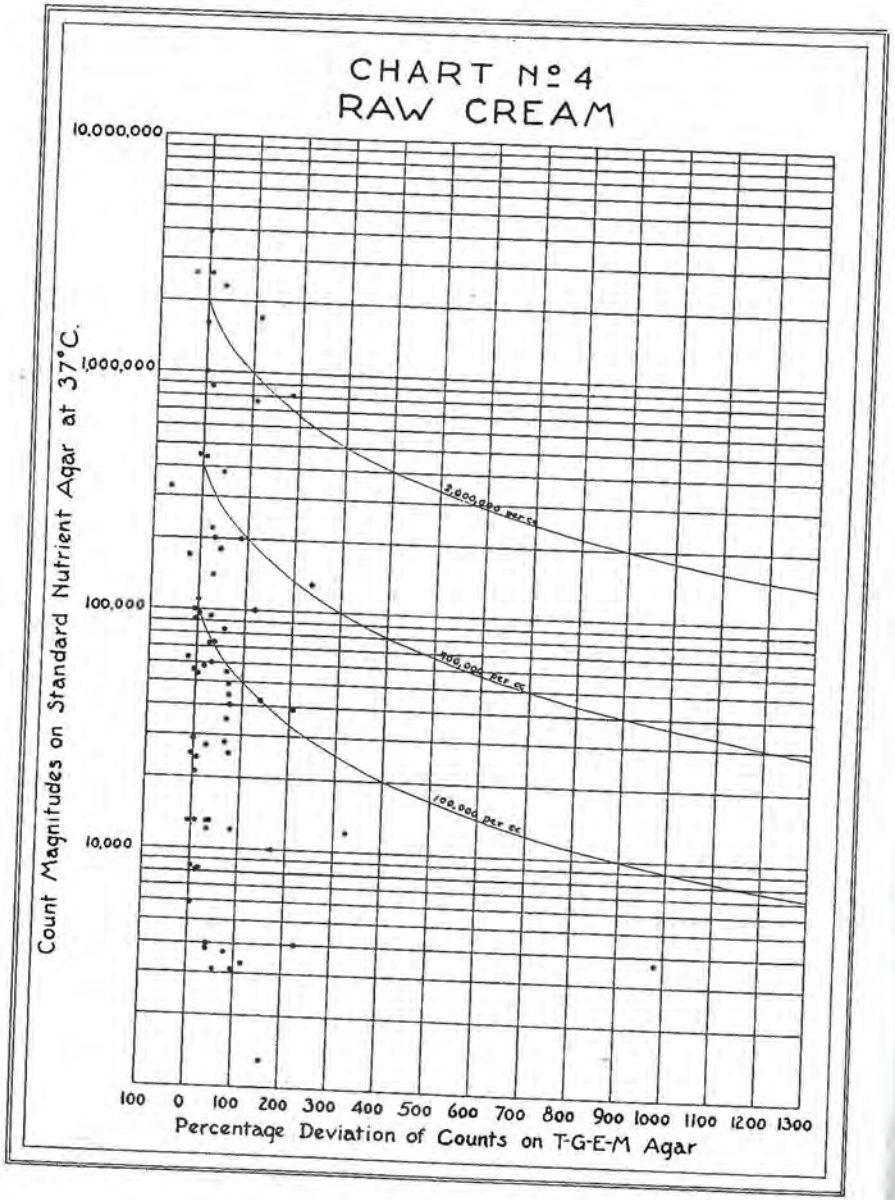
In Chart No. 4 is presented the effect of the use of the new standard agar on raw cream counts. In only one case, 1.5 per cent of 69 samples, was the count on new standard agar 500 per cent, or more, of the old standard agar count.

Changes of grade, because of higher counts on the new standard agar, would have been comparatively frequent in the lower grades: 8.2 per cent from Grade A to Grade B; 20.0 per cent from Grade B to Grade C; and 25.0 per cent from Grade C to the proscribed list. These latter percentages, however, are based upon small numbers of counts.

Chart No. 5 pertains to ice cream and ice cream mix, without regard to flavor of the former. The solid spots represent ice cream counts; the open circles, mix counts.

Note that the really high percentages of count increase all occur in the higher





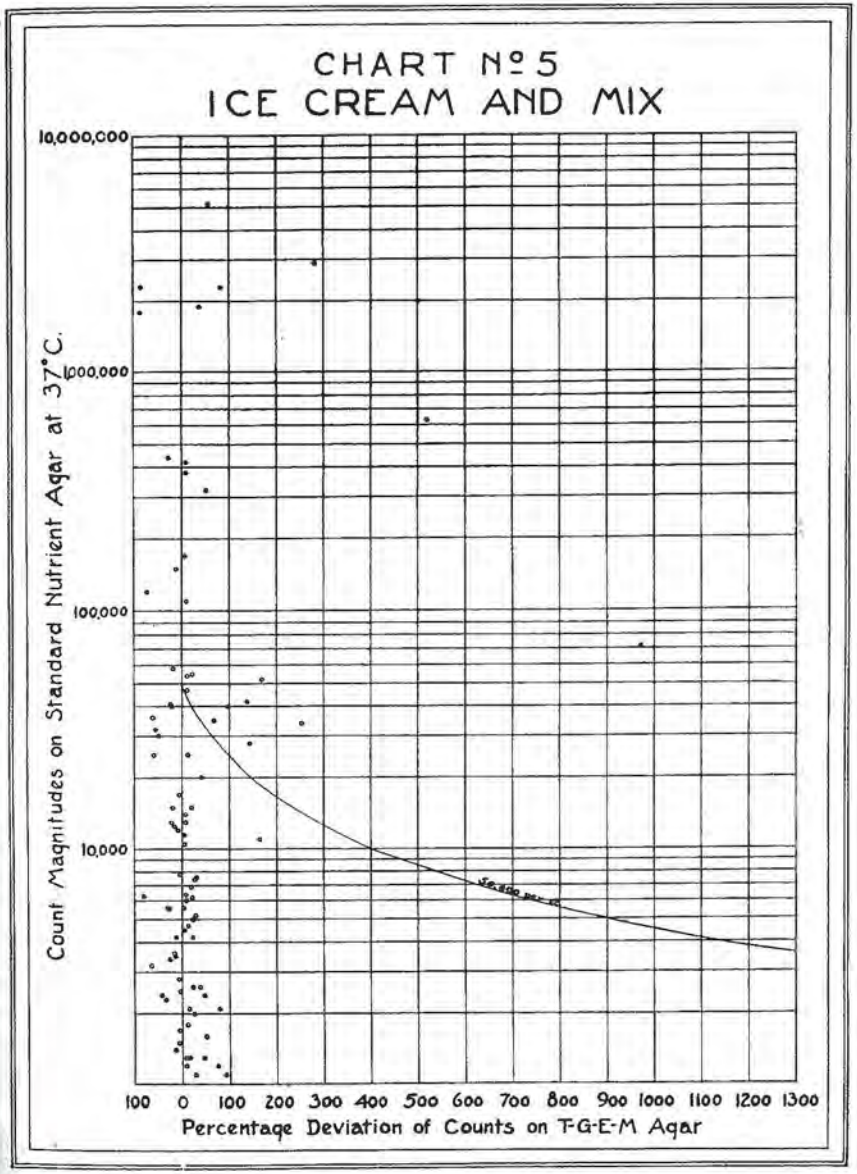
magnitudes of old agar counts; from 70,000 per cc., upward.

Only 6 (8.3 per cent) of the 72 counts of 50,000, or less, per cc. on old standard agar were increased above this limit by the new agar. A count of 58,000 per cc. on old agar was reduced to 47,000 on new agar, so that the net changes in grade actually affected only 6.9 per cent of the counts affectable.

SUMMARY

The effect of increased plate counts attributable to the use of the new standard (T-G-E-M) agar upon the grade of the supply sampled is presented in the following tabulation.

Kind of Product	Percentage of Samples Changed to Lower Grade		
	Grade A	Grade B	Grade C
Pasteurized Milk	8.1%	----	----
Pasteurized Cream	9.7%	----	----
Raw Milk (Retail)	6.6%	6.4%	3.2%
Raw Milk (Prepasteurized)	2.9%	2.4%	
Raw Cream	8.2%	20.0%	25.0%
Ice Cream and Mix	6.9%		



CONCLUSIONS

In view of the fact that less than one count in every twelve of pasteurized milk; one in ten of pasteurized cream; one in fifteen of retail raw milk; one in thirty-four of prepasteurized raw milk; one in twelve of raw cream, except in the lower grades; and one in fourteen of ice cream and ice cream mix affect the grade of the product from which the sample examined was taken; and, considering the likelihood that averages of four or more counts will further buffer degrading; it appears that the conclusion presented in a former paper (6) may be repeated. This conclusion is to the effect that the average plate count limits now fixed in milk (and frozen desserts) ordinances and regulations need not be raised to avoid chaos in the grades of milk and milk products supplies resulting from the higher counts obtained by the use of the new standard (T-G-E-M) agar.

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Wisconsin Conference of Dairy Manufacturers

The annual Wisconsin Dairy Manufacturers' Conference, 1940, will be held at the Dairy Building, University of Wisconsin, Madison, Wisconsin, on March 12 to 14 inclusive. There will be a registration fee of $1.00. The bound volume of papers can be purchased for $1.25. The meetings will run from 8 o'clock in the morning till about 5 o'clock in the afternoon. The program this year is particularly interesting to dairy technologists, laboratorians, milk dealers, and anyone who is interested in hearing of some of the latest developments in the dairy industry, by recognized authorities. The copy of the program can be obtained by writing to Professor H. C. Jackson, Dairy Department, University of Wisconsin, Madison.

The Effect of the Bang's Disease Control Program on Milk Production in Florida Dairies *

J. V. Knapp

State Veterinarian, Tallahassee, Florida

In approaching a discussion of "The Effect of the Bang's Disease Control Program on Milk Production in Florida Dairies", I wish to tell you something about our program: how and when it began, what we have accomplished, and where we expect to go with it.

In 1930, the State Live Stock Sanitary Board passed a regulation providing that all dairy and breeding cattle moved interstate into Florida must pass a negative blood agglutination test for Bang's disease. However, like the majority of states, we tested but few of our own cattle prior to the inauguration of the Triple A program in 1934.

The results of this voluntary testing, entered into freely by our people, proved to us that Bang's disease was widespread in the state and of high incidence among our dairy cattle.

The 1935 session of the legislature gave us the necessary law, and in July 1936 the State Live Stock Sanitary Board adopted a regulation making the test compulsory.

The Bang's disease control program is now a regulatory project and except for accredited herds, all cattle are tested at 30-day intervals, or oftener if deemed necessary.

ACCOMPLISHMENTS

We started in 1934 testing on a 60 to 90-day interval basis, and the records show that during the first 12 months we tested 922 herds comprising 38,109 cattle, disclosing 8,732 reactors, or 23 percent infected animals.

During the next year, which was the second year of voluntary testing under the plan adopted by the U. S. Bureau of Animal Industry, we made 143,915 tests in 5,377 herds, revealing 11,268 reactors, or 7-8/10 percent infection.

The Bang's disease control regulations adopted by the State Live Stock Sanitary Board July 1st, 1936, provide that all cattle in Florida are subject to the Bang's disease test, and the owner or custodian is required upon receipt of official notice to present his cattle for test as directed.

This action inaugurated our Statewide Compulsory Bang's Disease Program, and during 1936 we conducted 220,655 tests, disclosing 11,876 reactors, showing a reduction of infection to 5-4/10 percent.

In 1937 we tested 350,436 cattle with 8,565 reactors showing a further reduction in infection to 2-6/10 percent.

In 1938 we accomplished 431,602 blood tests revealing 6,265 reacting cattle, showing only 1-4/10 percent infection.

Up to October 1st, this year, we have run 119,718 tests, disclosing only 1,188 reactors, or 9/10 of 1 percent infection.

We have on this date 116 State Accredited Bang's Disease Free Herds, comprising 5,433 cattle.

You should not gain the impression from this brief recital of our statewide Bang's Disease control program that the work has been easy or that we have received 100 percent cooperation on the part of the cattle owners. Our Bang's law has been attacked unsuccessfully in our courts from the lowest through the highest. The path has been rough and at times most discouraging.

* Presented at 28th Annual Meeting of the International Association of Milk Sanitarians at Jacksonville, Florida, October 25-27, 1939.

Naturally, in conducting a program of this magnitude, it is wise to proceed cautiously, giving the public opportunity to recognize the economic necessity for the project, to develop a confidence that our premise is sound, our methods scientifically correct; that the work can be accomplished and that the end justifies the means.

Florida is proud of the progress made in eliminating Bang's disease from the cattle of the State, and I believe justly so, because any live stock sanitary program that will reduce an insidious infectious disease of cattle from a high of 23 cows in every 100 tested in 1934, to the present low of 9 cattle in every 1000 tested, is worthy of commendation and bespeaks not only the control, but the eradication of this disease, and to that end, my friends, the Bang's disease control program of Florida is directed.

All informed people are cognizant of the effect of Bang's disease on the individual milk cow. But what is there of a practical nature that a dairyman can understand and appreciate in a Bang's disease control program? He would like to have his herd free of disease, surely, but if a Bang's disease free cow or herd does not produce more milk, more and better calves, over a longer period of time and at less expense, he is not impressed, and assuredly not financially benefited.

Let us see what our program has accomplished by increasing milk production, or in other ways reflecting a tangible monetary benefit to the dairymen.

Take for example the dairy producing area of the City of Jacksonville. Our first Bang's test produced the following figures: 231 herds, 8304 cattle, 2319 reactors, or a Bang's infection of 27-9/10 percent. Our last test, 7403 cattle in the same area, disclosing but 38 reactors, or 5/10 of 1 percent.

The milk production records of this area show that the 7403 head of cattle are producing 1,430 gallons more of milk per day than the 8304 head did when Bang's infected. 901 cows less are producing 1,430 gallons more milk per day —a very tangible benefit to the dairyman, reflected not only through an increase in milk production, but in lowered feed costs.

Very similar are the records for the Miami area, where, on first test we obtained 3,313 reactors out of 11,386 cattle, or an infection of 29.1 percent. On the last test, our infection had been reduced to only 0.08 percent, and here, according to the Chief of the Bureau of Dairy Inspection, approximately 1,000 less cattle are producing 1,853,596 gallons more of milk annually. About ½ gallon increase per day per cow.

Our records show, throughout the state, as Bang's infection was reduced in dairy herds, a lesser number of cattle were required, and it has been found that this lesser number of cattle have invariably produced a greater quantity of milk.

The State of Florida produces only a very small part of her replacement cattle in dairy herds, and another example of the value to the dairymen from the Bang's Disease program is taken from the record of interstate shipments of dairy cattle for herd additions. Prior to our Bang's Diseas control program, Florida imported annually ten to fifteen thousand dairy cattle.

In 1936, 411 shipments were received from 23 states consisting of 9,977 cattle.

In 1937, 374 shipments were received from 24 states consisting of 9,458 cattle.

In 1938, 291 shipments were received from 23 states, consisting of 6,596 cattle.

January 1939 to date, only 2,712 cattle from 19 states have been received.

We have on file hundreds of testimonials from dairymen evidencing appreciation of our Bang's disease program, a few of which are given here:

Dinsmore Dairy Co., Dinsmore, Fla. . .

"We find very definite results in the greatly decreased number of retained placentas at calving time with a definite increase in milk in such cases and our calf crop has been larger and the calves stronger as less are dropped prematurely, which has been very valuable to us as we have been improving the quality of our herd of Guernseys. Due to freedom from Bang's disease, we are able to enter our purebred Guernseys in auction sales from which we were previously barred. These are some of the outstanding results, most readily noted, and we are more than pleased with the effect of the intensive campaign which we waged to eliminate this disease.

Ives Dairy Co., Ojus, Fla. . .

"While we have as yet no comparative figures, undoubtedly the work we have done toward the eradication of Bang's from our herd, has increased the average production per cow to a considerable extent. Regardless of monetary considerations to the herd owners, public health officers—backed by public opinion—are taking a more active interest in herd health and thus from a purely marketing standpoint the elimination of Bang's disease is sound business practice."

Milam Farm Dairy, Miami, Fla. . .

"Our first test I think showed about 25% reactors and we have not had a reactor now since November 1937. We have stopped losing calves from abortions, mastitis has been reduced and production in general has been increased. Therefore, we have nothing but words of praise for the testing work and we believe if the other dairymen will render your department the cooperation that we have, it will be only a matter of a few years until Bang's disease will be practically eliminated."

Whitehurst Dairy, Gainesville, Fla. . .

"We are more than pleased with the results of Bang's disease testing. Before we started testing for Bang's disease more than 50% of our calves were dropped before time or if they were carried to time they were so weak that we could hardly raise them. Since our herd is clean we do not have more than 1% defective calves and we find that they are much stronger and produce more milk. We find that the fact that our herd is accredited is one of the best selling points we have in approaching and securing new customers."

Bang's Disease is admittedly the Live Stock Sanitary problem of this day and each year the several states are devoting more attention to their Bang's programs and each successive Legislature appropriates more money to reimburse cattle owners for losses and to increase the working personnel.

The records submitted herewith showing the progress of our work during the five year period warrants, I believe, the consideration of a Bang's Disease Control Program in the field of economic milk production.

Progress made in elimination of Bang's Disease for period August 1934 to September 30, 1939 inclusive

Period	Herds	Cattle	Reactors	Percent Reactors
August '34 to June '35	922	38,109	8,732	0.229
July '35 to June '36	5,377	143,915	11,268	0.078
July '36 to June '37	11,150	220,655	11,876	0.054
July '37 to June '38	12,125	350,436	8,565	0.026
July '38 to June '39	12,338	431,602	6,265	0.0145
July '39 to Sept. 30, 1939	3,958	119,718	1,188	0.0099

Necessity for and Some Difficulties of Public Health Milk Control *

F. D. Brock

Director, Bureau of Food and Drugs,
Texas State Department of Health, Austin, Texas.

In the United States we use something like fifty billion quarts of milk a year. This would make a lake large enough to float all the navies of the world. It is one of, if not the most universally used food. Milk and cream, either by themselves or in combination with other foodstuffs, make up about one-sixth, by weight, of all the food eaten by the average American family. Dr. E. V. McCollum of Johns Hopkins University stated that "The people who have achieved, who have become large, strong, vigorous people, who have reduced their infant mortality, who have the best trades in the world, who have an appreciation for art, literature, and music, who are progressive in science and in every activity of the human intellect, are the people who have used liberal amounts of milk and its products."

PUBLIC HEALTH PROBLEM

However, the fundamental necessity for public health milk control is to protect health by preventing milk-borne diseases and to promote health by increasing individual consumption. It is generally conceded that milk is one of the most important of all human foods, and that it contains practically all of the elements which man requires for his sustenance. It constitutes his sole dependence throughout the first year of life, and is one of the most important foods for the sick and aged.

But while milk is second to no other food as an item of diet, yet it is second only to water as a vehicle of disease transmission. Diseases that are usually transmitted through impure milk are bovine tuberculosis, typhoid fever, scarlet fever, septic sore throat, diphtheria, undulant fever, and enteritis, the most frequent being enteritis, a common infection of infancy. According to the U. S. Public Health Service this disease "annually accounts for 65,000 deaths in the United States of children under the age of two years".

Quoting from the figures compiled by the Illinois Department of Public Health "From 1918 to 1937 inclusive, there have occurred 723 milk-borne epidemics of preventable disease in the United States. We say 'preventable' because of the monetary expense, human suffering and death that could have been avoided by proper pasteurization of milk supplies. There were 28,321 persons ill, and 869 deaths resulted from the use of raw milk and improperly pasteurized milk and dairy products. In thirty-six of these epidemics, improperly pasteurized milk or pasteurized milk contaminated after pasteurization was responsible for 1,634 cases of illness and 63 deaths. Six of the 36 epidemics involved both raw and pasteurized milk". In order to produce safe milk, it is necessary to prevent disease-producing bacteria from getting into the milk or to destroy them by pasteurization in case they do.

To promote health by increasing individual consumption of milk, it is necessary not only to offer the consumer safe milk but also clean milk. This involves absence of sediment, bad taste, and off odors. If we are to get people to drink more milk, we must make it palatable. Visible sediment in milk, such as manure, dirt, hairs, flies, etc., may be strained out but soluble filth and disease-producing bacteria remain for the consumer. This soluble filth remaining in the milk has much to do with taste and odor. Pasteurization cannot make clean milk out of dirty milk. Therefore, if we are to promote public health by increasing individual consumption, we must make milk clean as well as safe. This necessitates milk sanitation at the farm where the milk is produced and its protection while en route to the consumer.

Probably the above remarks are more or less repetitions of time worn statements and are not necessary to a gathering of this kind, but we in Texas have found it necessary to remind ourselves constantly of the great need for public health protection of milk supplies.

SOME OF THE DIFFICULTIES OF PUBLIC HEALTH MILK CONTROL

While the need for public health milk control is fairly well recognized, there are many difficulties and varied opinions as to its application. But it is reasonably certain that successful milk ordinance supervision and enforcement must depend largely upon the city or local unit. We divide these into two classes: Cities large enough to support a local inspection and enforcement unit, say those with a population of 10,000 or more, and small cities and towns with less than 10,000 population which are not able to support a local inspection and enforcement unit.

For the purpose of this discussion, I want to divide still further the cities having more than 10,000 population, into those which have grown to such proportions as to be largely self-sustaining within and depend only in a limited and indirect way upon the farms surrounding them; and those cities which are more or less dependent upon the country around them for their support and prosperity. It has been our observation that the former cities which are more or less independent of their immediate territory usually provide better enforcement of their milk regulations. However, the enforcement units in these cities are not entirely free from political interference, and this operates in some as a handicap to enforcement. When local health departments become independent of local politics, this handicap will disappear.

Cities in the second class mentioned above, that is, those cities with populations ranging from 10,000 to about 50,000, present a still more difficult problem. While they are large enough to provide enforcement personnel, they depend largely upon their surrounding farms for their support and prosperity. In many cities this results in a tendency to lean too much toward the interest of the dairy industry to the sacrifice of the public health. Political considerations quite often provide untrained personnel which interferes with proper supervision and efficient enforcement.

Now we consider the last class of small cities and towns which are not able to provide continuous local inspection and enforcement of milk regulations. Public Health milk control in these areas presents the biggest problem of all. These small cities and towns are usually entirely dependent on the farms immediately around them for their support and prosperity. Some of these small cities adopt a milk ordinance but the close relationship between city and country too often makes for lax enforcement or no enforcement at all. The Mayor usually is a business man, perhaps owning a grocery or feed store, supplying food and feed to the dairy farmer. In such a position, it is difficult for him to compel one of his customers to label his milk "Grade D" and too often the result is that all dairymen are allowed to use the grade "A" label, regardless of the condition of their dairies. Also where there is no state law regulating the use of the grade "A" label on milk, dairies serving cities without any local milk regulations have also been found using the grade "A" label. Consequently the grade "A" label becomes meaningless, and public confidence in milk labels is shaken to the detriment not only of the public health but of the dairy industry as well. It is not enough to educate the public to the benefits of safe and clean milk if the milk dealer is permitted to misrepresent the sanitary quality

* Presented at the 28th Annual Meeting of the International Association of Milk Sanitarians, Jacksonville, Fla., October 24-26, 1939.

of his milk through the label to the consumer. It is also not enough to prevent this misrepresentation without establishing a sanitary standard available to all dairymen in the state.

ENFORCEMENT PROGRAM

It is not the purpose of this paper to attempt to abate these difficulties or to solve these problems but Texas is now trying an experiment which we hope will alleviate these difficulties to some extent in our state. We felt that it was necessary to provide by Legislative enactment a milk sanitation standard and make it available but not compulsory to all parts of Texas with or without a local milk ordinance. This law enacted by the Legislature in 1937 is explained as follows:

1. It provides definitions for the labeling of milk and milk products. One group of definitions define milk and certain milk products. These definitions for labels and for representation in other ways are made compulsory. The other defines grades "A", "B", "C", and "D" raw milk and milk products and grades "A", "B", and "C" pasteurized milk and milk products. This second group of definitions for *grade* labels are optional. They are the "Standard" for the use of grade labels on milk and milk products in Texas. The law provides that grade specifications shall be promulgated by the State Health Officer but that they shall be based upon and in harmony with the current requirements of the U. S. Public Health Service Milk Ordinance and Code.

2. No milk producer or dealer is required to use a grade label, but if he does use one his milk must meet the standard for that grade. Permits are required from the city or county health officer having jurisdiction for the use of a grade label in the sale of raw or pasteurized milk. This applies whether there is a local milk ordinance or not. The State Health Officer and his representatives are empowered to revoke any permit for the use of a grade label, if they find that the dairyman has not complied with the grade specifications. This provides a check by the state health authority on the use of grade labels, especially the grade A label. The state force assists these local health officers to build up one or more grade "A" dairies in these rural areas. In this manner, the privilege of earning the right to use the grade "A" label is extended to the milk producers and plant operators in small city and rural areas of the state where there are no local milk regulations. These dairymen hitherto had little inducement to provide a good sanitary quality of milk because there was no method for distinguishing their milk from other milk which had not been produced and handled with sanitary safeguards. The grade label provided them with this incentive, and we have been swamped with requests from dairymen in all parts of the state to know what the grade "A" requirements are, especially with regard to grade "A" barn and milkhouse construction. We have now one or more grade A dairies supplying about 75 non-Standard milk ordinance small cities and towns in the state. This is in addition to our 134 Standard Milk Ordinance cities.

3. Securing competent inspection and grading of the milk in small cities and rural communities has been quite a problem from a financial standpoint. It has been found that most of our milk-borne epidemics have occurred in small cities where there is no supervision over the milk supplies. This law makes possible the organization of "milk inspection units" composed of several towns in one or more counties which can jointly support a full-time trained milk inspector. County health units can also operate the state grade specifications on a voluntary basis.

4. While the law extends the grading privilege to all parts of the state, it also protects grade labels, especially the grade "A" label by preventing its misuse. Thus by regulating the *use* of *grade* labels, we believe public health will be protected and promoted.

5. It may be of some interest to you for me to relate some of the methods we are using to operate this Milk Grading and Labeling Law. The Law was a new venture; therefore, new methods had to be devised in which milk sanitation educational activities and law enforcement had to go hand in hand in a manner that each would promote the other.

(a) Our first step was to send to the seven hundred and some odd city and county health officers of Texas a copy of the state law, the grade specifications promulgated by the State Health Officer and a copy of the 1936 Edition of the U. S. Public Health Service Milk Ordinance and code which the law practically adopted.

(b) We drew up a "Texas Long-Form Milk Ordinance" in harmony with the U. S. Public Health Service Milk Ordinance but with such revisions as were required by the state law. This "Long Form" was intended for our larger cities. A "Short Form Milk Ordinance" was drawn up for adoption by small cities which were not able to provide the expense of publication of the full text. The Short Form simply makes mandatory the grading and labeling of milk according to the requirements of the state Law and includes all sections of the U. S. Public Health Service Milk Ordinance which are not contained in the state specifications. A number of our small Texas cities have adopted this form since the adoption of the State Milk Grading and Labeling Act. In this manner the state Law provides uniform milk regulations for Texas cities.

(c) For the small cities, counties, and rural areas which have no milk ordinance, we provided a simple resolution to be adopted by the city or county authorities, directing their respective health officers to receive applications, determine the grades, and award a permit as he is authorized and empowered to do by the state law. Since his permit is subject to revocation by the State Health Officer or his representatives, if the grade authorized is found not to be in accordance with the state grade specifications, we advise local health officers not to issue such permits until a state man has pointed out to the dairyman the corrections necessary to be made for the grade he desires. However, any city or county health officer anywhere in the state is authorized by the law to issue grade permits in accordance with the state grade specifications whether or not any resolution directing him to do so has been adopted. Our idea for this "Resolution" was two-fold—to provide opportunity for contact with city and county authorities for educational work along the lines of milk sanitation, and to secure an order making it the duty of the health officer to determine the grade and award grade permits to all voluntary applicants. We have found this "Resolution for Voluntary Grading and Labeling" to be of much educational value in these areas. These applications for grading and for a grade permit are optional in these areas, and we designate them as "voluntary applications and permits". We also furnish application and permit blanks to these health officers and the law requires that they send a copy of all grade permits issued by them to the State Health Officer. This plan has resulted in at least one source of grade A milk being made available to the citizenship of a large number of our small cities and towns where there had been none hitherto. It appeals to the ambitious dairymen of each community because it provides him with an opportunity he did not have before.

(d) The operation of the law as described above in these non-ordinance areas is purely educational and voluntary. The enforcement part of the law protects the ambitious dairyman who has complied with the grade "A" specifications by prohibiting the use of the grade "A" label by others who have not met these specifications. Thus the enforcement part of the law promotes the program. At first we contented ourselves by notifying those who were illegally using the grade "A" label to discontinue its use. Later those we found still using that label after they had been notified in writing to discontinue its use, were prosecuted. Fortunately, we have not had to resort to many prosecutions for mislabeling.

(e) In Standard Milk Ordinance cities which are not making any attempt to en-

force their ordinance, we apply the state law as we do in non-milk ordinance areas. Since there is no milk supervision in such cities, the first step is to require all dairymen to stop using the grade "A" label and then try to build at least some of them up to the grade "A" standard. Quite often when the consumers of such cities wake up to the fact that they have no grade "A" milk, they demand of their city authorities that operation and enforcement of the ordinance be provided. Thus the state law has proved to be a good weapon to promote enforcement of milk ordinances and secure better sanitary quality of milk.

(f) In Standard Milk Ordinance cities which are enforcing the ordinance, our operations are of necessity a little different. We work in cooperation with the city enforcement personnel and use our supervisory authority to assist them. This is done by degrading such dairies and plants as are violating the grade "A" specifications. Since the state law requires that grade "A" pasteurized milk must be made from Grade "A" raw milk, degrading of raw to plant dairies has the effect of preventing the use of their milk by plants for their grade "A" pasteurized milk. This supervisory authority by state men has enabled us to assist local enforcement officials to improve the sanitary conditions of their milk supply. Of course, we continue to make milk sanitation ratings of city milk supplies, and have 24 Texas cities on the Honor Roll of the U. S. Public Health Service.

The Purification and Disposal of Milk Wastes. *E. A. Hepburn. Health Bull. Melbourne.* 1938. Jan.-June, 1478-90. *Bulletin of Hygiene,* Vol. 14, No. 3, March, 1939., p. 233. *Public Health Engin. Abs.* xix, S., 103.

"The discharge of 'milk wastes,' consisting of drainage from milk collecting and pasteurization depots, butter, condensed and concentrated milk factories and cheese factories, has caused great nuisance and stream pollution in the State of Victoria, Australia, and the author has made a very careful study of the subject. He has reviewed existing literature, both English and American publications, and has produced a very useful summary embodying all the best precepts of modern practice. Following the advice of the Water Pollution Research Board of the British Government Department of Scientific and Industrial Research, the author stresses the fact that the volume of the waste should be reduced as far as possible in order to reduce the strength of the liquid which has to be oxidized. Stress is also laid upon the fact that whey, whether from the manufacture of cheese or casein, should not be discharged to the drains but should be used in the liquid or dried form for feeding pigs or other stock, or should be otherwise utilized.

The author concludes that septic tanks are unsuitable for preliminary treatment of the wastes as the high acidity of stale milk wastes prevents the development of the desired organisms. He recommends that the detention period in preliminary settlement tanks should be not less than 8 hours for a horizontal flow tank and 2 to 4 hours for a vertical flow tank. Secondary treatment of the waste may be by means of irrigation, filtration, or the activated sludge process, but as this latter is the subject of conflicting reports, the adoption of the process is not advised at present."

L. C. FRANK.

Closures Employed for Dairy Products Containers *

D. Levowitz

Director New Jersey Dairy Laboratories, New Brunswick, N. J.

The general considerations of the problems related to closures were reviewed by four members of the society, who had been invited to express their thoughts on this subject from their respective standpoints. Discussion from the floor followed this presentation.

The health control officials' attitude toward closures used on dairy products containers was presented by the first speaker, Mr. Samuel Abraham of the New York City Health Department. Mr. Abraham noted the following in the development of his topic:

1. At first, health departments were concerned primarily with measures directly affecting the safety of milk supplies such as pasteurization, cooling, etc. Definite advances have been made in this direction. The time has now come when more attention may be given to the problems involved in the protection of milk during its distribution, especially the protection given by bottle closures.

2. The literature on the protection afforded to the contents of dairy products containers by plug caps has indicated for some time that these closures may well be improved upon. Mr. Abraham reviewed the work of Isaacs and Zeiber (*Amer. J. Hygiene,* 16, 806-822, 1932) on the contamination noted on plug caps and the relative protection given to dairy products by plug caps and double caps. The work of Dearstyne and Ewing (*Amer. J. Pub. Health,* 10, 533-535, 1920) relating to the number and types of bacteria found on milk bottle pouring lips was also reviewed. Arnold's studies (*J. Milk Technol.* 1, (6) 5-14, 1938, and 2 (1) 41-43, 1939) were also discussed.

3. Mr. Abraham pointed out that although the literature does not show many instances in which infections may be traced through contamination of milk by way of unsatisfactory closures, the possibility exists that these occurrences may not have been recognized in the development of dairy technology.

4. The New York City code defines the specifications for closures used on Grade "A" products as follows: "The outer caps on all bottles and single service containers of Grade "A" milk and cream shall consist of a hood, or other satisfactory protection from contamination, which shall completely cover the pouring lip of the bottle or paper container." (Page 62, Department of Health Sanitary Code Relating to Milk and Milk Products). This definition although drawn years ago serves the purpose admirably, although a preferential definition would say: "which shall completely protect the pouring lip and the dairy product in the container from contamination".

5. The impossibility of demanding a "positive" closure on containers used for the storage of normal fluid dairy products is recognized, but the definition as indicated above could be interpreted in the light of practical considerations.

6. Although the Department of Health does not as yet require closures subscribing to these specifications on all milk sold in the territory under its jurisdiction it has gone on record as planning such action and has urged the industry to adopt these standards voluntarily for Grade "B" milk and cream.

7. A problem encountered has been the development of a comparatively sim-

* Symposium held at meeting of Metropolitan Dairy Technology Society, October 24, Dr. O. F. Garrett, Secretary.

ple but accurate test for calibrating closure efficiencies. The department has watched the various techniques which have been proposed, with interest.

8. At conferences with container and closure manufacturers and dairy companies the need for modification of some of the present closures has been discussed.

The reactions of the dairy industry to closure problems were summarized by Mr. F. M. Scales of Sheffield Farms, Inc., and Mr. A. J. Powers of Borden Farm Products Company. Mr. Scales commented that the dairies were keenly interested in following developments instituted toward improving containers and closures but were necessarily waiting until sufficient progress had been made experimentally before altering present practises. Mr. Powers related the experiences of his laboratory in working with some of the calibration techniques. He concurred with Mr. Scales in feeling that changes should not be made until further experimental evidences showed the advantages of such changes.

The problem of calibrating container closure efficiencies was discussed by Dr. David Levowitz of the New Jersey Dairy Laboratories. The limitations of methods employing dyes were discussed and the theoretical advantages of employing bacterial suspensions were offered. Such suspensions using organisms not commonly found in dairy products can be traced by employing bacterial techniques after suitable culturing periods. The technique described is summarized below:

1. A bacterial suspension of a suitable test organism is frozen into ice. The concentration of organisms in the ice is determined and this "contaminated" ice is mixed with normal ice after chopping fine to yield a standard ice containing a fixed number of colonies per gram. The organism selected for this technique is B. prodigiosus Flugge and the concentration of colonies to be yielded by one gram of standard ice is fixed at approximately 500,000.

2. This ice is used to refrigerate a standard number of containers. The manner of icing is standardized. The number of containers used for individual tests is made over one hundred—to reduce experimental error.

3. The iced containers are exposed to room temperature for four hours without agitation, followed by four hours of intermittent agitation. This procedure is comparable to standard commercial practise.

4. The contents of the containers are examined for the presence of the test organism by suitable laboratory methods.

5. The pouring lips of the containers are examined for the presence of the test organism by suitable methods.

6. The virility of the test organism and its ability to grow under the experimental conditions are determined by running controls at every portion of the experimental procedure.

7. The efficiency of the closure in preventing contamination of the contents and in preventing contamination of the pouring lip is determined by obtaining the percentage ratios between negative samples and the total number of samples run.

At the conclusion of this introduction, the discussion from the floor was begun. Dr. J. A. Keenan of the Whiting Milk Company of Boston was asked what the status of the closure problem was in the Boston territory. Dr. Keenan related that the industry was very much interested in closure studies and was trying to keep posted on new developments. He indicated that it was his personal belief that the problems of containers and closures and their being brought to a stage of development satisfactory to health control officials was directly related to the manufacturer of containers and closures, rather than to the dairy industry itself. He stressed the necessity of action from container and closure manufacturers if the dairies were to be able to obtain appropriate packages. It is to be noted that container and closure manufacturer representatives at the meeting indicated their willingness to cooperate in the prompt solution of the problem.

Mr. A. J. Powers discussed some of the details of the prodigiosus technique reported by Dr. Levowitz. He said that he was inclined to the opinion that the coliform group offered more as a satistory test organism than did prodigiosus, since under certain conditions of culturing, prodigiosus organisms might not readily develop their characteristic color.

Dr. J. A. Anderson of Rutgers University agreed with Mr. Powers, and stated conditions under which prodigiosus growth development would be inhibited. Dr. Levowitz felt that the use of the coliform group might yield some trouble through the recovery of coliforms in control samples.

The expression was offered that the bacteriological technique was hardly a simple matter, and the question raised as to whether or not the use of dyes in bottles filled with water would not be as satisfactory. Comments on this topic indicated that the capillary qualities of milk could not be correlated with those of water sufficiently to obtain proper guidance from such trials.

Suggestions were offered as to a method of insuring against the contamination of ice by freezing water chlorinated at different levels into ice. Questions were raised as to the acceptability of this practice and as to its limitations.

Methods were proposed whereby handling of containers could be curtailed but comments on these suggestions indicated that such methods were impractical.

The concensus of opinion at the conclusion of the meeting was that the problems of modifying closures to meet with specific standards were important enough to warrant immediate work by all interested agencies.

The Methylene Blue Reduction Test and the Keeping Quality of Milk. C. H. Chalmers, J. Dairy Res. 1938, v. 9, 351-5. Bulletin of Hygience, Vol. 14, No. 4, April 1939, p. 333. Public Health Engin. Abs. XIX, Mi, 47.

"It is well known that the keeping quality of milk gives poor correlation with the methylene blue test under the conditions laid down for the testing of designated milks. The author carried out a number of experiments with milk, holding it for longer periods at 15° C. before submitting the samples to the reductase test. Morning milk produced about 7 a. m. and cooled at the farm was sampled about 10 a. m. and at once sent to the laboratory. Two hundred samples were examined, each divided into six portions. With samples held at 15° C. for 1 hour there was very poor relationship between reduction time and keeping quality and the correlation was but little better after 7 hours' incubation at 15° C. When the samples were kept for 16 hours at 15° C. the correlation was considerably better but by no means perfect. In the last group which were held at 15° C. for 23 hours there was fairly close agreement between keeping quality and reduction time. No bacterial studies were made but the author suggests that during the keeping period there is a progressive change in the number of different species of organisms and that the type predominant at any one time varies."

Resolution Relative to Abolition of Grade B Raw Milk. Health News, N. Y. State Dept. of Health, Vol. 16, No. 24, June 12, 1939. p. 93. Public Health Engin. Abs. XIX, Mi, 50.

On May 19, 1939, the Public Health Council of New York City by unanimous vote adopted a resolution to abolish Grade B raw milk effective Jan. 1, 1941. The resolution in full is published therein.

M. K. HAVENS.

Frozen Desserts Ordinance

Recommended by the U. S. Public Health Service.

November, 1939 Edition

PREFACE

The following frozen desserts ordinance is recommended by the U. S. Public Health Service for adoption by states and communities in order to encourage a greater uniformity and a higher level of excellence in the sanitary control of frozen desserts.

This ordinance embodies the best information at present available on frozen-desserts-control legislation, but it should be considered subject to change as improvements are developed.

In order that it may have at its command the technical advice of a comprehensive group of experts in the various phases of environmental sanitation, the United States Public Health Service has appointed a board of consultants, termed the "Public Health Service Sanitation Advisory Board," composed of the following members:

Mr. H. A. Whittaker, director, division of sanitation, State health department, Minneapolis, Minn., chairman.

Mr. C. A. Abele, director, bureau of inspection, State health department, Montgomery, Ala., member.

Dr. Paul B. Brooks, deputy commissioner of health, State health department, Albany, N. Y., member.

Mr. W. D. Dotterrer, Bowman Dairy Co., 140 West Ontario St., Chicago, Ill., member.

Mr. V. M. Ehlers, director, bureau of sanitary engineering, State board of health, Austin, Texas, member.

Mr. Alfred H. Fletcher, City health department, Memphis, Tenn., member.

Dr. John G. Hardenbergh, Walker-Gordon Laboratory Co., Inc., Plainsboro, N. J., member.

Mr. Henry F. Judkins, Sealtest, Inc., 230 Park Avenue, New York, N. Y., member.

Mr. Ernest Kelly, Chief, Division of Market-Milk Investigations, U. S. Department of Agriculture, Washington, D. C., member.

Mr. H. A. Kroeze, director, bureau of sanitary engineering, State board of health, Jackson, Miss., member.

Mr. Paul F. Krueger, Board of Health, Chicago, Ill., member.

Mr. Alan Leighton, Bureau of Dairy Industry, U. S. Department of Agriculture, Washington, D. C., member.

Mr. Geo. W. Putnam, Creamery Package Mfg. Co., Chicago, Ill., member.

Mr. Seth W. Shoemaker, 825 Sunset St., Scranton, Pa., member.

Mr. E. S. Tisdale, formerly chief engineer, division of sanitary engineering, State health department, Charleston, W. Va., member.

Mr. L. C. Frank, Senior Sanitary Engineer, Sanitation Section, U. S. Public Health Service, Washington, D. C., secretary.

Advantage has been taken of the recommendations of the Advisory Board in preparing this edition of the ordinance and code.

The code (Part III) should be used as the legal interpretation of the ordinance. (Ed.—The Code is not printed herewith.)

Because of the nature of frozen desserts production and control, it is not considered wise, for the present at least, to recommend grading the product. This ordinance therefore provides for grading of, or minimum requirements for, frozen desserts plants.

Due to the fact that many ice cream manufacturers must procure their dairy products ingredients from widely scattered sources and because their demand for these products varies greatly with weather conditions and the season of the year, one form of this ordinance includes no provision for quality control of these ingredients at their source but does provide for platform control at the frozen desserts plant. However any municipality[1] which adopts this ordinance and feels that it would be possible for it to control effectively the quality of dairy products ingredients at their source is urged to include such specifications in its ordinance. While inspection and control of frozen desserts plants are considered of paramount importance, production control of ingredients is urged wherever possible, and for such communities the alternative wording given in the footnote to item 25p, on ingredients, is suggested to implement this recommendation. It is expected that as quality control procedures for dairy products at their source are established in the other manufacturing branches of the dairy industry, it will be possible for more and more communities to adopt the form of the ordinance which provides for production control of ingredients.

It is recommended that municipalities adopt the form of the ordinance which provides for grading and degrading of frozen desserts plants and which permits enforcement by degrading or permit revocation or both. Some municipalities may prefer, however, to adopt a non-grading form of ordinance which provides for only a single set of minimum requirements for all frozen desserts plants, and to use exclusively the permit revocation method of enforcement; for these alternative short form B is given in Part I, and the proper unabridged form (Part II) is obtained by the deletion of the words referring to grading, shown within parentheses, and by the substitution of "six-months period" for "grading period" in sections 5 and 6. It will be noted that the sanitation requirements for grade A frozen desserts plants in the grading form of the ordinance are identical with the minimum requirements in the non-grading form.

PART I.

SHORT ENABLING FORM OF UNITED STATES PUBLIC HEALTH SERVICE FROZEN DESSERTS ORDINANCE

(November, 1939 edition)

(This short form is suggested for adoption by states, municipalities, counties, or health districts, subject to the approval of the local legal authority, to reduce the cost of publication, and to promote keeping the frozen desserts ordinance up to date. In many states the adoption of such short form is considered legal.)

ALTERNATIVE SHORT FORM A GRADING TYPE, ENFORCEABLE BY DEGRADING OR PERMIT REVOCATION OR BOTH[1]

An ordinance defining "frozen desserts," "mix," "pasteurization," "frozen desserts plants," etc; prohibiting the sale of adulterated or misbranded mix or frozen desserts; regulating the issuing, suspension and revocation of permits for the sale of mix and frozen desserts, the labeling of containers, the display of grade placards, the inspection of frozen desserts plants, etc., the examination of frozen desserts and their ingredients, the grading and regrading of frozen desserts plants, the transfer of frozen desserts, the sale of mix and frozen desserts from distant points, the construction of future plants, the reporting and control of communicable disease at plants, the enforcement of this ordinance, and the fixing of penalties.

The municipality of.....ordains:

SECTION 1. The production, manufacturing, mixing, preparing, processing, pasteurizing, freezing, packaging, transportation, handling, sampling, examination, labeling, and sale of all mix and frozen desserts sold for ultimate consumption within the municipality of....., or its police jurisdiction, the inspection of all establishments engaged in the production, processing, and distribution of mix and frozen desserts, the issuing and revocation of permits to frozen desserts plants, the grading and regrading of frozen desserts plants, the displaying of grade placards, and the fixing of penalties, shall[1] be regulated in accordance with the terms of the unabridged form of the 1939 edition of the U. S. Public Health Service frozen desserts ordinance, a certified copy of which shall be on file in the office of the City Clerk: *Provided,* That the blank spaces following the words "municipality of" in said unabridged form shall be understood to refer to the municipality of .....: *Provided further,* That in said ordinance all parentheses signs, which enclose words referring to grading, shall be understood to be deleted: *Provided further,* That the provision for production control of ingredients derived from milk, contained in the footnote to item 25p of said ordinance, shall (shall not) apply: *Provided further,* That sections 8, 16, and 17 of said ordinance shall be replaced, respectively, by sections 2, 3, and 4 below.

SECTION 2. From and after 12 months from the date on which this ordinance takes effect no mix or frozen dessert shall be sold for ultimate consumption within the municipality of....., or its police jurisdiction, unless it has been manufactured and frozen in a plant conforming with the grade A or grade B[2] requirements of said ordinance: *Provided,* That when any frozen desserts plant fails to qualify for grade A or grade B[2] the health officer is authorized to revoke the permit or in lieu thereof to degrade the plant and permit its operation during a temporary period not exceeding 30 days or in emergencies such longer period as he may deem necessary.

SECTION 3. Any person, firm, or corporation violating any provisions of this ordi-

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This ordinance is published by permission of the Surgeon-General, U. S. Public Health Service.

[1] The word municipality as used in this ordinance and code shall be understood to mean municipality, county, district, or state.

[1] Communities which wish to adopt the short form of the non-grading type of ordinance, and to restrict the health officer to the permit revocation method of punishing violations, should adopt alternative Form B below.

[1] Municipalities, counties, and health districts in which the adoption of legislation by reference is not considered legal may delete the remainder of section 1 after "shall" and substitute the following: "conform with the regulations which the health officer (or Board of health) of the municipality of .....may adopt, under authority hereby conferred." If the regulations adopted by the health officer conform to the 1939 edition of the U. S. Public Health Service Frozen Desserts Ordinance, said community will be considered as having adopted the ordinance.

[2] Communities in position to do so may delete "or grade B."

nance shall upon conviction be punished by .....

SECTION 4. All ordinances and parts of ordinances in conflict with this ordinance are hereby repealed; and this ordinance shall take effect .....its adoption and publication.

ALTERNATIVE SHORT FORM B NON-GRADING TYPE, ENFORCEABLE BY PERMIT REVOCATION ONLY

An ordinance defining "frozen desserts," "mix," "pasteurization," "frozen desserts plants," etc; prohibiting the sale of adulterated or misbranded mix or frozen desserts; regulating the issuing, suspension and revocation of permits for the sale of mix and frozen desserts, the labeling of containers, the inspection of frozen desserts plants, etc., the examination of frozen desserts and their ingredients, the transfer of frozen desserts, the sale of mix and frozen desserts from distant points, the construction of future plants, the reporting and control of communicable disease at plants, the enforcement of this ordinance, and the fixing of penalties.

The municipality of.....ordains:

SECTION 1. The production, manufacturing, mixing, preparing, processing, pasteurizing, freezing, packaging, transportation, handling, sampling, examination, labeling, and sale of all mix and frozen desserts sold for ultimate consumption within the municipality of..... ....., or its police jurisdiction, the inspection of all establishments engaged in the production, processing, and distribution of mix and frozen desserts, the issuing and revocation of permits to frozen desserts plants, and the fixing of penalties, shall[1] be regulated in accordance with the terms of the unabridged form of the 1939 edition of the U. S. Public Health Service frozen desserts ordinance, a certified copy of which shall be on file in the office of the City Clerk: *Provided,* That the blank spaces following the words "municipality of" in said unabridged form shall be understood to refer to the municipality of.....:

[1] Municipalities, counties, and health districts in which the adoption of legislation by reference is not considered legal may delete the remainder of section 1 after "shall" and substitute the following: "conform with the regulations which the health officer (or Board of health) of the municipality of .....may adopt, under authority hereby conferred." If the regulations adopted by the health officer conform to the 1939 edition of the U. S. Public Health Service Frozen Desserts Ordinance, said municipality will be considered as having adopted the ordinance.

Provided further, That in said ordinance all words within parentheses, referring to grading, shall be understood to be deleted: *Provided further,* That in sections 5 and 6 of said ordinance the words "grading period" shall be replaced by the words "six-months period:" *Provided further,* That the provision for production control of ingredients derived from milk, contained in the footnote to item 25 p of said ordinance, shall (shall not) apply: *Provided further,* That sections 8, 16, and 17 of said ordinance shall be replaced, respectively, by sections 2, 3, and 4 below.

SECTION 2. From and after 12 months from the date on which this ordinance takes effect no mix or frozen dessert shall be sold for ultimate consumption within the municipality of ..... or its police jurisdiction unless it has been manufactured and frozen in a plant conforming with the requirements of said ordinance: *Provided,* That when any frozen desserts plant fails to qualify the health officer is authorized to revoke the permit.

SECTION 3. Any person, firm, or corporation violating any provisions of this ordinance shall upon conviction be punished by .....

SECTION 4. All ordinances and parts of ordinances in conflict with this ordinance are hereby repealed; and this ordinance shall take effect .....its adoption and publication.

PART II.

THE UNITED STATES PUBLIC HEALTH SERVICE FROZEN DESSERTS ORDINANCE

(November, 1939 Edition)

(This unabridged form of the ordinance should be adopted only where the short enabling form in Part I is not considered legal.)

An ordinance defining "frozen desserts," "mix," "pasteurization," "frozen desserts plants," etc.; prohibiting the sale of adulterated or misbranded mix or frozen desserts; regulating the issuing, suspension and revocation of permits for the sale of mix and frozen desserts, the labeling of containers, (the display of grade placards,)[1] the inspection of frozen desserts plants, etc., the examination of frozen desserts and their ingredients, (the grading and regrading of frozen desserts plants,)[1] the transfer of frozen desserts, the sale of mix and frozen desserts from distant points, the construction of future plants, the reporting and control of communicable disease at plants, the enforcement of this ordinance, and the fixing of penalties.

Be it ordained by the.....of the municipality of..... as follows:

SECTION 1. *Definitions.*—The following definitions shall apply in the interpretation and the enforcement of this ordinance:

A. *Frozen desserts.*—A frozen dessert is any clean frozen or partially frozen combination of two or more of the following: milk or milk products, eggs or egg products, sugar, water, fruit or fruit juices, candy, nut meats, or other harmless and wholesome food products, flavors, color, or harmless stabilizer, and shall be deemed to include ice cream, frozen custard, ice milk, milk sherbet, ices, and other similar products.[1]

B. *Milk and milk products.*—Milk and milk products used in mix or frozen desserts shall include milk, cream, fluid skim milk, butter, sweetened and unsweetened evaporated milk, sweetened and unsweetened evaporated skim milk, sweetened and unsweetened condensed milk, sweetened and unsweetened condensed skim milk, powdered whole milk, powdered skim milk, sweet cream buttermilk, sweet cream condensed buttermilk, and sweet cream powdered buttermilk, or any of these products from which lactose has been wholly or partially removed.

C. *Mix.*—Mix is the unfrozen combination of all ingredients of a frozen dessert with or without fruits, fruit juices, candy, nut meats, flavor, or harmless color.

D. *Pasteurization.*—The terms "pasteurization," "pasteurized," and similar terms shall be taken to refer to the process of heating every particle of mix to at least 155° F. and holding at such temperature for at least 30 minutes in approved and properly operated equipment, provided that nothing contained in this definition shall be construed as disbarring any other process which has been demonstrated to be equally efficient and is approved by the State health authority.

E. *Person.*—The word "person" as used in this ordinance shall mean person, firm, corporation, or association.

F. *Frozen desserts manufacturer.*—A frozen desserts manufacturer is any person who manufactures, processes, or freezes any mix or frozen desserts for distribution or sale.

G. *Frozen desserts plant.*—A frozen desserts plant is hereby defined as any place or premises where frozen desserts or mix are manufactured, processed, or frozen for distribution or sale.

H. *Health officer.*—The term "health officer" shall mean the health authority of the city of .....or his authorized representative.

I. *Average bacterial plate count, direct microscopic count, reduction time, and cooling temperature.*—Average bacterial plate count and average direct microscopic count shall be taken to mean the logarithmic average, and average reduction time and average cooling temperature shall be taken to mean the arithmetic average, of the respective results of the last four consecutive samples, taken upon separate days.

J. *Adulterated or misbranded frozen desserts or mix.*—Any frozen dessert or mix which contains any unwholesome substance, or which if defined in this ordinance[1] does not conform with its definition, (or which carries a grade label unless such grade label has been awarded by the health officer and not revoked,)[2] shall be deemed adulterated and/or misbranded.

K. *And/or.*—Where the term "and/or" is used "and" shall apply where possible, otherwise "or" shall apply.

(L. *Grading period.*—The grading period shall be taken to mean the interval between the public announcements of the grades of frozen desserts plants and shall in no case exceed 6 months.)[2]

SECTION 2. *The sale prohibited of mix or frozen dessert which is adulterated or misbranded.*—No person shall, within the municipality of..... or its police jurisdiction, manufacture, freeze, sell, offer or expose for sale, or have in possession with intent to sell, any mix or frozen dessert which is adulterated or misbranded.

SECTION 3. *Permits.*—It shall be unlawful for any person to deliver into or receive into the municipality of....., or its police jurisdiction, for sale, or to produce, sell or offer for sale therein, or to have in storage where mix or frozen desserts are sold or served, any mix or frozen dessert, who does not possess a permit from the health officer of the municipality of.....

[1] Communities which wish to adopt the non-grading type of ordinance and to restrict the health officer to the permit revocation method of punishing violations should substitute "six-months period" for "grading period" in sections 5 and 6, and should delete all words within parentheses throughout the ordinance. Communities desiring to adopt the grading type of ordinance, enforceable by degrading or permit revocation or both, should instead delete such parentheses signs throughout the ordinance.

[1] Composition standards for various frozen desserts are to be issued by the Food and Drug Administration, U. S. Department of Agriculture. These will be included as suggested standards in an appendix to later editions of this ordinance.

[1] If definitions of the various frozen desserts are not included in the ordinance as adopted, the wording should be changed to refer to the State standards.

[2] See footnote 1, second column, p. 46.

Only a person who complies with the requirements of this ordinance shall be entitled to receive and retain such a permit.

Such a permit may be suspended by the health officer, or revoked after an opportunity for a hearing by the health officer, upon the violation by the holder of any of the terms of this ordinance.

SECTION 4. *Labeling (and placarding)*[1] —All cans, packages, and other containers enclosing mix or frozen desserts or their ingredients derived from milk, except those filled from labeled bulk containers in retail dispensing, shall be plainly labeled or marked with (1) the name of the contents; (2) in the case of mix the word "pasteurized" only if the contents have been pasteurized and the word "raw" only if the contents are raw; and (3) the name and the street address, or the permit number, of the plant at which the contents were placed in the container. A descriptive word or phrase indicating in more detail the composition or flavoring of the mix or frozen dessert, such as strawberry, chocolate, custard, lemon, etc., may be used on the label. The label or mark shall be in letters of a size, kind, and color approved by the health officer. Trade names and trade marks may be permitted. The label shall contain no marks or words which are misleading.

(No person who manufactures, distributes, or dispenses frozen desserts or mix may display any grade placard, sign, or notice without the approval of the health officer.)[1]

SECTION 5. *Inspection of frozen desserts plants.*—At least once during each grading period[1] the health officer shall inspect all frozen desserts plants the products of which are intended for consumption within the municipality of..... or its police jurisdiction. In case the health officer discovers the violation of any item of sanitation, he shall make a second inspection after a lapse of such time as he deems necessary for the defect to be remedied, but not before the lapse of 3 days, and the second inspection shall be used in determining compliance with the (grade)[1] requirements of this ordinance. Any violation of the same item of this ordinance on two consecutive inspections shall call for immediate (degrading or)[1] suspension of permit.

One copy of the inspection report shall be delivered to the owner of the premises inspected, or his agent, and shall be readily available at any time for a period of 12 months. Another copy of the inspection report shall be filed with the records of the health department.

SECTION 6.—*The examination of frozen desserts and their ingredients.*—During each grading period[1] at least four samples of frozen desserts and pasteurized mix from each plant and of milk and milk products ingredients of mix or frozen desserts shall be tested by the health officer. Samples of mix or frozen desserts may be taken by the health officer at any time prior to final delivery. Samples of ingredients not derived from milk may be tested as often as the health officer may require. Samples of frozen desserts from stores, cafes, soda fountains, restaurants, and other places where frozen desserts are sold may be tested as often as the health officer may require. Bacterial plate counts and direct microscopic counts shall be made in conformity with the[1] 1934[2] standard methods recommended by the American Public Health Association. Examinations may include such ther chemical and physical determinations as the health officer may deem necessary for the detection of adulteration, these examinations to be made in conformity with the[1] 1934[2] standard methods of the American Public Health Association and the Association of Official Agricultural Chemists. All proprietors of plants, stores, cafes, restaurants, soda fountains, and other similar places shall furnish the health officer, upon his request, with the names of all persons from whom their mix or frozen desserts are obtained.

Whenever the average bacterial count, the average reduction time, or the average cooling temperature falls beyond the limit (for the grade then held)[3], the health officer shall send written notice thereof to the plant concerned, and shall take an additional sample, but not before the lapse of three days, for determining a new average in accordance with section 1(I). Violation of the (grade)[3] requirement by the new average or by any subsequent average during the remainder of the current grading period[3] shall call for immediate (degrading or)[3] suspension of the permit, unless the last individual result is within the (grade)[3] limit.

[1] See footnote 1, second column, p. 46.

[1] Municipalities in which the adoption of legislation by reference is not considered legal may substitute the following for the remainder of this sentence: "regulations of the health officer (or Board of Health)." If the regulations then adopted by the health officer are equivalent to those contained in the reference thus replaced, they will not be considered as constituting a downward revision of this ordinance. All other references in this ordinance to standards and methods not specifically described may be treated in the same manner.

[2] The Advisory Board has appointed a committee to determine whether the new culture medium specified in the 1939 Standard Methods will necesitate a revision of the bacterial standards of this ordinance for frozen desserts and ingredients. Until this question is settled the "1934" rather than the current Standard Methods are recommended.

[3] See footnote 1, second column, p. 46.

SECTION 7. *(The grading of frozen desserts plants.*—At least once every 6 months the health officer shall announce the grades of all frozen desserts plants the products of which are ultimately consumed within the municipality of ..... or its police jurisdiction. Said grades shall be based upon the following standards.)[1]

Sanitation requirements for (Grade A)[1] frozen desserts plants—All (grade A)[1] frozen desserts plants shall comply with the following items of sanitation.

ITEM 1p. *Floors.*—In frozen desserts plants the floors of all rooms in which mix, frozen deserts, or their ingredients are manufactured, frozen, or stored, or in which containers and utensils are washed, shall be constructed of concrete or other equally impervious and easily cleaned material, and shall be smooth, properly drained, provided with trapped drains, and kept clean; provided that cold storage rooms need not be provided with drains; provided further, that the construction requirements of this item shall be waived, in frozen desserts plants of 5-gallon freezer capacity or less, if the portion of the room in which the freezer is installed and the room in which containers or utensils are washed have impervious floors or solid floors covered with tight linoleum or other approved, washable material.

ITEM 2p. *Walls and ceilings.*—Walls and ceilings of rooms in which mix, frozen desserts, or their ingredients are manufactured or frozen, or in which containers or utensils are washed, shall have a smooth, washable, light-colored surface, and shall be kept clean.

ITEM 3p. *Doors and windows.*—Unless other effective means are provided to prevent the access of flies, all openings into the outer air shall be effectively screened and doors shall be self-closing.

ITEM 4p. *Lighting and ventilation.*—All rooms shall be well lighted and ventilated.

ITEM 5p. *Miscellaneous protection from contamination.*—The various plant operations shall be so located and conducted as to prevent any contamination of the mix, frozen desserts, their ingredients, cleaned equipment, or containers. All means necessary for the elimination of flies shall be used.

Separate rooms shall be provided for (a) the pasteurizing, processing, cooling, freezing, and packaging operations, and (b) the washing and bactericidal treatment of containers; provided that this requirement shall be waived, in frozen desserts plants which freeze and sell only at retail on the premises, if all mixing, freezing, and packaging processes, but not necessarily the hardening and storage compartments, are enclosed in a tight glass or other sanitary enclosure which is open only on the side farthest from the public, which has a dust-tight top extending over the entire freezer, and which is protected by a fan so installed and of such power as to prevent the entrance of flies. Containers of frozen desserts ingredients shall not be unloaded directly into the room or rooms used for pasteurization or subsequent processes. Pasteurized mix or frozen desserts shall not be permitted to come in contact with equipment with which unpasteurized mix, frozen desserts, milk, or milk products have been in contact, (or with which mix or frozen desserts from a lower grade plant have been in contact,)[1] unless such equipment has first been thoroughly cleaned and subjected to bactericidal treatment. None of the operations connected with a frozen desserts plant shall be conducted in a room used for domestic purposes.

ITEM 6p. *Toilet facilities.*—There shall be provided toilet facilities conforming with the ordinances of the municipality of....., and which are kept clean, well ventilated, and in good repair. Toilet rooms shall not open directly into any room in which frozen desserts, their ingredients, equipment or containers are handled or stored. The doors of all toilet rooms shall be self-closing. In case privies or earth closets are permitted and used, they shall be separate from the building, and shall be of a sanitary type constructed and operated in conformity with the requirements of the State board of health.

ITEM 7p. *Water supply.*—The water supply shall be easily accessible, adequate, and of a safe, sanitary quality.

ITEM 8p. *Hand-washing facilities.*—Convenient hand-washing facilities shall be provided, including warm running water, soap, and approved sanitary towels. The use of a comon towel is prohibited.

ITEM 9p. *Sanitary piping.*—All piping used to conduct ingredients, mix, or frozen desserts shall be "sanitary milk piping" of a type which can be easily cleaned with a brush.

ITEM 10p. *Construction and repair of containers and equipment.*—All multi-use containers and equipment with which mix, frozen desserts, or their ingredients come in contact shall be constructed in such manner as to be easily cleaned, and shall be kept in good repair.

ITEM 11p. *Disposal of wastes.*—All wastes shall be properly disposed of.

ITEM 12p. *Cleaning and bactericidal treatment of containers and equipment.*—All containers and equipment for mix, frozen desserts, or their ingredients, except single-service containers shall be thoroughly cleaned after each usage. All containers shall be subjected to an approved bactericidal process after each cleaning, and all equipment immediately before each usage. When empty and before being returned by a frozen desserts plant, each container shall

[1] See footnote 1, second column, p. 46.

[1] See footnote 1, second column, p. 46.

be effectively cleaned and subjected to bactericidal treatment.

ITEM 13p. *Storage of containers.*—After bactericidal treatment all multi-use containers for mix, frozen desserts, and their ingredients shall be stored in such manner as to be protected from contamination.

ITEM 14p. *Handling of containers and equipment.*—Between bactericidal treatment and usage, and during usage, containers and equipment shall not be handled or operated in such manner as to permit contamination of the frozen desserts, mix, or their ingredients.

ITEM 15p. *Storage of caps, parchment papers, wrappers, can liners, and single-service containers.*—Caps, parchment papers, wrappers, can liners, and single-service containers for frozen desserts, mix, or their ingredients shall be purchased only in sanitary containers and shall be kept therein in a clean dry place.

ITEM 16p. *Pasteurization of mix.*—All mix shall be pasteurized as described in section 1(D) of this ordinance.

ITEM 17p. *Cooling and freezing.*—All milk or fluid milk products received at the frozen desserts plant for use in frozen desserts or mix shall immediately be cooled in approved equipment to 50° F. or less and maintained at that temperature until pasteurized, unless they are to be pasteurized within 2 hours after receipt and all pasteurized mix shall immediately be cooled in approved equipment to an average temperature of 50° F. or less, as defined in section 1(I) of this ordinance, and maintained thereat until frozen.

All mix which is not frozen at the plant at which it was pasteurized shall be transported to the place of manufacturing or freezing in sealed containers, and the mix shall be handled in a sanitary manner. Dipping from containers of pasteurized mix is prohibited.

ITEM 18p. *Packaging.*—Packaging, cutting, molding, dipping, and other preparation of mix or frozen desserts or their ingredients shall be done in an approved manner. Containers shall be adequately covered immediately after filling. Caps or covers shall be handled in such manner as to prevent contamination of the package contents.

ITEM 19p. *Overflow.*—Product drip, or overflow mix or frozen desserts or their ingredients, shall not be sold for human consumption.

ITEM 20p. *Returns.*—Mix or frozen desserts in broken and open containers may after delivery be returned to the plant for inspection, but shall not be used for making mix or frozen desserts.

ITEM 21p. *Personnel, health.*—The health officer or a physician authorized by him shall examine and take a careful morbidity history of every person connected with a frozen desserts plant, or about to be employed, whose work brings him in contact with the production, handling, or storage of mix or frozen desserts, containers, or equipment. If such examination suggests that such person may be a carrier of or infected with the organisms of typhoid or paratyphoid fever or any other communicable diseases likely to be transmitted through frozen desserts, he shall secure appropriate specimens of body discharges and cause them to be examined in a laboratory approved by him or by the State health authority for such examinations, and if the results justify such person shall be barred from such employment.

Such persons shall furnish such information, submit to such physical examinations, and submit such laboratory specimens as the health officer may require for the purpose of determining freedom from infection.

ITEM 22p. *Personnel, cleanliness.*—All persons coming in contact with mix, frozen desserts, their ingredients, containers, or equipment shall wear clean outer garments and shall keep their hands clean at all times while thus engaged.

ITEM 23p. *Miscellaneous.*—All vehicles used for transportation of mix or frozen desserts or their ingredients shall be so constructed and operated as to protect their contents from the sun and from contamination. Such vehicles shall be kept clean, and no substance capable of contaminating mix or frozen desserts or their ingredients shall be transported therewith in such manner as to permit contamination. All vehicles used solely for the distribution of mix or frozen desserts shall have the name of the distributor prominently displayed.

The immediate surroundings of all frozen desserts plants shall be kept in a neat, clean condition.

ITEM 24p. *Bacterial plate count of pasteurized mix or frozen desserts.*—The average bacterial plate count of the pasteurized mix or the frozen desserts shall at no time prior to delivery exceed 50,000 per gram, as determined under sections 1(I) and 6.

ITEM 25p. *Ingredients.*—All mix and frozen desserts ingredients shall be clean, have a fresh wholesome flavor and odor and a normal appearance, and be of satisfactory quality.

Fruits, nuts, flavors, and other ingredients which are not pasteurized shall be handled or processed in an approved manner.

Milk and milk products used as ingredients shall at no time before the mix is pasteurized have an average bacterial plate count exceeding 200,000 per cubic centimeter, or an average direct microscopic count exceeding 200,000 per cubic centimeter if clumps are counted or 800,000 per cubic centimeter if individual organisms are counted, or an average reduction time of less than 6 hours, as determined under sections 1(I) and 6, provided that these limits shall be doubled in the case of cream.[1]

(*Grade B frozen desserts plants.*—Grade B frozen desserts plants are those which conform with all of the requirements for grade A plants except as follows:

In item 1p floors may be of tight wood or linoleum surfacing instead of concrete, tile, etc., if they are smooth and kept clean, and floor drains are not required.

In item 2p the requirements relative to the surfaces of walls and ceilings shall be waived if they are kept clean.

In item 4p the ventilation requirement and the requirement relative to the even distribution of light shall be waived.

In item 24p the average bacterial plate count of the pasteurized mix or the frozen desserts shall at no time prior to delivery exceed 100,000 per gram.

In item 25p ingredients derived from milk and milk products shall at no time before the mix is pasteurized have an average bacterial plate count exceeding 1,000,000 per cubic centimeter, or an average direct microscopic count exceeding 1,000,000 per cubic centimeter if clumps are counted or 4,000,000 per cubic centimeter if individual organisms are counted, or an average reduction time of less than 3½ hours, provided that these limits shall be doubled in the case of cream.)[2]

(*Grade C frozen desserts plants.*—Grade C frozen desserts plants are those which violate any of the requirements for grade B plants.)[2]

SECTION 8. *(Grades of)[2] frozen desserts plants which may sell their products.*—From and after 12 months from the date on which this ordinance takes effect no mix or frozen desserts shall be sold for ultimate consumption within the municipality of..... or its police jurisdiction unless it has been manufactured and frozen in a plant conforming with the (grade A or grade B[2])[1] requirements of this ordinance. Provided that when any frozen desserts plant fails to qualify (for Grade A or grade B[2])[1] the health officer is authorized to revoke the permit (or in lieu thereof to degrade the plant and permit its operation during a temporary period of 30 days or in emergencies such longer period as he may deem necessary)[1].

SECTION 9. *Suspension and reissuing of permit (supplementary regrading)[1].*—If at any time (between the regular announcements of the grades of frozen desserts plants a lower grade or)[1] a suspension of the permit shall become justified in any case, the health officer shall, subject to the provisions of sections 3, 5, 6, and 7 of this ordinance, immediately (lower the grade or)[1] suspend the permit of said frozen desserts plant.

Any frozen desserts plant (the grade of which has been lowered or)[1] the permit of which has been suspended by the health officer may at any time make application for (regarding or)[1] the reissuing of the permit.

Upon receipt of a satisfactory application, in case (the lowered grade or)[1] the suspension of permit is the result of an unsatisfactory bacterial condition or cooling temperature, the health officer shall take further samples at the rate of not more than two samples per week. The health officer shall (regrade the applicant upward or)[1] reissue the permit whenever the average of the last four sample results indicates the necessary compliance, but not before the lapse of two weeks from the date of (degrading or)[1] suspension of permit.

In case the (lowered grade or)[1] the suspension of permit is due to the violation of any item or items of the specifications prescribed in section 7 other than bacterial condition or cooling temperature, the said application must be accompanied by a statement signed by the applicant to the effect that the violated item or items of the specifications have been conformed with. Within one week of the receipt of such an application and statement the health officer shall make a reinspection, and thereafter as many additional reinspections as he may deem necessary, to assure himself that the applicant is again complying with the (higher grade)[1] requirements, and, in case the findings indicate compliance, shall (award the higher grade or)[1] reissue the permit, but not before the lapse of two weeks from the date of (degrading or)[1] suspension of permit.

SECTION 10. *Transferring or packaging frozen desserts.*—No person shall transfer frozen desserts from one container to another or package the same on the street or in any

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[1] Communities which are in position to undertake production control of ingredients derived from milk and milk products within the 12-months period provided in section 8 are urged to add the following sentence to this paragraph when adopting this ordinance:

"All milk and milk products used as ingredients shall be produced on dairy farms conforming with all the requirements for grade A raw milk for pasteurization contained in section 7 of the 1939 edition of the Milk Ordinance and Code recommended by the U. S. Public Health Service, and shall be received and/or processed only in receiving stations and/or milk products plants conforming with items 1p to 15p, inclusive, 17p, 18p, 19p, 22p, and 23p of this ordinance, provided that the partitioning requirement of item 5p shall not apply to receiving stations."

[2] See footnote 1, second column, p. 46.

[1] See footnote 1, second column, p. 46.

[2] Communities in position to do so may delete "or grade B."

vehicle or in any place except a sanitary room under approved conditions.

SECTION 11. *Mix and frozen desserts from points beyond the limits of routine inspection.*—Mix and frozen desserts from points beyond the limits of routine inspection of the municipality of.....may not be sold in the municipality of....., or its police jurisdiction, unless controlled under provisions equivalent to the requirements of this ordinance, provided that the health officer shall satisfy himself that the health officer having jurisdiction over the manufacture is properly enforcing such provisions.

SECTION 12. *Future frozen desserts plants.*—All frozen desserts plants from which mix or frozen desserts are supplied to the municipality of....., which are hereafter constructed, reconstructed, or extensively altered shall conform in their construction to the (grade A)[1] requirements of this ordinance. Properly prepared plans for all frozen desserts plants which are hereafter constructed, reconstructed, or extensively altered shall be submitted for approval before work is begun, and signed approval shall be obtained from the health officer and/or the state health department.

SECTION 13.—*Notification of disease.*—Notice shall be sent to the health officer immediately by any frozen desserts manufacturer or distributor among whose employees any infectious, contagious, or communicable disease occurs.

SECTION 14. *Procedure when infection suspected*—When suspicion arises as to the possibility of transmission of infection from any person concerned with the handling of mix, frozen desserts, or their ingredients, the health officer is authorized to require any or all of the following measures: (1) the immediate exclusion of that person from handling mix, frozen desserts, or their ingredients; (2) the immediate exclusion of the supply concerned from distribution and use; (3) adequate medical and bacteriological examination of the person, of his associates, and of his and their body discharges.

SECTION 15. *Enforcement interpretation.* This ordinance shall be enforced by the health officer in accordance with the interpretations thereof contained in the 1939 edition of the United States Public Health Service Frozen Desserts Code, a certified copy of which shall be on file in the City Clerk's office[2]

SECTION 16. *Penalty.*—Any person who shall violate any provision of this ordinance shall be fined not more than..... at the discretion of the court. Each and every violation of the provisions of this ordinance shall constitute a separate offense.

SECTION 17. *Repeal and date of effect.*—All ordinances and parts of ordinances in conflict with this ordinance are hereby repealed; and this ordinance shall be in full force and effect immediately upon adoption and its publication, as provided by law.

SECTION 18. *Unconstitutionality clause.* Should any section, paragraph, sentence, clause, or phrase of this ordinance be declared unconstitutional or invalid for any reason, the remainder of said ordinance shall not be affected thereby.

[1] See footnote 1, second column, p. 46.

[2] See footnote 1, second column, p. 48.

The Measurement of Air Conditions. C. P. McCord and W. N. Witheridge. Jour. A. M. A., Vol. 111, No. 18, Oct. 29, 1938, pp. 1647-1654. Public Health Engin. Abs. XIX, AC 18.

The increasing use of artificially conditioned atmosphere in occupied spaces has brought a demand for the use of modern instruments for judging the suitability of the air conditions. The authors have pointed out in earlier publications that the five principal factors in determining the quality of the air and its effect on human comfort are air temperature, humidity, air movement, radiation, and cleanliness of the atmosphere. For the determination of air temperature and humidity, the authors discuss the Sling Psychrometer and the various modifications of this instrument. A discussion of air movement contains a description of standard Kata thermometer and the recently devised electrical anemometer. Mechanical and presure types of anemometers are also described. The factor of radiation in air conditioning is discussed fully, and the various instruments employed in determining this factor are presented.

And finally, the subject of atmospheric contamination is briefly discussed. The article is well illustrated with photographs of the various physical instruments employed in measuring atmospheric conditions. and in addition, the chart used in determining air velocities from Kata thermometer readings and effective temperature charts are given.

J. J. BLOOMFIELD.

Abstracts of Technical Papers Presented at Thirty-first Annual Meeting of the American Butter Institute December 5-6, 1939, Chicago, Illinois.

Reported by M. E. Parker

Trouble Shooting for Flavor Defects

1. Observations in Practice

V. L. Turgasen

Armour and Company, Chicago, Ill.

A summary of the practical observations on this problem indicate:

Water supplies may be the source of the microorganisms capable of producing cheesy flavors in butter. Some of the organisms are rather resistant to the action of chlorine, as has been indicated by the high concentrations at which water must be chlorinated to control the spoilage.

Printing or re-working butter in such a manner as to bring about an aggregation of the moisture droplets apparently has an influence upon the appearance of the defect. Some statistical data have indicated predominately a larger percentage of butters developing cheese flavors to contain less than 2.5 percent salt. However, in some of the cases studied where water has been the source of the organisms, increasing the salt content to as much as 4 percent did not have any apparent effect upon the control of the defect. Variations in the acidity of the cream at churning so the reaction of the butter sera ranged from pH 5.4 to 7.8 apparently had no influence in controlling the defect.

Adequate chlorination of all water used in the creamery has been effective in controlling the defect; however, there are certain factors in the use of chlorine which must be taken into consideration.

2. Laboratory Studies on Cheesy Flavors in Butter

B. W. Hammer

Iowa Agricultural Experiment Station, Ames, Iowa

In attempting to control cheesiness in butter, the primary object should be to protect the product against the entrance of the responsible organisms. This involves adequate pasteurization of all the cream, adequate care of the equipment and materials with which the pasteurized cream and butter come in contact, and a water supply for washing the butter, rinsing vats, and other such uses, that is of a satisfactory quality.

Experience has shown that even with rather rigid control measures, irregularities occasionally occur. Probably the most serious one with which the plant operators must contend is a change in the bacteriological quality of the water supply. This may be seasonal, or it may be due to unknown factors. It appears to be especially common with water supplies of certain types. In chlorinated supplies, the problem is complicated by the lack of information on the chlorine tolerance of organisms causing cheesiness and on the factors influencing this.

With the possibility of harmful or-

ganisms being present in the butter, even with rigid attempts at their control, the plant procedures should take advantage of the factors influencing their development. The butter should be adequately worked and the moisture well dispersed since this limits the growth of organisms. The use of butter culture apparently has some protective effect, although it is by no means complete, as is evident from the spoilage that has occurred in butter made with culture. The relationship of temperature to the growth of organisms causing cheesiness should be recognized and provisions made for adequate refrigeration, the exact temperatures used being dependent on a number of factors.

An important point in the control of cheesiness, as well as other defects due to organisms, is the regular use of keeping quality tests on the butter* These are advisable so that ineffective control measures in the plant will be detected and remedied at the earliest possible moment, the amount of defective butter in the outbreak thus being kept to a minimum.

* Editor—See this Journal 1, No. 4, 49 (1938).

Weedy Flavors

Feeding Experiments

T. M. Olson

A series of experiments were conducted in which the effects of feeding weeds upon the flavor of milk produced by the ingesting cows were observed. One of the weeds was peppergrass (*Lepidium apetalum*), also known as tongue grass and birds' seed, and identified by its white petalled, small flower and seed pods notched at the top. Other weeds were French weed or penny creas (*Thalspi arvense*), and wild onion. The weeds were fed by grazing or by exclusive feeding in the barn. For barn feeding, the weeds were gathered, sorted out by hand and fed as hay. A bolus of the macerated mass was used when force fed. All these steps, while laborious and time-consuming, were considered essential to assure the proper control of the experiments. No other feeds were used.

Peppergrass was eaten freely and apparently preferred by most cows. As the result of repeated experiments, it appeared that the hay and seed of pepper grass did not adversely affect the flavor of the milk of an ingesting cow. More work is necessary before it can be definitely established that the green peppergrass is detrimental to the flavor of milk, particularly if fed in large quantities.

It was observed that as soon as five minutes after a cow had her first mouthful of French weed, the flavor of the milk was adversely affected. Feeding a cow as little as five pounds of French weed gave the off flavor to milk in a very short while, and it persisted in the milk even four to five hours after feeding.

The off flavor was still present to a marked degree in the milk seven hours after the cow had ingested a large quantity of French weed. Three pounds of macerated French weed hung in a sack over the nose of a cow produced an off flavor in the milk which persisted for several hours. Cows apparently will not eat French weed by preference as it has been noted they will avoid the plant in a pasture if other green feed is available. In the French weed experiments outlined practically all cows were force fed.

Wild onions imparted an off flavor and odor to milk in about five minutes after the cow was fed the same and persisted for four hours. Even hanging a sack of chopped onions over the nose produced pronounced onion flavor in milk in a few minutes and persisted for hours.

(*To be continued in the March-April issue*)

New Books and Other Publications

The Phosphatase Test for Control of Efficiency of Pasteurization, by H. D. Kay, R. Aschaffenburg, and F. K. Neave. 53 pages. Technical Communication No. 1. Imperial Bureau of Dairy Science, Shinfield, near Reading, England. October 1939. Price 2/-.

The subject of this publication is one which is of vital interest to many dairy plant operators, dairy technologists, medical officers of health, dairy scientists, nutrition experts, and others interested in the production and distribution of safe milk to the public. It critically reviews the development, modification, and application of the phosphatase test. It summarizes the present development, and points out the advantages and limitations of the phosphatase test, which is undoubtedly the most effective method at present available for controlling pasteurization. The authors are Prof. H. D. Kay, D.Sc., one of the originators of the test, Dr. R. Aschaffenburg, and Mr. F. K. Neave, the latter two of whom have carried out and published considerable work on the test. This publication is therefore an authoritative work on the subject.

This review comprises 53 pages with 85 references. It gives the details of the procedure for making the phosphatase test according to five different modifications of the original technique, and may be procured at a price in England of 2 shillings.

It is a valuable paper for all persons interested in the development and present status of the use of the phosphatase test in milk control work.

[Editor—An excellent review of the literature on the use of the phosphatase test for detecting irregularities in the pasteurization of milk has been published by L. H. Burgwald, *J. Dairy Sci.*, XX, 853-873 (1939)].

Elements of Sanitation, edited by Edward S. Hopkins, in Association with W. D. Binger, C. L. Ewing, H. A. Faber, C. A. Hechmer, L. H. James, C. E. Keefer, F. L. LaMotte, L. L. Lewis, W. H. Schulze, J. H. Shrader, W. W. Skinner, L. F. Warrick, with Foreword by Abel Wolman. xi + 435 pages. D. Van Nostrand Co., Inc., New York, 1939.

In the Preface the authors state that the science of sanitation has become so widespread that it is impossible for one individual to have detailed knowledge of its many ramifications. With recognition of this fact, the text was undertaken as a cooperative task. It is offered for use as a guide for the general training of college students in the fundamentals of sanitation and hygiene. It will also be useful in the training of health officers and public health nurses. It is not designed primarily for the engineering student but much of its contents will be of interest to him. Compiled by individuals who are familiar with their respective fields, the text presents basic data that should be enlarged upon by the instructor according to his personal background and experience.

The chapter headings are as follows:

The Scientific Background of Sanitation
The Meaning and Determination of pH
Water and Sewage Disinfection
Public Water Supplies
Sewage Disposal
Stream Pollution and Trade Waste Disposal
Refuse Disposal
The Essentials of Food Sanitaition
Milk Sanitation
Ventilation and Air Conditioning
Swimming Pool Control
Environment Hygiene

These subjects are discussed in nontechnical language but clearly and authoritatively. Illustrations and references to literature amplify the presentation. This book will be useful to those who want to be informed concerning the practices in sanitation but who do not care to peruse the highly technical treatises on the subject. It should be read by all sanitarians.

J. H. SHRADER.

JOURNAL OF MILK TECHNOLOGY

Official Publication of the

International Association of Milk Sanitarians

(Association Organized 1911)

THE JOURNAL OF MILK TECHNOLOGY is issued bimonthly beginning with the January number. Each volume comprises six numbers. It is published by the International Association of Milk Sanitarians, and is printed by The Chronicle Press, Inc., Orange, N. J., U. S. A.

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Association News

International Association of Milk Sanitarians

The next annual meeting will be held in New York City, October 17, 18, and 19, with headquarters at the Hotel Pennsylvania. Inasmuch as the World's Fair and the Dairy Industries Exposition at Atlantic City will be in progress at the same time, this meeting should be particularly attractive to milk sanitarians. An additional attraction will be the joint sessions with the New York State Association of Dairy and Milk Inspectors.

C. S. LEETE,
Secretary-Treasurer.

New York State Association of Dairy and Milk Inspectors

The annual meeting in 1940 is to be held in New York City on Thursday, Friday, and Saturday, October 17, 18, and 19, in conjunction with the International Association of Milk Sanitarians. The Hotel Pennsylvania has been designated as headquarters for both meetings.

This time has been selected in order that members may plan to include in their trip a visit to the Dairy Industries Exposition at Atlantic City during the week of October 20.

We also understand that the World's Fair will be open until October 31, 1940.

Special plans are being made to provide entertainment for the wives of members.

President Brosnan has appointed the following committee to confer with authorities at the New York State Veterinary College at Ithaca relative to undertaking a special study of methods of preventing the spread of mastitis in dairy herds:

DR. J. J. REGAN, *Chairman*
DR. PAUL B. BROOKS
MR. SOL PINCUS
MR. GEORGE A. WEST
DR. W. L. CLARK

This is in accordance with a resolution adopted at the last annual meeting.

W. D. TIEDEMAN,
Secretary-Treasurer.

Metropolitan Dairy Technology Society

Dr. Gerald Fitzgerald, of General Foods, Hoboken, N. J., spoke at the November meeting on "Quick Freezing of Foods". He traced the development of the quick-freezing process, and emphasized the importance of studying the reactions and the keeping quality of the various foods after they reach the consumer.

The program for future meetings is as follows:

December 15—Advances in the Manufacture of Sugar for Dairy Products, by Stroud Jardon, American Sugar Refining Co.

January 16—Vitamin Fortification of Foods, by F. M. Parker, Merck Chemical Company.

February 20—Subject to be announced, by G. C. Supplee, The Borden Co.

March 19—Progress in the Control of Mastitis, by E. O. Anderson, University of Connecticut.

April 16—Vacuum Pasteurization of Milk, by E. S. Guthrie, Cornell University.

May 21—Nutritional and Physical Properties of Chocolate Milk, by W. S. Mueller, Massachusetts State College.

O. F. GARRETT,
Secretary-Treasurer.

Indianapolis Dairy Technology Club

At the December meeting, Dr. H. H. Sommer, University of Wisconsin, addressed the club on the subject, "Physical factors affecting the body and texture of cream."

At the meeting on January 8, Dr. J. B. Stine, Kraft-Phenix Cheese Corporation, spoke on "What's quality in cheese". Dr. Stine demonstrated, by means of samples, what constitutes the right flavor and texture.

The February speaker will be Dr. B. E. Horrall, Purdue University, on "The significance of minute amounts of copper in dairy products".

The March speaker will be Miss Anita Beadle, Nutritionist, Purdue University, who will talk on "What the consumer looks for in dairy products".

E. H. PARFITT,
Secretary.

Texas Public Health Association—Milk Section

A milk seminar will be held at Dallas, Texas beginning March 4, conducted by the U. S. Public Health Service. Invitations are being sent to all the milk sanitarians and milk sanitation personnel in neighboring states to attend this seminar, and a large attendance is expected.

W. E. ROBERTS,
Secretary.

Chicago Dairy Technology Society

New officers for 1940 were elected at the December meeting. (See page). The speaker for the evening was Professor H. H. Sommer who discussed "Standardizing the Physical Behavior of Ice Cream Mixes."

Mr. Milton Parker of the Beatrice Creamery Co. gave a discussion on "Is the Standard Plate Count a Proper Yardstick of Quality?" at the January meeting (January 9).

P. H. TRACY,
Secretary.

Michigan Association of Milk Sanitarians

The Annual Meeting will be held at the Civic Auditorium in Grand Rapids during the week of March 4. This meeting will be held in conjunction with the Michigan Allied Dairy Association's Annual Convention. A dairy machinery exhibit is planned, together with separate and combined meetings of all the units of the Allied.

The paid-up membership now totals 92 members—only 8 short of the goal of 100 members for the year 1939.

H. J. BARNUM,
Secretary-Treasurer.

Connecticut Association of Dairy and Milk Inspectors

The Fourteenth Annual Meeting was held at the Hotel Bond, Hartford, on January 9, 1940, with the following program:

Connecticut Food, Drug and Cosmetic Law—E. G. Woodward, Dairy and Food Commissioner.

Coordination of State and Municipal Milk Control—Ira V. Hiscock, Director, Department of Public Health, Yale University.

Short-time High-temperature Pasteurization—T. W. Workman, Deputy Dairy and Food Commissioner.

Homogenized Milk—C. J. Babcock, U. S. Department of Agriculture.

Governor Raymond E. Baldwin was the luncheon guest and speaker.

A Question Box period was sponsored by the following special committee: L. S. Dibble, R. L. Pierce, J. M. Curry, S. T. Williams, G. D. Sullivan, F. R. Fox.

This was followed by the submission of annual reports and election of officers for the ensuing year.

H. C. GOSLEE,
Secretary-Treasurer.

"Doctor Jones" Says—

"Back quite some years ago, when I was getting started in practice, business was kind of slack one day and I dropped out into the kitchen. They were pickling green peppers—doing something to 'em, anyway—and being sort of partial to peppers, I took a hand cutting 'em up. While I was fiddling around there the office doorbell rang so I rinsed my hands off under the spout and went in. It was a fellow that'd been here before—I knew he was good pay—had something in his eye, so I started rolling back his lid to take a look. All of a sudden he grabbed his eye and began dancing around: 'My gosh! Doc,' he says, 'what'd you have on your hands?' Of course I told him nothing at all—that was the substance of it anyway (I'd sort of forgot about the peppers) but he didn't seem to be satisfied and walked out on me.

"Well, sir, that experience learned me a —I mean after that I was pretty careful to see't my hands got a good scrubbing before I went to work, especially when I was going to stick my fingers in somebody's eye. He came back, later, that fellow did—but, you know, I've often thought, since, maybe it'd be a good idea if disease germs had a little sting to 'em like that so't when you had 'em on your hands they'd sort of announce 'emselves. When you get right down to it I suppose more germs ride around on hands than most any other way.

"I remember back in the early days of antiseptic surgery, they tried disinfecting the air and all that stuff; then they began to find out that the main thing was having the hands of the operator good and clean. Of course, then, rubber gloves came along and that helped out.

"You take a person that's a typhoid carrier—that is with typhoid germs in his intestinal discharges—it's remarkable how easy it is for him to get 'em on his fingers. Then if he handles food—well, there you are! That's one good reason for having washbowls in toilet rooms—and using 'em.

"A lot of the scarlet fever and septic sore throat epidemics they've had, hands did it: the hired man on a farm had a sore throat, got the germs on his hands, rubbed 'em into a scratch on a cow's teat when he was milking, the cow got up an inflammation of the udder and the consumers were the goats—several hundred of 'em, in some cases. If the hired man had treated his hands to a little soap and water before he started milking, it might not've happened.

"Covering up your sneezes when you have a cold—that's a fine idea. But when you cover 'em up with your hand and then, right away, shake hands with some fellow—well, I'd say you might better give him a dirty look than that kind of a dirty hand. And that's the way it goes.

" 'Hands across the sea,' like they tell about, may help to promote peace—providing they don't get in somebody else's pocket. But when it comes to promoting health, I'd vote for hands in the washbasin."

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