

*Journal of Milk & Food Technology*

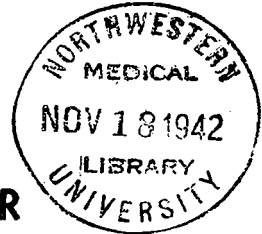
**JOURNAL OF MILK  
TECHNOLOGY**

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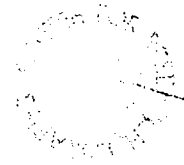
**SEPTEMBER-OCTOBER  
1942**

**VOLUME 5**

**NUMBER 5**



**THIRTY-FIRST ANNUAL MEETING**  
October 30 and 31  
St. Louis, Missouri



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MILK SANITARIANS**  
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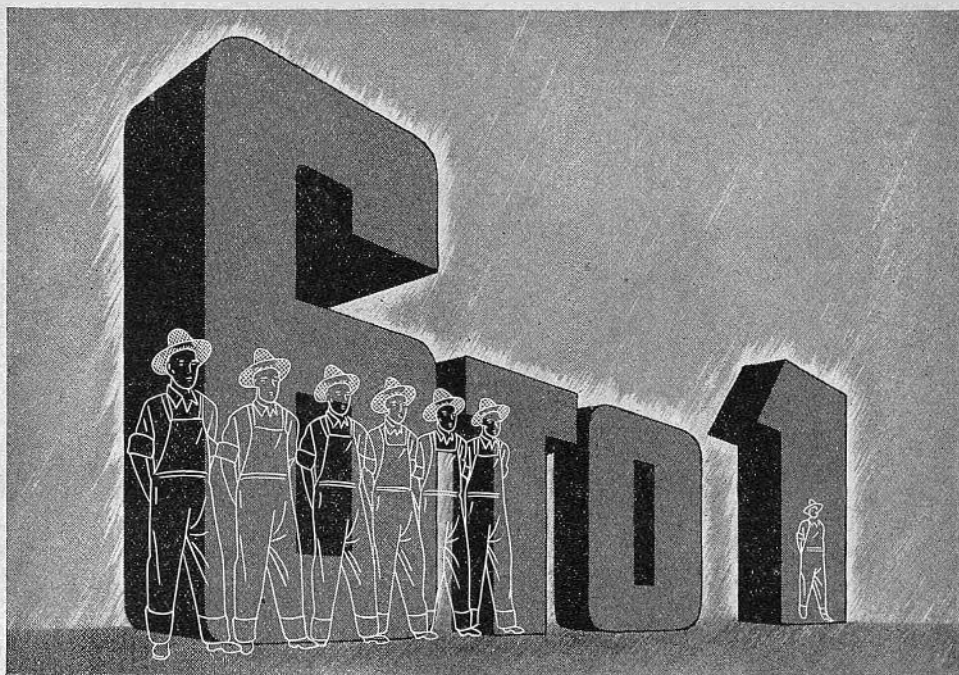
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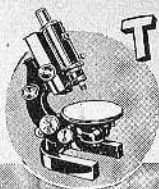
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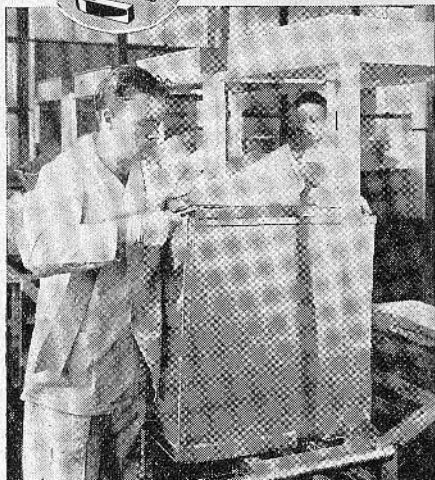
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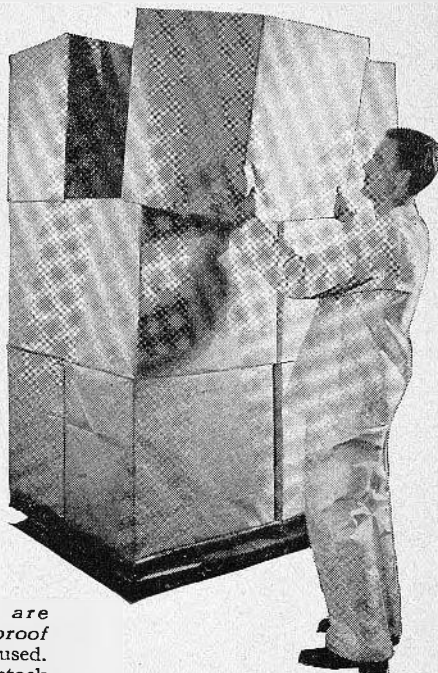


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1. American Journal of Public Health, 5-38.



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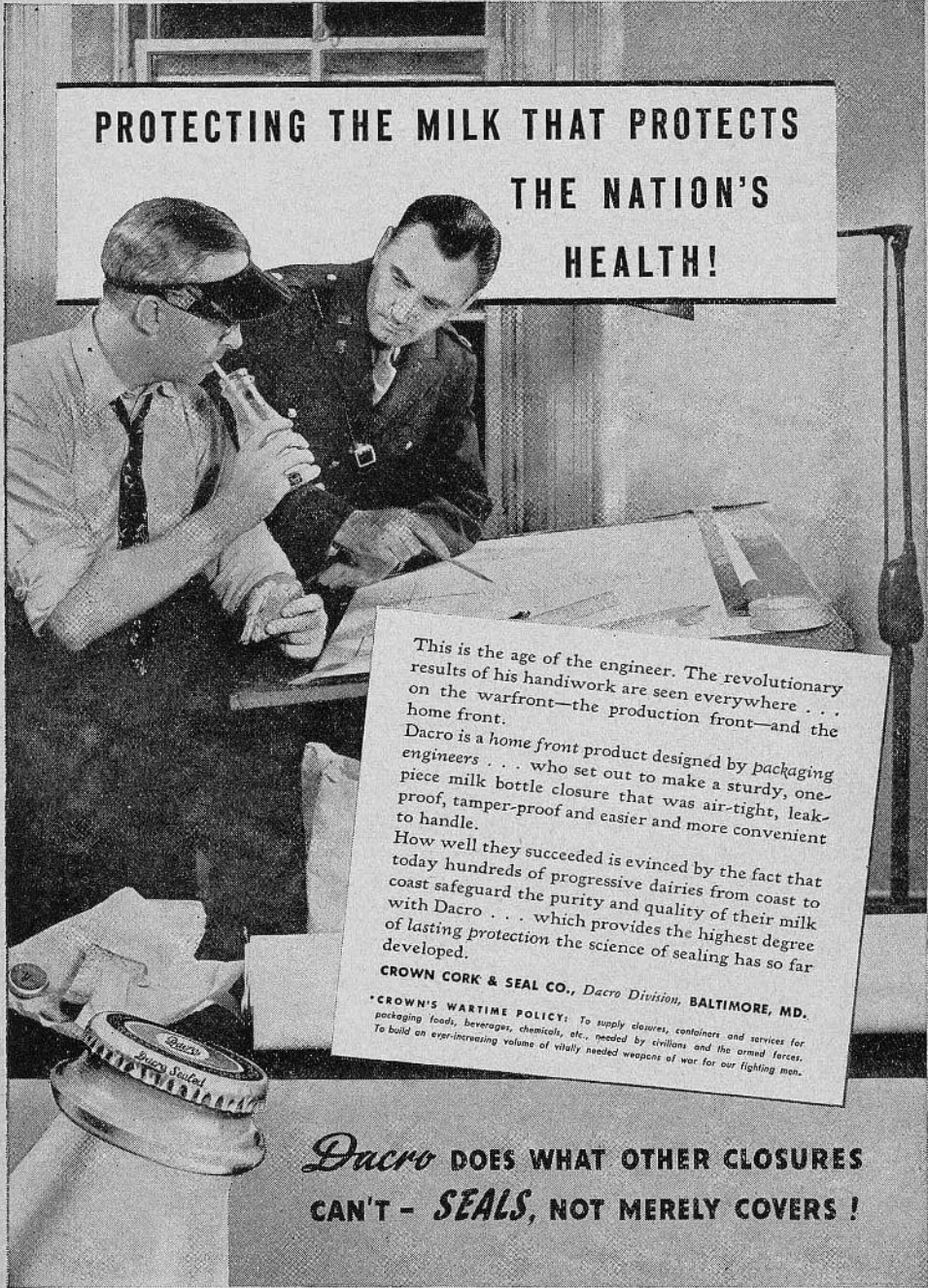
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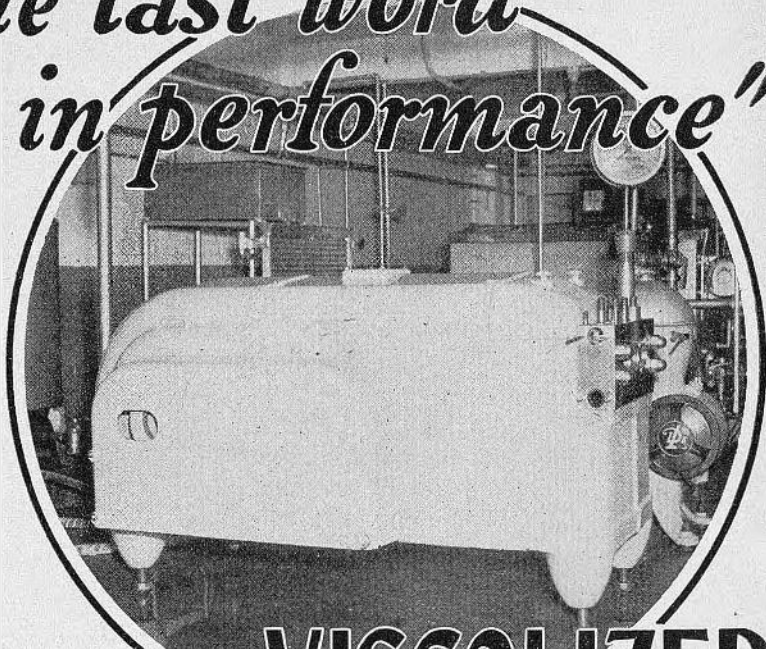
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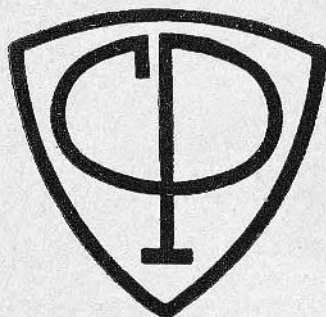
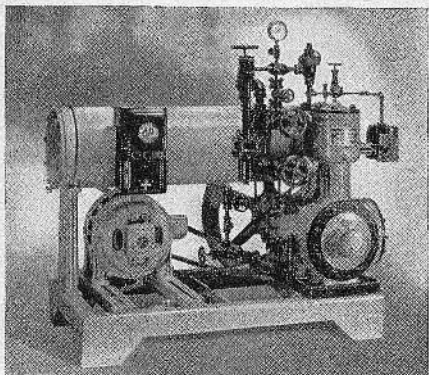
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# JOURNAL of MILK TECHNOLOGY

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Volume 5

September-October, 1942

Number 5

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## Editorials

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

### What's In A Name?

"TOBACCO In Your Bread." So read a newspaper article that referred to the use of nicotinic acid as an added nutritive ingredient. The public at large have no way of knowing that such a sensational headline is only a misinformed headliner's idea of human interest. They do not know that the news release referred to nicotinic acid, one of the vitamins of the B complex, so widely recommended for the fortification of white bread. They confused it with the poisonous alkaloid, nicotine, a very different product.

Recognizing this unfortunate situation, the Food and Nutrition Board of the National Research Council recommends now the use of the words "Niacin" and "Niacin amide" as synonyms for nicotinic acid and nicotinic acid amide. These new words are commonly, almost exclusively, used now.

"Butter Yellow Causes Cancer." Immediately the public jumped to an association of butter with this dread disease. Dr. Enright, Hawaiian Health Department, writes, "I do not believe that any amount of explanation will suffice to separate 'butter yellow' from butter, in the lay mind."

The "lay mind" must be used here in a very broad sense. President Conant, of Harvard University, writes in his "*Organic Chemistry*" (1939 ed.), page 548, "The substance commonly employed for coloring butter is paradimethylaminoazobenzene (p. 381), known as butter yellow." This text-book is one of the best sellers in the elementary organic chemistry field. H. J. Lucas, Associate Professor of Organic Chemistry at the California Institute of Technology, writes in his "*Organic Chemistry*" (1935), page 637, "Butter yellow, which is p. dimethylaminoazobenzene, is used for coloring butter." N. D. Cheronis, Instructor of Chemistry, Chicago City Junior Colleges, states in his "*Organic Chemistry*" (1942), page 656, "p-Dimethylaminoazobenzene, or butter yellow, . . . is used for coloring butter." Merck's Index, fifth edition, 1940, page 200, reads, "Butter or Methyl Yellow. . . . Use: Coloring of fats and butter."

The above texts are taught to hundreds of young chemists and home economics students. These in turn are the teachers of the next generation. Merck's Text is authoritative in the pharmaceutical field.

Hunziker in his "*Butter Industry*," page 407, states that the products used to color butter are the vegetable dye, annatto, and the two oil-soluble aniline dyes, known respectively as Yellow AB, benzeneazo- $\beta$ -naphthylamine, and Yellow OB, ortho tolueneazo- $\beta$ -naphthylamine. The list of colors (1940), certified by the United States Food and Drug Administration for use in foods, are the FD&C Yellow No. 3, formerly known as Yellow AB, and FD&C Yellow No. 4, formerly known as Yellow OB. According to recent broadcast from the Administration, the former is 1-0-phenylazo-2-naphthylamine, and the latter is 1-0-tolylazo-2-naphthylamine. A chemist recognizes that the Hunziker names and those of the United States Food and Drug Administration are correspondingly the same products. These products are oil-soluble and are perfectly harmless. The Food and Drug Administration states that the tendency is toward a greater use of vegetable dyes, concerning which there may be a difference of opinion.

Once a misstatement gets into a text-book, there it stays. No, it doesn't stay—it keeps on rolling along. Well, we can let the matter ride, or we can do something about it. We think that measures should be adopted immediately to check this spread of false information.

We suggest that the American Butter Institute run down every reference in the recent literature and inform the editor of each such journal article using the words "butter yellow" that the public are becoming apprehensive, and urge that the proper chemical name be used. Likewise, the publisher of every book on organic chemistry, food chemistry, nutrition, and home economics, making the above misstatements, should be apprised of this fact to avoid repetition in new books and to correct them when the present books are revised. Furthermore, the above Board should be requested to coin a new chemically descriptive name for Butter Yellow that is shorter than the strictly chemical name so that editors will be even more inclined to use it than the present term "Butter Yellow." If we can estop a continuance of the present harmful practice as successfully as the National Canners' Association got the press to stop attributing so many untraced stomach-aches to ptomaine poisoning from canned goods, it will have rendered useful service to protect the butter industry from the harmful effects of public misinformation, and at the same time educate some highly placed educators that all is not gold that glitters.

J. H. S.

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### "A Call for Public Health Statemanship"—A Reply

IN the August number of the *American Journal of Public Health*, the leading editorial under the above caption clearly points out the critical situation that the nation faces on account of the un-ordered manner in which physicians are being withdrawn from civil practice into the military establishment. Great areas of the country are being uncovered in medical service whereas others are still over-supplied. The editorial writer poses this question: "Is the answer to the problem to draft all physicians into one of the present services, or a service to be created, and detail them to this place or that, as is done in the Army, Navy, or Public Health Service? We do not know the answer. . . . But time is passing, and increasingly the problem presses for solution. Unselfish and authoritative leadership, with first interests focused on solving this problem, is what physicians and the people now want. And they want it very much and at once."

The military have endeavored to avoid getting the nation into such a situation

by organizing a collaboration with the state medical societies. In spite of this, physicians serving great tracts are being pressed to enlist. In one area in a rural community, one physician covers the territory formerly served by eight doctors embracing almost a whole county. He cannot leave these people with no medical attention, and yet he is being made to feel as if he were a "slacker" in the national interest. A key nurse in a city hospital and a large Red Cross area is feeling the pressure to enter the military service whereas nurses are being rejected by the military on hair-splitting distinctions. From what ranks will the statesman come to solve this problem?

This "some one" will have to be one who is interested enough to devise, or to take the initiative in helping to devise, a workable plan—quickly—and to stay with it until the job is completed.

The medical ranks do not seem to be producing him. The American Public Health Association ought to do it in the interest of the inarticulate public. Imagine the increased morbidity, the growing loss of manpower from the slowed-down production, the lowered morale which will attend the inability of the public to secure adequate medical attention! The Office of Defense Health and Welfare Services has broadcast that "At least 80,000,000 working days can be saved this year if war workers keep fit" calculated on the basis of the 24,000,000 man-hours lost monthly on the production front now.

If the public health people do not rise to the occasion by producing a workable plan, then we should look to the insurance companies to take the initiative. Higher civilian death rates and liability charges mean reduced dividends. If the public health interest is not great enough to stir the public's officers, then we should certainly look to the interests of business to provide the driving force necessary to solve this difficult problem and to keep at the job until an equitable plan is effectuated.

As a layman in such matters, we suspect that the present situation could be ameliorated, to some degree at least, if the physical requirements for medical officers were less exacting. This would open the reservoirs of over-crowded medical centers for more physicians for military service and relieve the pressure on under-served territory which is now being all the more depleted by drawing the physicians into military service. The absence of a few molars is certainly regretful but not too bad to the extent of constituting a disability. As some one facetiously remarked, "I thought we were going to shoot 'em, not bite 'em."

We are all out to win this war. We admit that no half way measures will suffice. However, we agree with the above editorial writer that we are jeopardizing our war production power if we neglect the public health interests of the civilian manpower. In our haste to stop the march of the dictators, we should not lose our sense of balanced perspective. "Too little, too late" can apply to public health conservation measures as well as to combat services.

J. H. S.

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## A Promising New Tool in Quality Control

FOR the last seventy-five years or so, chemists have been seeking and developing methods to determine the quality of market milk. No one procedure can be expected to measure this important matter completely but several taken together have been very useful. Note the acidity, the alcohol, the methylene blue, the resazurin, the phosphatase, the microscopic, and other laboratory tests. Now we see the beginnings of a new one.

From McCollum's laboratory at the School of Hygiene and Public Health

of the Johns Hopkins University comes the choline test.\* This method, announced in a preliminary study on a few samples, is based on the relatively rapid quantitative determination of choline as a decomposition product of lecithin. As milk ages or is exposed to oxygen and relatively high temperatures, the lecithin breaks down (hydrolyzes) into glycerophosphoric acid and choline. The latter in turn is hydrolyzed, yielding among other compounds the "fishy" product trimethylamine. The authors, Marquez and Rask, have divulged their findings promptly in the hope that other experimenters will subject the new method to rigorous study.

We particularly hail this report because it is a careful study of some of the fundamental chemistry of milk. The literature is full of studies of a superficial type. Progress in understanding the chemistry of milk will go forward proportional to the degree of painstaking, long-time, academic (if you please) research. Here is an investigation that introduces a new insight.

We hope that this work will stimulate other chemical studies. May it catalyze the field.

J. H. S.

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## St. Louis Meeting

THE thirty-first annual meeting of the Association will be held on October 30 and 31, 1942, at St. Louis, Mo., with headquarters at the Hotel Jefferson. In keeping with the request of the Office of Defense Transportation we are not scheduling any social activities or entertainment for members or guests, but have planned to hold scientific and business sessions through both days. There will be a Friday evening session, which will take the place of the banquet and entertainment which we have had heretofore, thus making it possible to present the usual number of papers and discussions.

Although the final program can not be announced at this time it is assured that capable and authoritative speakers will discuss, both formally and informally, the many new problems with which we are faced as a result of the war. However, the scientific program will not be neglected.

The war and its effect upon economics have made it imperative that many administrative as well as sanitary measures be modified. An opportunity to learn how these problems are being met in all parts of the country awaits those who attend our meetings. To meet our new obligations—in the war effort—there must be a thorough understanding of the situation and the ability to carry on under changing conditions. We can use our conference as a clearing house for new ideas.

In addition there are several matters of major interest and importance to the International and to local associations which will be decided this year.

The American Public Health Association will be in session in St. Louis just previous to our meeting. Attendance at both Association meetings during the week of October 26 should be on the "must list" of all who are furthering in any way the war effort through milk sanitation.

C. S. LEETE

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\* Marquez, Victor M. Variation Found in the Cholin Contents of Milk During Its Aging. Johns Hopkins University School of Hygiene and Public Health, Baltimore, Md., 1942.

## Should Congress Help Unify Milk Control Onto a War-Time Footing?

L. C. BULMER

*Director, Bureau of Food and Dairy Inspection,  
Department of Health, Birmingham, Alabama*

BY no means the least in significance of the many institutions of this country which stand today at the cross-roads is the typically American bottle of fresh market milk.

Should this war be a long one, and there are many indications to prompt this belief, then we may be sure that the market milk industry, as we know it today, is due for revolutionary changes. Indeed, in the event that this world conflict should continue even into 1943, there are, even now, many serious economic changes to be seen hovering over the horizon. And much of the ground thus lost, in all likelihood, would be quite irretrievable after the war.

### PUBLIC CRITICISM

The truth is that many a fine American institution, including that of fresh market milk, may topple and crash before this war ends, due largely, if not entirely, to our reluctance to look unpleasant facts in the face, and to strive, before it is too late, to save a part—the best part—where we cannot hope to save the whole. This refers to such industries as are to be considered, at least partially, in the luxury class.

It may be a shock to a great many to have fresh market milk even referred to as a partial luxury. Many of us, despite this grave National Emergency, rather hate to confess, even to ourselves, certain unpleasant truths about some of our accustomed and fond extravagances. We are prone to do absolutely nothing about such problems, lest we rock the boat. Should

such policy as this be applied, and continued indefinitely, to the present market milk problem, both regulatory officials and the industry itself must inevitably incur the wrath of governmental economists. Their job is to finance this war at all costs. Despite all sacrifices, their ax, once wielded at long last, possibly out of desperation, is apt to swing with all too much severity with attending disastrous results. Such explosive reaction we surely invite where procrastination and lack of realistic foresight are allowed to play a part in dealing with important economic problems, in war-time; particularly where the public interest is involved.

The rumble of public criticism, of the type that frequently foreshadows a storm of protest, has been constant, more or less for some time, in respect to the ailments of market milk. While a great deal of this criticism may have been largely inarticulate from a technical point of view, nevertheless, the press and radio, of late, have re-echoed much that has afforded food for thought. Recently, Wesley McCune of Newsweek, through an article in *Harper's Magazine*, and republished in the July issue of *Reader's Digest*, rather pointedly correlated and summarized this lay voice of public opinion on the milk question.

Certain politicians, throughout the country, with an eye to opportunism, seem already poised in a stance of watchful waiting to pounce upon this economic football of the dairy industry. Unfortunately, the market milk

industry, itself, now weighed down with many new economic burdens, constitutes a rather easy victim of prey. Much too preoccupied to offer any constructive solution, its leaders and executives seem to be indulging, so to speak, in a wishful the-war-may-be-over-before-I-go-crazy sort of attitude. And there seems no longer little doubt but that this vexed problem is blindly racing pell-mell toward the arms of an already over-loaded and impatient wartime Congress. The latter may be expected to make short work and possibly an awful hash of it, particularly, in the absence of any well considered and carefully planned technical guidance, such as promises to coordinate the present unduly divergent views of the consumer, the industry concerned, and the regulatory milk official.

#### NEED FOR FEDERAL CONTROL

The question presents itself: Should, or would, the Federal Government accept this opportunity to seek a solution to the present day city and state milk problem? In reply, and without debating the matter here, much stranger things in Washington have already come to pass. It would also seem prudent to bear in mind the extent to which local control in many instances over the country has apparently drifted out of hand; that, in the eyes of many, milk should be regarded in the light of a public utility; that present day knowledge of nutrition is emphasizing more and more the all important relationship of milk to a balanced diet; that sound nutrition is now regarded as absolutely essential to the War Effort; that both soldiers and many industrial workers are now being obliged to shift from one section of the country to another, and do not have always available their needs, in a plentiful and reasonably standardized milk supply; that the lack of uniformity in milk regulations and official enforcement in America is being subjected to criticism, far and wide; and that such a situation is not in the best interest of the public health

or the milk industry involved, and also is detrimental to both the quality and price of the product to the consumer.

While weighing these facts, and, no doubt, many others, in the balance, before reaching any precise conclusions, it would be folly to assume definitely that there would be any real insurmountable opposition on the part of the industry entailed, or from the consumer, to a federal plan calculated to unify official milk control all over the country. Indeed, such opposition could amount to little more than a handful of individuals. As a matter of fact, it would be surprising, when some really comprehensive scheme were developed, if the majority of regulatory milk officials, who were not under petty local political influence, would not actually support such a plan, in the end, as a blessing in disguise.

The writer subscribes to the belief that only timely action on the part of Congress now can possibly enable, without very serious impairment, the preservation, throughout this National Emergency (if extended for any prolonged period of time), of the daily bottle of fresh market milk which the American public has come to love so "dearly." The fluid milk business must be speedily trimmed of many of its present frills and its regulations streamlined considerably, if it is to survive economically this crisis.

This is not a prejudiced opinion, but an assumption reached rather reluctantly, based upon certain definite deductions. The plain truth is that the product in question is now vulnerable to serious economic attack, while it affords little ground, aside from pure sentiment, on which logically to justify defense. No authority on nutrition in this country could possibly expect to justify the present market milk situation, if confronted with an expert economist bent on winning the war, even though it should cut our national economy to the very bone. And, indeed, this is just about what the prosecution of this war means, if we expect to



win—a fact that many of us have still not comprehensively assimilated.

#### PRESENT STATUS OF FLUID MILK INDUSTRY

The present day bottle of fresh milk has been referred to as an extravagant, partial luxury. Can this assertion be technically sustained, economically and from a nutritional standpoint? Let us briefly and frankly review a few of the more or less undebatable nutritional and economic facts concerning so-called fluid or market milk, and certain of the somewhat unpleasant, and perhaps not fully appreciated, handicaps under which the industry operates:

1. It is expensive from a nutritional point of view in relation to evaporated milk and whole powdered milk (which now, in some sections, is being packed in increasing volume for retail consumption), while the chemical constituents and nutritive value, including the vitamin content of all three, in a broad technical sense, and for most practical purposes, are comparable.

2. It is often expensive at best, and the price widely fluctuates throughout America. Roughly, for brevity, the price varies in this country from 13 cents to 20 cents per quart to the consumer, and from approximately \$2.20 to over \$4.00 per hundredweight, paid by dealers to farmers.

3. It is not essential for infant feeding. The majority of physicians, especially pediatricians, have long since prescribed evaporated milk for infant feeding on account of its more standardized composition, its softer curd (lower curd tension) and normally, its safer qualities in general, particularly its greater insurance against intestinal disorders.

4. It is not essential for the growing child or adult, provided the diet is balanced with other dairy products containing the all-important constituents and vitamins peculiar to milk solids. These may be obtained much more economically through substituting butter, cheese, and evaporated and pow-

dered milk in the home in the preparation of cooked products that are in routine use at most every table and indistinguishable from the use of fluid milk in good cuisine.

5. It is not a poor man's food. In fact, the poor man with a family of four or five cannot hope, at the present retail price of milk, to attain the recommended nutritional minimum of one quart for children and one pint for adults, and is frequently deprived of its more economical equivalents through striving to purchase fluid milk at the expense of other dairy products (often a result of misinformation and laxity in education). Hence, it is possible for fluid milk actually to defeat the desired national nutrition program.

6. It is, of all dairy products, the most susceptible to serious contamination and, therefore, the most potentially hazardous of such products to the public health.

7. It is the most costly to produce and distribute of all dairy products, and it is by far the most expensive to regulate officially.

8. Its composition varies greatly as does its degree of wholesomeness or relative safety, due in part to variance in milk regulations over the country.

9. It is a highly perishable product, severely taxing rail and highway transportation systems daily throughout the country, particularly in war-time. Of every 100 pounds of fluid milk net weight thus transported, approximately 87 pounds of it is water—of the same composition, of course, as that which could be added from the spigot at most every home. The war-time significance of this is clear when it is recalled that for household purposes alone in America of over one hundred million pounds of market milk in transit every day of the year, only approximately thirteen million pounds constitutes actual foodstuff.

10. It is the most extravagantly packaged piece of merchandise in the world, from a transportation point of view. The gross weight of a quart

bottle of milk is approximately  $3\frac{3}{4}$  pounds, of which about  $1\frac{3}{4}$  pounds is the weight of the bottle, about another  $1\frac{3}{4}$  pounds represents the water the milk contains, and the small remainder, namely about  $4\frac{1}{2}$  ounces (only about  $7\frac{1}{2}$  percent of gross weight), is the actual foodstuff furnished. This is truly an economist's nightmare in wartime Washington for one who is charged with the conservation of tires—and especially if he reflects that New York City alone consumes over one billion quarts of milk per annum.

11. It is a product of truly national significance over which the Federal Government exercises, at present, practically no jurisdiction or control, despite the fact that many large cities draw their milk supplies from a radius of several hundred miles, and frequently via inter-state shipment from several neighboring States.

12. It is a product, unfortunately, sometimes used as a political football—dependent, almost entirely, upon the wisdom, or lack of it, of local authorities, who may or may not be schooled in dairy economics.

13. It is a product more highly restricted, through local ordinances and requirements, indirectly bearing on economics and price, than all other foodstuffs combined, while it is often weighed down with many esthetic requirements which have little or no true public health significance.

14. It is a product that encounters more trade barriers than all other foodstuffs combined, due to lack of coordination or unification of milk regulations throughout America.

To sum up, therefore, technically at least, it would seem: that the significance of market milk in itself is rather over-emphasized as an absolutely essential article of diet; that the foundation upon which it rests is weak and at present economically unsound; and that if it drifted out of the picture at this stage, it would perhaps actually help the War Effort, provided, of course, that the diet were balanced

from more economical sources of dairy products, which is entirely possible.

Theoretically all this seems to be true! But there is another, and more practical, side of the picture to be considered. It has to deal, perhaps illogically enough, with the reason why we would nearly all prefer to forego almost anything rather than to sacrifice entirely this old institution of market milk. Why? Well, simply because America is still very much in love with its bottle of fresh milk, despite its faults. Maybe it is tradition! Even in the good old days, America held the milk pitcher in high esteem, and surely, one hundred and thirty million Americans can't be wrong! Indeed, it would scarcely not seem like America without the early morning clatter of the milkman. And, as though these reasons should not be considered sufficient in themselves, there are even others—in fact, technical reasons—why we should all strive to work out some practical plan to relieve market milk of some of its many present petty encumbrances and handicaps, in order that it may be revived to a healthier economic level where it may justify its existence on a high plane; because:

1. We should certainly miss it, if it were gone—economically and otherwise.

2. It is, after all, nature's most nearly perfect single food. No substitute has ever been found to really compare with it. It has a matchless taste of its own; that is worth a million.

3. Certainly, it is an industry not to be discarded lightly, or allowed to slide, innocently enough, into a war-grave, for technical lack of circumspection and defense of its more vulnerable parts.

4. Of the approximate one hundred billion pounds of milk produced annually, in America, over forty percent is distributed as market milk. The surplus milk of farmers largely fosters, encourages and supports the enterprise of other milk products, without which there would be dietary chaos. More-

over, such farmers have expended millions upon millions, to comply with sanitary regulations governing market milk, upon which they must now have a reasonable return on their investment, through continuance of the industry and official regulations governing it, or go bankrupt.

The question presents itself: Is the market milk industry actually in serious straits? No, perhaps not financially as yet, at least not by and large, over the country. It has thus far not seriously felt the war pinch, and, in fact, in some sections it may, for the first time in many a long year, be making some rather quick money.

#### WHAT'S AHEAD

Technically, however, those of us who try to read the writing on the wall, will probably recognize this period as one that often signifies, and precedes, a quick turn in a financial trend. We do know that a dark storm lies directly ahead, should the war continue into 1943. And to jot down just a few of the obstacles seen: shortage of tires; shortage of equipment to replace that which may soon be old and no longer sanitary; shortage of labor and, in consequence, much less intelligent labor to contend with, requiring more adequate supervision but which is not in the least procurable; possibly, contaminated raw milk, improperly or else recontaminated pasteurized milk, through lack of skilled supervision; and withal, probably less and less official control on the part of boards of health who also are suffering depletion in experienced personnel. Experience has demonstrated in the past where there has been laxity in milk supervision on the part of the industry or laxity on the part of official milk control, that it has inevitably and quickly led to a grave menace to the public health. Those of us who have been through the harrowing experience of milk-borne epidemics know full well that only a few scattered ones over the country would speedily disperse any

so-called war-time prosperity now, and would bring market milk into disrepute everywhere.

This discussion is not focused on painting an unnecessarily gloomy picture. No industrial picture at this time could possibly be one-half as dark as the war itself, from which we should all take our cue, as we must, in the final analysis.

#### PUBLIC POLICY CONSIDERATIONS

1. That, since foremost authorities, on the one hand, agree that a sound national nutrition program is fundamental to the War Effort, and leading economists, on the other, are agreed that our whole national economy is at stake, no industry so vital as milk, should be left entirely in the hands of countless local authorities without some immediate federal plan to coordinate, and if possible unify official milk control throughout America.

2. That, to survive, the market milk industry must use vast and enormous quantities of rubber and important metals. The Government can ill-afford promiscuously to dole out such nationally essential products from its now limited reserves without first having its finger directly and firmly upon the economic pulse of the industry, through federal participation, and thereby first-hand knowledge and responsibility, in some sort of national control of the market milk problem.

3. That, a solution to the problem of affording some comprehensive scheme of cooperative federal milk control, in the interest of public health and the industry itself, is now a matter that appears to transcend far any question of State rights as often considered in its narrow, prejudicial light. (State rights, from the angle of appropriate protection of farmers and the industry itself against detrimental competition of neighboring states, could and should be safeguarded against, and is discussed later herein.)

4. That, while the Federal Government probably would not be able to

justify much assistance to farmers and milk plant operators toward a solution of the skilled labor shortage, it would, if it had first hand knowledge, through active participation in market milk control, be much more alive to the wisdom and necessity of exempting from military service certain key men on the farm and in the milk plant, to act in a supervisory capacity over raw and inexperienced help. It would know better how to extend intelligent priority on tires, metals, and essential milk equipment in accordance with actual local industrial needs and the public health interest, rather than on a basis of those over the country who "holla the loudest."

5. That, the present system of official market milk control in America is half a century behind the times, and is based on conditions of bygone days when a handful of nearby farmers would supply milk to the town; that market milk today is linked nutritionally, economically, and from a public health aspect, to our entire federal structure, and should be elevated to an industry of national dignity and control.

6. That, federal participation in milk control would ultimately financially benefit greatly both farmer and city milk dealer, and yet satisfy and very materially help the consumer in more ways than one. In addition, it would promote the prestige of regulatory milk officials in that it would create a great new technical field for future endeavor, requiring more technical workers—which the job requires anyway.

7. That, federal guidance and cooperative control of this big ship without a rudder, or rather this great ungainly lad who has grown up only to find himself still being booted around from pillar to post, in every hamlet, town, and city throughout the land, should present absolutely no insurmountable obstacles, provided, that we have the vision, courage, and determination to approach the job devoid of a one-track mind, in order that we may fairly con-

sider and insure the rights of the farmer, the dealer, and the consumer.

8. That, this is a job that should be done advisedly now, or else we must expect to be stampeded into it in the very near future, since we are at war for a long time to come.

9. And, that, despite the war and Hitler *et al.*, we may still make progress, if we have just the will to grasp this peculiar opportunity which the war has precipitated, and which now is literally presented on a silver platter, to reorganize, on a much firmer economic foundation, official control of market milk, thereby justifying—I say "justifying"—a sound attempt to insure this industry for the next generation.

#### THE CORE OF THE PROBLEM

Market milk is at present subject to and regulated by possibly not less than three thousand separate, and frequently conflicting, local milk ordinances, which have practically no direct relationship to each other, and little or no coordination with one another. It is true that, for nearly two decades, the United States Public Health Service has fostered the adoption of its so-called Standard Milk Ordinance, but even yet this ordinance is operative in only about thirty percent of the milk areas of this country. Even here, it is usually in modified form, and in many instances, was adopted only after the injection of various and sundry local "bright ideas." Moreover, many of its "standard" provisions are nullified by irregular enforcement.

There is even no standardization in America of the official agency which shall administer official milk control. In a few states, such activity is largely administered by the state department of agriculture, or the state engineer, in others the state board of health exercises a great deal of authority and supervision, but, by and large, it is mostly left to the municipalities, ranging from small towns to large cities, to adopt and administer their own milk

regulations. This they do to their hearts' content, and sometimes with a vengeance.

In some states, where milk control comes under agricultural authorities, occasionally there is a tendency to give more than an even break to the farmer, at the expense of the consumer, and possibly the public health. On the other hand, where public health authorities are in control, they are often prone to elevate milk control to a lofty plane of esthetics rather than to maintain it on a practical level in relation to minimum fundamental public health safeguards. Such practice results in severe economic strain to the farmer, a higher price of milk to the consumer, with detrimental dietary consequences due to lowering milk consumption. Up to the present, there has been little effort or disposition on the part of public health authorities and dairy economists to get around the table and find a common solution to the problem in the interest of both the farmer and the consumer.

The writer would under no circumstances hazard the recommendation that there should be any tampering with official milk requirements that are known to have fundamental public health significance, but he does urge that the economic importance of certain of the esthetics which have crept into milk regulations, particularly those at the farm, be re-examined. He calls attention not only to the mass of unstandardized, and sometimes contradictory, milk regulations in America, but also to the lack of uniformity in their practical application and enforcement.

It would seem that scarcely no one who has been schooled in the public health significance of milk, and at the same time, who has some technical knowledge of dairy economics, could possibly afford to defend such a condition of affairs. Unquestionably, it is fundamentally wrong! But, we must, for the sake of brevity, let this side of the subject rest here, excepting to emphasize once again, that it seems

high time milk regulations, throughout America, were streamlined, insofar as is consistent and practicable, and placed on a war-time footing, if for no other reason.

#### SUGGESTED SOLUTION

What is to be done about it? I suggest that it is a problem that requires the appointment of, and consideration by, a national public health and economic milk commission, judiciously balanced with recognized public health milk specialists, nutritionists, dairy economists, and possibly other economists to participate in behalf of the consumer. Since the problem is linked to the public health, and, in that all straight-thinking persons now are agreed on the tremendous importance of entirely removing public health considerations from political intervention, such a commission should be comprised of persons who are not under political influence [possibly appointed, say, by (not necessarily from within) the U. S. Public Health Service, the U. S. Department of Agriculture, or like consistent federal institutions].

What would be the function of such a Commission? I would suggest broadly, (1) To consider speedily and streamline the present U. S. Public Health Milk Ordinance, and to place it on a practical economic war-time footing, without sacrificing any of its essential health safeguards, (2) To sponsor vigorously the adoption of such uniform milk regulations in every state in the Union, (3) to find legal ways and means not only to encourage every state, but economically to leave a state with little alternative but to cooperate, by appointing a similar non-political public health and economic commission within its own jurisdiction (nominated, say, by the State Medical Society, Agricultural institution, etc.) and, to adopt consistent standardized milk regulations over which the Federal Government could exercise some influence through possibly a permit system for all dairy products shipped

outside the state, to be issued by an official public health and economic agency subject to federal approval, and (4) To serve in an advisory capacity to all such state commissions, and act in the form of a supreme court of appeals, relative to abuse of state milk regulations, or enforcement of same, involving interstate shipments.

One of the primary objects, it would seem, should be to make it extremely embarrassing to a state which failed to uphold and exercise its constituted authority to safeguard the public health in relation to the economics of the milk question. Obviously, the federal authorities could not hope to deal with about three thousand municipalities with separate milk ordinances at present. It could, however, cooperate and work constructively with forty-eight states. Hence, state regulations and control seem to be the answer.

The legal aspect is naturally involved. The states have always possessed the authority of health protection, and this power was not transferred in the Constitution of the United States. According to Tobey (Public Health Law), "Under the law making power of the States, legislation affecting public health may be passed . . . it may be conferred upon State or Local boards" (health) "or upon municipal corporations . . . and in the absence of legislation this power may be implied" (by boards and municipalities).

There are instances where Supreme

Court decisions, for example, have confirmed the right of a state to render void local civil service regulations. There can be little doubt of the right of the states to render void all municipal milk regulations and vest such authority in some official state agency, such as a state public health and economic commission. Certainly, if there were a will, there would be found a legal way.

It is not suggested, of course, to strip municipalities of power to enforce milk regulations. But matters of policy, it would seem, should be centralized in the state, and there should be left open an appeal over the head of a municipality to the State Commission in respect to abuse in the enforcement of regulations, milk shortage, or the price of milk.

In conclusion, the solution to the problem discussed should be safeguarded against floating into the hands of intolerant economic "butchers," or into the lap of rabid narrow politicians representing selfish group interests.

Should Congress exercise the necessary leadership, and gather unto itself technical guidance from the ranks of clear and unprejudiced minds, schooled in public health milk control, dairy economics, and similar consistent fields of endeavor—experts of which, thank God, there are still aplenty in this Great Republic—then perhaps an institution we prize highly, market milk, may yet be saved in the nick of time

## A Comparison of Various Methods for Detecting Thermoduric Bacteria in Milk\*

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WITH the adoption of a more nutritionally adequate medium for plate counts of milk (1) attention has been focussed upon the presence of thermoduric bacteria. The detection of milk supplies carrying large numbers of such organisms often throws a heavy load upon already over-taxed official and private control laboratories. Several methods have been proposed as having advantages over the plate count method in the routine detection of thermoduric organisms (3, 9, 10, 12) but no reports have appeared concerning their relative suitability. The present studies were undertaken to supply some information upon this point.

### EXPERIMENTAL

*Methods.* As the standard plate count (1) is the generally accepted index of bacteriological quality of pasteurized milk, this was used as the yard-stick for determining the efficiency of the other tests. Samples of herd milks were obtained from three local pasteurizing plants in August, September, and December, 1941, brought to the laboratory and held overnight at approximately 0° C. (Preliminary studies had shown satisfactory agreement between the results of immediate analysis and that conducted after overnight refrigeration.)

For the standard plate count, Myers and Pence method (10), and the resazurin test (7), 11 milliliters of

milk in a test-tube were heated in a water-bath to 61.7° C. (143° F.) in about 4 minutes and held at that temperature for 35 minutes, the water being continuously agitated. At the end of the holding period, tubes were removed to a 37° C. water-bath; plates were poured on appropriate dilutions, and Myers and Pence tubes prepared as described by the authors (10). One milliliter of 0.0055 percent solution of resazurin was then added to the milk remaining in each tube, the mixture inverted, and incubation carried out at 37° C. The degree of color change was recorded hourly, following which the contents were mixed by a single inversion of the tubes. The No. 8 color (P 7/4 Munsell) was taken for the end-point as in the "triple reading" test (7).

For the Hileman and Leber test (3), 10 milliliter portions of raw milk were pasteurized in test-tubes as previously described, then incubated at 37° C. for 7 hours. In the hope that this test might be made more convenient through shortening the incubation period, microscopic preparations were made at 4, 5, and 6 hours in addition to that at 7 hours.

The Mallmann, Bryan, and Fox test (9) was carried out by placing tubes containing 10 milliliter portions of raw milk directly into a thermostatically controlled water-bath at 60° C. After 2 hours, tubes were removed, shaken 30 times, and microscopic preparations made.

*Results.* For convenience in comparing results, samples were arranged

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in ascending order of standard plate count. In Table 1 are presented complete data on 26 of 132 samples selected at random by taking every fifth sample.

authors (10), a fairly satisfactory correlation is apparent.

The usefulness of this method was at times impaired by the development

TABLE I  
REPRESENTATIVE DATA OBTAINED FROM VARIOUS TESTS FOR THE DETECTION OF  
THERMODURIC BACTERIA IN MILK

(All counts in thousands)

Raw		Pasteurized						
Sample No.	Microscopic count	Standard plate count	Myers and Pence	Hileman and Leber 7 hours	Hileman and Leber 4 hours	Mallmann <i>et al.</i>	Mallmann modified	Resazurin hrs. to color No. 8
1 x	158	.1	.1	44	13	132	26	6
6 x	57	.13	.4	44	13	132	57	>6
11 x	200	.2	17.5	38,000	13	145	13	>6
16 #	321	.3	.9	70	—	102	70	>6
21 x	44	.45	.8	26	13	66	88	6
26 x	1,900	.5	S	572	55	26	26	5
31 x	114	.63	.9	44	26	101	13	6
36 x	233	.7	3.9	5,720	132	13	—	6
41 x	572	.88	6.5	308	70	1,012	286	>6
46 x	686	1.4	.8	13	13	328	132	6
51 #	246	2.0	1.8	100	57	26	13	>6
56 x	642	2.4	7.5	1,900	114	245	114	4
61 x	176	4.3	4.5	13	528	57	26	>6
66 o	1,900	5.3	8.4	57	13	290	158	4
71 x	246	7.0	7.0	145	44	13	—	5
76 x	1,320	8.3	11.0	1,320	44	486	176	>6
81 o	750	10.0	5.7	26	1,060	189	—	5
86 #	510	11.3	9.0	354	—	233	100	>6
91 x	70	15.0	S	440	—	145	70	5
96 x	114	21.0	40.0	308	—	57	13	>6
101 x	500	25.0	5.5	8,800	176	132	88	4
106 #	748	37.0	34.0	1,170	—	169	88	>6
111 x	9,240	53.0	35.0	440	200	1,000	528	5
116 #	2,140	75.0	80.0	396	—	430	145	>6
121 x	422	105.0	17.0	132	—	57	57	5
126 x	13,200	175.0	61.0	308	114	2,300	792	4
131 x	176	534.0	1.2	233	—	88	57	6

x = August sample  
o = September sample

# = December sample  
S = spreader

In the following sections each method is compared individually with the standard plate count.

#### A. Myers and Pence Method

Table 2 and Figure 1 indicate the degree of agreement between the plate counts and those obtained by the Myers and Pence tube method on 132 samples. While this is not nearly as close as that reported by the

of "spreaders." This was slight during August and September but a great deal of difficulty was experienced during December. Modifications studied included the addition of NaCl (8), increased agar content (2), and reduction of the amount of medium in the tube by 50 percent. Of these the latter proved to be more satisfactory, and is recommended where trouble with spreaders is encountered.



TABLE 2

COMPARISON OF RESULTS BY MYERS AND PENCE AND PLATE COUNT METHODS

(131 samples)

A Plate count	B		C		D		E	
	No. of samples	%	No. of samples	%	No. of samples	%	No. of samples	%
5,000 and over	70	53	63	90	70	53	7	5
10,000 " "	54	41	42	78	52	40	10	8
20,000 " "	39	29	32	82	42	32	10	8
30,000 " "	29	22	25	86	33	25	8	6
40,000 " "	26	20	19	73	24	26	6	4

- A—Range of plate count.
- B—Number of samples high by standard plate count.
- C—Number of same samples also high by Myers and Pence count.
- D—Total number of tests high by Myers and Pence count.
- E—"False positives"—samples high by Myers and Pence count but low by standard plate method.

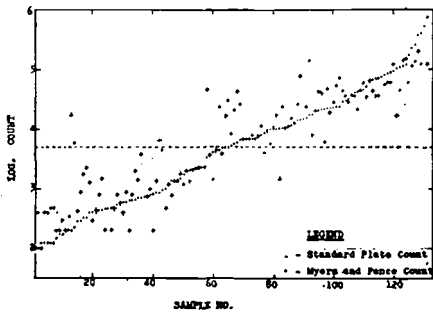


FIGURE 1

Comparison of standard plate counts and Myers and Pence counts. 131 samples arranged in ascending order of plate counts.

B. Hileman and Leber Method

In describing their method, Hileman and Leber (3) classed all samples showing micrococci in smears made after 7 hours incubation as "poor." Samples showing plate counts in excess of 5,000 per milliliter were also called "poor." In our studies, micrococci were found in almost every sample examined, hence all but a small percentage would have been condemned on this basis. In reply to an enquiry, Hileman (5) stated that "a count

higher than 500,000 per cubic centimeter based on clumps of micrococci would indicate a high thermophilic count." Taking this as a standard, Figure 2 shows 46 out of 132 samples exceeding this limit. Fourteen of these 46 samples (30.4 percent) showed plate counts below the suggested limit of 5,000 per milliliter.

The counts made after 4 hours incubation at 37° show a somewhat better

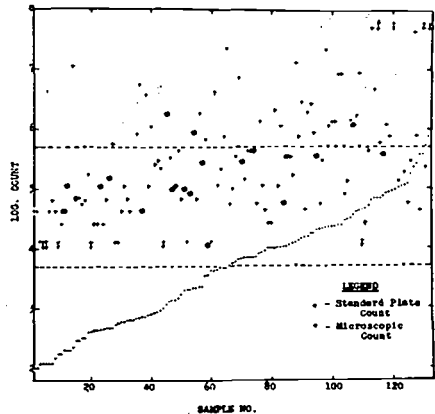


FIGURE 2

Comparison of standard plate counts and Hileman-Leber micrococci clump counts at 7th hour. 132 samples.

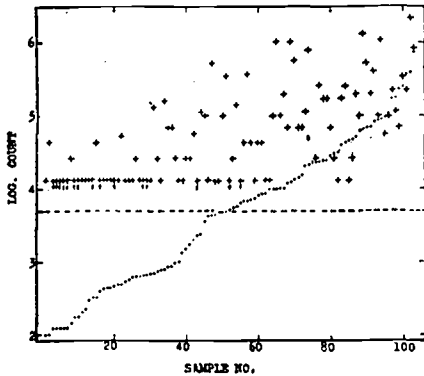


FIGURE 3

Comparison of standard plate counts and Hileman-Leber micrococci clump counts at 4th hour. 102 samples.

correlation with plate counts. (Fig. 3.) However, as indicated by the data summarized in Table 3, even lowering

departure from the original technique in preparing smears after 4, 5, and 6 hours, as the additional shakings involved may have led to the breaking up of clumps of micrococci, thus increasing the microscopic count after 7 hours. However, when a set of 21 samples was incubated without disturbance for 7 hours, the results were still none too satisfactory. (Data from these samples are distinguished by a ring  $\ominus$  in Figure 2.)

A more likely reason for the discrepancy lies in the findings subsequently reported by Hileman, Leber, and Speck (4). These show that micrococci make up a much smaller proportion of the flora resisting pasteurization when milk is pasteurized by the holding method than where the high-temperature-short-time method is

TABLE 3

RELATION BETWEEN A PLATE COUNT LIMIT OF 5,000 PER. ML. AND VARIOUS MICROCOCCI CLUMP COUNT LIMITS FOR HILEMAN AND LEBER METHOD<sup>1</sup>

Smears made at 4th hour. 51 of 102 samples with plate counts >5,000 per ml.

A Plate count	B		C	
	No.	%	No.	% <sup>1</sup>
40,000 and over	39	76.5	12	23.5
50,000 " "	35	68.6	10	19.6
70,000 " "	34	66.7	6	11.8
80,000 " "	30	58.8	6	11.8
100,000 " "	30	58.8	6	11.8
150,000 " "	20	39.2	2	4.0

A—Range of microscopic count.

B—Samples exceeding both plate count and microscopic count limits.

C—"False positives"—samples below plate count limit but exceeding microscopic count limit.

<sup>1</sup> Percentage of the 51 samples with plate counts of 5,000 or less.

the microscopic count limit to 40,000 per milliliter would enable 23.5 percent of samples with plate counts in excess of 5,000 to escape detection. If the plate count limit is raised to 10,000 (Table 4) a higher proportion of high plate count samples is detected, but at the expense of a considerable increase in the percentage of "false positives."

It was thought that this lack of agreement might be partly due to our

used. The method of Hileman and Leber was designed for milk pasteurized by the latter method, but since this has not yet received official acceptance in Canada, our studies were confined to the relative efficiency of these various tests when applied to milk pasteurized by the holding method.

Since micrococci made up only 23.5 percent of the flora of their samples pasteurized at 143° F. for 35 min-

utes (4), it seemed not unlikely that the accuracy of this method might be improved by including types other than micrococci in the microscopic count. To throw light on this point, smears from samples showing high plate counts but low micrococci counts were

re-examined. From the data in Table 5 it will be seen that the inclusion of all types other than spore-forming rods improves the correlation with the plate count to some extent. Nevertheless, the agreement still leaves much to be desired.

TABLE 4

RELATION BETWEEN A PLATE COUNT LIMIT OF 10,000 PER ML. AND VARIOUS MICROCOCCI CLUMP COUNT LIMITS FOR HILEMAN AND LEBER METHOD

Smears made at 4th hour. 37 of 102 samples with plate counts >10,000 per ml.

A Plate count	B		C	
	No.	%	No.	% <sup>1</sup>
40,000 and over	31	83.8	21	32.3
50,000 " "	31	83.8	15	23.1
70,000 " "	30	81.1	13	20.0
80,000 " "	26	70.3	11	16.9
100,000 " "	26	70.3	11	16.9
150,000 " "	18	48.7	4	6.2

A—Range of microscopic count.

B—Samples exceeding both plate count and microscopic count limits.

C—"False positives"—samples below plate count limit but exceeding microscopic count limit.

<sup>1</sup> Percentage of the 65 samples with plate counts of 10,000 or less.

TABLE 5

DIFFERENTIAL COUNTS ON SAMPLES SHOWING PLATE COUNTS OVER 5,000 AND MICROCOCCI CLUMP COUNTS BELOW 80,000 PER ML.

A	B	C	D	E	F	G
63	5,000	13,000	145,000	—	13,000	26,000
66	5,250	13,000	—	—	572,000	57,000
67	5,630	26,000	26,000	—	88,000	132,000
69	6,500	13,000	—	—	13,000	—
71	7,000	44,000	88,000	—	—	—
74	7,200	44,000	—	—	—	13,000
75	7,500	13,000	26,000	—	880,000	—
76	8,250	44,000	—	—	—	220,000
77	8,750	44,000	13,000	—	—	13,000
78	9,000	13,000	57,000	—	200,000	—
87	12,300	70,000	—	—	176,000	88,000
90	14,400	70,000	26,000	—	—	13,000
92	15,600	70,000	57,000	—	—	—
99	23,300	26,000	22,000	—	—	—
103	29,800	70,000	—	—	176,000	88,000
104	31,000	26,000	—	—	1,000,000	—
105	31,800	13,000	132,000	—	—	13,000
109	45,800	13,000	—	—	440,000	—
110	48,500	26,000	70,000	—	—	—
120	95,500	57,000	—	13,000	—	—

A—Sample number

B—Plate count

C—Micrococci count

D—Streptococci

E—Sarcina

F—Heavy rods in chains—type *B. subtilis*

G—Rods—miscellaneous types

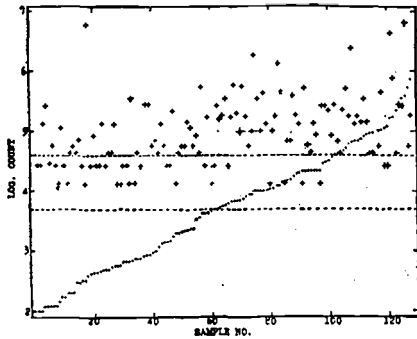


FIGURE 4

*Comparison of standard plate counts and Mallmann total microscopic counts. 130 samples.*

#### C. Mallmann, Bryan, and Fox Method

The comparison between plate counts and microscopic clump counts made by the method of Mallman, Bryan, and Fox (9) is presented in Figure 4. The standard of 40,000 per milliliter recommended by these workers would condemn 118 of 130 samples (90.8 percent), although 52 of the condemned samples showed plate counts less than 5,000, and 34 less than 1,000 per milliliter.

In the Mallmann method, a clump count is made of all types of bacteria seen. The presence of numerous large rods appeared to be responsible for at least some of the discrepancies noted. In the hope of eliminating errors due to the growth of thermophilic bacteria, smears were recounted for micrococci only (Fig. 5). However, this failed to improve the agreement appreciably. With either the original or the modified technique it seems impossible to set a microscopic count limit which will detect a satisfactory percentage of samples with high plate counts without also giving an unduly high percentage of "false positives."

#### D. Resazurin Test

The use of the resazurin test for the detection of thermoduric organ-

isms in raw milk, as advocated by Wainess (12), would be most convenient if the test were reliable. However, Johns and Howson (6) reported that even large numbers of thermoduric bacteria caused a very slow decline in oxidation-reduction potential and a correspondingly slow reduction of resazurin. A few trials with raw milk have failed to demonstrate the ability of this test to indicate samples with large numbers of thermoduric organisms. In the present studies the test was applied to laboratory pasteurized milks. With the influence of the less resistant types removed dye reduction could then be attributed to the activity of thermoduric bacteria only. Unfortunately, our results show a total absence of correlation between rate of dye reduction and plate count, as indicated by the data in Table 6. This is confirmed in a recent paper by Rowlands and Provan in England (11).

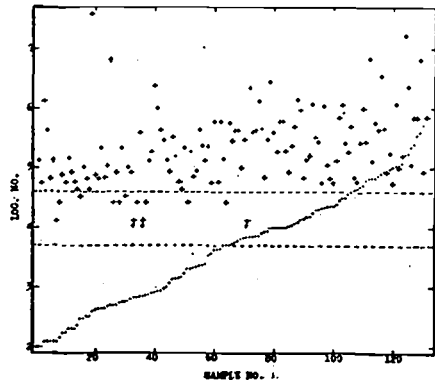


FIGURE 5

*Comparison of standard plate counts and modified Mallmann microscopic counts. 128 samples.*

#### CONCLUSIONS

The tube technique of Myers and Pence yielded results in much closer agreement with the plate count than did either of the microscopic methods—or their modifications—tested. The

TABLE 6

RELATION BETWEEN RATE OF RESAZURIN REDUCTION AND PLATE COUNT OF LABORATORY PASTEURIZED MILK SAMPLES

Plate Count	No. of Samples	Distribution of Samples on Basis of Hours to Decolorize Resazurin to No. 8						
		1	2	3	4	5	6	7 <sup>1</sup>
500 and less	27	..	..	..	1	3	4	19
501-1,000	16	..	..	1	2	3	5	5
1,001-2,500	14	..	..	..	1	3	2	8
2,501-5,000	8	..	..	1	0	3	0	4
5,001-10,000	16	..	..	..	2	7	3	4
10,001-25,000	21	..	..	1	1	5	4	10
25,001-100,000	18	..	..	..	2	9	1	6
100,001-500,000	10	..	..	..	4	3	1	2
Over 500,000	2	..	..	..	1	0	1	..
Total		132						

<sup>1</sup> All samples not reaching end-point at 6th hour.

saving in time, media, glassware and incubator space as compared with the plate method have been described by the authors themselves; our experience fully confirms their claims. This test appears to be more convenient than either the plate count or the microscopic methods studied.

It is difficult to explain the inferior results obtained by us with both microscopic methods on any other basis than differences between the types of flora encountered by the original authors and by ourselves.

While the resazurin test furnishes valuable information regarding the bacteriological quality of raw milk, our findings fail to support the contention of Wainess (12) that "the resazurin test used exclusively is a relatively accurate index of thermiduric contamination."

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**Conservation of Health Means Maintenance of Production**

Plan to attend the two important public health meetings at St. Louis, Mo.

Both in the same week, October 27 to 31, inclusive

**INTERNATIONAL ASSOCIATION OF MILK SANITARIANS**

and

**AMERICAN PUBLIC HEALTH ASSOCIATION**

## Constructing and Equipping a Milk Pasteurizing Plant\*

C. W. WEBER

*New York State Department of Health, Albany, N. Y.*

CONSTRUCTING and equipping a milk pasteurizing plant is primarily a problem of the plant owner. However, there are many features of the building and equipment which affect the sanitary quality of the finished product.

There are two basic factors which affect the efficiency of a pasteurizing plant; namely, (1) the building and equipment, and (2) the operation. Poor or inefficient operation can be corrected immediately and inexpensively. Faults in construction of a new building or equipment are expensive to correct and usually remain in existence for a long time. Good operation of a poor plant or equipment may yield a good product but good operation of a good plant and good equipment will yield a better product more consistently.

It would truly be a miracle to construct and equip a good plant in the next thirty minutes or even to tell you how to do it. As milk sanitarians, we are primarily interested in those phases of the plans, construction, and design which have a direct bearing on the public health and sanitary aspects of the finished product.

Chapter III of the New York State Sanitary Code sets forth certain general requirements which are as follows: Rooms or buildings in which milk or cream is received, bottled, pasteurized, or stored and/or in which milk or cream containers are washed and sterilized shall be suitable for the purpose, well lighted, well ventilated, kept clean, kept free from flies, and shall not open directly into a stable or any room used for domestic purposes. The floors shall be watertight, impervious, well drained,

and have drainage properly handled. The walls and ceilings of such rooms shall be of tight construction. A separate room shall be provided in which cans, bottles, and other utensils shall be cleaned, except before pasteurization and bottling operations are commenced.

Before starting to build a pasteurizing plant each of the above requirements should be given careful consideration. But even before considering these requirements the prospective plant owner should ask himself this question, Why am I building a plant? A building is not required by law nor is it necessary for the actual operation of the equipment. The answer should be to protect the equipment, the operator, and the product from the natural physical elements, namely weather (temperature, moisture, wind) and animals (insects, mammals, birds).

With this basic requirement in mind you are now ready to consider the building in relation to location, arrangement, size, and construction.

### LOCATION

In selecting the location for the building the following conditions should be satisfied:

Accessibility to source of production, market, and driveways.

Adequate supply of potable water.

Adequate facilities for sewage and waste disposal.

Good surface grade and drainage away from the plant.

Freedom from nuisances such as fly-breeding places, dust, and odors.

Opportunity for expansion.

### ARRANGEMENT

The plant is being built to receive, process, package, store, and load milk. Therefore, the arrangement is depend-

\* Presented at the 15th annual meeting of the New York State Association of Milk Sanitarians, Buffalo, September 24, 25, and 26, 1941.

ent primarily on the movement of the milk through the plant. Each step in the movement of milk should follow in proper sequence. The sequence does not have to be in a straight line, but the distances between each step should be as short as possible. The accessories to the milk stream, namely the containers, steam and refrigerant must join at the proper places and be so located that there is the shortest movement that is practicable.

SIZE

As the purpose of the building is to house the equipment and the operation, the size of the plant should be determined by the amount and size of the equipment and the space needed to operate it. The size of the equipment selected can be secured from the manufacturer. In order to operate and service the equipment properly, adequate space is needed on all sides of it. All milk-handling equipment should be spaced at least twenty-four inches from the walls, and should have similar clearance from all other equipment. Surface coolers should be mounted at least thirty-six inches away from the wall. Using this premise a 100-gallon pasteurizer four feet square would require a floor area eight feet square or sixty-four square feet.

A small plant using only one 100-gallon pasteurizer should have at least the following size rooms:

<i>Essential</i>	
Room	Minimum size
Pasteurizing .....	150 square feet
Wash .....	150 " "
Refrigerator .....	50 " "
Boiler .....	50 " "
<hr/>	
Total .....	400 square feet
<i>Desirable</i>	
Receiving .....	60 square feet
Store .....	40 " "
Toilet .....	25 " "
Machine .....	25 " "
<hr/>	
Total .....	150 square feet
<hr/>	
Grand Total .....	550 square feet

Many of you may consider these dimensions too small for even the smallest plant. Larger rooms would be more ideal but would also be more costly.

CONSTRUCTION

There are many features and details of construction to be considered. Time permits consideration only of those features which are essential to good sanitation.

Floors are required to be watertight, impervious, and well drained. Either cement or tile floors, properly laid, are watertight and impervious. In order to be well drained they should have a slope of about one inch to three or four feet. Floors with less slope do not drain well and floors with more slope make the leveling of equipment and operation difficult. A sturdily constructed, well-trapped drain should be provided for about each 400 square feet of floor area. No floor surface should be much more than fourteen feet from a drain. To facilitate cleaning, the union between the floor and wall should be coved.

The walls and ceilings are required to be tight. It is desirable that they also be made watertight and impervious. If this is financially impossible, at least the walls from the window sills down should be of watertight material. Wood door frames should be cut off at least six inches from the floor and placed on impervious wall material. All wall ledges should be avoided so far as possible, and where ledges do occur, such as window sills, they should have sufficient slope to drain well. High ceilings facilitate good lighting and ventilating of the rooms. The ceiling height should be at least ten feet. High ceilings also facilitate proper installation of surface coolers.

The building shall be well lighted. This might be interpreted to mean that there should be adequate light where and when the operation is being performed. Some standards specify that the window area should be 10 percent

of the floor area. This minimum specification is easily met especially in small rooms. However, if the room were long and narrow, and the window area were at one end, and the equipment and operation at the other end, the room would probably be inadequately lighted. Artificial light is more constant than natural light and can be located where needed. One standard specifies fifty watts of electric light per 100 square feet of floor area. Usually this amount is inadequate. Artificial lights should be placed so that the light is concentrated at the place of greatest operation and cleaning. For example, in order to have a surface cooler well lighted for the purpose of cleaning it is necessary to have an outlet on either side of the cooler and within the covers when they are open. Cross-lighting, such as windows on two walls, tends to eliminate shadows.

Proper ventilation of a milk plant is undoubtedly the most difficult requirement to satisfy. The primary purpose of ventilation is to remove the excess humidity in the air, thereby preventing condensation on walls, ceilings, and equipment. The moisture condenses from the air when chilled. Therefore the first prerequisite to good ventilation is to avoid the need for it by preventing excess humidity. Escaping steam is always wasteful. Prevent it whenever possible. Do not try to scare the bacteria off the surface cooler with the noise of a steam hose. Use good steam valves and replace or repair leaky ones. Steam or hot water from pasteurizer overflows and other equipment should be conveyed directly to drains. The second prerequisite to good ventilation is to keep the interior of the plant warm by insulating the walls and ceiling and heating the rooms. The steam or moisture-laden air rises to the ceiling and is conducted out of the room through ventilator ducts. The air movement flows upward just as the water movement on the floor flows downward to the drains. The air drains or ventilator outlets

should be at the highest point on the ceiling. If possible the ceiling should be sloped upward to the duct and there should be no pockets on the ceiling caused by girders or a molding around the lower end of the duct. Consider air draining the ceiling as you would water draining the floor. The water drain must be large enough and air being more voluminous, the ventilator must be relatively larger. I have seen no specifications as to the size of ventilators but from my observation I am sure that they are often too small and never too large. I know of one small plant, the washroom of which was very poorly ventilated. A frame insulated duct four feet by four feet or sixteen square feet was installed which corrected the condition. A damper was placed in the duct which was closed at night to conserve heat. The ventilator was carried high enough above the roof so that it was in the line of prevailing wind. We know from experience that a small chimney will not draw well and if it is not extended above the roof the stove will often smoke. Ventilators work similarly.

In barn ventilation, inlet as well as outlet ducts are provided. You seldom see inlet ducts on milk plant ventilating systems other than the doors and windows. I have seen several plants with inlet flues, the cold air being drawn in through a unit type blower heater. The cold air is warmed in the winter which increases its moisture-carrying capacity, and as more air is taken into the room it will be forced out the outlet duct. If inlets are provided the cold incoming-air must be warmed to prevent condensation. This problem of milk plant ventilation warrants study by some college or institution.

It is preferable to locate toilets so that they do not open directly into a milk or milk-utensil handling room. The room should be ventilated, screened, and provided with a self-closing door. The floor should be provided with a drain so that floor washings and



drainage, will not flow into other rooms. If a urinal is provided it should be of the high type. The urinary discharge at a low urinal often splashes on the floor or foot gear of the operator and is tracked into other rooms or even into equipment where the operator is required to enter the equipment for the purpose of cleansing. Hand-washing facilities including warm running water, soap, and single service towels in the toilet room.

#### INSTALLATION OF EQUIPMENT

The equipment was selected and its arrangement and location was decided upon before the building was constructed.

Before the equipment is installed it should be carefully checked for workmanship. Although manufacturers have standardized certain pieces of equipment, almost every individual unit is custom built. The following are a few of the defects noted in new equipment.

Burrs not removed from the inside of distributor pipes of surface coolers.

Rust spots and poor tinning of surface coolers.

Cracks in corners of surface cooler covers.  
Rusted iron agitator shaft in a stainless steel pasteurizer.

Unpolished ground joints on the interior of pasteurizers.

Sterilizing jets in soaker washers turned upside down, or improperly located.

Lack of leak protector grooves in plug outlet valves of pasteurizers.

Lack of leak ports in the plate on the bottom of plug outlet valves of pasteurizers.

Poor soldering on valve ports of bottle fillers.

Cracks or openings between valve seat and bowl of bottle fillers.

Many more defects could probably be added to this list. They do not occur often, but every piece of new equipment should be thoroughly checked before it is installed.

Since this is a milk pasteurizing plant, a pasteurizer is essential. It is to be located as the next step in the processing line after the receiving room or raw storage tank, and it is to be

placed twenty-four inches from the wall. It must be connected with a cold water line, a hot water or steam line, and an electric line. These lines should be so located that they do not interfere with the operation or the cleaning of the unit. Lines coming from the wall to the pasteurizer at about the height of the pasteurizer interfere with the operator passing around the back of the unit. If the lines are run from the wall to the unit along the floor it is difficult to clean the floor beneath the pipes. This leaves two alternatives. The lines may be run up through the floor. This is ideal for the basement type plant. The lines may be run down from the ceiling. This is the usual practice in one story plants. Both the water and steam lines should be equipped with first class valves. Cheap valves soon develop leaks which result in difficult or inefficient operation. The valve on the steam or hot water line should be mounted high enough so that when closed the line below the valve will be cold and not burn the operator when washing up.

The surface cooler is installed improperly more often than any other piece of equipment. Its corrugated construction and its mounting high up makes it the most difficult piece of equipment to clean. It is usually mounted close to the wall with the result that the surface toward the wall is poorly lighted. I believe it should be located at least thirty-six inches from the wall. It should be mounted high enough so that there is room to place a condensation drip guard on the outlet pipe just above the bottle filler when the filler is raised to its highest operating position. The support posts should be placed far enough apart so that they do not interfere with movement of the cooler covers. The refrigerant lines to and from the cooler should be placed so that they do not interfere with the operation. Where possible the lines and cooler should be self-draining.

If the equipment is properly located

in the sequence of operation there will be a minimum of sanitary milk piping required. Straight line pipes should be used wherever possible to eliminate ells or tees. The pump can be connected to the pasteurizer with one short straight piece of pipe. The upright piece of pipe from the pump should be made in two sections separated by means of a 10 c. valve which is threaded at each end. The piece of pipe above the valve may also be placed in a horizontal position to convey milk to the separator. With many small surface coolers the inlet pipe may be connected to the end of the spreader pipe. If the spreader pipe inlet is at the center, one or more additional fittings and several feet of pipe are required. If the pas-

teurizer, pump, and surface cooler are properly arranged, only four pieces of pipe, one valve, and one ell are needed. No piece of pipe need be over five feet long. Recessless fittings with the pipe expanded to the fitting is much preferred to the recessed, soldered fittings. Pumps can be mounted on adjustable sanitary legs which are not fastened to the floor.

This problem of plant construction and installation of equipment is so broad that in this short paper I have only been able to touch on some of the high points and in a very general way. In conclusion I would like to recommend that this Association at some future annual meeting, devote at least one whole day to the subject.

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### CELEBRATION OF A HALF CENTURY OF MILK SANITATION

On Thursday, May 14, 1942, in Pittsburgh, Pennsylvania, the Pennsylvania Public Health Association, the Association of Dairy Sanitarians, the Tri-State Conference of Food and Health Officials, and the Philadelphia Dairy Technology Society held a joint meeting in celebration of A HALF CENTURY OF MILK SANITATION.

The specific episode which initiated our present era of Milk Sanitation, with all its noteworthy significance for human nutrition, was the publication in 1892 of the paper by Sedgwick and Batchelder on "A Bacteriological Examination of the Boston Milk Supply." This study, the very first published, in this country, at least, which related bacterial content to the sanitary quality of market milk, appeared in the *Boston Medical and Surgical Journal*, Vol. 126, 1892, pp. 25-28.

Fifty years ago bacteriology was still a new field of endeavor and the workers were few. Sedgwick's interest in water purification and water-borne outbreaks of disease had fitted him well to inves-

tigate, by bacteriological methods, the exact role of milk in the production of epidemics.

The Pittsburgh meetings were most interesting and were well attended. The past, the present, and the future of milk sanitation were discussed by persons best equipped to do so, from various parts of the country. At the luncheon meeting, Professor Samuel C. Prescott, successor to William T. Sedgwick, at the Massachusetts Institute of Technology, reviewed the work of, and paid a worthy tribute to his former chief and illustrious associate. The proceedings will be published in the annual volume of the *Pennsylvania Association of Dairy Sanitarians* for 1942.

Displayed conspicuously, all during the meetings, was the official slogan:

"NOT TO PREVENT DISEASE IS  
SABOTAGE"

On the day following the half century celebration, the Pennsylvania Public Health Association held its own regular annual meeting.

## The Sediment Testing of Milk\*

### REPORT OF COMMITTEE ON APPLIED LABORATORY METHODS

AT THE last annual convention the Committee on Applied Laboratory Methods was directed by vote of this Association to study and report upon the sediment test as used for judging the quality of fluid milk. While the motion as stated by President Brooks was general in nature, a review of the discussion preceding the vote clearly indicated that the Association had several definite questions in mind. These might be stated:

1. What is the proper method of sampling milk for a sediment test?
2. How should the test be carried out?
3. How should the results be evaluated?
4. What standards should be used?

The obvious end desired was a uniform test the results of which would be comparable in all milk sheds—a method and standards accepted by this Association which might be, although not necessarily so, in agreement with the latest recommendations of the Standard Methods Committee of the American Public Health Association. Such an approved, uniform test would be a particular boon to the sanitarians working in sheds inspected by a multiplicity of agencies.

We should like to be able to present clear-cut answers to the above questions but after a year's work we have rather to present a study of some of the more recently developed sediment testing methods, followed by a general

discussion of sediment testing in which we have included some general recommendations. This report should, then, throw some further light on methods of testing, and present a number of problem for further discussion by the Association.

During the year three studies of sediment testing were carried on under the direction of members of your committee. Since these studies were made by groups having dissimilar points of view, *i.e.*, a university, a public health authority, and a commercial milk plant, they are of particular significance and have been included as an appendix to this report for the benefit of those who wish to study them in detail. Summaries of these studies follow, and upon them and the opinions of committee members as expressed in correspondence, this report is based.

#### RESULTS OF STUDIES CONDUCTED AT A UNIVERSITY

In these studies the factors affecting the distribution of sediment in milk were investigated. "When the hygienic care expended in the production of milk is to a degree determined by the amount of extraneous material withdrawn from the bottom of the can, and all cans are compared on this basis, it would seem that the reliability of the test with respect to interpretation of what it measures would be influenced by the rate and condition of sedimentation, which in turn would be affected by particle size, temperature and viscosity of the milk, solubility of the extraneous material, time of sedimentation, and distribution of the extraneous material on the can bottom."

\* Presented at the Thirtieth Annual Convention of the International Association of Milk Sanitarians. Tulsa, Oklahoma. October 27, 1941.

In this study, interesting use was made of ten-gallon cans with glass bottoms and the following results were reported:

"1. The nature of the final stirring of the milk may affect the distribution of sediment over the floor surface of the can. Circular stirring results in central zone deposition of sediment, while transverse stirring results in more uniform deposition of material. The amount of sediment obtained by use of the off-the-bottom tester will, therefore, depend on the form of the stirring, and the position or movement of the tester during extraction of the sample.

"2. Prolonged periods of holding of milk tend to favor solution of soluble sediment. When used as a basis of comparison of evening's milk and morning's milk, the off-the-bottom tester favors the evening's milk. This, nevertheless, is true also when other types of testers are used. This indicates an inherent weakness in the sediment test as a milk grading procedure.

"3. When the extraneous material is of a soluble type, the sediment test may not compare properly milks of equal, but relatively poor hygienic quality or milks of different hygienic quality.

"4. Evening's milk is favored by sediment tests as a grading procedure.

"5. Neither viscosity nor temperature seemed to affect the significance of results as obtained by off-the-bottom sediment samplers."

#### RESULTS OF STUDIES CONDUCTED BY A PUBLIC HEALTH AUTHORITY

The Milk Sanitation Division of the Health Department of a large city in comparing the off-the-bottom testers and the vacuum testers as used by it in routine practice points out that the results secured by any method should be interpreted in the light of:

"1. The total amount or volume of milk in the shipment.

"2. The amount or volume of milk in each can in the shipment.

"3. The variance in amount and kind of sediment in each can.

"4. The variance in weight and size of sediment particles.

"Volumes of milk are different in every shipment. Because it is necessary to compare the amount of sediment between shipments this presents a problem, especially where two or three representative cans are chosen from the shipment for the sample. With the use of the off-the-bottom types of testers, care must be taken to make comparisons between volumes as accurately as possible. The variance in volume between cans of the same shipment makes it absolutely essential that cans chosen from the shipment for samples must be of the same volume. It is obvious, therefore, that a sediment taken from a full ten-gallon can cannot be justly compared with a sediment taken from another can of five-gallon content.

"There is a decided difference between cans of the same shipment in regard to the amount and kind of sediment contained in each. Many cases are found where it is possible to secure several different results from the same shipment by taking sediment tests from individual cans. From the health standpoint it is assumed by this authority that a dirty sediment from any portion of the milk is sufficient reason to condemn the entire shipment."

It was concluded in this study that:

"1. The small hand vacuum type tester is the least satisfactory of the sediment testers under average receiving room conditions. Its main use should be in the laboratory where more careful attention may be given the sample.

"2. The Hinman type of tester takes the milk off the bottom of the can and is most efficient if the milk is not stirred. Results are not as satisfactory if the milk is cold or stirred because there is no form of pressure to force the milk through the foam or butterfat on the pad. Advantages of the tester may be listed as follows: simple to

operate, easy to clean and sterilize, and pads kept in good condition. There is a disadvantage in the amount of equipment to be assembled when using this tester.

"3. Although the L. and W. vacuum tube type takes the sediment sample with ease, there is some difficulty in sterilizing the tube before each test is taken. Unlike the Hinman tester, the L. and W. must be handled with the hands when pads are removed and changed. This tester also requires attention in keeping the plunger clean and in good condition.

"4. From a purely scientific standpoint, the most logical basis for comparison would be the result of the amount of sediment obtained divided by the total volume of the shipment, rather than the amount of sediment from individual cans, even of the same volume.

"Under average plant conditions this would be impractical due to the amount of detailed work involved. This particular Milk Division takes the position that sediment from any portion of the milk shipment is undesirable. In making comparisons of sediment with sediment some effort is made to keep in mind the volume from which that sediment came. To minimize any differences between cans of the same shipment, two or three cans of the same volume are selected from the entire shipment for the test. If the results from these cans show a clean test, the entire shipment is assumed to be clean. If the test shows any appreciable amount of sediment, the shipment is excluded until the condition causing the sediment is corrected. Then additional tests are run until one or more clean sediment tests are obtained.

"5. For average plant conditions, in this reporter's opinion, the off-the-bottom testers are best suited, especially where a large number of shippers' milk is to be tested. Milk should not be stirred if the sample is to be taken from the bottom of the can.

Off-the-bottom samples yield a test sufficiently satisfactory to form the basis for judgment from a health standpoint. In efficiency there is little difference between the L. and W. and the Hinman testers, the latter being slightly easier to operate and sterilize."

#### RESULTS OF STUDIES CONDUCTED BY A COMMERCIAL MILK COMPANY

These studies compared four of the off-the-bottom type testers, the vacuum and the Wisconsin testers.

"It was found that the off-the-bottom group, with the exception of one, which was very inefficient, had comparative efficiency when tests were run on the same milk to which had been added equal quantities of 60 and 100 mesh sediment. Some trouble was experienced with the two-pressure, piston-type off-the-bottom testers in that the sediment by-passed the pad occasionally. However, minor changes in the pad holders might remedy this defect.

"On a portion of the efficiency tests of the off-the-bottom type testers a glass jug, approximately the size of a ten-gallon milk can, was used to determine how much of the sediment was actually removed from the bottom of the can. Experiments showed that the sediment was removed from a circular area having a diameter of about  $3\frac{1}{2}$  inches. It is estimated that approximately one-tenth of the sediment on the bottom of a forty-quart can is removed by the off-the-bottom type testers.

"As to the actual efficiency of removing the sediment from a given pint of milk, the Wisconsin tester is probably the most efficient. The off-the-bottom presents a more striking picture than the mixed-sample type of tester, provided the right can is sampled.

"It is the opinion of this particular reporter, however, that testing the standard pint of well-mixed milk taken from the weigh tank is a much fairer and more accurate method of deter-

mining the sediment content of each producer's milk. To prove this theory a number of tests were run with the Hinman tester on each forty-quart can from several small, medium, and large-sized lots of milk. It was found very frequently that the sediment content varied from clean to extremely dirty in the individual cans of the larger lots. This is entirely understandable when it is considered that the first can or two are strained on the farm with comparative ease after which the filter pads begin to clog up. Then, more often than not, the strainer is jammed a few times to speed up the straining process. This causes the pad to rupture and allows the sediment which has accumulated to pass through. For this reason, the type of tester designed to filter a mixed sample is considered most efficient.

"As to exertion required for operation, the Hinman tester in the off-the-bottom group is without question the easiest to operate. Of the other two, the Wisconsin required least exertion provided the sample was at or near room temperature.

"All six testers were compared for speed of operation and here again the Hinman proved superior, with an average time of 22 seconds required per test. The speed of the Hinman apparatus is dependent upon the fact that a different type pad is used which is not as thick or compressed as much as the standard lintine disc. The off-the-bottom types are faster than the existing mixed-milk types of tester because skim milk is drawn from the bottom of the can, below the cream layer.

"With the mixed-milk type of testers the speed of operation is dependent upon the temperature of the milk being tested and whether or not churning during transportation has occurred. Occasionally the lintine discs will become clogged with the butterfat and no ordinary pressure will force the milk through. It was found that some raw milks had to be warmed to 65° F.,

and some pasteurized milks to 75° F., before they could be forced through the lintine discs.

"From the standpoint of sanitary operation the Wisconsin and vacuum type are superior. In the off-the-bottom group the barrels of the sampling tubes are immersed in the milk and there is a natural tendency on the part of the operator to grasp the barrel of the tester, especially in a fast operation or where trouble is experienced in forcing the milk from the tube. One tester in particular was decidedly insanitary because of the necessity of unscrewing the bottom part of the sampling tube by hand to remove the sediment disc."

#### GENERAL DISCUSSION

The sediment test is, in the light of present day improved farm strainers and strainer pads and plant clarifiers, of rather doubtful value as a general quality test. It is of course highly valuable in specific instances. Sediment is of aesthetic rather than sanitary importance. Moderate amounts of sediment coming to a plant in producers' milk will be removed during clarification. Without complementary bacteriological information the sediment test of producers' milk is a poor means of judging milking practices. The test is of value as a gauge of the efficiency of any filtering device and has a marked psychological effect useful in rectifying an insanitary milk shed. Actually its routine use at the receiving room is more for the psychological effect upon the producer than for the information of the receiver although of course in some instances such a test may form the basis for excluding a particularly dirty supply.

If a digression may be allowed at this point it might be pointed out that the straining of milk on the farm is actually a deception and should not be allowed. It is well known that milk properly milked, cooled, and handled will arrive at the receiving room with a minimum of sediment. Strain-

ing has been justified on the basis that dirt inadvertently entering a supply of milk should be removed promptly in a sanitary fashion. With the elaborate precautions carried out in producing a quality fluid milk today, such a condition would constitute an accident rather than the usual thing and strainers might be available to care for the unusual condition when it occurred.

If straining at the farm were prohibited and could be controlled, then the sediment test at the plant would become a valuable quality test. Present straining methods being known, however, it would probably be next to impossible to prevent farm straining. An alternative is for the field man upon his visits to check the strainer disc on the farm strainer and score the dairy accordingly.

In a number of instances excellent dairymen have been found straining their milk three or four times while handling it on the farm, for the express purpose of removing such extraneous material as might fall into it during aeration and cooling. When these men were shown how properly to cover their aerators, tanks, and cans, all filtering was abolished with improved bacteria counts.

Returning to the discussion of the mechanics of the sediment test, the following methods have been reported in use in one large municipal area:

1. Withdrawal of samples from the weigh pan by vacuum, somewhat in the manner in which butterfat samples are drawn.

2. Withdrawal of the sample from the cans of producers:

- a. From the bottom without stirring

- b. From the center of the can after stirring.

3. Catching of sample, in a dipper, from the last portion of the milk to flow from the can during the dumping operation.

The opinion has also been expressed

that in some instances it may be advisable for a plant to be ruled by the methods of the local health authority in the matter of sediment testing technique. While this may be expedient it is to be regretted unless such authority employs an accepted procedure.

Before making any specific recommendations it seems advisable to state the probable purposes of any sediment test. These might be divided into three broad groups, each of which might call for a different technique, different equipment, perhaps even different standards. Of the three as given, only the last seems amenable of possible standardization. These groups are:

First, as a research measure for determining the actual amount of sediment in any given quantity of milk under controlled conditions, as in judging the efficiency of a strainer or clarifier.

Second, as an object lesson to a careless dairyman when getting the most sediment possible from a given source might be advisable even though the sample was not strictly representative. For this purpose the off-the-bottom tester used on the center of the bottom of an unstirred can might be most suitable.

Third, as a general check on the incoming milk supply, or on bottled milk, in which test the use of a representative sample is indicated.

#### COMMITTEE RECOMMENDATIONS

For the first purpose no standard is necessary, the sediment removed being an end in itself. The tester to be used should be of the most accurate available, and is left to the discretion of the operator.

For the second purpose likewise no standard is recommended, further than comparison with a filter disc from any reasonably clean milk or with any published standard. As has been suggested one of the off-the-bottom testers is probably best suited to this purpose.

For the third purpose, the committee recommends the vacuum type filter used in connection with the 1939 Connecticut standards.

For this type of test a truly representative sample is required, and this can only be obtained by removing aliquot portions from the well-mixed milk in each can or, since such a procedure would not be practicable in a plant receiving-room, to remove a standard amount from the well-stirred milk in the weigh pan. One pint has been standard for many years and there seems no reason for changing.

Off-the-bottom testers have no particular value when used in a weigh pan. The vacuum type filter, as has been mentioned, can not keep up with rapid milk reception. Furthermore, a great deal of milk is received cold, in some sheds as low as 45° F. This would seriously delay filtration by any device. It therefore seems advisable to procure a full pint of milk in a clean pint bottle from the well-mixed milk in the weigh pan, using either a properly constructed sanitary sterile dipper or, a less practical method, a detachable handle which may be fastened to the neck of a pint bottle, removing the sample to the laboratory for subsequent testing by the vacuum tester. The dipper should be used in the sweeping motion employed in taking a fat sample, and should be used while the milk is still in motion following agitation. A removable motor-driven agitator might be useful in this respect. While this method is believed practicable under most conditions, there may be weigh pans the operating principle of which prevents sample-taking. In such cases some modification will have to be developed.

The dried discs should be compared with the Connecticut photographic standards, and should preferably be returned to the dairyman. In poor

sheds, however, where educational programs are under way, it may be advisable to modify temporarily the standard readings in order that a relatively fair dairyman may not become discouraged.

For random sampling of cans, an off-the-bottom type tester which is easy to operate and clean and can be kept sterile during use and has a good speed, used on the center of the bottom of an unstirred can, is recommended. The results, however, must be interpreted with full knowledge of the method of sampling employed. Filter discs may be compared with the standards of the New Jersey Health Officers' Association. These standards are photographic like the Connecticut standards but are unique in that they are in natural color. They may be used as a guide in judging sediment discs but as yet are not officially recommended. This random sampling method might be used as a surprise feature at irregular intervals to keep producers on the alert and as a supplement to regular sediment testing from the mixed sample. These suggested methods do not conflict with the A.P.H.A. "Standard Method," eighth edition.

In conclusion, then, this committee reports on the results of three studies of sediment testing of milk and in a general discussion of the test offers several suggestions as to possible approved methods. A further discussion of these suggestions is invited.

The chairman wishes to express his particular thanks to the members of the committee for their splendid cooperation.

T. H. BUTTERWORTH, Chairman	
C. A. ADELE	J. A. KEENAN
J. L. BARRON	ERNEST KELLY
H. L. DELOZIER	I. A. MERCHANT
H. A. HARDING	K. G. WECKEL
F. D. HOLFORD	F. P. WILCOX
C. K. JOHNS	



## APPENDIX

### REPORT ON STUDIES ON MEASUREMENT OF SEDIMENT IN MILK \*

#### INTRODUCTION

Within the past few years there has been introduced, and increasingly accepted, the "off-the-bottom" sediment testers as devices for measurement of sediment in milk. There has been a growing tendency to measure the sedimentation of extraneous material in the bottom of a can of milk (10 or 8-gallon milk can) as an index of the hygienic care expended by the milk producer in handling the milk. An early system of ascertaining the extent of the volume of sedimented material consisted of "decanting" all but the last pint of milk from the can, and transferring this quantity to a vacuum or pressure type sediment tester for appraisal of the density of sediment. This laborious and uncertain technique has been superseded by devices which, inserted into the can of milk, withdraws a pint portion of milk from the bottom of the can, and when withdrawn passes it through a lintine filter disc whence the sediment is retained, and the milk discharged back into the can.

When the hygienic care expended in the production of milk is to a degree determined by the amount of extraneous material withdrawn from the bottom of the can, and all cans are compared on this basis, it would seem the reliability of the test with respect to interpretation of what it measures would be influenced by a number of factors. These factors in the main would affect essentially the rate and condition of sedimentation of the extraneous material. Among the factors which might be considered academically, are: Particle size, temperature and viscosity of the milk, solubility of the extraneous material, time of sedi-

mentation, and distribution of the extraneous material on the can bottom, or conversely, the point(s) at which the sample of milk is withdrawn by the "off-the-bottom" tester. If these factors affect the intensity of the deposit on the lintine disc obtained from an "off-the-bottom" tester, then, of course, the reliability of the test will be questionable. An examination was made of the influence of the several factors on the character of the sediment appearing on the bottom of milk cans.

#### PROCEDURE

Three 10-gallon milk cans were equipped with glass bottoms. The cans, without bottoms, were obtained from the Geuder, Paeschke, and Frey Co. of Milwaukee. These were provided with bottoms made of mirror glass 0.25 inch thick, supported by an attached soldered supporting rim. The glass bottoms were held in place and made leak-proof by the use of either a red lead oxide-glycerine mixture, or paraffin wax. The glass bottoms were flat, but not concave. The mirror finish of the glass permitted undistorted inspection of the extraneous material. The use of glass bottoms in cans for the purpose of examining extraneous material was first reported by R. E. Johnson, Pet Milk Company, Hudson, Michigan. Mr. Johnson advised, in correspondence, that he was interested in the influence of several factors on the off-the-bottom test, including the distribution of sediment, the effect of stirring on the farm, the speed of immersion of the tester, the size of the opening of the sampler, and the distance of the sampler from the bottom of the can.

Milk for the experiments was obtained from the milk receipts of the

\* Submitted by Dr. K. G. Weckel, Department of Dairy Industry, University of Wisconsin.

Department of Dairy Industry of the University of Wisconsin. The tests were carried out over a two-month period, the milks from different farms of the approximately 100 patrons being used. The sediment used consisted of that occurring naturally in the milk. When greater quantities of extraneous material were desired, the last pint fraction of the milks from several cans was isolated, and these added to the milks being examined. For the experiments, the milk was mixed in a vat, and apportioned into the 10-gallon cans. Sediment tests made with an off-the-bottom tester, and with a vacuum-type tester using the stirred milk were used to augment interpretations made of the observations made through glass bottoms.

Photographs of the appearance of all the cans was attempted for purposes of record, but was abandoned because of the lack of photographic facilities and conditions necessary for adequate results. Photographs of the cans, showing the bottoms, and of some of the sediment in the cans when filled with milk are attached.

#### RESULTS

1. *Effect of stirring on distribution of sediment in the bottom of the can.* Whether milk in the can is stirred with a circular or a transverse motion will influence the distribution of sediment on the can bottom. When the milk is stirred with a circular motion, the sediment tends to aggregate in the center area of the can floor. The degree to which the centralization takes place is evidently influenced by particle size, for as will be shown while sedimentation is quite rapid, a small portion of the extraneous material deposits slowly. When the stirring is done by transverse motion (across and vertical), the distribution of the extraneous material on the can floor is much more uniform. It seems quite evident from a comparison of the methods of stirring that the conditions of the agitation of the milk will affect

the distribution of the sediment. This being so, the representivity of the sample taken by an off-the-bottom tester will be influenced by two factors, the condition of stirring last given the milk, and the position of the tester on the floor of the can at the time of withdrawal of the sample.

#### EFFECT OF HOLDING TIME ON SEDIMENTATION

The rate of sedimentation in milk is affected to some extent by particle size. During the first four hours of holding, a trace of sediment is observed in the upper third of the can (cream layer). The quantity retained in the upper third portion is not significant in terms of the sediment appearing on the bottom of the can. Most of the sediment appears on the bottom of the can within two to three hours. Additional intervals of holding do not alter the appearance of sediment significantly. Thus sediment samples taken of milk by off-the-bottom testers before a two-hour period has elapsed may not be comparable to samples taken after this period. This appears to be dependent in part on particle size. Large particles sediment rapidly. If the agitation has been circular, these aggregate in the center. Smaller particles which sediment slowly, are less and less influenced by the form of agitation as the period since the agitation increases.

Off-the-bottom sediment testers may not give comparable results on morning and evening milk when the samples are taken in the morning. Repeated test indicated there is frequently a decrease in the intensity of sediment on the disc when the milk is held for periods over 16 hours. The probable explanation for this observation is that over a period of time some of the extraneous material goes into solution and hence is not recovered by the sediment tester. The recent statement that evening milk has less sediment than morning milk would be supported by the observations cited in this work

if the sediment samples were taken from both milks in the morning. In these tests three cans of mixed milk were selected, and sediment tests made of the milks after various intervals, the periods of one, four, and sixteen hours, respectively, being representative. Sediment tests were made of the mixed portion from the upper, middle, and lower thirds of the contents of the can. In some of the tests a noticeable decrease was observed in the amount of sediment in the lower third of the can when the holding period was extended to 16 hours or more. It seemed evident that some of the extraneous material had disappeared, probably by solution. Thus, if the sediment in milk is of a soluble character, and the time of holding of the milk is extended as for evening milk, the off-the-bottom sediment tester cannot give comparable results in estimation of the care expended in the handling of evening and morning milk. While the differences in the appearance of the sediment tests taken at different intervals may not be great, the macroscopic inspection of the glass bottom cans permitted ready discernment of a difference, and in cases, the intensity of sediment on the lintine disc appeared to be reduced by as much as one-third.

#### EFFECT OF VISCOSITY AND TEMPERATURE

No significant difference in the rate of sedimentation could be determined when the viscosity of the milk was varied by changes in fat content, or by change in the temperature of holding. Other conditions being equal, temperature differences of from 50° to 80° F. did not appear to affect the rate of sedimentation, and hence would not influence the results obtained by off-the-bottom testers.

#### INFLUENCE OF PARTICLE SIZE

Larger particles in milk settle more rapidly than smaller particles. The rate of sedimentation of the smaller

particles (and these are retained on the lintine filter disc) is sufficiently great that within a period of some three hours a major portion of the material is present on the can bottom. Further holding of the milk does not appear to further increase the intensity of the sediment on the filter disc when the off-the-bottom tester is used. This effect was tested by inspection of the glass bottoms of the cans, and by sediment tests of the upper, middle, and lower thirds of the cans.

#### SUMMARY

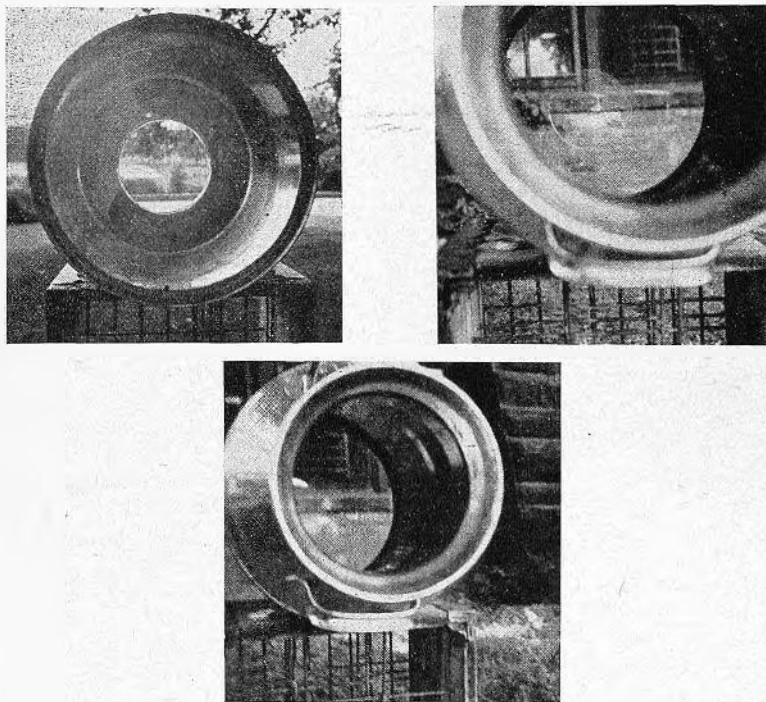
The reliability of the significance of sediment tests made by off-the-bottom sediment testers may be affected by several factors.

1. The condition of the final stirring of the milk may affect the distribution of sediment over the floor surface of the can. Circular stirring results in central zone deposition of sediment, while transverse stirring results in more uniform deposition of material. The amount of sediment obtained by use of the off-the-bottom tester will then depend on the form of the stirring, and the position or movement of the tester during extraction of the sample.
2. Prolonged periods of holding of milk tend to favor solution of soluble sediment. When used as a basis of comparison of evening and morning milk, the off-the-bottom tester favors the evening milk. This nevertheless is true also when other types of testers are used. This indicates an inherent weakness in the sediment test as a milk grading procedure.
3. When the extraneous material is of a soluble type, the sediment test may not compare properly milks of equal, but relatively poor hygienic quality nor milks of different hygienic quality.
4. Evening milk is favored by sediment tests as a grading procedure.
5. Neither viscosity nor temperature

seemed to affect the significance of results as obtained by off-the-bottom sediment samplers.

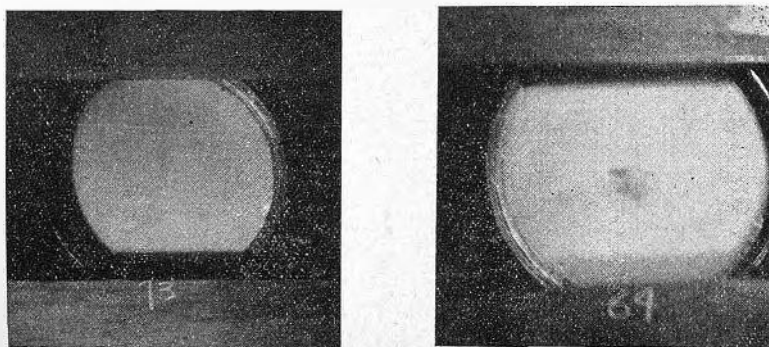
6. Because the use of glass bottom

cans is convenient, they can be used for further study of the reliability of the off-the-bottom sediment testers.



FIGURES 1, 2 AND 3

*Three views of glass bottom cans. Mirror glass supported in cans by permanent metal rim. Joints between glass and metal rim and can side sealed either with paraffin or litharge.*



FIGURES 4 AND 5

*Worm's view of glass bottom cans containing milk. Figure 4 shows sediment distributed over entire can bottom surface; Figure 5 shows sediment accumulated on center area of can bottom surface.*

## Some Problems in Sediment Testing

REPORT SUBMITTED BY H. L. DELOZIER

Chief, Milk Control Division, Department of Health, Louisville, Kentucky

FOR many years public health officials, plant operators and other persons interested in the production of clean milk have used the sediment test as one factor in basing their judgment on quality milk supplies. In spite of the importance of this test, there is a wide variety of methods of procedure in taking the test and in measuring the results.

There is only one procedure fully recommended by Standard Methods for taking this test. This consists of taking a pint sample of milk from a can or vat after the contents have been thoroughly stirred. As for the unstirred off-the-bottom sample, Standard Methods recommends: "While the use of sediment testers that draw milk from the bottom of the can is not approved as a standard procedure because of evident sources of error in measurement, these testers can be used with excellent results."\*

The City Health Department of Louisville has long used the results of sediment tests as one factor in judging the quality of milk supplies coming into the city. Recently trials with various types of testers have been conducted in an effort to determine the type of tester and method of procedure best suited to the needs of our health work. It is the object of this article to point out some of the conclusions reached in these trials.

In the beginning it may be well to discuss some of the many factors that we believe enter into the interpretation of results secured by any method of procedure:

1. The total amount or volume of milk in each shipment.
2. The amount or volume of milk in each can in the shipment.
3. The variance in amount and kind of sediment in each can.
4. The variance in weight and size of sediment particles.

Volumes of milk are different in every shipment. Because it is necessary to compare the amount of sediment between shipments this presents a problem, especially where two or three representative cans are chosen from the shipment for the sample. With the use of the off-the-bottom types of testers, care must be taken to make comparisons between volumes as accurately as possible. The variance in volumes between cans of the same shipment makes it absolutely essential that cans chosen from the shipment, for samples must be of the same volume. It is obvious, therefore, that a sediment taken from a full 10-gallon can cannot be justly compared with the sediment taken from another can of 5 gallons content.

There is a decided difference between cans of the same shipment in regard to the amount and kind of sediment contained in each. We have found many cases where it was possible to secure several different results from the same shipment by taking sediment tests from individual cans. From the health standpoint we have assumed that a dirty sediment from any portion of the milk has been reason enough to base our judgment on the entire shipment.

Close examination of any sediment test will reveal a variety of sediment

\* *Standard Methods for the Examination of Dairy Products, Seventh Edition, 1939, page 66.*

particles ranging in weight and size from fine dust and chaff to coarser particles of manure and dirt. It is at this point that the question of procedure of technique may be introduced. There is some controversy as to the stirring of the milk before the sample is taken. In working on this problem we began taking sediments with three types of testers: (a) the small vacuum type requiring a pint extraction of milk, (b) the Hinman off-the-bottom type, and (c) the L and W off-the-bottom type. All three types of testers were used both with and without stirring the milk. Results obtained from 250 sediment tests were somewhat confusing, first the stirred then the unstirred sample showing the best result. But after careful comparisons of the entire lot, we were inclined to favor the unstirred sample, especially with the off-the-bottom types of testers. With the small, hand vacuum type tester it was difficult to get a sample without some slight stirring of the milk. The unstirred off-the-bottom sample usually showed more of the heavier particles found near the bottom of the can. When a sample of milk is stirred, these particles are taken from the bottom layers of the milk and diffused throughout the entire can and mixed with the lighter particles floating about on the top layers of the milk in the can. It may be contended that the stirred sample shows a truer picture as to type of particle found in the milk, but as to total quantity of sediment this may not be true.

This point is especially important from the health standpoint since we are not so much interested from the standpoint of type of particles as we are the amount or kind of sediment making the milk supply undesirable. It must be stated that comparative results were difficult to obtain because both the stirred and the unstirred sample had to be taken from the same can.

The amount of butterfat caught on the pad when the milk is stirred some-

times makes it far more difficult to read. The pads will not keep as long and the process of taking the sample is retarded. In the Hinman type of tester there is no form of pressure to force the milk through the butterfat on the pad. In the L and W tester more pressure is required than with the unstirred sample.

After using the three types of sediment testers previously mentioned and comparing the results obtained from each, we reached the following conclusions.

1. The small hand vacuum tester is the least satisfactory of the sediment testers under average plant conditions. The amount of time necessary to stir the milk and fill the tester is a disadvantage. Its main use should be in the laboratory where more careful attention may be given the sample and where a few pint samples may be brought from the plant to the laboratory.

2. The Hinman type of tester takes the milk off the bottom of the can and is most efficient if the milk is not stirred. Results are not satisfactory if the milk is cold or stirred because there is no form of pressure to force the milk through the foam or butterfat on the pad. Advantages of the tester may be listed as follows: simple to operate, easy to clean and sterilize, and pads are kept in good condition. There is a disadvantage in the amount of equipment necessary to assemble when using this tester.

3. The L and W vacuum tube type also takes the sample of milk off the bottom of the can and should be used with unstirred milk. Milk is drawn up through the bottom of the tube by a vacuum created by a rubber plunger inside the tube. When the plunger is pushed down the tube the milk is forced through the sediment disc. With this tester no equipment is necessary other than pads and a can of chlorine solution. The actual taking of the sediment is accomplished with ease. However, there is some diffi-

culty in sterilizing the tube before each test is taken. Unlike the Hinman tester, the L and W tester must be handled with the hands when pads are removed and changed. This tester also requires attention in keeping the plunger clean and in good condition.

The following are results obtained from the three testers. The Hinman and L and W are off-the-bottom samples and the small vacuum pad represents a pint sample after stirring.

#### SUMMARY

1. Sediment tests at best show only the undissolved dirt in milk. Although little correlation has been found between the amount of sediment and number of bacteria,\* from the standpoint of public health, sediment tests may be used as one factor in judging the quality of a milk supply.

2. The results of sediment testing should probably be worked out on a comparative basis and interpreted in light of existing conditions. From a purely scientific standpoint, perhaps the most accurate comparison procedure should be based upon degree of sediment times the total volume of shipment rather than the comparison of individual cans. Under average plant conditions this would be impractical due to the amount of detailed work involved. The Louisville Health Department has taken the viewpoint that sediment from any portion of the milk

shipment is undesirable. In making comparisons of sediment tests, some effort is made to keep in mind the volume from which each sediment came. To minimize any differences between cans of the same shipment, two or three cans of the same volume are selected from the entire shipment for the test. If the results from these cans show a clean test, the entire shipment is assumed to be clean. If the test shows any appreciable amount of sediment, the shipment is excluded until the condition causing the sediment is corrected. Then additional tests are run until one or more clean sediments are obtained.

3. For average plant conditions, in our opinion, the off-the-bottom testers are best suited, especially where a large number of shippers are to be tested. Milk should not be stirred if the sample is to be taken from the bottom of the can. Off-the-bottom samples yield a test accurate enough to base judgment from a health standpoint. In efficiency there is little difference between the L and W and the Hinman tester, the latter being slightly easier to operate and sterilize.

4. There are a few factors entering into the technique of taking samples that could be standardized without much difficulty, such as type of testers to be used and kind of pads.

The interpretation of results regardless of the method used in taking the samples, will in our opinion be the biggest problem in standardizing sediment testing.

\* Ruehle, G. L. A., and Kulp, W. L. Germ Content of Stable Air and Its Effect on Germ Content of Milk. *New York Agr. Exp. Sta. Bul.* 409 (1915).

#### MEMPHIS MEETINGS OF DAIRY INDUSTRY CANCELLED

The annual meetings at Memphis, scheduled for the week of October 18 to 24, have been cancelled. The participating organizations are: International Association of Milk Dealers, International Association of Ice Cream Manufacturers, Milk Industry Foundation, Ice Cream Merchandising Institute, National Dairy Council, Certified Milk Producers' Association of America, and milk and ice cream state associations. The Dairy Industry Supplies Association previously discontinued the machinery exposition.

## Survey of Sediment Testers and Methods

SUBMITTED BY DR. JOHN A. KEENAN

(Report prepared by Mr. H. Rutan, Whiting Milk Company, Boston, Mass.)

AT the request of Mr. T. H. Butterworth, Chairman of the Committee on Sediment Tests of the International Association of Milk Sanitarians, work was started some time ago in an attempt to find out:

1. What is the best type of sediment tester to use, and
2. How should the results be judged.

To carry out this project six of the sediment testers in most common use were obtained, and comparative tests were run to determine their qualities with the following points in mind.

### EFFICIENCY

Four of the testers were the so-called off-the-bottom type designed to remove approximately a pint of skim milk from the bottom of the can, together with some of the sediment which has settled.

The other two pieces of apparatus were the Vacuum and the Wisconsin testers.

The off-the-bottom group, with the exception of one, which was very inefficient, had comparative efficiency when tests were run on the same milk to which had been added equal quantities of 60 and 100 mesh sediment. Some trouble was experienced with the piston-type off-the-bottom testers in that the sediment by-passed the pad occasionally. However, minor changes in the pad holder would probably remedy this defect.

On a portion of the efficiency tests on the off-the-bottom type, a glass jug, approximately the size of a 10-gallon milk can, was used to determine how

much of the sediment was actually removed from the bottom of a can. Experiments showed that the sediment was removed from a circular area having a diameter of about  $3\frac{1}{2}$  inches. It is estimated that approximately one-tenth of the sediment on the bottom of a 40-quart can is removed by the off-the-bottom type testers.

As to the actual efficiency in removing the sediment from a given pint of milk, the Wisconsin tester is probably the most efficient. The off-the-bottom type presents a more striking picture than the mixed-sample type of tester, provided the right can is sampled.

It is the opinion of the writer, however, that testing a pint of well-mixed milk taken from the weight tank is a much fairer and more accurate method of determining the sediment content of each producer's milk. To prove this theory a number of tests were run with the Hinman tester on each 40-quart can from several small, medium, and large-sized lots of milk. It was found very frequently that the sediment content varied from clean to extremely dirty in the individual cans of the larger lots. This is entirely understandable when it is considered that the first can or two are strained on the farm with comparative ease after which the filter pads begin to clog up. Then, more often than not, the strainer is jarred a few times to speed up the straining process. This causes the pad to rupture and allows the sediment which has accumulated to pass through. For this reason, the type of tester designed to filter a mixed sample is considered most efficient.





FIGURE 1

*Sediment tester devised by Mr. Rutan utilizing air pressure supplied by foot operated pump.*

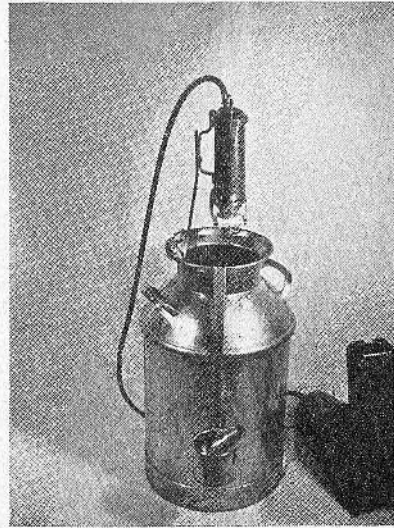


FIGURE 2

*Tester with Hinman type pad in place, for use in deck sampling of cold mixed milk from weighing vat.*



FIGURE 3

*Tester with standard lintine sediment disc (before clamping in place.)*



FIGURE 4

*Same tester with standard lintine sediment disc in place for use in the laboratory on mixed samples at room temperature.*

## EASE OF OPERATION

The various testers were compared as to the amount of exertion required for their operation. This is an important factor, especially in the larger plants.

In the off-the-bottom group the Hinman without question is the easiest to operate as it merely entails the tilting of the milk thief into the filter cup, and the actual filtering is done by gravity.

Of the testers designed to take a mixed sample of milk, the Wisconsin required the least amount of exertion provided the milk was at or near room temperature, because of the utilization of air pressure supplied by a hand bulb.

## SPEED

The time required to operate the sediment test is important. It would not be practical to employ a test that would hold up modern, high-speed dumping operation.

All six testers were compared for speed of operation and here again the Hinman proved superior, with an average time of 22 seconds required per test. The speed of the Hinman apparatus is dependent on the fact that a different type pad is used which is not as thick or as compressed as the standard lintine disc. The off-the-bottom types are faster than the existing mixed-milk type testers because skim milk is drawn from the bottom of the can below the cream layer.

Difficulty is experienced occasionally with the Hinman when an attempt is made to filter milk taken from a partially filled can of rich milk which has been agitated during transportation.

The off-the-bottom testers work more satisfactorily on morning milk because it is usually warmer than night milk.

On the mixed-milk type of testers such as the Wisconsin and the Vacuum, speed of operation is dependent on the temperature of the milk being tested and whether or not churning during transportation has occurred. Occa-

sionally the lintine discs will become clogged with the butter fat and no ordinary pressure will force the milk through.

It was found that some raw milks had to be warmed to 65° F., and some pasteurized milks to 75° F., before they could be forced through the lintine discs.

## SANITATION OF DESIGN AND OPERATION

The Hinman and Wisconsin testers are comparatively easy to clean. Some of the equipment, because it is more complicated, required considerable time to cleanse properly.

From the standpoint of sanitation of operation the Wisconsin and Vacuum types are superior. In the off-the-bottom group the barrels of the sampling tubes are immersed in the milk and there is a natural tendency on the part of the operator to grasp the barrel of the tester, especially in a fast operation or where trouble is experienced in forcing the milk from the tube. One tester in particular was decidedly unsanitary because of the necessity of unscrewing the bottom part of the sampling tube by hand to remove the sediment disc.

## JUDGING SEDIMENT TESTS

Recently a set of milk standards was adopted by the New Jersey Health Officers' Association. These standards are satisfactory for tests made with the off-the-bottom testers. However, since the use of a well-agitated pint sample taken from the weigh can is herein recommended, the Connecticut Standards should be referred to.

The grading card on the Hinman pad for use with the above tester should read, "Sediment in One Pint of Milk," and the following grades should be printed thereon:

Clean  
 Fairy Clean  
 Dirty  
 Very Dirty

### CONCLUSION

1. A comparison of several of the most common sediment testers revealed one of the so-called off-the-bottom type testers to be efficient as far as testing a 40-quart can is concerned. It was also found to require little exertion to operate, was rapid, and fairly sanitary.

Recommendation is herein made, however, that a pint sample of mixed milk from the weigh can is more surely representative of the sediment content of any particular lot of milk as received from the farm.

Neither of the two agitated-sample type testers examined were rapid enough to enable the operator to keep up with modern weigh room speeds but were satisfactory for laboratory use.

2. New Jersey Health Officers' Sediment Standards are satisfactory for off-the-bottom sediment tests. Connecticut Official Milk Sediment Standards are satisfactory for sediment tests run on pint samples of properly agitated milk.

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## REPLACEMENT PARTS

OFFICE OF WAR INFORMATION

WAR PRODUCTION BOARD

In a move to expedite production of replacement parts to keep the country's motorized equipment in good running order for the duration of the war, the War Production Board has ruled that producers may schedule production of replacement parts without regard to purchase orders or contracts placed with them for other material on ratings lower than A-1-a.

Amendment No. 1 to Limitation Order L-158 authorizes producers to schedule production of essential replacement parts ahead of all other orders rated lower than A-1-a.

The amendment makes certain other changes in the replacement parts order. One of these is merely a modification of the definition of a truck trailer to make it clear that the definition applies to passenger trailers.

Another change revises the section of the order which provides that consumers must turn in a used part for every new part purchased.

Under this change, a producer or

distributor may sell and deliver any replacement part to a consumer without receiving a used part in exchange, provided that the part involved is not installed in the consumer's vehicle by the producer or distributor from whom it was purchased, and the consumer signs a statement certifying that he will use the new part for replacement purposes only and will, within thirty days after purchasing it, dispose of his used part through regular scrap channels. The use of the certificate does not apply to parts consumed in use or lost or stolen. Such parts are exempt from the turn-in regulations.

This provision is intended to relieve consumers who are in a position to repair their own vehicles and do not wish to have the vehicles torn down at a repair shop. The amendment also exempts Federal, State and local governments from the turn-in rule, provided they are forbidden by law from disposing of used equipment.

## Pasteurization of Small Milk Supplies\*

C. S. LEETE

*Principal Milk Sanitarian, New York State Department of Health  
Albany, N. Y.*

THE importance of the pasteurization of small milk supplies at first glance is all out of proportion to the volume of milk involved and to the time which would be necessary in supervision. In this State, exclusive of New York City, about 73 percent of the milk is pasteurized. This represents an enormous volume of milk, yet the remaining 27 percent is our big problem. To adequately appreciate and understand the necessity for undertaking a program which eventually will result in reducing to a minimum the volume of raw milk used, we should study our records of milkborne outbreaks. We have known for years that such outbreaks are almost always due to raw milk.

Let us see where these outbreaks occurred. From 1917 to 1927 there were 84 outbreaks recorded. Of this number 57, or 68 percent, occurred in "rural" areas, while 27, or 32 percent, were in the "urban" population centers. During that period pasteurization was first beginning to emerge as a standard practice. From 1928 to 1938 pasteurization increased tremendously and naturally the increase was in the urban centers. What was the effect of this on our milkborne outbreak record? During that period 1928-1938, we still had outbreaks, 67 of them. Not a very substantial decrease as compared with the previous 11 year period. But the startling fact is this: Of the later number only 4 or 6 percent were in urban communities while 63 or 94 percent were in the rural areas. From 1917 to 1927 there were 2 outbreaks in small

places for every one in the cities, while in the next 11 year period the ratio was 16 in the rural to 1 in the urban. So it is plain that we should be concerned with milk supplies in rural areas.

Even though the volume of milk is relatively small, the population affected is not. The term "rural," as used in this discussion means communities of 12,400 or less. This figure was used because one-half of the population of upstate New York resides in such places. In other words the amount of raw milk under consideration is small, but the population in the area is equal to the population in the larger communities which are now, through the extensive use of pasteurized milk, protected from the dangers of milkborne outbreaks.

There is another reason, a very current and pressing one, why efforts should be made to bring about the pasteurization of small milk supplies. There is hardly a community of any size which is not confronted with the problem of sales of milk at the farm and at roadside stands. In the main such supplies are comparatively small, yet in the aggregate a rather large number of consumers are involved. It has been said that these operations flourish because consumers want raw milk and because such type of milk is not available in the cities, consumers go to the farms for the milk. Surveys have shown that it is not a question of raw versus pasteurized milk—but a matter of price. If the small dealer could find a practical way to pasteurize his milk, many of the producer dealer and farm supplies would be pasteurized.

All this has been recognized for

\* Presented at 15th annual meeting of the New York State Association of Dairy and Milk Inspectors (now the New York State Association of Milk Sanitarians), September 24, 25, and 26, 1941.

years, at least by a few men. One in particular has worked hard with manufacturers trying to show them the problem and pointing the way to the solution. At last such efforts are bearing fruit, for there is in operation in this State equipment which is efficiently and practically pasteurizing small quantities of milk, from 50 quarts upward. Mr. Tiedeman of this Department has been the driving force behind this movement.

A pasteurizer for small quantities of milk (50 quarts or perhaps even less and upward) must be:

1. Capable of pasteurizing milk in accordance with the provision of Chapter III of the Sanitary Code.
2. So operated and constructed as to result in a good quality milk, that is, the milk shall have good flavor, good keeping qualities and good cream line.
3. Within a price range which makes it practical to purchase and operate.

Such equipment is now on the market.

There are two classes of pasteurizers designed for the pasteurization of small quantities of milk: (1) the in-the-bottle pasteurizer, and (2) the vat type. The present in-the-bottle pasteurizer is so designed, constructed, and operated as to overcome the faults encountered with the old time in-the-bottle pasteurizer. Each bottle, no matter what its location in the pasteurizer is properly pasteurized. All milk in each bottle, top, middle, or bottom, is also properly pasteurized. In other words, this apparatus does the job of pasteurization. Further, cream line and taste studies indicate that quality is not impaired.

Briefly the system consists of two large Bethanized sheet steel tanks, similar to the commonly used can cooling tank, in which water at a predetermined and controlled temperature is circulating rapidly. Oversized lightweight milk bottles and welded wire milk crates are used. Neither standard weight milk bottles nor wooden crates can be used. The bottles are placed in properly designed wire crates which

set on a false bottom or rack in order to insure unobstructed circulation of the heating water. The temperature of pasteurization is determined and controlled by the temperature of the circulating water. Extensive tests were made to determine how long it would take to pasteurize properly milk with water at a definite temperature. Repeated tests showed that with milk at 40° F. it would take one hour to pasteurize a full load of bottled milk with circulating water at 144° F. After the bottled raw milk has been placed in the vats the cover is secured. An extra pen on the recording thermometer which records the temperature of the water, is actuated by the raising or lowering of the cover. The pen is also connected with the pump circuit and shows when the circulating pump is operating. For acceptable pasteurization, the recording chart must show a water temperature of 144° F. for one hour without any record that the cover has been raised. Data indicated that it takes the milk from twenty to twenty-five minutes to reach 143° F. with the circulating water at 144° F. For safety the heating period is figured as one-half hour. Hence the holding time is calculated at the end of this period. Immediately after holding, the cases of milk are removed, placed on the floor for five minutes and then immersed in the tank containing circulating cooling water. Racks are so made as to keep the closure of the bottles above the level of the water during cooling. Storage of the milk may be within the cooling vat or in a cold storage room. The method will depend on the quantity of milk handled. This type of pasteurizer is made in two sizes, the small holding 48 quarts, the large 96 quarts. Oversize bottles to take care of expansion during heating are required. Likewise waterproof cover caps are necessary. Heating of water is done electrically and the temperature of operation is controlled by control of water temperature. No steam boiler is needed.

From the viewpoint of public health this method of pasteurization is ideal. It assures that the milk will be sold as bottled milk (not dipped); that no contamination can take place after pasteurization; that in the event that bottle washing is not satisfactorily done, the bottle as well as the contents are subsequently pasteurized; that there will be available at the plant hot water which can be used for washing operations; that any quantity of milk from a single bottle up to the capacity of the apparatus can be properly pasteurized. The cooling section has capacity for storing three times the quantity of milk that can be pasteurized in one run. Like all equipment there are certain features which are not ideal. One is that the cost of the equipment at present is somewhat higher than was anticipated. The operating cost is normal. Because Bethanized steel cannot be obtained at present for this use, a copper lining is needed to resist rusting which increases the cost. At the present time, due to the program adopted by the Priorities Board of the O.P.M., quantity production of the pasteurizer does not seem to be possible.

There are two types of small vat pasteurizers now on the market. One type is similar to if not in every respect identical with the larger vats with the exception of size. Various sizes are available, the smallest being 120 quarts. They are water jacketed vats, with agitators, valves, indicating and recording thermometers of acceptable design and construction. Operation is the same as for the larger vats. Cooling is usually accomplished by means of a surface cooler. Steam boilers are needed. Little if any more needs to be said regarding these vats for we have all been working with the larger type for years.

However the other type of small vat pasteurizer and the vat to be considered deviates from the standard design. The smallest size is 40 quarts, although it is believed that the 80 and

120 quart sizes will be more popular.

The problem of the pasteurization of goats' milk may be solved by the use of this small sized pasteurizer. Heretofore generally only makeshift equipment has been used. Now a satisfactory pasteurizer suitable for this product is available. The pasteurizer is an upright cylindrical water jacketed vat, with agitator, valves, indicating and recording thermometers of satisfactory design and construction. Heating is by means of hot water at about 160° F. which is circulated through the water jacket. When the milk reaches the pasteurizing temperature the hot water is immediately drained off. This can be done rapidly as the volume within the water pocket is small. During the holding period the drop in temperature of the milk is so small as to be negligible. If, however, for some reason the temperature does drop, hot water can again be circulated in the jacket. After the holding period, tap water is circulated within the water jacket. Rather quickly the temperature may be lowered to about 100° F. Ice water should then be circulated to cool the milk to proper cooling and storage temperatures. The hot water may be heated by means of an ordinary laundry coal stove, side arm gas heater, or electrical immersion unit. This water is stored in an open tank and then pumped through the vat. It is recirculated. No steam boiler is therefore needed for the operation of this type of pasteurizer. The hot water storage makes available hot water for washing operations. This pasteurizer was designed especially for small dealers who are now selling milk at the place of production. However, as with the other vat type bottling equipment can be used in conjunction with the operation.

Prices for the various pasteurizers without boiler, bottle filling machines, cappers and bottles ranged from approximately \$300 for the last described type to about \$1,000 for the in-the-bottle pasteurizer. These prices include both indicating and recording

thermometers. It should be noted that the in-the-bottle type includes an electrical refrigerating unit and storage capacity for the bottled pasteurized milk. The other vat types are under \$1,000, the price varying with the capacity. The prices are approximate and due to the emergency, may "change without notice." Efforts have been made by manufacturers to keep cost down without impairing efficiency. How well they have succeeded can be judged by the fact that there are on the market now pasteurizers capable of pasteurizing small quantities of milk at prices way below any which we have had heretofore.

This type of equipment should help us solve several vital problems which are before us. First, there is no reason now why small communities served by dealers handling small quantities of milk cannot secure that protection which only pasteurized milk can give. The criticism that equipment adaptable to these conditions is not available is not true now. Equipment is available and it is now up to us and up to consumers to see to it that the rural population is just as well protected from the dangers of milk-borne outbreaks as are the people in urban centers. Furthermore, the use of these small pasteurizers should help us in giving to these people in cities, who insist upon going to the farm for their milk, milk which is properly pasteurized. It is believed that a pro-

gram may be worked out, whereby pasteurized milk will be used, almost exclusively throughout the State. There apparently is no unsurmountable obstacle in the way. Objection may be made that the cost, even though low, would naturally cut profits. This is true, yet the additional cost, if passed on to the consumer would be very cheap insurance. Further lowered costs, with the advantages, can be secured by the cooperative use of small pasteurizers. Several small dealers going together at a low per capita outlay can make available this equipment. The overhead per quart would be reduced and also it would be possible for each dealer to keep his own milk intact. A dealer, with high fat milk or milk with some so-called special characteristic could pasteurize and handle his own supply.

When public health is involved, there should be no compromise. It has been said and I'm quoting, "the business man, like the savage, must occasionally put his ear to the ground to get the tendencies of the time and then prepare to meet them. Furthermore the financial interests of any individual or group cannot properly be weighed against the protection of the community as a whole."

Let us put our efforts into a program which eventually will result in making available to our entire population pasteurized milk. The means to do this are now available.

*Attend two important conventions!*

INTERNATIONAL ASSOCIATION OF MILK SANITARIANS

and

AMERICAN PUBLIC HEALTH ASSOCIATION

Both at St. Louis, Missouri

October 30-31 and 27-30 respectively

## SANITARY GLASS PIPING DEVELOPED TO RELIEVE METAL SHORTAGE IN DAIRY INDUSTRY

Despite the importance of dairy products to a nation at war, the extreme scarcity of metals has already forced the dairy industry to search for a substitute for metal tubing. This tough problem has been tackled directly by The Dairy Industries Supply Association; and through a sub-committee on sanitary fittings, holding conferences with representative milk dealers and milk sanitarians, a comprehensive study has been made of all available materials.

The committee enlisted the aid of a glass company that has been manufacturing glass piping for the food products and chemical industries for over fifteen years. The joint efforts of the committee and this company have resulted in the development of a new-type glass piping that apparently meets dairy pipe line requirements, including sanitary considerations.

This new glass dairy piping can be substituted directly for straight lengths of stainless or tinned copper tubing, because it can be used with present standard 3-A fittings. Hence, the connecting of metal to glass lines should be easy and inexpensive.

Joints are made with standard 13-H nuts, small molded rubber gaskets, and molded plastic follower rings. The joints are remarkably flexible. And no wrenches need be used, for hand tightening is sufficient for usual dairy-plant pressures. At present these glass dairy lines are recommended for pressures up to 50 pounds per square inch. This allows for an adequate safety factor.

The glass piping itself has beaded ends, and the small rubber gaskets fit snugly over this beading. It is a simple matter to bead the ends of the piping. No special knowledge of glass is required, and the beading can be done by any competent mechanic with a minimum of practice.

The glass from which the dairy pip-

ing is made is the same borosilicate glass used to make Pyrex Brand Industrial Piping for the food and chemical industries and the same glass used in Pyrex Brand Ovenware. The special qualities of this glass—thermal resistance, corrosion resistance, smoothness and hardness, transparency, and mechanical strength—seem to be particularly adaptable to dairy-line requirements.

The glass piping withstands sudden changes from cold to hot or hot to cold. Thus the piping may be safely sterilized with hot water or live steam.

Glass piping is so resistant to acids and alkalis that it is used in the chemical industries for conveying such highly corrosive solutions as nitric acid, muriatic acid, and chlorine. This corrosion resistance means that even the most powerful cleaning solutions will not harm the glass dairy piping. Consequently, there is no formation of pits that could hold bacteria, yeast, or mold. The smooth, hard surface remains intact indefinitely.

Glass in general is easy to clean. And the glass used in the dairy piping, being considerably harder than the glass used, for example, in milk bottles, resists scratching and scuffing and consequently is unusually easy to clean. Glass piping *keeps* its smooth, hard surface.

In the food products and chemical industries glass piping has demonstrated remarkable reluctance to accumulate films and scale. And preliminary field testing indicates equal reluctance to retain milkstone deposits. This resistance to milkstone, it is thought, is due to the fact that the surface of the glass piping is so smooth that film and scale cannot form a strong bond with the glass.

One characteristic of glass piping has important possibilities with respect to sanitary considerations. This is the



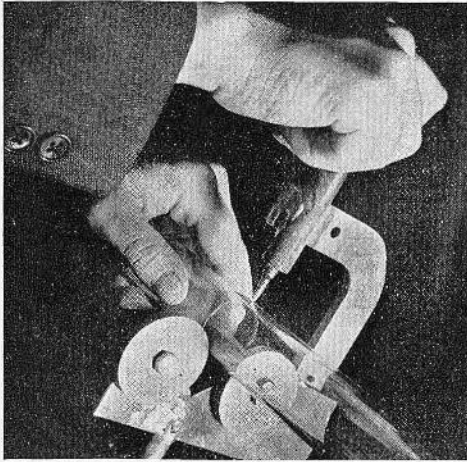


FIGURE 1

*How to prepare beaded glass piping for dairy lines. Step #1. A length of glass piping, supported on rollers, is scored with a diamond pencil.*

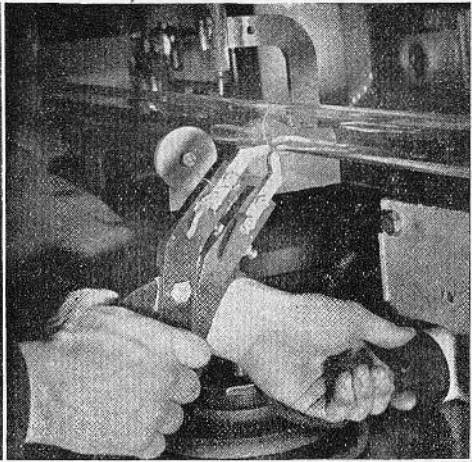


FIGURE 2

*How to prepare beaded glass piping for dairy lines. Step #2. An electrically heated wire is applied to the glass piping at the place where the piping is scored. Thus the glass is brought to a high temperature at that point.*

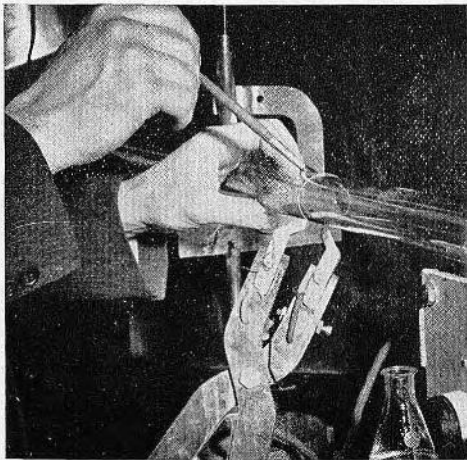


FIGURE 3

*How to prepare beaded glass piping for dairy lines. Step #3. The hot wire is removed from the scoring, and a wet brush is then applied to the hot glass as the piping is rotated on the rollers.*



FIGURE 4

*How to prepare beaded glass piping for Dairy lines. Step #4. The combination of scoring, heating, and chilling has effected a clean accurate cut. Next, the end of the piping will be beaded.*

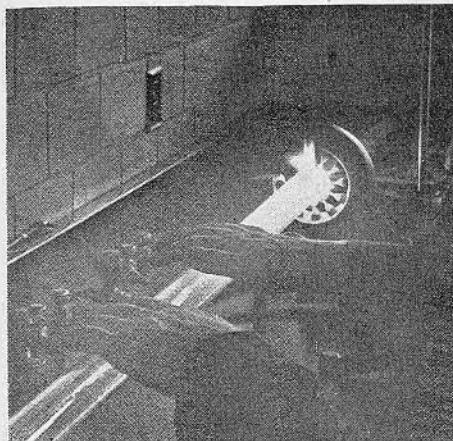


FIGURE 5

*How to prepare beaded glass piping for dairy lines. Step # 5. The glass piping, supported on the rollers, is thrust into a concentrated gas-oxygen flame that softens the end of the piping. As the pipe is rotated by the operator, the softened end begins to form into a bead.*

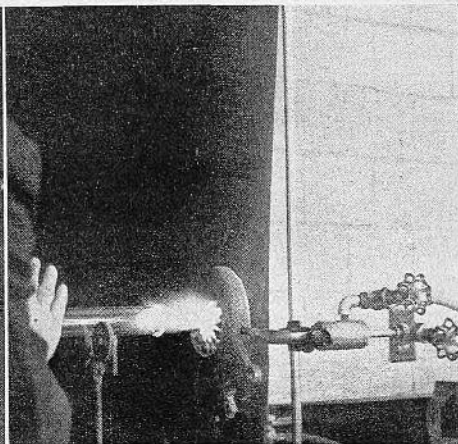


FIGURE 6

*How to prepare beaded glass piping for dairy lines. Step # 6. The white-hot bead can be seen as the operator pulls the piping from the flame and rotates the piping rapidly for a few seconds.*

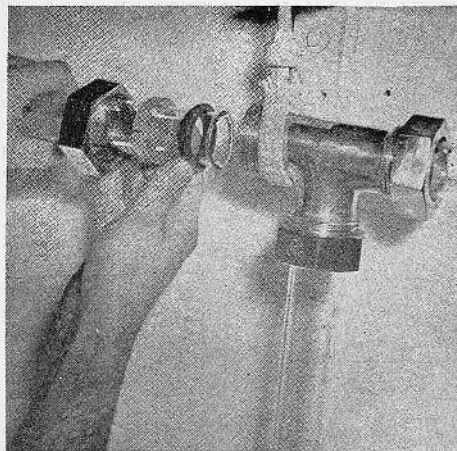


FIGURE 7

*Standard metal fittings may be used to make joints in glass dairy pipe lines. Here the small rubber gasket is about to be slipped over the beaded end of the glass pipe. The plastic follower ring and the 13-H nut will then be pulled up, and the nut will be screwed to the metal "tee" by hand tightening.*

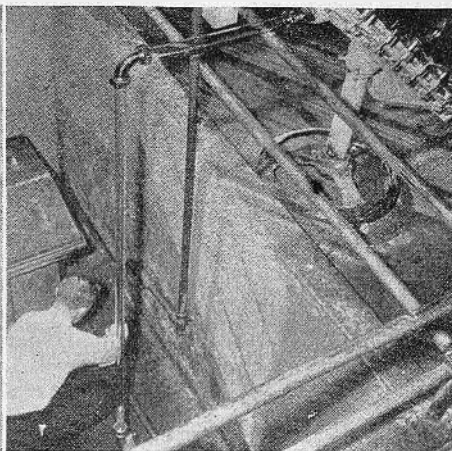


FIGURE 8

*Glass piping being installed in a milk plant. This section of the piping runs from receiving tanks to filter.*

transparency of the piping. It is possible for the dairy plant operator to observe every square inch of the piping surface both during and after cleaning.

With regard to mechanical strength and possible breakage, fifteen years' experience in the chemical and food fields has demonstrated clearly that only reasonable care is necessary in the handling of the glass lines during installation and operation.

The D.I.S.A. has outlined a comprehensive field testing program for these new glass dairy lines, so that sufficient plant experience may be ob-

tained on best methods of installation, daily handling, cleaning, and sterilizing. Demonstration installations of several lengths of glass piping are already in operation in dairy plants and six more are now being installed or about to be installed. The demonstration installations will cover a wide territorial area and will be diversified as to size and type of products. It is expected that this test program will reach a representative cross-section of the industry and that operators in the vicinity of the test installations will be able to see the glass piping in action.

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**The Scientific Foundations of the Bacteriological Tests of Water.** C. R. Baier. *Gas. u. Wasser. (Ger.)* 83:329 (June 13, '40). Max Suter. *Jour. of the Amer. Water Works Assoc.*, 33, 184 (Jan. 1941). *Pub. Health Eng. Abs.* xxi, W, 38.

"Hygienic control of drinking water is generally done by 2 bacteriological tests—total count and determination of presence of coliform bacteria. Certain chemical tests ( $\text{NH}_3$ ,  $\text{NO}_3$ ,  $\text{O}_2$ ,  $\text{SH}_2$ ) also give some insight on bacteriological activity. So-called total count on gelatin or agar gives incorrect count of all bacteria. Nevertheless, plate method gives dependable picture of aerobic saprophytes. Incubation periods of 6 to 8 days give higher counts than only a 48-hour period, although liquefaction of gelatin is an obstacle. Agar gives lower counts than gelatin, but shows organisms of fecal origin more clearly. Direct microscopic count gives all organisms, even dead ones. Coliform test determines only certain physiological group. German methods try

not only to show presence of coliform organisms but also to get approximate count of them, either by using different dilutions in liquid media or by direct plating on Endo agar. As incubation at 37° C. also gives coliform organisms from cold-blooded animals, method by Eijkman (incubation at 46° C.) is considered of more hygienic value, being specific for thermophilic gas formers. Often important is the determination of bacterial activity by measuring chemical changes caused by bacteria, either by putting isolated bacteria in favorable media or by more natural method of putting chemical food to large water sample. Method also allows study of certain influences, as temperature,  $\text{O}_2$  content, and effect of poisons. Chemical analysis can give chemical activity directly in water course. Interpretation of results from bacteriological standpoint, however, requires care in differentiating biological and purely chemical causes of changes observed."

H. B. FOOTE

## Legal Aspects

### Instant Whip

(*Aerated Products Company of Buffalo, Inc., v. Edward S. Godfrey, Jr., Commissioner of Health of the State of New York.*) In 1939 the New York State Public Health Council amended the State Sanitary Code (Chapter III) to include in the definition of a milk product "cream to which any substance has been added and for use in fluid state or whipped." It was understood that the definition, as amended, covered a product known as "Instant Whip," prepared and distributed by the Aerated Products Company of Buffalo, Inc. Under the code, milk products must be made from milk or cream meeting "the applicable requirements . . . for milk or cream of a grade permitted to be sold in the municipality where sold or offered for sale." A person selling milk products is required to have a permit from the local health officer. The health officer of Rochester, N. Y., refused to issue a permit to the company on the ground that the cream used was from sources not subject to inspection by his department.

The State Supreme Court, on a motion for a declaratory judgment against the Commissioner of Health, appointed a referee to hear and determine the issue.

"Instant Whip" was said to be prepared by adding sugar and vanilla to cream, this mixture being placed in a dispenser into which sufficient nitrous oxide gas was injected to give a pressure of 150 pounds. The dispenser operated "on a siphon bottle principle," the "whipped" product exuding.

The plaintiff company contended that the product was a manufactured food product, not a milk product, and should be classified as "frozen desserts mix"; that jurisdiction therefore rested with the State Department of Agriculture and Markets and that "the attempt by the defendant to require plaintiff to comply with the Sanitary Code" was "unreasonable and unconstitutional," etc.

The referee decided for the plaintiff. "I find the product is a food product," he said in a memorandum explaining his decision. "As it is ejected from the container . . . I find it has undergone a change . . . from a milk product, open to contamination, to a food product, not open to contamination."

The Appellate Division of the State Supreme Court, Third Judicial Department, on appeal, reversed the judgment of the referee on the law and the facts and dismissed the complaint, with costs. Instant Whip, it held,

was a milk product and subject to regulation under the Public Health law. It "is not used in the manufacture of frozen desserts, but is ordinary whipped cream." Instant Whip, the Presiding Justice wrote, was defined by the Sanitary Code and arguments that it should be removed from the supervision of the health department should be presented to the legislature and not to the courts.

The plaintiff company has filed an appeal.  
Reported by PAUL B. BROOKS.

### Use of Paper Containers in the Sale of Milk\*

(United States Circuit Court of Appeals, Seventh Circuit; *Fieldcrest Dairies, Inc., v. City of Chicago, et al.*, 122 F.2d 132; decided August 4, 1941.) In January, 1935, the city of Chicago adopted an ordinance regulating the production and distribution of milk in the city. One of the provisions of this ordinance read: "Any milk or milk products sold in quantities of less than one gallon shall be delivered in standard milk bottles; provided, however, that nothing herein contained shall be construed to prohibit hotels, soda fountains, restaurants, and similar establishments from dispensing milk or milk products from sanitary dispensers approved by the board of health." The plaintiff corporation sought a judicial declaration that the above-quoted requirement that milk be delivered in "standard milk bottles" did not prohibit the sale of milk in the plaintiff's paper containers or that, if it did, the provision of the ordinance was invalid. Also, an injunction was sought restraining the defendants from interfering with the sale of milk in such paper containers.

The court of appeals concluded that the use of the plaintiff's paper containers for the delivery of milk in the city was prohibited by the ordinance, taking the view that what the city council meant and intended by standard milk bottle was the glass bottle in universal use at the time of the adoption of the ordinance. The language of the ordinance had to be construed as it was intended to be understood when the ordinance was passed, and the court pointed out that the use of paper containers was scarcely known when the ordinance was enacted.

In connection with the attack made upon the validity of the ordinance, the court proceeded to consider the legislation enacted by

\* *Public Health Repts.*, Feb. 20, 1942.

the Illinois Legislature in July, 1939, during the pendency of the instant suit. By this lengthy statute, as well as by the regulations promulgated pursuant thereto, the State undertook to regulate the pasteurization of milk and the sale and distribution thereof, and, according to the court, it was plain that the use of single service containers, such as those of the plaintiff, for the distribution of milk was permitted and approved upon compliance with the act. "Thus," said the court, "we are confronted with a situation wherein the State on the one hand has expressly recognized and made provision for the use of a single service container for the sale and distribution of milk upon compliance with the requirements of the act, and regulations lawfully promulgated in conformity therewith, and on the other hand, with the provision of the city ordinance which prohibits such use." The conclusion was reached that the portion of the ordinance prohibiting the plaintiff from distributing milk in single service containers was contrary to the public policy of the State and void. The court said, however, that it had no doubt that the city, by virtue of a saving clause contained in the statute, had the power to regulate paper containers and held that the plaintiff was entitled to an injunction restraining the defendants from prohibiting, but not from regulating, the use of such containers.

#### **Manufacturer of Bakery Products Held Not Liable in Action Based on Illness Resulting Therefrom \***

(Massachusetts Supreme Judicial Court; *Johnson v. Stoddard et al.* (2 cases), 37 N.E.2d 505; decided October 31, 1941.) A wife and husband each sued two individuals, as manufacturers of bakery products, to recover damages for illness resulting from eating cream puffs which were alleged to have been unfit for human consumption because infected with dangerous germs from one of the defendants' employees. In each case the judge directed a verdict in favor of one of the defendants while the jury returned a verdict against the other defendant. The judge reported the cases to the supreme court of Massachusetts upon the stipulation that, if they were properly submitted to the jury, judgments were to be entered in accordance with the verdicts; otherwise, judgment in each case was to be entered for the defendant against whom the verdicts had been returned.

There was evidence that the wife purchased four cream puffs for herself and her husband at a store which procured bakery products, including cream puffs, from the defendant. The plaintiffs ate these puffs on

the day purchased, April 1, 1937, there being nothing wrong in their appearance and taste. One of the plaintiffs became ill on April 8 and the other on April 10. The appellate court said that it could be found that they were suffering from paratyphoid B.

On April 29 the defendant was informed by a physician who was apparently connected with the State department of health that he was suspicious that an employee of the defendant had this disease and the defendant immediately laid off the employee. This employee had worked 5 years for the defendant and during that time was never sick. In 1936 he had been immunized against the disease. There was other evidence by physicians who were also health officials, and the supreme court said that the question before it was whether the evidence was sufficient to warrant the verdicts for the plaintiffs.

According to the court the manufacturer of an article of food for human consumption owed a duty to the ultimate consumer to exercise care in its preparation and output in order that his product would not cause injury to the consumer, and the degree of care that had to be exercised was commensurate with the danger to the life and health of the consumer that might probably result from the lack of such care. The court assumed, without deciding, that the evidence would warrant an inference that the employee was a carrier of paratyphoid B when the puffs were manufactured and that in some way germs from him were imparted to the puffs, but it went on to say that there was no evidence that the defendant knew or reasonably could be expected to know that one of his employees was in such physical condition that it was dangerous to permit him to handle food. "Indeed, the testimony is to the contrary and clearly demonstrates that it was not until April 29, 1937, that the defendant had or should have had any knowledge concerning this condition of the employee."

In the next place it was the court's view that the evidence would not support a contention that the employee on April 1 knew or ought to have known that he was afflicted with a dangerous disease which might be transmitted to others through the food that he handled and that there was nothing upon which liability could be imposed upon the defendant on the ground that the employee was negligent.

In an attempt to prove negligence of the defendant the plaintiffs relied upon a violation of a State statute which provided, in part, that there should not be used in bakery products or in the ingredients thereof any ingredient or material, including water, which was spoiled or contaminated or which might render the product unwholesome, unfit for food or injurious to health, and that

\* *Public Health Repts.*, June 19, 1942.

there should not be used in any bakery product any ingredient likely to deceive the consumer or which lessened the nutritive value of such product. The law also provided that the said ingredients and the sale and offering for sale of the said products should otherwise comply with certain specified sections of the statutes. The court said that the purpose of the statute was to require the manufacturer to use only pure and wholesome materials and such as would not be injurious to health and that there was no contention that the use of any of the materials that went into the cream puffs was contrary to the statute. "The primary concern of the statute is to insure the wholesomeness of the finished product by the use of proper ingredients. It deals specifically with the ingredients as distinguished from the manufactured product." Regarding the plaintiffs' contention that some of the ingredients were impregnated by disease germs emanating from the employee, the court stated that the plaintiffs had not sustained the burden upon them of showing that the ingredients used did not comply with the statute.

The judgment in each case was in favor of the defendant.

#### Nuisance—Dumping of Garbage on Farm—Power of Local Board of Health—Statute Upheld \*

(Iowa Supreme Court; *State v. Strayer*, 209 N.W. 912; decided September 23, 1941.) The defendant was the operator of a farm and engaged in raising hogs. He fed them garbage which was obtained from various sources and deposited upon his land. The board of health of the township in which the defendant's farm was located, without notice having been served upon the defendant, found that a nuisance existed by reason of the dumping of the garbage and ordered the removal of such nuisance from the premises. It was alleged that the defendant failed to comply with the order and 2 months after the order he was charged with violating chapter 107 of the 1939 Iowa Code, section 2228 *et seq.*, by hauling garbage to his place in violation of the board's order. The said code chapter provided for the organization, powers, and duties of boards of health and section 2240 provided that the local board could order the owner, occupant, or person in charge of any place to remove at his own expense any nuisance found thereon, by serving on such person a written notice stating some reasonable time within which the removal should be made, and if there was failure to comply with the order the board

could cause the same to be executed at such person's expense. Section 2246 made it a misdemeanor to violate knowingly any provision of the chapter or of the rules of the board or any lawful order of the said board or of its officers or authorized agents.

From a ruling by the lower court sustaining a demurrer to the information the State appealed to the Supreme Court of Iowa. The latter court held that the statute under consideration was a valid exercise of the police power of the State and was not a delegation of the legislative power in permitting the local board of health to pass upon the question of whether or not a certain condition constituted a nuisance or was detrimental to the health of the community.

Another point passed upon by the appellate court related to the right of the board, without notice or opportunity for hearing, to declare a nuisance and order its abatement. The defendant's contention respecting this was that an *ex parte* determination of facts as to a nuisance which was not such *per se* was a denial of due process of law. However, in this also, the court ruled against the defendant, stating that he was not without remedy and pointing out that, if he failed to comply with the order and was made the subject of criminal prosecution, he had his day in court in such proceeding on the question whether the dumping of garbage on his farm constituted a nuisance. Nothing in the statute, said the court, grants to the officers immunity from the consequences of unfair or oppressive acts. "The particular form of procedure prescribed may vary from the customary procedure, but essential rights are not violated by granting to the board the right, in an emergency, to proceed in the abatement of a nuisance detrimental to public health, and it is safe to say that most cases calling for action on the part of the board of health are matters requiring immediate attention." The court then went on to say that, while the courts had not been uniform in their holdings, it believed that the weight of authority, as well as reason and necessity, prescribed that in cases involving the public health, where prompt and efficient action was necessary, the State or its officers should not be subjected to the inevitable delays incident to a complete hearing before action could be taken. "The enforcement of quarantine regulations to avoid the risk of an epidemic is a situation in point; and a public nuisance of the nature claimed in this proceeding is also a menace, not only to comfort but to health. In such cases, so far as consistent with constitutional rights, the public interest should prevail against the interest of the individual."

The ruling of the lower court was reversed.

\* *Public Health Repts.*, July 3, 1942.

**Food—Adulterated—Sale in Violation of Statute**

(Kansas Supreme Court; *State v. Hupp*, 118 P.2d 579; decided November 8, 1941, rehearing denied December 11, 1941.) The statutes of Kansas made it unlawful to sell, keep for sale, or offer for sale any article of food which was adulterated and provided that one instance in which an article of food should be deemed to be adulterated was if it

were the product of a diseased animal or one that had died otherwise than by slaughter. In a criminal prosecution for the sale of adulterated food consisting in whole or in part of the product of a diseased animal, in violation of the said statutory provisions, the Supreme Court of Kansas held that it was not necessary for the State to charge and prove that the sale was to a particular person.

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## Obituary

### L. G. KUENNING, DECEASED

Wisconsin lost one of its ablest dairy leaders Monday night through the death of L. G. Kuenning, Chief of the Dairy Division, State Department of Agriculture, from a heart attack.

Mr. Kuenning was stricken at Saukville, where he had discussed the benefits of the statewide quality improvement program with dairy farmers and plant operators of Ozaukee county. He was taken to Port Washington but died within half an hour after arriving at a hospital.

To the people of Wisconsin and other dairy states, George Kuenning was a present-day pioneer in the field of quality improvement who possessed the enthusiasm, energy and determination to surmount obstacles besetting the dairy industry's path to progress. His greatest contribution to the industry was that he helped make the path to quality and better markets a much easier road for dairymen of the present and future to travel.

L. G. Kuenning was born March 28, 1895, on a Nebraska dairy farm where he spent his boyhood. He attended River Falls College at River Falls, Wis., and later secured additional training in agriculture at the University of Wisconsin College of Agriculture.

In 1915-16, he taught general science in the schools of Shenandoah, Iowa, and in 1916-17 taught agriculture in the high school at Viroqua, Wis. He served in the World War and was commissioned a second lieutenant. After the war he managed a large farm in North Dakota for about two years. From 1920 to 1926 he taught agriculture in the high school at Neillsville, and from Feb. 1, 1926, to Dec. 31, 1931, served as county agricultural agent of Monroe county.

On Jan. 2, 1932, Mr. Kuenning entered the employ of the State Department of Agriculture as a marketing specialist in the Markets Division. In this capacity he helped in the organization of cooperatives throughout the state. He was promoted to chief of the Dairy Division on June 28, 1939.

Funeral services will be held at the First Congregational Church, Madison, at 2 o'clock Thursday, with the Rev. Alfred W. Swan officiating. Burial will be in Forest Hill Cemetery.

Survivors are his wife; three sons, Robert of Schenectady, N. Y., and James and John, Madison; and three sisters living in Syracuse, Neb.

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## New Books and Other Publications

**The Vitamin Content of Meat**, by H. A. Waisman and C. A. Elvehjem. Minneapolis, Minn.: Burgess Publishing Co. (planograph), 1941. 210 pp.

The authors state that the aim of this book is to summarize the available information on the relative nutritive value of meat and meat products. The literature has been reviewed critically, and work over the past five years is reported from the Madison laboratories. Individual chapters are devoted to the more important nutrients, giving the value of meat in supplying body requirements. Over eight hundred references to the literature support the text. Each chapter briefly but clearly presents the latest knowledge on the occurrence, history, and chemistry of each dietary factor (insofar as known), followed by a critical discussion of the bioassay methods and their significance. Many tables list the nutritive constituents of the various meats and meat products.

**Outlines of Food Technology**, by Harry W. vonLoesccke. Reinhold Publishing Corporation, New York. 1942. 505 pages. 84 illustrations. \$7.00.

This book describes briefly the more important food processes in non-technical language that is easy and pleasant to read. No previous knowledge of bacteriology, chemistry, or engineering is required and hence the technology is of rather an elementary character.

The subject of dairy products reveals a somewhat remote acquaintance with actual practices. For example, it is questionable whether the modern dairy farm actually "carefully considers the health of the cow as well as that of the workers." Unfortunately pasteurization of milk does effect more than "a slight reduction in vitamin C content." Regeneration is not done by

the hot milk in the tank. Short-time, high-temperature pasteurization is more precise than subjecting the milk "to a holding temperature of 160° F. for 10 to 20 seconds." Other such inaccuracies occur. The more prevalent phosphatase method developed by Schärer is not mentioned.

The first chapter is devoted to a brief discussion of tin cans and glass containers, but fiber containers are given only brief scattered reference, and only one indirect mention in the index. The last chapter is devoted to Preservation of Foods by Freezing, but dehydration occupies only four pages at the end of the canning chapter without index entry.

The book will have some general usefulness by reason of information not conveniently found in other available books, as for example the chapter on Nuts.

**Secretion of Milk**, by Dwight Espe. The Iowa State College Press, Ames, Iowa. 1941. 294 pages.

The author has written this book for the student who is neither a practical dairyman nor engaged in research. Part One: Chapter I, Phylogenetic Development of the Mammary Gland; Chapter II, Anatomy of the Udder. Part II: Chapter III, Nervous Control; Chapter IV, Theory of Milk Secretion; Chapter V, Factors Affecting the Amount and Composition of Milk; Chapter VI, Miscellaneous Factors Related to Milk Secretion; Chapter VII, Hormonal Control. Part Three: Chapters VIII and IX, Effect of Feed on the Amount and Composition of Milk; Literature, 981 references. Many tables, charts, drawings, and photomicrographs illustrate the text. The latter is written in a smooth, readable, flowing style, informative to those who have a working knowledge of anatomy, physiology, nutrition, and biochemistry.



**Chemical Dictionary**, compiled by F. H. Campbell. Chemical Publishing Co., Inc., Brooklyn, N. Y. 1942. 85 pages. \$2.50.

This is a conveniently compiled dictionary of about one thousand terms that are commonly met with in the more recent chemical literature. It is particularly valuable on account of its convenience before "the moment of excited curiosity" has passed. To thumb through it is an educational, refresher exercise.

**Plant Efficiency—Ideas and Suggestions on Increasing Efficiency in Smaller Plants.** Issued by Division of Information, War Production Board, Washington, D. C. 39 pages. 1942.

This booklet is designed simply as a group of suggestions, ideas, and plans which have proved helpful in some plants and in which other manufacturers may be interested. It contains schedules for machine operation to keep them in continuous operation, charts for keeping track of orders, etc., planning board, control charts, stores records, stock record, and similar prac-

tical information. Copies may be secured by writing to the above publisher.

#### Free Literature

Copies of the following literature may be obtained by writing to the Illinois Department of Public Health, Roland R. Cross, Director, Springfield, Illinois:

Milk Pasteurization Plant Law, enacted 1939. Educational Health Circular No. 134. (Minimum Requirements for Construction, Equipment, Maintenance, and Operation of Milk Pasteurization Plants. Revised August, 1939.)

Grade A Milk Pasteurized—Raw, and Grade A Milk Products. Educational Health Circular No. 135. (Law and Minimum Requirements for Interpretation and Enforcement.)

Wells Dug, Drilled, and Driven. Educational Health Circular No. 14, May, 1941.

Milk, The Most Valuable Food. Educational Health Circular No. 6. Revised July, 1941. (Popularly written discussion of food value and sanitation of milk.)

The Sanitary Pit Privy. Educational Health Circular No. 137. (Construction details with drawings.)

Dairy Barn Plans. (Drawings and illustrations.)

Milk House Plan. (Detailed construction and illustrations.)

### WARFARE CHEMICAL HAZARDS

"Warfare gases merit your respect; but your fear is unjustified." This is the opinion of a man whose entire professional life for the past 17 years has been spent in public health work and in chemical safety promotion.

L. L. Hedgepeth, Manager of Technical Service for the Pennsylvania Salt Manufacturing Company, chemicals, is the author of the above statement in a study entitled "Warfare Chemical Hazards." It is a reprint of an informal lecture given by the author before air raid wardens in Delaware County, Pa.

Mr. Hedgepeth discusses gas warfare from the standpoint of civilian

defense protective measures. The effects of gas are discussed and the article also names the principal war gases, describes their characteristics, and suggests first aid treatment for victims. The study voices a note of reassurance, giving the civilian a calm, non-technical understanding of what actually is involved in gas warfare.

The study appears as a supplement of "The Laundry Bundle" published by the company for May, 1942. A limited supply of reprints is available for interested persons by writing to the Pennsylvania Salt Manufacturing Co., 1000 Widener Bldg., Philadelphia, Pa.

# JOURNAL OF MILK TECHNOLOGY

*Official Publication of the*

## International Association of Milk Sanitarians

(Association Organized 1911)

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## Association News

### Chicago Dairy Technology Society

The regular monthly meetings of the Chicago Dairy Technology Society, after the usual summer vacation, will be resumed this fall with their September 8th meeting.

G. B. ULVIN.

### California Association of Dairy and Milk Inspectors

The California Association of Dairy and Milk Inspectors will hold their annual meeting in Los Angeles, September 21-24, 1942. President H. E. Ball has appointed Dr. F. P. Wilcox, Chief of the Division of Dairy Products, Los Angeles County, to head the program committee. The headquarters and meeting places will be announced later.

A. E. REYNOLDS,  
*Secretary-Treasurer.*

### Iowa Association of Milk Sanitarians

Dr. M. P. Baker, Dairy Bacteriologist, Iowa State College at Ames, has been working this summer with the Iowa State Department of Health. His time has been spent, for the most part, working with the various city milk sanitarians over the state on their local problems.

In a number of the larger towns evening meetings have been held with plant operators discussing sanitary problems in the plant.

Dr. Baker is president of the Iowa Association of Milk Sanitarians and his work this summer has done much to build interest in the Association.

The annual meeting will be held at the State College in February.

It is expected that a large delegation from Iowa will attend the annual meeting in St. Louis this fall.

J. R. JENNINGS,  
*Secretary-Treasurer.*

### Michigan Association of Dairy and Milk Inspectors

Seventy-five members of the Association attended the meeting of the American Dairy Science Association at Michigan State College in June. A short business meeting was held at which time President Holiday appointed the following men to serve on a committee to draw up a code of interpretation of the newly adopted Michigan Milk Ordinance.

Charles Ruegnitz, Midland Co. Health Dept., Chairman,  
Russell Palmer, Detroit Health Dept.,

Charles Gotta, Michigan Dept. of Health,

Doctor E. F. Meyer, Grand Rapids Dept. of Health,

R. A. Kirkpatrick, Pet Milk Co., Charlotte,

J. M. Jensen, Dairy Dept., Michigan State College,

A. C. Miller, State Dept. of Agriculture,

H. J. Barnum, Ann Arbor Health Dept.

E. C. Folkers, formerly superintendent of the McDonald Dairy at Flint, who has been very active in Association affairs, recently resigned to accept a position with the Meadow Gold Dairy in Pittsburgh, Pennsylvania.

HAROLD J. BARNUM,  
*Secretary-Treasurer.*

**New York State Association of Milk Sanitarians**

Notwithstanding any rumors to the contrary, the annual meeting of this association will be held as scheduled at the De Witt Clinton Hotel, Albany, N. Y., on September 23, 24, and 25, 1942. Members are requested to use public transportation facilities wherever possible and otherwise to travel in groups.

Serious consideration has been given to the possibility of cancelling the meeting as a war conservation measure. However, it is believed that holding the meeting will not interfere in any way with the war effort and that the opportunity to exchange ideas and to secure new scientific information

offered by the meeting is too valuable to be lightly cast aside.

Members who have recently accepted commissions in the Veterinary Corps of the U. S. Army are David T. Ensign of the Columbia County Department of Health, Hudson, N. Y.; E. M. Kennelly of the Westchester County Department of Health, White Plains, N. Y., and Donald J. Presler of the New York State Department of Health, Albany, N. Y.

C. D. Vedder, Jr., D.V.M., has been appointed as veterinarian in the Columbia County Health Department to fill the vacancy created by Dr. Ensign's entrance into military service.

W. D. TIEDEMAN,  
*Secretary-Treasurer.*

**Change of Date for Wisconsin Winter Course**

Due to the war, the registration of students for the 12 Weeks Winter Course will be held on October 5. Instruction begins on October 6. The First Semester runs from October 5

to November 14; the Second Semester, November 16 to December 23, 1942. These courses are available to women. For full information write to Professor H. C. Jackson, Department of Dairy Industry, University of Wisconsin, Madison, Wisconsin.

**Thirty-first Annual Meeting****INTERNATIONAL ASSOCIATION OF MILK SANITARIANS**

*Headquarters: Hotel Jefferson*

**St. Louis, Missouri**

**October 30 and 31**

## New Members

### INTERNATIONAL ASSOCIATION OF MILK SANITARIANS

#### ACTIVE

Evans, T. Allen, State Milk Sanitarian, State Board of Health, Pierre, South Dakota.

#### ASSOCIATE

Bellair, Thomas S., Market Milk Specialist, Food Laboratories (Aust.) Pty. Ltd., 402 Swanston St., Melbourne, Australia.  
 Burdick, C. A., 209 Ludwig Ave., West Monroe, Louisiana (Health Department, Ouachita Parish).  
 Klusmeyer, Lloyd, Plant Manager, International Dairy Co., 801 Lafayette St., Valparaiso, Indiana.  
 Foter, Milton J., Head, Division of Bacteriology, Pet Milk Co., Greenville, Illinois.

### ADVISORY COMMITTEE ON SANITATION OF THE INTERNATIONAL ASSOCIATION OF MILK SANITARIANS

To advise with MR. CLAUDE BEARDSLEE, Chief, Dairy Section, Food Supply Branch, War Production Board, Washington, D. C.

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Senior Sanitary Engineer, U. S. Public Health Service, Washington, D. C.  
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Chief Dairy Supervisor, State of Florida, Gainesville, Florida.  
 WALTER D. TIEDEMAN  
Chief, Bureau of Milk Sanitation, State Department of Health, Albany, N. Y.

## EMERGENCY STANDARDS FOR COMMODITIES

OFFICE OF WAR INFORMATION

OFFICE OF PRICE ADMINISTRATION

WAR PRODUCTION BOARD

Development of standards which will save materials, make fuller use of the nation's production facilities, and make price control more effective by pegging price to quality will be spurred by a new contract between the Government and the American Standards Association, War Production Board Chairman Donald M. Nelson and Price Administrator Leon Henderson announced today.

Under the terms of the contract, the American Standards Association will develop emergency standards in connection with WPB and OPA wartime supply and price control measures and will be reimbursed by the Government for the actual cost of the work involved. The contract is limited to \$90,000 in any one fiscal year; \$60,000 is to be provided by WPB and the remaining \$30,000 by OPA.

The increasing importance of standards for pegging the price of goods to their quality has been pointed out recently by Mr. Henderson in connection with the enforcement of price control. OPA's most recent action of this kind was its order forbidding reduction in the size or quality of soap.

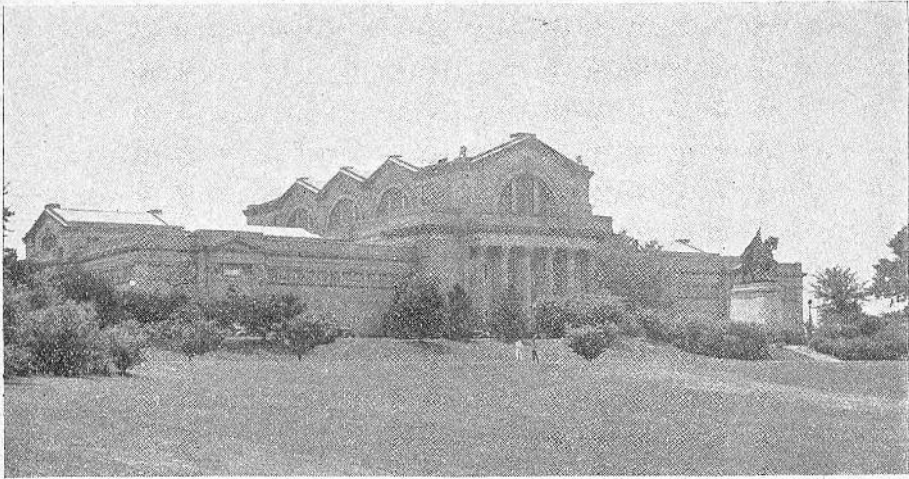
Similarly, Mr. Nelson has referred to the importance of standardization and simplification in connection with the program to concentrate civilian production, being studied by WPB. Used in this way, standards can help conserve resources of materials, manpower, production, and distribution for essential war purposes.

The contract with the ASA emphasizes the policy of both the OPA and the WPB of using existing specialized agencies in their work. The National Bureau of Standards has greatly increased its wartime research, testing

and standards activities in cooperation with the war agencies. The new contract enables the ASA, the most important standardizing agency outside the Government, to enter more completely into the war effort.

The ASA is a federation of 77 national technical and trade associations and government departments. Among the 10 Governmental members are the Army, the Navy, the Department of Commerce of which the National Bureau of Standards is a part, and the Department of Agriculture. American standards are developed through the work of hundreds of committees comprising over three thousand specialized technical experts representing manufacturers, distributors, and civilian and industrial consumers.

The ASA has been actively engaged in developing standards for war use since early in the defense program. Emergency standards for gas ranges and hot water heaters have been developed at the request of WPB. A series of three standards for quality control in mass production which were developed at the request of the War Department are now in extensive use by both government and industry. Currently the ASA is developing standards for safety shoes and boys' and girls' clothing sizes at the request of the Standards Branch of OPA; standards for radio materials and parts for the Radio and Radar Branch of the WPB; and standards for electrical measuring instruments of the indicating type, bolts for high temperature use, and the packaging of radio tubes for the Simplification Branch of WPB. The assignment of other WPB and OPA projects is now under consideration.



*ST. LOUIS' ART MUSEUM, erected during the World's Fair of 1904 as a permanent building, stands on the crest of Art Hill in Forest Park. It contains one of the finest art exhibits in this country and its collection of ceramics and pottery dating from ancient times is especially notable.*



*DUCK LAKE in 1,400 acre Forest Park, located in the western section of St. Louis. A part of the Park's world-famous zoological gardens, the lake is the home of many kinds of ducks, geese, and swans. Many varieties of the birds have never been pinioned, and fly about the Park at will.*





SUNKEN GARDEN in the downtown district, St. Louis. In the center is the Christ Church Cathedral; on the left, the Shell Building; on the extreme right, a corner of the Public Library. In the background to the right is the Missouri Pacific Missouri Building.



MISSOURI BOTANICAL GARDENS (SHAW'S GARDEN)—This scene shows a part of St. Louis' famed city garden of 75 acres, which boasts more than 12,000 species of plants from all climes and all parts of the globe. Most visited of all United States' botanical showplaces, it is perhaps most famous for its many orchids, of which more than 1,000 varieties are on display in some seasons, and for the famous St. Louis (yellow) lily. Established in 1860 by Henry Shaw, St. Louis capitalist, the Garden is still maintained on income from property he bequeathed for the purpose.

## “Dr. Jones” Says—\*

SOMETHING I was reading about the Japs: it was reported a Japanese plane—some place in China they'd dropped grains of rice that'd been contaminated with plague germs. Stuff like that, it seems like a terrible thing—and it would be.

But something I saw later: it hits the nail on your head—as the fellow says. He was talking, this man was, about the demand for man power: the fighting forces and defense industries and keeping things going at home and all that—how important it is right now having everybody at work—not having any of this man power wasted. And all this communicable disease stuff—epidemics and so on that could be done away with—what he said—the substance of it: “When we allow disease germs to be scattered around when it could be prevented,” he says, “we're serving the purposes of the enemy just as effectively as he could do it himself.”

Take these milkborne outbreaks we keep having: scarlet fever, septic sore throat, dysentery, gastroenteritis—four of 'em in the State last year—almost 500 folks laid up with 'em. They could just as well've been prevented. Pasteurizing all the milk'd practically put an end to 'em. “Why isn't it done?” Why—principally because in

a lot of these small places (and that's where most of the epidemics are) there's still a lot of folks fighting pasteurization. They can't go too much ahead of public sentiment—the health departments can't. The same way with undulant fever: upwards of 400 cases every year, most of 'em from raw milk.

Water supplies: they've practically got rid of the big typhoid epidemics we used to have right along, in this State, from public supplies. But a lot of places the Health Department had to nag at 'em for years to get 'em to make their supplies safe. And we're still getting outbreaks of gastroenteritis and what not from wells and other private supplies. Smallpox and diphtheria—we could get 'em back same as ever if we let up on the inoculations. And you have to keep harping about it all the time to keep 'em going. It seems to be hard for 'em to realize that controlling disease germs, like charity—it ought to begin at home.

Yes; worrying about the enemy scattering diseases—it's like when Alec MacGregor was kicking about his neighbors' stock getting into his pasture. “Before you make too much fuss about it,” his wife told him, “you'd better take a look at your own fences.”

PAUL B. BROOKS, M.D.

\* *Health News*, N. Y. State Department of Health, Albany, April 13, 1942.

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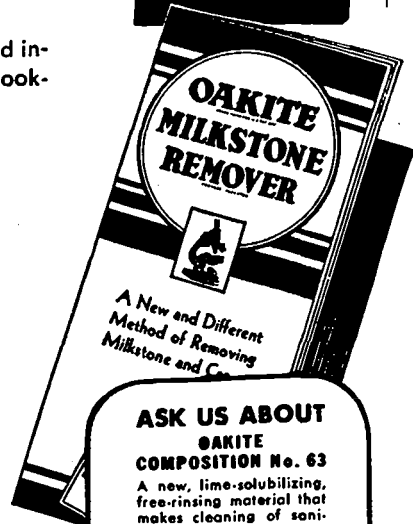
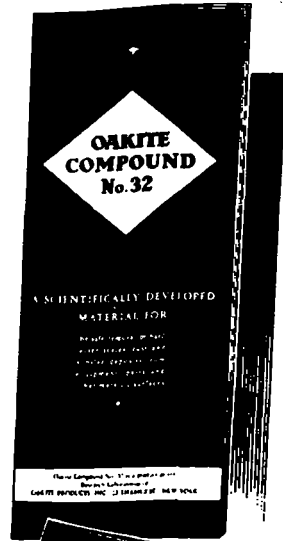
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For particulars, see page 312

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**CONTROL** and prevention of ropy milk is by no means a simple task. Drastic and far-reaching measures are required to eliminate the cause; eternal vigilance is vital if a recurrence is to be avoided. The following "case history" recently reported by a Diversey D-Man is typical.

A large receiving plant located in an Eastern state handles premium guernsey milk. An anxious plant manager got in touch with our Diversey D-Man by long distance phone to report several cases of ropy milk producers. The condition seemed to be getting rapidly worse, the manager added. Reaching the plant, our Diversey D-Man was informed that 20 producers were already having trouble. Prompt action was imperative. First the can washer was subjected to a thorough cleaning with **DIVERSEY EVERITE**. Next, arrangements were made to rinse all cans as they came from the rehabilitated washer in a lukewarm solution of **DIVERSOL** (500 ppm available chlorine). Not stopping here, the entire plant itself was subjected to a disinfecting solution of **DIVERSOL** (250 ppm).

Finally, but equally important, the producers having trouble came in for attention. In the course of several days each and every one of them was called on . . . and shown how to clean and disinfect utensils effectively with **DIVERSEY DUMORE** and **DIVERSOL**. Concluding line to our D-Man's report: "Ropy milk problem solved."

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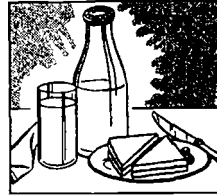
...to the last drop



**BABY'S FORMULA:** Pure milk guarded against danger of contamination by Seal-Kap.



**BREAKFAST:** Bottle opened. Seal-Kap re-seals, completely covering the pouring lip.



**LUNCH:** Bottle opened again. Seal-Kap still on guard against dirt, dust and ice-box odors.



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