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Journal of

MILK and FOOD TECHNOLOGY

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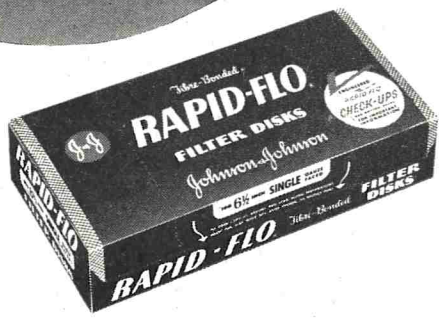

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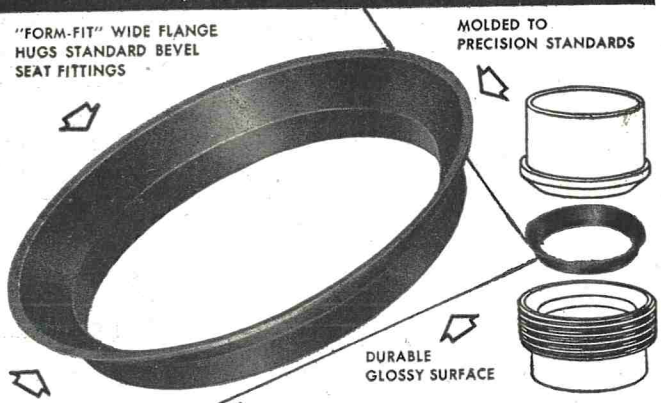

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THE SANITARIAN AND PUBLIC RELATIONS

FRANKLIN K. BROUGH

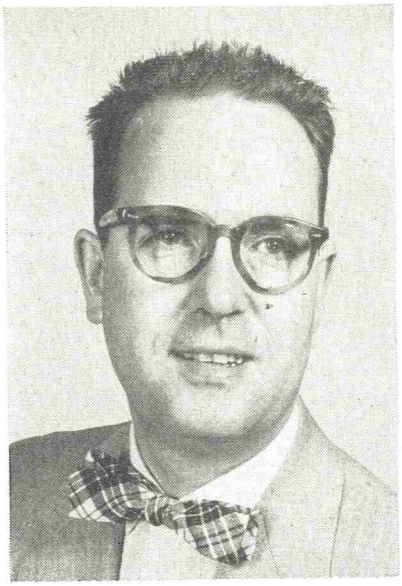
Utah Tuberculosis and Health Association, Salt Lake City

The concept of public relations in sanitation is very much delimited by the often repeated, but erroneous definition of a sanitarian as one who deals with the environment. This leads government officials, personnel leaders and the lay public to believe a person skilled in human relations is not needed for a job of inspecting facilities, dealing with things and solving the problems of inanimate objects. This situation has made it difficult to set desirable pre-employment standards for recruiting. This erroneous concept has also restricted the effective work of some sanitarians. When asked what their work is, all too frequently we get the usual answer . . . they deal with the environment; their work has to do with community housekeeping. In other words, the public is left out of a sanitarian's job.

A professional public health sanitarian is one whose work does not deal with things, with the inanimate environment as is so commonly stated, but rather he deals with people in their environment. The public health sanitarian does not deal with water wells, septic tanks, dishwashing machines, insecticides and bulk milk coolers. He deals with the rural school principal who has a safe water supply problem; with the suburban home owner who is building a private sewage disposal system; with the restaurant operator who is unable to get clean, film-free utensils. The sanitarian deals with the housewife troubled with a cockroach infestation or with a dairy farmer who has high bacterial counts in his milk.

The sanitarian works not with the environment but with the people and their environment. He must not only solve the environmental problem, but the interpersonal problem as well. The public health sanitarian more nearly works in the field of ecology than in sanitation as it is usually defined. Human ecology, being the science dealing with the mutual relationships of man and the environment, puts the "public" in the sanitation picture. Perhaps the sanitarian should be called an ecologist.

This public relations and ecological concept of a sanitarian is more in harmony with his actual function, and sheds a truer light on the kind of man needed to do the job. One further barrier to an understanding of the relationship of sanitation and public relations is a clear understandig of the latter.



Franklin K. Brough, until recently, was Chief of Public Health Education Services for the Wichita–Sedgwick County (Kansas) Department of Public Health. He has also served as sanitarian with the Branch–Hillsdale District (Michigan) Health Department and instructor at Utah State University. Mr. Brough, a native of Utah, received the M.S. degree in Bacteriology from Utah State in 1949. The M.P.H. degree was conferred by the University of Minnesota (School of Public Health) in 1951. At present, Mr. Brough is Executive Director of the Utah Tuberculosis and Health Association, Salt Lake City.

A few people have the mistaken idea that public relations is a cheap or slick scheme to get the best of someone to gain an advantage for oneself. They see it as high pressuring methods, or the smooth ability to talk people into something they don't want. This concept of PR, as public relations is frequently called, is seen in the story of the tourist that stopped in front of a little country store. He was dumbfounded at the sight of an enormous display of salt. Stack after stack of salt could be seen. Boxes, barrels, bags—tons of salt both inside and outside the store. The curious tourist said to the store owner, "You must sell a lot of salt." The country gentlemen replied, "No, I don't sell much. But you shoulda seen the guy that came here last week. He could really sell salt." This obviously is not the point in public relations.

A more common misconception of PR puts it synonomous with soft-soaping or buttering-up. This is

a deceitful, short-lived approach to creating a false front. It is something you can do today and not tomorrow as the need may indicate. Again, this is not a description of public relations which is a more consistent and purposeful parctice.

Actually, public relations is a perfectly good word which sums up ones dealings with people. In its simplest sense, public relations for a sanitarian is the things he does to get along with other people, both within and outside his professional work. Public health sanitarians have public relations whether they want it or not, simply because they are in constant communication with people. Everyone but a hermit has public relations. True, those relations may be either good or bad, but they have them. This brings us again to the concept of public relations in sanitation. The sanitarian knows the technicalities of a food poisoning problem, for example. He must also know how to deal with the human problem. This is public relations . . . . . dealing with people.

One might look at PR as the point of contact from which all public health effort proceeds. If the relations between a sanitarian and a client is good; if they have a mutual respect and trust; if each understands the other person's viewpoint, philosophy, ambition and purpose; if their relation is such that they have the same goal but can differ graciously about the detail; if this sort of wholesome, solid interpersonal connection has been welded, the basis for the efficient solving of health problems and the promoting of health programs is assured.

PR, like an electrical connection, is the joint between two people or two groups of people that permits an ungarbled, unbiased flow of communication, both oral and felt. If the sanitarian has established this first step, he can find success in presenting the information or knowledge necessary for public health action. Without this first step, the sanitarian cannot hope his teaching, advice or conusel will be understood or followed. When the client knows what to do, and because of good public relations accepts it as reasonable and correct, the sanitarian may then proceed in the final step of motivation to achieve action. Thus we see public relations has achieved its true position of necessity in sanitation. It is the foundation upon which lasting and far reaching public health accomplishment is built.

Now for a look into the basics of public relations. We have established that the professional sanitarian must carry a skill of dealing with people . . . . must have good public relations. This means he must develop a greater abundance of the human virtues than is found in many people. The sanitarian need not be endowed with these virtues, but they must be developed. Most individuals can enhance and improve the qualities and skills necessary in successful interpersonal relationhips.

It is not the purpose of this discussion to describe the elements of good public relations practice. They have been described and illustrated many times. Neither is it the purpose to define the structure of public relations organization in reaching various publics, whether they be large groups or single individuals. Rather, emphasis is placed on the underlying philosophy that will motivate us to greater PR skill.

Basically, a public health sanitarian must like people. He must like to work with them. He must find something good and likeable in all of them. There is no room for hate or for passive tolerance. The sanitarian must know how to get along with people even when at first they don't want to get along with him. He must honestly want to help the farmer or restaurant operator, for example, achieve a profitable and successful business as well as a safe and sanitary operation. We accomplish nothing if we make it so difficult to accomplish the latter that he is unable to operate his business which the community needs to obtain milk or food.

One of the greatest public relations virtues a sanitarian can have is that of patience. It seems that public health workers demand that they have their way all the time. To them, understandably, health is the most important aspect of daily concern. They don't realize, however, that our ideas, the public health we are selling, is in competition with other demands upon people.

Public health is in competition whether we like it or not (and even whether or not it is right) from the standpoint of time, money, interest and need. Sometimes a client may actually have a more pressing problem than a particular health problem with which we confront him. If our public relations sense permits us to truly understand this client and see his problems as they bear upon him, we may have the courtesy to suggest our special health problem be the second item on his agenda. It is likely that our patience would accomplish the health change more quickly than if we demanded or coerced his immediate action.

Of course, we recognize that some public health problems are of such immediate and far-reaching

significance that immediate action is necessary and we cannot allow time to lapse. Good public relations, previously established, will help the client to understand our sense of urgency in such problems.

The core of this PR picture is the attitude of the sanitarian toward his work and toward the people he meets. A client's hostile and uncooperative attitude may be but the mirror of the sanitarian's negative and demanding emotions. The professional sanitarian might well be asked the question: are people glad to see you when you come to their home or establishment? What is the first reaction of a client when he sees you step into his place of business? Does he give you an enthusiastic smile and welcome, or is his reaction something less than that? If it is less, then you need better look into your public relations. Too often it's, "Here comes the bad news man! Wonder what he'll find to complain about this time?"

The negative, despairing attitude of a sanitarian will always find something wrong, something to degrade, without at the same time pointing out something good, something accomplished, something which will provide recognition and appreciation and a further basis upon which good personal relations can continue.

When the reaction of a client to our appearance on the scene is something less than cordial it's time we take a look at ourselves through the other man's eyes. Did we bring him encouragement or discouragement? Were we helping him or promoting something? Did we help him solve his problems or did we leave him problems to solve? Did we listen patiently or did we have so much to sell that we did most of the talking?

"We are interested in others when they are truly interested in us" is an ancient statement that is equally true when it is reversed to become applicable to our purpose. Others are interested in us when are truly interested in them.

A sanitarian radiates what he really is. By his attitude he may radiate hope, despair, calmness, pettiness or dignity and by these constantly affect the quality of the sanitation in his community. The affect of attitude is seen in the story told of two men, who upon being presented a long-stemmed rose, saw it in opposite views. The first on taking the rose in his hand commented on the delicate aroma, the perfectness of the shape and the beauty of the color. The second man saw not the rose but the thorns and cautioned care in being handed the rose that he might not be pricked. How do you see the daily contacts in your work: as roses or as thorns?

The story is also told of the two boys who each received a half bag of peanuts. The first remarked, "Oh boy, my bag is half full." Said the second, Gee whiz, mine is half empty!" Again, how does your attitude help you see life; half full or half empty?

In summary, the sanitarian, because he deals with people in their environment, must have the skills of public relations. The heart of this skill lies in the attitude, among other virtues, the sanitarian has toward people and toward his work. The skills of public relations can be increased through desire, knowledge and practice.

This subject has been discussed many times before. Most of us recognize the truth of it. Many of us are moved to a feeling that we will try to put the public in sanitation. We sense the need to gain a knowledge of human relations and human behavior so we can really make public relations a part of our work. It seems, however, that we are all prone to say, "Inasmuch as I've really got a full load of work today, I'll get to that tomorrow." Once again we face the challenge of personal progress. If not now, when?

After all, there are three kinds of people in the world. There are those who watch things happen. There are those who make things happen. And finally there are those who sit around and wonder what happened. Professional public health sanitarians should be the sort of people who make things happen. They can do so when skilled public relations properly becomes a part of their competent sanitation practice.

CURRENT STATUS OF SANITARIAN REGISTRATION LEGISLATION IN THE UNITED STATES[1]

KARL K. JONES

Division of Food and Drugs

Indiana State Board of Health, Indianapolis

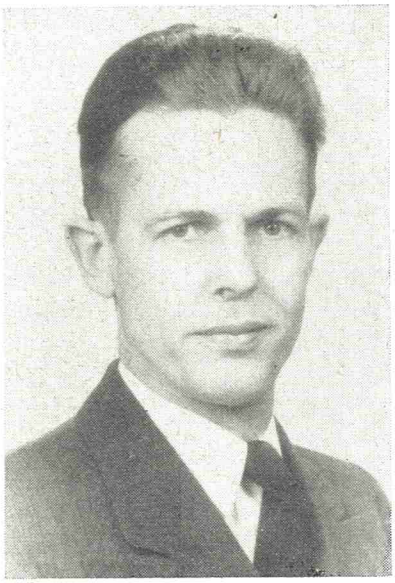
Registration of sanitarians by law as a means of raising the professional status of sanitarians has been the subject of many inquiries by health officials and others interested in Public Health. It has been the subject of some controversy, too, during recent years.

It has been evident for the past several years that a large majority of sanitarians are concerned about their professional status. They realize that registration, whether voluntary or mandatory, should be used to demonstrate and cultivate professional attainment and proficiency. It should be based upon high-level qualifications and ability, and not be used as a device to insure job security or to protect mediocrity.

It is an accepted fact, as will be noted later, that practically all present state registration laws emphasize education and training of the sanitarian as fundamental to his professional development. It is also recognized that most of these laws promote a reciprocal interchange of personnel between states with similar acts, thus eliminating employment barriers which now exist in some areas.

Several of the state associations and our three leading national professional organizations, *International Association of Milk and Food Sanitarians, Inc., American Public Health Association*, and *National Association of Sanitarians*, have been working on various plans to provide standards of recognition for qualified sanitarians so that the sanitarian can achieve a position in the community equal in recognition and prestige to that of the doctor, nurse, engineer, educator, and others on the public health team.

At the present time eleven states and one territory have enacted legislation to establish legal procedures for registering sanitarians. They are California, Louisiana, Oklahoma, Oregon, Utah, West Virginia, Georgia, Arkansas, Colorado, Wisconsin, Massachusetts, and the Territory of Hawaii. In addition, New Jersey has a state law requiring the licensing of Health Officers and Sanitary Inspectors. This has been in effect since 1912.



Karl K. Jones is Chief of the Retail Food Section, Division of Food and Drugs, Indiana State Board of Health. Prior to this assignment, he served for several years as State Survey Officer of the Division of Food and Drugs. In 1950, Mr. Jones received the Bachelor of Science degree in Public Health from Indiana University. Since 1952, he has been Secretary of the Indiana Association of Milk and Food Sanitarians.

Arizona, Connecticut, Florida, Missouri, Minnesota, Ohio, Texas, and Washington legislatures have considered bills to register sanitarians, but have failed to act on them up to this time.

Three states, Ohio, Pennsylvania, and Indiana, have established voluntary plans to certify and register sanitarians. These three voluntary plans require definite educational qualifications and experience for sanitarians and are administered by the sanitarian organization in each of the respective states. These plans are a step in the right direction, but for maximum recognition, prestige and uniformity of standards, a voluntary national registration plan or a uniform registration law in each state is needed to establish minimum qualifications for professional sanitarians and to register only those sanitarians who have met these standards.

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[1]Presented at the 44th Annual Meeting of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, Louisville, Kentucky, October 7-10, 1957.

According to reports received recently from most of the forty-eight states, there is a definite trend toward the establishment of some form of state legislation for registering qualified sanitarians. Because of this widespread interest in legal registration, it was felt that a brief discussion of the present acts might prove beneficial to others planning similar legislation. (The Massachusetts act will not be discussed in this paper because the report of its recent passage was received too late.) With this in mind we will begin by touching on some of the "highlights" of the present acts, methods employed in promoting them, and effects on the sanitarian and his programs.

DEFINITION OF A SANITARIAN

In most state acts, there is general uniformity in defining "sanitarian". He is usually defined as a person trained and experienced in the physical, biological, and sanitary sciences who possesses the necessary qualifications to carry out educational and inspectional duties in the field of sanitation, or who serves as a consultant, supervisor or administrator of programs and personnel engaged in such duties.

Seven of the states have also provided for a category of "Assistant or Trainee Sanitarian" whereby a person can be employed to work under the supervision of a registered professional sanitarian until he may be fully qualified. "Assistant" or "Trainee" usually means a person who has met the academic requirements but has not as yet completed his experience requirements in the field of sanitation.

QUALIFICATION FOR REGISTRATION

Present sanitarian registration acts, like other state laws establishing a specific professional status, provide that persons employed prior to the effective date of the acts may be registered as professional sanitarians under a "grandfather" clause. Such a clause is inserted in an act to offer some protection to the competent "job–proven" sanitarian. As a rule, newly employed sanitarians as well as those employed at the effective date of the acts meet certain exacting educational and experience requirements. Furthermore, they must demonstrate their ability to cope with technical sanitation matters before being granted the privilege of using the term registered sanitarian. For example, a person registered under the 1957 Colorado Act must have been employd six years prior to 1963 and have successfully passed an examination - one comparable to those given sanitarians employed under the merit system.

A few of the other state laws have not demanded such high standards for registering presently employed sanitarians. The Oklahoma Act permitted a person to be registered as a professional sanitarian provided he was employed on the effective date of the act and had fulfilled a one-year residency requirement immediately preceding the date of his application. In the other registering states, specifications for registering sanitarians under a "grandfather" clause are variations of these two extremes.

After the effective date of every state act, educational qualifications usually are higher. Thus, an applicant desiring to belong to the sanitarian profession must meet loftier academic requirements than his experienced colleagues. These often include a college degree with specialization in sanitary science or the physical and biological sciences. This is the case in Arkansas, Georgia, Oklahoma, and Louisiana. Each of these states require an applicant to have a Bachelor's Degree or its equivalent from an accredited college or university. They also stipulate that the applicant must complete at least one year of experience in sanitation, including in-service training. In addition to these requirements, all of the states except Louisiana further stipulate that a person must pass an examination before being registered as a professional sanitarian.

In the case of California, Utah, Oregon, and West Virginia, the basic educational qualifications for new sanitarians are established at less than a college degree. Of course, it must be kept in mind that three of these four states were the nation's poineers in furthering the cause of the sanitarian. His status at that time was not as well accepted as it is today, nor were the opportunities or the salary levels great enough to permit top-level academic requirements in the earlier days of registration.

Now, to examine the specific requirements of a few registration acts. In West Virginia, a person may be registered as a sanitarian if he has passed a civil service or merit system examination and has completed a six months probationary period of employment. In Oregon, a person must take formal courses in appropriate sciences and complete at least 3,000 hours of experience under the supervision of a registered sanitarian. The Utah Act stipulates that a person must complete the requirements for a high school education or the equivalent; but in addition, must have at least four years of experience in sanitation and pass a written examination. California, the really true pioneer, establishes the minimum qualifications for professional sanitarians at a two year

college level with a major in the basic sciences. This state further requires each applicant, prior to the date of his application, to have completed one year of experience in the field of environmental sanitation, plus completion of an approved training course.

It is evident, after examining the acts of the ten states, that most of the proponents of registration throughout the nation were convinced of the need for requiring a college degree with a major in the sanitary or other basic sciences for the beginning sanitarian. Such an academic background, plus a short probationary period, is expected to equip new sanitarians with sufficient "know how" to cope with most sanitation problems.

ADMINISTRATION OF REGISTRATION PROGRAMS

In Wisconsin, Oklahoma, Oregon, California, and Colorado, the sole responsibility for registering qualified professional sanitarians is assigned to a special committee or division of the State Board of Health. In the other five states, a State Board of Examiners for Sanitarians or an existing State Department of Registration for all professions is charged with the administration of the act.

It was noted that eight of the ten states have limited *membership* on this administrative body to not more than five persons. However, there is a marked variation between the states in the *make-up* of the administrative organization. The acts of Arkansas, Colorado, Utah, and Oklahoma stipulate that the entire membership shall be composed of sanitarians who can qualify for registration. The other acts limit membership to not less than three, nor more than four, practicing sanitarians – the other members are State Health Department personnel, members of other state departments, or industry representatives.

RECIPROCITY VARIES AMONG THE STATES

California, Oregon, Arkansas, and West Virginia grant reciprocity to sanitarians registered in other states in which academic and experience qualifications are established at an equal or higher level. Only California further stipulates that a person registered in another state must pass an additional examination to be registered in California.

Acts of Louisiana, Georgia, Wisconsin, and Colorado permit the administering body to establish rules and regulations whereby agreements for reciprocity with other states can be accepted. It is implied that sanitarians to be registered in one of these states must have already met comparable qualifications.

The Oklahoma and Utah Acts make no provision for granting reciprocity to sanitarians registered under laws in other states.

PROMOTION OF REGISTRATION ACTS

California was the first state in recent years to recognize the need for giving professional status to the sanitarian and establishing minimum educational and experience qualifications through legislation. Its law became effective in 1945 and has served as a pattern for other states desiring to promote similar legislation.

In general, the other states which have adopted legal procedures for registering sanitarians have followed about the same style in promoting legislation within their own boundaries. They have found that success in promoting registration laws for sanitarians has been largely dependent upon the following factors: (*a*) *content* and *intent* of the proposed law; (*b*) public understanding and recognition of the meaning of the word, sanitarian; (*c*) willingness and ability of sanitarians throughout the state to "sell" the program through group meetings and personal contacts with key people; (*d*) support of all allied and other interested groups, and of members of the affected industries; (*e*) attitude of legislators toward establishing another registering agency; (*f*) financing of the program; and (*g*) the community's present acceptance and respect of the sanitarian and his work.

As a rule, sanitarians' organizations have taken the initiative in preparing a proposed law and in planning a definite course of action. However, such plans should not be too obvious, as it is easy for others to see the sanitarians' motive – they have an "ax to grind." Besides, there are some questions which the sanitarians themselves cannot always answer effectively, such as "How would a registration act benefit the public?" "How would it benefit the legitimate industries?" These questions can best be answered through some sponsoring agency or group. A few states have completely ignored the availability of resources and, consequently, have often failed in their attempts to sell a sanitarian registration program.

A review of the current state legislative acts revealed that the successful ones have usually contained one or more of the following necessary ingredients. They have secured the support from good allies, such as the state public health association, the state health officers association, the food and milk industries, farm bureau, and the women's organizations. The local sanitarian has also played an important role. He has assisted these groups in convincing key people, especially the legislators in his district, of

the benefits which registration will bring to the public, to the ethical industries being regulated, and to the sanitarian. In each of these states the sanitarian and the sanitarian association's legislative committee have given some expert "behind the scenes" guidance of the act during its course through the General Assembly. Here again, the sanitarians have stayed in the background and functioned as consultants rather than promoters. Finally, many of the successful states have received the support of a recognized legislative leader, one who would introduce and push a bill through the assembly and follow it until signed by the governor.

EFFECT ON THE SANITARIAN AND HIS PROGRAM

Our leading public health organizations have realized for the past several years the acute problems facing some state and local health department employing officials — that is, how to avoid accepting the unqualified "political appointees", how to obtain qualified sanitarians, and how to hold qualified personnel on the job. Each of these organizations is working on plans to solve this personnel problem. The method of advancing professional status through promotion of legal registration is meeting wide acceptance. According to a recent report by one of these organizations "the purpose of registration is two-fold — first, to establish certain minimum training and experience qualifications prerequisite to registration; and second, to give recognition to the sanitarian as a professional member of the public health team". Other members on this team already have such qualifications and are usually not among the "political appointees."

Most of the states which have registration programs have done an excellent job in registering only qualified people. Reports from these states indicate that sanitation programs are improving in direct proportion to the quality of personnel employed. Sanitarians, in these registering areas, are to be commended for keeping faith with their legislators and the public in proving that professional status can be advanced through good legislation. As the result of this advancement, the public is enjoying greater health protection through improved sanitation programs, and the qualified sanitarian is being rewarded with increased salary and prestige and with much greater job opportunities.

In view of these many known benefits to the public, to the sanitarian, and to the sanitarian's programs, it is felt that this association and the other national professional organizations should continue to actively support and guide other states in promoting good legislation.

FORTY-FIFTH ANNUAL MEETING, IAMFS, Inc.

NEW YORK STATE MILK SANITARIANS ASSOCIATION

CORNELL DAIRY CONFERENCE

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PHOSPHATASE REACTIVATION IN DAIRY PRODUCTS[1]

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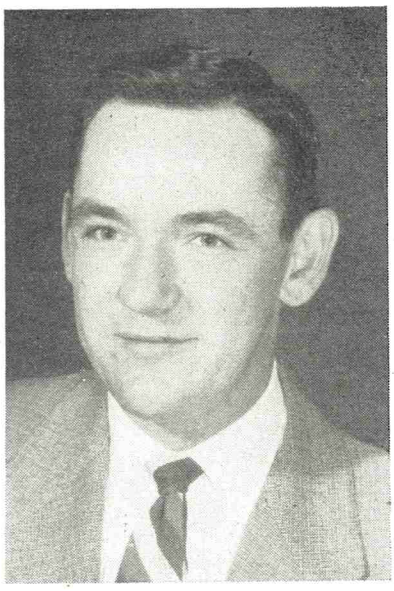
Equipment is available to the dairy industry for pasteurizing milk at temperatures much higher than those employed with conventional methods. Under certain conditions, ultra high temperature pasteurization results in reactivation of the enzyme phosphatase. Reactivation is influenced by several factors including temperature of heating, holding time, fat content of product, etc.

The phosphatase test has been of considerable value to regulatory officials and dairy plant laboratories as a means of detecting irregularities in the pasteurization of dairy products, particularly milk. With certain products, such as cream and butter, it has been recognized that the test has certain limitations. As early as 1940, Fay and Barber (*2*) noted that cream pasteurized under commercial conditions or under controlled laboratory conditions, and which had a negative phosphatase test immediately after pasteurization, might develop a positive test within one or more days. No evidence was found which indicated that the change from a negative to a positive reaction was due to bacteria and the authors thought the change involved reversible coagulation of the enzyme. Brown and Elliker (*1*) stated that the phosphatase test determined the adequacy of heat treatment when cream was pasteurized by the vat method; however, pasteurization by the flash method gave variations in the phosphatase reaction. In many cases the phosphatase test on flash-pasteurized cream was negative or slightly positive immediately after heating, and the phosphatase value increased with storage. Shadwick and Parker (*4*) found that a large percentage of butter samples made from pasteurized cream and giving a negative phosphatase test gave a positive test after holding at 70°F. for 8 days.

Rather recently, several investigators have noted irregularities in the phosphatase test when applied to milk heated to higher temperatures than the conventional pasteurization exposures. Wright and Tramer (*6*) noted that "Uperized" milk (canned sterile milk) developed a positive phosphatase reaction after storage even though the samples remained sterile. The reactivated phosphatase was similar to milk phosphatase. Raw milk which was heated rapidly to temperatures above 185°F. developed a positive phosphatase reaction when the milk was stored at 64.4 to 98.6°F.; optimum temperature for reactivation was 86°F. Reactivation did not occur in milk heated at 161°F. for 15 seconds, or at 145°F. for 30 minutes. These investigators (*7*) also noted that a decrease in the bacteriological quality of milk, the absence of air, and the presence of reducing conditions, increased reactivation of phosphatase. Reactivation did not occur when milk was heated sufficiently to denature the soluble proteins completely. In additional experiments (*8*), several samples of milk from farms were pasteurized using an exposure of 161°F. for 23 to 24 seconds. Two of the samples developed a positive phosphatase reaction after storage and it was shown that the phosphatase was not of bacterial origin. Bulk



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[1]Published with the approval of the Director of the Purdue Agricultural Experiment Station as Journal Series Paper No. *1221*.

[2]Portion of a thesis prepared by the senior author in partial fulfillment of the requirements for the degree of Master of Science. Present address: Indiana State Board of Health, Indianapolis, Indiana.

raw milk from tanks did not exhibit reactivation when given a smiliar heat treatment. Metallic ions were considered to play a part in phosphatase activity and in reactivation (9). Either Mg^{++} or Zu^{++}, or both, seemed to play a part in reactivation.

Fram (3) heated skim milk, milk, and cream in a tubular heater using an exposure of 165 to 240°F. for 16 seconds. Also, portions were pasteurized at 145°F. for 30 minutes. Immediately after pasteurization, and when stored at 40°F., all products showed negative phosphatase tests. When the samples were stored at 88°F., phosphatase reactivation was noted in all products heated to high temperatures but not at the low temperature. The minimum temperature above which reactivation occurred, and the time of storage at 88°F. required for reactivation, was a function of the fat content. Bacteriological studies indicated that reactivated phosphatase was not of bacterial origin.

Since the methods employed by Wright and Tramer (6) for measuring phosphatase activity were different than those commonly used in this country, and the test used by Fram (3) was the Scharer rapid qualitative test, it appeared desirable to conduct additional studies on phosphatase reactivation at high temperatures using a quantitative method. The effect of temperature of heating, time of heating, storage temperature, storage time, and fat content on phosphatase reactivation were studied.

PROCEDURES

The milk used in these experiments was bulk milk, representing a mixture from several patrons. When desired, the milk was separated by means of a cold-milk separator, or cream was removed from milk after standing in a refrigerator at 40°F.

Heating of samples was carried out in sealed capillary tubes (1 x 100 mm.). The tubes were heated in a glycerol bath allowing 4 seconds "come-up" time. "Come-up" time was determined by the melting point method, employing chemicals whose melting points were within a suitable range of the desired exposure.

Phosphatase determinations were made by the method of Sanders and Sager (5). The contents of several capillaries were pooled in order to obtain the quantity of milk recommeded in this method. Color intensity was measured with a Coleman Spectrophotometer at a wavelength of 610 mμ. Results are reported as micrograms of phenol liberated per 1 ml. of milk.

Bacterial counts were made by the plate method using plate count agar, and incubation temperature ranging from 25° to 45°C., depending upon the information desired.

RESULTS

Temperature reactivation of phosphatase in skim milk

Raw skim milk obtained by the cold separation of mixed herd milk was heated to temperatures ranging from 167 to 284°F., and held at these temperatures for 5, 10 and 15 seconds. Phosphatase activity was determined immediately after heating and also after holding at 41°F. for 24 hr. and at 86°F. for 24 and 48 hr. The samples held were preserved with chloroform (5).

Data presented in Table 1 show that no phosphatase activity was observed in skim milk given an exposure of 190.4°F. for 5, 10, or 15 seconds, even after holding at 86°F. for 48 hrs. Trials also were conducted at temperatures of 167°, 176°, and 185°F. with holding times of 5, 10, and 15 seconds; the data in these trails are not reported since no phosphatase activity was observed. The first indication of phosphatase reactivation occurred with an exposure of 197.6°F. for 10 or 15 seconds and holding at 86°F. No reactivation was observed in any of the samples held at 41°F. With skim milk, an increase in the extent of reactivation was noted as the temperature was increased over the range of 197.6° to 284.0°F. Since phenol values higher than 4μg. per ml. indicate under-

TABLE 1 — EFFECT OF HEATING SKIM MILK TO VARIOUS TEMPERATURES ON PHOSPHATASE ACTIVITY AFTER STORAGE AT 41 AND 86°F.

Temperature of heating (°F.)	Holding time (seconds)	Phosphatase activity (micrograms phenol liberated from substrate) after storage for			
		0 hrs.	24 hrs. at 41°F.	24 hrs. at 86°F.	48 hrs. at 86°F.
190.4	5	0	0	0	0
	10	0	0	0	0
	15	0	0	0	0
197.6	5	0	0	0	0
	10	0	0	2	1
	15	0	0	2	2
204.8	5	0	0	3	2
	10	0	0	4	4
	15	0	0	4	3
212.0	5	0	0	3	4
	10	0	0	4	4
	15	0	0	4	4
248.0	5	0	0	5	3
	10	0	0	4	4
	15	0	0	5	D
284.0	5	0	0	5	6
	10	0	0	6	6
	15	0	0	6	7

TABLE 2 — EFFECT OF HEATING WHOLE MILK TO VARIOUS TEMPERATURES ON PHOSPHATASE ACTIVITY AFTER STORAGE AT 41 AND 86°F.

Temperature of heating (°F.)	Holding time (seconds)	Phosphatase activity (micrograms phenol liberated from substrate) after storage for			
		0 hrs.	24 hrs. at 41°F.	24 hrs. at 86°F.	48 hrs. at 86°F.
176	5	0	0	0	0
	10	0	0	0	0
	15	0	0	0	0
185	5	0	0	4	4
	10	0	0	0	0
	15	0	0	0	4
194	5	0	0	3	1
	10	0	0	6	6
	15	0	0	8	7
212	5	0	0	12	18
	10	0	0	38	38
	15	0	0	40	42
230	5	0	0	39	36
	10	0	0	43	44
	15	0	0	43	43
248	10	0	0	43	42
	15	0	0	41	42
268	10	0	0	25	25
	15	0	0	23	25

TABLE 3 — EFFECT OF HEATING HALF (MILK) AND HALF (CREAM) CONTAINING 10% FAT TO VARIOUS TEMPERATURES ON PHOSPHATASE ACTIVITY AFTER STORAGE AT 41 AND 86°F.

Temperature of heating (°F.)	Holding time (seconds)	Phosphatase activity (micrograms phenol liberated from substrate) after storage for			
		0 hrs.	24 hrs. at 41°F.	24 hrs. at 86°F.	48 hrs. at 86°F.
176	10	0	0	0	0
	15	0	0	0	0
185	10	0	0	0	0
	15	0	0	2	2
194	10	0	0	13	12
	15	0	0	10	10
203	10	0	0	9	13
	15	0	2	10	12
212	10	0	0	—	22
	15	0	0	—	28
230	10	0	0	20	22
	15	0	0	24	24
248	10	0	0	12	16
	15	0	2	23	22
268	10	0	0	6	7
	15	0	0	8	10
284	15	0	0	5	11

pasteurization with the Sanders and Sager method (5), samples exposed to 248°F. for 5 or 15 seconds and held 24 hr. at 86°F., and also samples exposed to 284°F. for 5, 10, or 15 seconds and held 24 or 48 hr. at 86°F. would be classed as underpasteurized.

Temperature reactivation of phosphatase in whole milk

Mixed raw milk from several producers was used in these trails. The fat content of the milk was 3.9 per cent. Table 2 indicates that no reactivation occurred in milk heated at 176°F. for 5, 10, or 15 seconds. At 185°F., some reactivation was observed but it was not sufficient to class the samples as underpasteurized. An exposure of 194°F. for 10 or 15 seconds, with holding at 86°F., resulted in sufficient reactivation to class the samples as underpasteurized. An increase in the extent of reactivation was observed over the temperature range of 185° to 230°F., when the samples were stored at 86°F. Temperatures higher than 230°F. gave less reactivation; an appreciable decrease was noted in the trails at 268°F. As with skim milk, no phosphatase activity was observed in samples immediately after heating or after storage at 41°F. for 24 hrs.

Temperature reactivation of phosphatase in Half and Half

A mixture of raw milk and raw cream containing 10 per cent fat was used to obtain the data presented in Table 3. No. reactivation of phosphatase occurred in the mixture when the temperature employed was 176°F. Very slight reactivation resulted when the exposure was 185°F. for 15 seconds. Sufficient reactivation was obtained with an exposure of 194°F. for 10 or 15 seconds and holding at 86°F. for 24 or 48 hr. to class the product as underpasteurized. All exposures within the range of 194° to 284°F. gave appreciable reactivation. However, a noticable decrease in phosphatase activity was observed at 268° and 284°F. A very slight amount of reactivation was noted in two samples held at 41°F. for 24 hrs. (203°F. for 15 seconds, and 248°F. for 15 seconds) but not sufficient to class them as under pasteurized.

Temperature reactivation of phosphatase in cream

Raw cream containing 20 per cent fat was used for obtaining the data given in Table 4. The lowest

TABLE 4 — EFFECT OF HEATING CREAM (20% FAT) TO VARIOUS TEMPERATURES ON PHOSPHATASE ACTIVITY AFTER STORAGE AT 41 AND 86°F.

Temperature of heating (°F.)	Holding time (seconds)	Phosphatase activity (micrograms phenol liberated from substrate) after storage for			
		0 hrs.	24 hrs. at 41°F.	24 hrs. at 86°F.	48 hrs. at 86°F.
167	10	0	0	2	10
	15	0	0	0	13
176	10	0	0	7	48
	15	0	2	7	50
194	10	0	3	14	52
	15	0	3	16	60
212	10	0	2	8	100
	15	0	4	16	100
230	10	0	0	12	126
	15	0	4	16	120
248	10	0	0	8	100
	15	0	2	15	100
268	10	0	0	16	94
	15	0	1	12	100
284	10	0	0	11	79
	15	0	0	10	80

exposure employed (167°F. for 10 seconds) showed some enzyme reactivation when the sample was held at 41°F. for 48 hrs., and sufficient reactivation to class the sample as underpasteurized when held for 48 hrs. at 86°F. Phosphatase activity increased progressively over the temperature range of 167° to 230°F. Above 230°F. a decrease in enzyme activity was noted and the decrease was particulary noticeable at 284°F. No phosphatase activity was noted in any of the cream samples immediately after pasteurization. Slight activity could be detected in many of the samples after holding for 24 hrs. at 41°F. All of the samples heated in the range of 176° to 284°F. with an exposure time of 10 or 15 seconds and held for 48 hours at 41°F. showed sufficient phosphatase activity to class them as underpasteurized.

Additional observations on reactivated phosphatase

An experiment was designed to compare the rate of hydrolysis of disodium phenyl phosphate by normal milk phosphatase and reactivated phosphatase. A sample of cream containing reactivated phosphatase liberated 33 μg. phenol per ml. A sample of raw milk was diluted with boiled milk so that it also would liberate 33 μg. of phenol per ml. Several 1-ml. aliquots of each sample were tested by the Sanders–Sager test, varying only the contact time with the substrate. Curves representing the results of this experiment were prepared but they are not included since they indicated that the rates of hydrolysis for both the normal and reactivated enzyme were the same.

Another comparison was made of the rate of formation of indophenol by phenol, phenol liberated from disodium phenyl phosphate by normal milk phosphatase, and phenol liberated from disodium phenyl phosphate by reactivated milk phosphatase. Appropriate samples adjusted to the same phenol content showed no difference in the rate of formation of indophenol.

When milk samples were heated in the laboratory to 145°F. and held for 30 minutes, it was not possible to reactivate phosphatase by additional exposures at high temperatures known to produce reactivation. Samples containing reactivated phosphatase showed no phosphatase activity when given an exposure of 145°F. for 30 minutes, nor could the phosphatase be reactivated again by an exposure to a high temperature known to produce reactivation.

Phosphatase activity of sterile cream

Four samples of commercial cream labeled "sterilized" were tested for phosphatase. All of the samples contained appreciable phosphatase as they liberated 25, or more, micrograms of phenol when tested by the Sanders–Sager method. The cream samples were plated using plate count agar and the plates were incubated at 25°, 32° and 45°C. No bacterial colonies appeared on the plates during incubation for 5 days. Laboratory pasteurization of these samples using an exposure of 145°F. for 30 minutes destroyed the phosphatase activity.

DISCUSSION

During the past several years, equipment has been available to the dairy industry for heating milk and other dairy products to temperatures higher than the conventional high-temperature short-time method (161°F. for 15 seconds). At least one such apparatus has been approved by regulatory officials for pasteurizing milk and cream. The experiments conducted for this study were designed to determine whether the phosphatase test, which has been used for detecting irregularities in the pasteurization of milk, cream, and other dairy products, could be applied to milk and cream heated to higher temperatures and held for the same, or less time, than the regular method.

The enzyme phosphatase is associated with the fat globule membrane but is not soluble in the fat. Consequently, skim milk contains less of the enzyme than whole milk or cream. With skim milk, the first evidence of reactivation occurred at 197.6°F., whereas with milk the temperature was 185°F. and with cream (20% fat) it was 167°F., or less. Therefore, there is a definite relation between reactivation temperature and fat content of the product.

Skim milk showed an increase in the amount of reactivation as the temperature was increased over the range of 190.4° to 284°F. Perhaps even more reactivation would have occurred at a higher temperature but it was not possible to attain temperatures higher than 284°F. by the method of heating employed. With milk and cream, reactivation of phosphatase increased with temperature only up to a certain point and then a decrease was noted; the temperature for maximum reactivation was about 230°F. for both products.

Regulatory officials generally collect one sample of milk or cream that is used for bacteriological analysis, the phosphatase test, and chemical analysis It is recommended that samples be cooled promptly and held at 32 to 40°F. (5). Such a procedure limits reactivation of phosphatase. Data presented on skim milk, milk, or cream show that when products were held at 41°F. for 24 hrs., insufficient reactivation

occurred to class the samples as underpasteurized. However, some samples of cream held at 41°F. for 24 hrs. liberated 4μg. of phenol in the phosphatase test; this is the maximum permitted in classifying the samples as properly pasteurized.

In some laboratories large numbers of samples are tested for phosphatase activity at one time. If the small sample used is measured into a warm test tube and held in a warm room for some time before testing appreciable reactivation may occur, particularly with cream, and a properly pasteurized sample may be classed as underpasteurized. Regulatory officials and plant personnel should recognize that reactivation of phosphatase may occur in dairy products heated to higher-than-normal temperatures, and that such reactivation can be limited by cooling to a low temperature after the heat treatment. Also, the low temperature must be maintained until the sample is tested for phosphatase.

SUMMARY

Samples of raw skim milk, milk, and cream were heated in capillary tubes at various temperatures over a range of 167° to 284°F. with holding times up to 15 seconds. After heat treatment the samples were stored at 41° and 86°F. in the presence of chloroform. Phosphatase determinations were made on all samples before heat treatment, immediately after heat treatment, and after storage.

Immediately after heat treatment, phosphatase tests on all products were negative. After storage at 41°F. for 24 hrs., no phosphatase activity was detected in skim milk or whole milk but a slight amount was noted in half and half (10% fat) and cream (20% fat). However, there was not sufficient activity to class the samples as underpasteurized. Cream (20% fat) heated at 176 to 284°F. and held at 41°F. for 48 hrs. showed sufficient phosphatase activity to be classed as underpasteurized.

Samples heated to high temperatures and held at 86°F. showed considerably more enzyme reactivation than samples held at 41°F. After storage at 86°F. for 24 hrs., phosphatase activity was observed in skim milk exposed to 190.4°F. or higher, in whole milk and half-and-half exposed to 185°F. or higher, and in cream exposed to 167°F. or higher. With all products held at 86°F. there was sufficient phosphatase activity to class them as underpasteurized, but the temperature necessary to bring about such reactivation varied with fat content of the product.

Samples of milk which gave a negative phosphatase test after an exposure of 145°F. for 30 minutes did not give a positive test after subsequent heating to high temperatures and storage at temperatures known to give reactivation of phosphatase in raw milk. Samples of milk containing reactivated phosphatase did not show phosphatase activity when given an exposure to 145°F. for 30 minutes; subsqunt heating to high temperatures also failed to activate the enzyme.

Four samples of cream labeled "sterilized" showed appreciable phosphatase activity. Bacteriological analyses of the samples indicated that they were sterile.

ADDENDUM

A technical note entitled, "Phosphatase Reactivation in High-Temperature, Short-Time Pasteurized Cream" (J. Dairy Sci. **40**: 1649. 1957) was published by Harvey Fram after this work has been completed and prepared for publication. The data presented in this article confirms the work of Fram and provides additional information on the subject.

REFERENCES

1. Brown, W. H. and Elliker, P. R. The Effect of Flash Pasteurization and Subsequent Treatment on the Phosphatase Value of Cream. J. Bacteriol. **43**: 118-119. 1942.

2. Fay, A. C. and Barber, F. W. Some Limitations of the Phosphatase Test When Applied to Cream. Abstr. of Paper Presented at 19th Ann. Meeting, Eastern Division Am. Dairy Sci. Assoc., Mfg. Section, Springfield, Mass., Sept. 16, 1940.

3. Fram, Harvey. The Reaction of Phosphatase in H.T.S.T. Pasteurized Dairy Products. J. Dairy Sci. **40**: 19-27. 1957.

4. Shadwick, G. W., Jr. and Parker, M. E. Application of the Phosphatase Test to Creamery Butter. Am. J. Public Health **29**: 482-489. 1939.

5. *Standard Methods for the Examination of Dairy Products,* 10th ed., Am. Public Health Assoc., Inc., New York, N. Y. 1953.

6. Wright, R. C. and Tramer, J. Reactivation of Milk Phosphatase Following Heat Treatment I. J. Dairy Research **20**: 177-188. 1953.

7. Wright, R. C. and Tramer J. Reactivation of Milk Phosphatase Following Heat Treatment II. J. Dairy Research **20**: 258-273. 1953.

8. Wright, R. C. and Tramer, J. Reactivation of Milk Phosphatase Following Heat Treatment III. J. Dairy Research **21**: 37-49. 1954.

9. Wright, R. C. and Tramer, J. Reactivation of Milk Phosphatase Following Heat Treatment IV. The influence of certain metallic ions. J. Dairy Research **23**: 248-256. 1956.

CONTAINERS, REFRIGERANTS AND INSULATION FOR SPLIT MILK SAMPLES[1]

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Milk and Food Research Program

Robert A. Taft Sanitary Engineering Center

Public Health Service

Methods are described for packing unfrozen split milk samples which hold their temperature within acceptable limits of 32-40°F for 24-30 hours when stored at ordinary room or higher temperature. The samples may be packed in a wrapped vacuum bottle, surrounded by a refreezant, and placed in cork or Styrofoam shippers or may be packed in nested Styrofoam boxes. Plate counts of split samples, shipped in the nested boxes to participating laboratories for examination, agreed well with each other and with the control laboratory.

Checking the performance of milk sanitation laboratories by split sample procedures normally requires that a sample of fluid milk be divided into portions for transportation to the participating laboratories under conditions that minimize bacterial or chemical change. The results reported by these laboratories are then compared with the results of concurrent examinations by one or more reference laboratories. Such a procedure is provided for in the recommendations of the National Conference on Interstate Milk Shipment and is intended to supply factual evidence of correct analysis by laboratories examining milk for interstate shipment (*3*).

Programs of split sampling have been initiated in at least 25 of the interstate milk shipping states. The procedures used by three of these states, Maryland, Missouri and Wisconsin have been described. (*1, 2, 4*).

In 1955 the Robert A. Taft Sanitary Engineering Center initiated a research project to develop a procedure for shipping split milk samples to all central state laboratories certified by the Public Health Service. This procedure would be an adjunct to the periodic surveys by which these laboratories are presently evaluated and would assist the Public Health Service in advising states regarding suitable equipment and procedures for split sampling programs.

Methods

Split milk samples may be frozen and shipped in dry ice, or they may be shipped in packages containing refrigerant to maintain the samples at desired temperatures for holding milk (32° - 40°F). The latter method yields samples which more closely represent those routinely examined by milk sanitation laboratories and, for this reason, may be preferable. To prevent the growth of psychrophilic bacteria, refrigerated samples should reach their destination within 24-30 hours. In many areas this is accomplished by packing the samples in regular milk sample shippers and transporting them by express or parcel post. In other areas split milk samples must be shipped by air, if they are to reach their destination in 24-30 hours, and the higher cost of air transportation limits the usefulness of the heavier types of sample shippers. As the Public Health Service would need to ship split samples by air to most of the 48 states, studies were carried out to develop a lightweight package or shipper that would maintain the temperature of the samples at 32° - 40°F for a period of 24-30 hours.

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[1]Presented at the 44th Annual Meeting of the International Association of Milk and Food Sanitarians, Inc., at Louisville, Kentucky, October 7-10, 1957.

Samples

The samples used in this study were usually prepared by dispensing homogenized milk into clean sample vials or tubes. The rate and extent of temperature changes in the samples served as the primary criterion for evaluation of the shipping containers and refrigerants. When split samples were to be examined by standard plate count as well, aseptic precautions were taken in their preparation. To avoid loss of samples due to breakage of glass tubes, the samples were initially dispensed in 10-ml. polyethylene screw-cap vials. These vials could not be strilized by heat and were replaced in later experiments by 12 - ml. centrifuge tubes (made of heat resistant polyethylene) which can be sterilized repeatedly by autoclaving at 15 lbs. for 15 minutes. Rubber-sleeved stoppers have been used as closures for these tubes. Experimentation indicates that neither the tubes nor the stoppers affect the phosphatase test on milk held in them for 40 hours at 36° - 41°F.

Insulation

Most of the insulating and refracting materials used in constructing the split sample packages are well known. Two comparatively new materials are Fiberglas and Styrofoam[2]. Insulating Fiberglas consists of laminated glass fibers in a variety of thicknesses. In this study one-inch Fiberglas, both plain and faced with aluminum foil, was used. Styrofoam is a rigid, plastic foam that can be sawed and shaped in the same manner as wood. It comes in several thicknesses and is sold by the board-foot measure. One-inch boards were used in constructing the boxes for this study.

Preliminary evaluations of packages indicated that the samples would freeze if placed in direct contact with the refreezant. To prevent freezing a double package was designed which consisted of a small insulated inner package and a larger insulated outer package. The sample tubes were placed in the inner package which was surrounded by the refreezant and then put in the outer package that acted as a barrier against the ambient temperature.

The small, inner packages consisted variously of Fiberglas envelopes, insulated Jiffy bags, Styrofoam boxes, or wide-mouthed pint vacuum jars, wrapped, in most instances, in Fiberglas and aluminum foil. The larger, outer packages were constructed of Fiberglas, both plain and faced, aluminum foil, large Jiffy bags, frozen food shippers insulated with cork or felt, Styrofoam boxes, and shipping cartons of corrugated paper.

Refrigeration

To avoid the nuisance of melting ice, a gel "refreezant" was used for refrigeration. This gel, which freezes at 30°F, can be purchased in cans or in plastic packages of various sizes. For the purpose described here, a 13-oz. plastic package was found to be most satisfactory. Originally these packages were frozen in the freezing compartment of a refrigerator but later, when more space was required, in a food freezer. Experimentation has shown that this refreezant provides effective refrigeration when it is arranged in single units in direct contact with a large portion of the surface of the small, inner box (Figure 1).

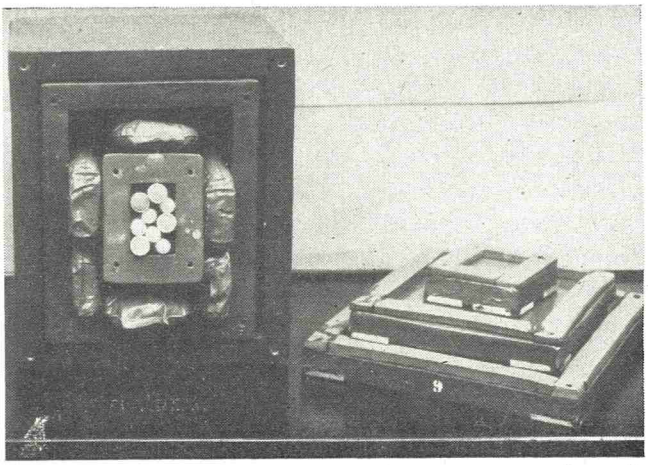

Figure 1. Assembled Styrofoam boxes containing split milk samples.

Generally the split samples at temperatures of 32° -40°F were prepared and packaged in a walk-in refrigerator. The small, inside packages had been precooled at freezer or refrigerator temperatures. Each package was surrounded by the refreezant and the whole wrapped or packed in materials which had also been precooled in the freezer or refrigerator. These packages were then placed in shipping containers, in some instances precooled, and stored at controlled temperatures during the testing period. A wire leading from a thermocouple in one of the packed samples was attached to a potentiometer, and the temperatures[3] maintained by the samples were measured at frequent intervals. Initially these measurements were made with a galvanometer-type potentiometer but in

[2]Trade names are used in the paper solely for the purpose of identifying products that cannot be adequately described by a common name.

[3]The temperatures of all samples were indicated by the temperature of the sample which contained the thermocouple.

later experiments a recording potentiometer was employed which could be operated continuously or at varying intervals.

Although a considerable number of split sample packages were designed, constructed, and evaluated, this report includes only comparative data from a few representative items. Temperatures maintained by the packaged split milk samples formed the primary basis for comparison, but standard plate counts were also used in a few instances.

Experimental Results

Initially several split milk sample packages were constructed in the laboratory. In one of these the split sample vials were wrapped in two layers of Fiberglas, then in leadfoil, and packed in an 8½ in. x 12½ in. Jiffy bag, which was wrapped in a layer of Fiberglas faced with aluminum foil. This package was then placed in a larger Jiffy bag which was surrounded with the refreezant and the whole placed in a third Jiffy bag. The resulting package was wrapped in Fiberglas faced with aluminum foil and placed in an insulated corrugated paper carton which was closed and stored at room temperature. Temperatures between 32° and 42°F were maintained by these split samples for a period of 30 hours. These results illustrate the fact that readily available materials can be used in the laboratory to make packages suitable for shipping split samples at ordinary room temperature. The making of such packages is time consuming and quality is apt to vary with the skill of the technician. Studies were carried out to evaluate prefabricated packages that would be suitable for temperatures higher than ordinary room temperature. In these studies, two commercial frozen food shippers and an experimental Styrofoam shipper were tested.

Both commercial shippers were canvas-covered, box-bottomed bags. The larger of these, with a capacity of approximately four gallons, was insulated with 2 in. of cork and weighed 12 lbs. It was closed with one flap which fitted down into the top and with four overlapping flaps which buckled over the first one. The other shipper was insulated with 1 in. felt and had a capacity of approximately one gallon. It was closed with four overlapping, buckle-down flaps.

The experimental Styrofoam shipper (which weighed only 5 lbs.) was constructed of 1 in. Styrofoam covered with Fiberglas and coated with a polyester resin. The outside dimensions were 11 in. x 13 in. x 9 in.; the inside dimensions, 9 in. x 11 in. x 8 in. It was closed with a detachable lid which was held in place by a screw on each of two sides. A rubber gasket between the lid and the box was designed to provide a tight closure.

To evaluate these shippers, polyethylene tubes containing milk were packed in a wide-mouthed, pint vacuum jar which was wrapped in aluminum foil, then in Fiberglas, and again in aluminum foil. This package was placed in an 8½ in. x 12 in. Jiffy bag and another Jiffy bag was pulled down over the open end of the first one. This package was then wrapped in aluminum foil and surrounded with six packages of the refreezant, previously frozen in a refrigerator, and the whole wrapped in Fiberglas and aluminum foil. Samples packed in this manner were placed in cork, felt, and Styrofoam shippers, and held for 30 hours, at room temperature (81°F) in the first experiment and at 92°F. in a second experiment. In a later experiment the cork and Styrofoam shippers were evaluated at 99°F.

Temperatures observed in the milk in these tests are recorded in Table 1, which shows that the felt shipper was unsatisfactory because the milk rose above 40°F in less than 24 hours. Split samples packed in the cork shipper maintained satisfactory temperatures for 30 hours when stored in ambient temperatures of 81°, 92° or 99°F. Split samples packed in the Styrofoam shipper maintained Satisfactory temperatures for the 30-hour period when stored at 81° and 92°F, but when stored at 99°F the sample temperatures were less satisfactory for they rose above 40°F by the end of 24 hours.

Table 1 — Temperatures observed in split milk samples stored at different ambient temperatures in cork, felt and Styrofoam shippers

	Temperature in °F							
	Average Ambient Temperature							
	81°F			92°F			99°F	
Storage time in hours	Cork	Felt	Styro-foam	Cork	Felt	Styro-foam	Cork	Styro-foam
0	40.6	40.1	39.9	40.5	40.5	40.5	40.8	40.8
2	38.7	38.3	37.2	37.8	37.8	37.2	37.2	37.6
4	37.0	36.1	35.6	35.4	36.1	34.0	34.2	35.4
6	35.6	35.6	34.7	34.3	35.6	34.2	33.4	34.2
8	34.9	35.2	34.0	33.6	35.2	33.4	32.9	34.0
10	34.3	34.7	33.8	33.4	35.2	33.3	32.4	33.8
12	34.0	35.2	33.6	32.7	35.2	32.7	32.4	33.8
14	34.0	35.2	33.6	32.5	35.6	32.5	32.4	33.8
16	33.8	35.6	33.6	32.5	36.1	32.4	32.9	34.0
18	33.8	36.5	33.6	33.4	37.9	32.5	33.6	35.4
20	33.8	37.0	33.4	33.6	39.7	33.3	33.6	36.0
22	33.8	40.1	33.6	34.2	42.8	33.6	34.0	37.6
24	34.0	43.0	34.0	35.2	45.3	34.2	34.7	40.6
26	34.3	46.4	34.5	35.8	48.9	35.4	35.2	43.7
28	34.5	51.4	35.2	37.2	52.7	36.5	—	—
30	35.2	53.4	36.0	39.2	57.0	38.5	36.5	51.8

These results show that the cork shipper provided better insulation against high temperatures than did the Styrofoam shipper. However, the data also indicated that the Styrofoam shipper would be satisfactory for shipping split milk samples at the temperatures usually maintained in heated aircraft compartments.

TABLE 2 — COMPARATIVE PLATE COUNTS OF SPLIT MILK SAMPLES IN GLASS AND POLYETHYLENE TUBES REFRIGERATED OR STORED AT ROOM TEMPERATURE IN A STYROFOAM SHIPPER

Sample	Tubes	Replicate number	Initial plate count[a]	Plate count[a] after 30-37 hrs. Refrigerated 35°F	Plate count[a] after 30-37 hrs. Styrofoam 29.6-45.4[b]
Pasteurized	Pyrex	1	144	143	149
		2	115	137	133
		3	119	132	132
		Average	126	137	138
	Polyethylene	4		123	151
		5		137	133
		6		136	143
		Average		132	142
Pasteurized + raw	Pyrex	1	245	234	234
		2	243	239	189
		3	—	250	220
		Average	244	241	214
	Polyethylene	4	226	247	231
		5	227	280	271
		6	—	204	215
		Average	227	244	239

[a]Average of duplicate plates, 1:100 dilution
[b]Temperature range of samples held in Styrofoam shipper

Standard Plate Counts

A further evaluation of Styrofoam shippers was made by determining the standard plate counts of split milk samples which, when held in the shipper at room temperature (76°F) for 30-36 hours, had maintained temperatures in a range of 29.6°-45.4°F. These counts were compared with the initial count of the split samples and with the counts of refrigerated controls.

To determine whether the polyethylene tubes affected bacterial survival, standard plate counts were made on replicate split samples of pasteurized milk stored in sterile pyrex glass and polyethylene tubes. Three tubes of each type were packed in the Styrofoam shipper, which was stored at room temperature (76°F) for approximately 37 hours. As controls, a similar set of split samples was refrigerated at 35°F. Duplicate plates of each sample, both packed and refrigerated, were prepared and examined by standard methods. A second series of comparative tests was made using split samples prepared from pasteurized milk to which a little raw milk had been added.

The results summarized in Table 2 show no significant differences among the variables tested. In other words, the polyethylene tubes can be substituted for glass containers without altering the bacterial count, and storage in either the refrigerator or in the Styrofoam shipper at room temperature allows little, if any, increase over the initial count.

Table 3 gives the results of a similar evaluation in which the initial counts on split samples of pasteurized and raw milk are compared with counts obtained after 30 hours storage at an average room temperature of 81°F in the Styrofoam, cork, or felt shippers and in the refrigerator. The counts of stored pasteurized milk showed only minor increase over the initial counts, but the counts of samples containing raw milk increased more noticeably when the samples were held in the felt shipper and in the refrigerator. The increases occurring in the felt shipper are probably due to multiplication of psychrophilic bacteria allowed by the relatively rapid rise in temperature typical of this shipper (Table 1). The increased counts of raw milk samples held in the refrigerator as contrasted with the samples held in the styrofoam and cork shippers, may be attributed to the fact that an average temperature of 35°F or below was maintained in these shippers while the refrigerator was approximately 38° -40° throughout the holding period. Apparently the slightly higher temperature of the refrigerated controls allowed a more rapid multiplication of psychrophilic bacteria.

Thermocouple Studies of Styrofoam Boxes

The Styrofoam shipper was subsequently improved by using a thicker and softer rubber sealing gasket and by using four screws (one at each corner) to tighten the lid. This improved shipper provided in-

TABLE 3 — COMPARATIVE PLATE COUNTS OF SPLIT MILK SAMPLES REFRIGERATED OR STORED AT ROOM TEMPERATURE IN CORK, FELT AND STYROFOAM SHIPPERS

Samples	Replicate number	Initial plate count	Plate count[a] after 30 hrs. Refrigerated 39.2°F	Cork 33.8 to 40.6[b]	Felt 34.7 to 52.4[b]	Styrofoam 33.6 to 39.9[b]
Pasteurized	1	77	87	107	98	92
	2	83	94	97	86	69
	3	69	88	87	91	79
	Average	76	90	97	92	80
Raw	1	59	159	110	194	91
	2	59	176	78	182	85
	3	68	153	74	193	85
	Average	62	163	87	190	87

[a]Average of duplicate plates, 1:1000 dilution
[b]Temperature range of samples held in shippers (°F)

sulation which compared favorably with that provided by the cork shipper.

The method of packing the sample tubes in a wrapped vacuum bottle (before packing them in shippers), while providing satisfactory insulation, was too cumbersome and time consuming to be practical. Studies were made to determine whether nested Styrofoam boxes, one small and one intermediate size, could be substituted, respectively, for the wrapped vacuum bottle and the outer wrappings of Fiberglas and aluminum foil. These boxes were of similar design and were constructed of the same materials as the Styrofoam shipper. The smaller box held 9 split samples tubes, It was packed in the intermediate box and was surrounded by six packages of refreezant (Figure 1). The intermediate box was inverted in the shipper. The lid of each box was fastened tightly with screws.

Comparative tests of Styrofoam boxes were conducted to define with greater precision the conditions necessary for maintaining sample temperatures within acceptable limits of the prefered range of 32° -40° F. In certain of these tests, the packages of gel (refreezant) were arranged in the liners and frozen around the sample box before the samples were packed. In other tests samples which were at refrigerator temperatures were placed in a sample box that had been precooled in the refrigerator. The sample box was then placed in a liner precooled in the freezer, and was surrounded by packages of the gel which had been frozen directly on the freezer shelves[4]. This method was more satisfactory and was used in obtaining the data presented in Figure 2. These data, which are fairly typical of several tests, show that samples packed by this latter method and stored at 75°F held temperatures in a range of 31.1°-37°F for 30 hours; when stored at 98°F the samples held temperatures of 31.8°-42.4°F for 24 hours.

It should be noted that in some of these tests, during the initial hours of storage, the temperature of the samples fell below the accepted freezing point of milk (31.01°F) and remained in the range of 30° -31°F for one to four hours. In one instance, when the temperature had fallen to 30°F, the package was opened and two of the samples were examined, neither of which appeared to be frozen. In other instances, temperatures as low as 27°-30°F were observed in samples of milk stored in the freezer or the refrigerator, yet most of them were still liquid. For example, samples which had held temperatures in a range of 28°-30°F for 24 hours were opened (when at an indicated temperature of 28.2°F) and were apparently unfrozen. These observations indicate that the temperatures of the samples may be slightly below the freezing point of milk for several hours without ice crystals forming in the milk. They are not intended to imply that the nested boxes will prevent samples from freezing if exposed to low temperatures, and it is necessary to emphasize that samples shipped in the boxes be protected from prolonged exposure below ordinary room temperature.

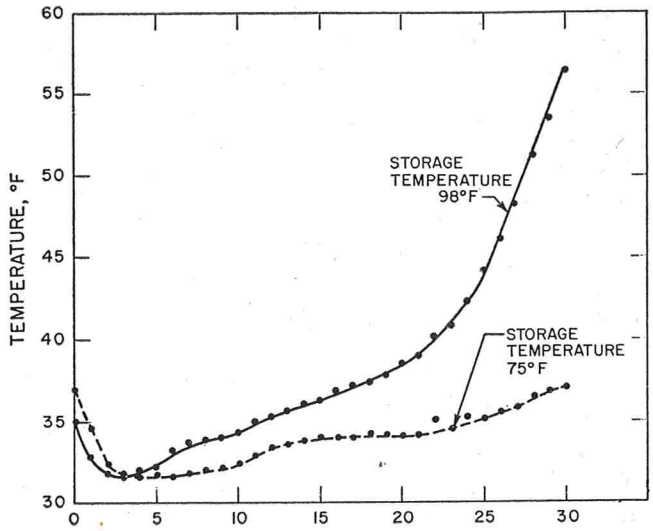

Figure 2. Temperatures observed in split milk samples packed in nested Styrofoam boxes and stored at different temperatures.

Pilot Study

A pilot study was arranged to determine whether the actual shipment of split samples in Styrofoam boxes would be satisfactory for comparative laboratory evaluations. Samples were sent by air to several milk sanitation laboratories located at varying distances (300 to 2200 miles) from Cincinnati.

The day before the samples were shipped, raw milk (received at the plant in the morning) and pasteurized milk (regular and homogenized) and cream (processed in the morning) were obtained from a dairy plant. These products were plated for the initial count and each was divided into several samples which were dispensed into sterile polyethylene tubes and refrigerated until the next day.

[4]Figure 2 is based on the temperatures held by samples which were packed in refreezant that had been frozen for 23-25 hours to 5°-9°F. Certain data show the gel frozen for 12 hours to 5°-14°F provide refrigeration equal to that of the gel frozen for the longer period.

The split samples were packed in the improved Styrofoam boxes and shipped by air parcel post to the participating laboratories. Each shippment consisted of duplicate samples (one tube 2/3 full and one completely filled) of the raw, pasteurized and homogenized milk and pasteurized cream. Each laboratory was requested to record the date and time it received the samples and to note, on opening, the temperature as well as the extent of fat separation, especially in the partly filled tubes. The laboratories were also requested to examine the samples by Standard Plate Count. Two sets of samples, packed for shipment, were held in the laboratory at room temperature as controls. One of these sets was plated after 26 hours; the other after 46 hours. The temperatures of these samples when examined were, respectively, 34° and 47°F.

Table 4 shows that, with one exception, the several sets of split samples reached their destinations and were examined within 30 hours from the time they were mailed, and that temperatures of the samples, on receipt, ranged from 37° to 45°F. The plate counts reported for the various samples (except for the count of the raw milk samples reported by Laboratory B) agree fairly well with each other and with the counts of the reference laboratory. The high counts of the raw milk samples reported by Laboratory B probably were due to psyhrophilic bacteria which developed at refrigerator temperatures in the three-day period that elapsed between the receipt[5] and examination of the samples. It is interesting to note that the counts of the samples of pasteurized milk and cream (packed with the raw milk for which high counts were reported) did not appear to be affected by this extended period of storage at refrigerator temperatures.

DISCUSSION

When split milk samples were packed in a wrapped vacuum bottle and stored at approximately 100°F, they held temperatures nearer the desired range (32°-40°F) than did similar samples packed in the Styrofoam boxes. However, the vacuum bottle was subject to breakage during shipment and the need for hand wrapping proved time consuming. No wrapping was required when packing samples in the Styrofoam boxes, and the complete package could be prepared for shipment in approximately 10 minutes.

There were also advantages and disadvantages in using the cork or Styrofoam shipper. The cork shipper was 5 to 10 pounds heavier, when packed with samples, than the Styrofoam shipper containing sam-

[5]Due to failure of communications the samples remained packaged and were refrigerated from the time of arrival (June 12) until they were examined (June 15)

TABLE 4 — PLATE COUNTS ON STORED AND SHIPPED SPLIT SAMPLES OF RAW MILK AND PASTEURIZED MILK AND CREAM

		Laboratories participating in pilot study						
		Controls held at 75°F		A	B	C	D	E
Shipping time (hrs.)		0	0	25	?	22	23	29
Distance (miles)		0	0	1200	800	300	600	2200
Temperature on receipt (°F)		34°[a]	47°[a]	45°	42°[a]	37°	43°	39°
Analyzed within (hrs.)		26	46	29	96	28	29	30
Samples[b]	Initial count	Plate counts 35°C (average of duplicate plates, 1:100 dilution)						
1 PHM	39	29	25	32	40	40	26	26
5 PHM	39	42	34	23	31	35	20	26
2 PM	59	47	59	44	47	53	48	58
6 PM	59	49	60	42	43	59	49	88
3 RM	74	61	73	44	TNTC	67	61	75
7 RM	74	78	56	43	TNTC	54	64	64
4 PC	5	12	10	8	6	15	9	11
8 PC	5	10	10	6	9	9	10	11

[a]Temperature of samples at time of analysis rather than when received.
[b]R: raw, P: pasteurized, H: homogenized, M: milk, C: cream

ples in either the vacuum bottle or the nested boxes. Thus the latter was more economical for air shipment. However, the cork shipper was of sturdier and more durable construction and could be shipped unwrapped, whereas the Styrofoam shipper required the protection of a corrugated paper carton.

The studies described in this paper are intended to serve only as guides for selection of appropriate materials and procedures for the shipping of split milk samples. Depending on conditions of use, a number of modifications in packaging might prove useful. For example, the experimetal Styrofoam box could be wrapped in the same manner as the vacuum bottle and be used with the cork shipper, thus avoiding breakage of bottles and loss of samples. The sample box could be constructed of 1½ in.—or possibly 2 in.—Styrofoam to provide more effective insulation. Relatively inexpensive prefabricated plastic bags, insulated with Fiberglas, could be used to eliminate the time-consuming procedure of wrapping the vacuum bottle. Vacuum bottles of metal, provided they are again available, could be used instead of glass vacuum jars. In some areas, particularly in the cooler seasons, the amount of refreezant could be reduced. These and other modifications of the methods described could be made depending on the needs of the laboratory shipping the samples. Such modifications should, of course, be checked to determine whether the split milk samples are held within an acceptable temperature range. Insertion in the shipper of a minimal-maximal registering thermometer adjacent to the samples would serve to determine this point.

SUMMARY

1. Methods are described for packing unfrozen split milk samples in a gel refreezant which refrigerates them during shipment.

2. The samples, in heat resistant polyethylene tubes, may be packed in a wrapped vacuum bottle and shipped in a Styrofoam or cork shipper, or they may be packed in nested Styrofoam boxes. The vacuum bottle appeared to provide better insulation but the nested boxes were more convenient.

3. Temperatures of split milk samples packed by these methods remained within acceptable limits of 32-40°F for 24-30 hours when stored at ordinary room or higher temperatures.

4. Pilot samples were shipped in the Styrofoam boxes to milk sanitation laboratories in various sections of the United States for examination by Standard Plate Count. The counts reported by these laboratories agree well with each other and with the reference counts.

REFERENCES

1. Beck, W. J. and Adams, Irma C. A Plan for the Preparation, Shipment and Bacteriological Analysis of Split Samples of Milk. J. Milk and Food Technol., 17:277-281.1954.

2. Laboratory Bulletin for Medical and Public Health Laboratories. 7 (1), September 1955. Maryland State Dept. of Health, Baltimore, Md.

3. Rowland, J. L. (Chairman) National Conference on Interstate Milk Shipment. J. Milk and Food Technol., 15:19-26. 1952.

4. Thompson, D. I. and Koepp, Elaine. Testing the Performance of Milk Sanitation Laboratories by Means of Liquid Split-Samples. J. Milk and Food Technol., 19:221-226.1956.

RADIATION PROCESSING OF FOOD[1]

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Despite the current interest in it, there is nothing basically new about radiation processing of food. Ever since 1905 when Roentgen discovered X-rays, it has been known that ionizing radiations kill bacteria. However, the radiation processing of foods began to be studied seriously about fifteen years ago because of the promise it held to preserve foods without the deteriorating effect of heat.

Original experiments in sterilizing foods made use of the Capacitron and the Van de Graaf machine. Both of them are generators of high velocity electrons, also called beta rays. Then advances in nuclear physics during and since World War II developed interest in the use of gamma rays in this application.

Radiation processing of foods is enticing because it destroys enzymes, viruses, bacteria, yeasts, molds, and insects; it is adaptable to continuous processing; it is accompanied by a nominal increase in temperature of the product being irradiated (hence the term "cold sterilization"); and low levels of treatment have an effect equivalent to pasteurization, due to surface sterilization.

In the radiation processing of foods, only beta and gamma rays may be used. Alpha rays and protons are ruled out because they have no penetration. Neutrons may not be used because they induce radio-activity in food exposed to them thus rendering them unfit for consumption.

Beta rays are obtained from machines like the Van de Graaf accelerator, the linear accelerator, the resonant transformer and the Capacitron. All of these machines embody the principles of an electron generator and electron accelerator emitting a beam of specified intensity.

The characteristics of a beta ray machine are that it can be turned on and off at will, the beam is directional, hence less shielding for the protection of workers is required. Beta rays exercise their effect in a matter of seconds. A food product processed by beta rays undergoes an increase of temperature of no more than 5° F. Their penetration is limited. In water they will penetrate about 1/4-inch per million electron volts, so that today, the maximum thickness of mass that can be treated for sterilization is two inches and that is obtained by irradiating from the bottom as well as the top.

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For the radiation processing of foods, gamma rays from spent fuel rods from reactors, radio-active Cobalt (with a half-life of 5.3 years), radio-active Cesium (with a half-life of 33 years and a lighter shielding requirement), and gamma energy piped from a power reactor, may be used.

In comparison with beta rays the operational characteristics of gamma rays differ in several respects. They cannot, for example be turned on and off. Moreover, they are emitted in all directions hence, are not directional and require much heavier and more elaborate shielding. They also require more time to exercise their effect, in other words minutes, rather than seconds. Like beta rays a food product processed by gamma rays undergoes an increase of temperature of no more than 5° F. On the other hand, they are

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much more penetrating so that they will penetrate 12 inches of water per million electron volts.

In general, the less complex the organism the less susceptible it is to destruction by radiation. The following scale will serve to illustrate this point. To inactivate enzymes a radiation dosage of 30 million reps is required. (The rep is a unit of dosage of radiation. It is an abbreviation for roentgen-equivalent-physical and represents an energy absorption of a little less than 100 ergs per gram of material of unit density.) For viruses the killing dosage is 3 to 5 million reps, for bacteria 1 to 3 million, for yeasts and molds 100,000 to 1 million, for insects 25,000 to 100,000 reps and for man a mere 600 reps.

Unfortunately the sterlizing dosages for enzymes and bacteria exercise undesirable side-effects on the color, flavor and texture, depending upon the particular food. This is the result of radiation effects on the constituent carbohydrates, proteins and fats. While these changes are minute in quantity, effecting only about 0.003% of the total material, yet they nevertheless effect sensory changes in many foods. The carbohydrates are least affected and are broken down into simple sugars. The proteins yield side-effect products such as poly-peptides, amino acids, ammonia and sulphur-containing compounds. From this it can be appreciated that serious problems need to be solved before "cold sterilization" can be realized.

There are more than fifty research organizations in the United States working on the problem of radiation processing of food. There is reason to feel therefore, that eventually, perhaps within the next decade, radiation sterilization will have a place in food processing.

Perhaps, as with freezing, blanching will have to precede radiation to inactivate enzymes and avoid the heavy radiation dosage they require. Other combinations of existent or yet to be developed processing stages, perhaps antibiotics along with radiation, may find ultimate application. However, there are some sign-posts in evidence that suggest that side-effects from irradiation may be minimized or circumvented. As one example, irradiation at low temperature reduces the formation of free radicals responsible for these undesirable effects. The addition of ascorbic acid or other free radical acceptors has a beneficial effect. The latest idea being researched, especially in the application of radiation processing to milk, involves the constant removal from the field of action of side-effect products.

Other problems must also be solved before radiation processing is applied commercially to foods. Engineering aspects remain to be developed. The economic facets are as yet unclear and questions of toxicity and nutritional effects on radiation processed foods need to be completed. It goes almost without saying that all parties interested in the development of radiation processing want to proceed in a thorough, responsible fashion to remove any question of hazard in connection with the consumption of irradiated foods. No commercial application will be made until the U. S. Food and Drug Administration approves of and passes on the safety of the device.

Thus far, short term and acute toxicity tests are assuring. The Surgeon General of the Armed Forces is now engaged in long term feeding tests including some involving human subjects at the Fitzsimmons General Hospital in Denver. They too, thus far, are reassuring. By about 1960 it is estimated that certain foods will have been cleared on wholesomeness and safety to the point where fairly large scale acceptance tests can be planned, making use of Armed Forces personnel.

Dove-tailing with this is the execution of plans which provide that within about a year from now, a pilot plant with a capacity for irradiating 3000 pounds of food per hour will be operating at Sharpe General Depot at Lathrop, California. It will be capable of producing relatively large quantities of foods for further research and testing, to develop information on commercial-scale equipment and to obtain cost data.

Attention now is being given to effects obtained by exposing foods to radiation dosages of less than 3 million reps. While these effects do not thoroughly sterilize the product, they do sterilize the surface of the product so that its edible life is extended generally with subsequent holding under refrigeration.

Here are some of the things that can be done. Potatoes and onions can be prevented from sprouting. The insect infestation in grain can be killed off. Trichonella in pork can be inactivated. The edible life of fish, notably halibut, cod and tuna can be extended. The refrigerated life of fresh meat can be extended about five-fold. Table-ready and processed meats, such as frankfurters, bologna, ham and bacon enjoy extended refrigerated edible life. Similar benefits can be imparted to fruits. Among those already satisfactorily tested are apricots, bananas, berries, melons, peaches, pears, plums and pineapples. The same is true for vegetables, some of which are, asparagus, carrots, celery, corn, green beans, peas, spinach and tomatoes.

What will be the impact of radiation processing on our supply of foods in the future? Radiation processed foods will probably encroach on canned, frozen,

refrigerated and fresh foods but will not necessarily displace any of them. When brought to the point of successful commercial application, this mode of processing food will probably permit the use of a wider range of packaging materials and simplify the fixturing and operation of retail food stores. The preparation and packaging of heretofore perishable products may be carried out on a centralized basis. The offering of foods in greater variety may be encouraged.

Radiation processing of food may indeed seem revolutionary in scope and effect but, as with frozen foods, it will be applied progressively over a significant period of time as problems are solved and render practicable, extended applications. It is assumed therefore, that its introduction will not cause serious dislocations and, since it will be evolutionary, conversions and adjustments called for can be effected in an orderly manner.

REPORT OF THE COMMITTEE ON RESEARCH NEEDS AND APPLICATION - 1957[1]

At the annual meeting of the Association on September 4, 1956, the Committee met and elected F C. Baselt as secretary. The objectives, policy and procedures were discussed and approved. These are as follows:

A. *Objectives*
To serve the man in the field; to serve as a clearhouse for new ideas; to cor-ordinate our activities with a similar committee of the American Public Health Association; to request questions and proposals from the membership; to determine how much demand there is to find specific information about a given problem; to find the best methods for informing the membership about the existence of this Committee.

B. *Policy*
To get down to the grass-roots level. This Committee will provide a time and place where local sanitarians can exchange ideas and discuss professional problems with the experts in research. In effect, it will provide a common meeting ground. There must be a spirit of fellowship, sincerity and willingness to help. The great experts must never talk down to a man, but must be ever mindful of an attitude of mutual assistance. This is important if the Committee is to attain its objectives. The Committee does not abstract articles or submit an annual research project.

C. *Procedures*
Solicit proposals for the best methods to serve the man in the field. How can we promote discussion of problems by research and field men? Where appropriate, proposals received by this Committee should be assigned to existing committees. Where necessary, action may be taken to assign a problem to a research agency.

The Committee felt that a question and answer page in the Journal would be a desirable method for contacting the membership, and the Executive Board of the Association approved this suggestion. Accordingly, an editorial entitled "Something New Has Been Added" appeared in this Journal in January, 1957. The editorial emphasized that the primary function of the Committee was to serve the man in the field. At the same time, suggestions were requested for a name for the Question and Answer page. Questions were to be addressed to: Department of Public Health, Indiana University Medical Center, Indianapolis, Indiana. Some names which have been submitted are: The Ouija Board, Saniquiz, The Query Box, The Brain Trust, Sanitary Nutcracker, Answering Your Saniquestions, Sanitary Information, and Ask and Be Answered.

To date, about a dozen questions have been sent to the Chairman. In each case, the question is referred to the appropriate expert on this Committee. In the event the information is not available within the Committee, the committee member suggests one or more names to the Chairman who then follows up with a letter to the new reference. This simple plan works well and should be continued.

With regard to reference made by this Committee to trade-marked products or classes of products, it was unanimously voted that the Committee would neither recommend, or disapprove of such items. Consequently, the sanitarian inquiring about a given product will have to decide for himself by a suitable test program.

[1]Presented at the 44th Annual Meeting of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., at Louisville, Kentucky, October 7-10, 1957.

Recommendations

1. The Committee unanimously recommends to the Executive Board that the IAMFS appoint a committee to study the labeling of dairy products for intra-state shipments, since these are not subject to Federal Food and Drug Administration regulations, and the need for regulation of these products is evident. It is suggested that said committee would make recommendations which would aid in eliminating confusion regarding inadequacy of labeling and conflicting labeling regulations which now exist.

2. Information is needed on the handling and storage conditions of dairy products in retail channels. It is recommended that the Executive Board of the IAMFS appoint a committee to obtain facts, study them, and report their recommendations to the Association.

3. The Committee recommends to the Executive Board of the IAMFS the need for bacteriological sanitary standards for pre-cooked frozen foods and that the Committee on Frozen Foods be encouraged to extend its work to obtain additional facts, to study the problem further, and to make recommendations.

4. The Committee recommends that the Question and Answer page be continued, and that all questions should be addressed to: International Association of Milk and Food Sanitarians, Inc., Box 437, Shelbyville, Indiana.

Samuel H. Hopper, *Chairman*,
Indiana Association
Fred C. Baselt, Secretary, New York
L. C. Peckham, Department of Health,
Education and Welfare
U. S. Public Health Service
Chicago, Illinois
Howard Froiland, South Dakota
K. G. Weckel, Wisconsin
Harold J. Barnum, Colorado
W. K. Moseley, Indiana Association
C. K. Johns, Ottawa, Canada
W. C. Lawton, Minnesota Association
Warren Litsky, Massachusetts
J. E. Guinn, Wyoming

REPORT OF THE COMMITTEE ON ORDINANCES AND REGULATIONS PERTAINING TO MILK AND DAIRY PRODUCTS — 1957[1]

The Committee on Ordinances and Regulations last year reviewed and summarized state laws and regulations pertaining to milk for manufacturing for each of the forty-eight states and concluded in its report that " . . . more attention should be given to the sanitary requirements for the production of milk used for manufacturing purposes with corresponding emphasis on appropriate quality standards."

Logically, the 1957 Committee considered it important to continue the project and develop further the suggestion contained in the 1956 Committee Report. Due to the delay in commencing committee activity this year, however, occasioned by a change in chairmanship, the Committee on Ordinances and Regulations has had time only to resolve the basic issue and will continue its investigation of various aspects of the suggestion incorporated in the 1956 report. A report of this investigation and further recommendations will be submitted by the Committee on Ordinances and Regulations at the 1958 Annual Meeting.

During the year, an affiliate of this Association submitted to the Committee a resolution which proposed certain changes and additions in Appendix D (Water Supplies) of the Milk Ordinance and Code - 1953 Recommendations of the U.S. Public Health Service.

The proposed changes as interpreted by the Committee:

1. Alter Section 1 under "Water Supplies" to permit in new construction the use of pits within 10 feet of the well for pumps or pump machinery, as in the case now for existing construction, if the pit meets the proposed amended construction requirements of Section 2 (e).

2. The amended construction requirements, which would also apply to existing construction, propose that in addition to the present requirements pertaining to pit drainage, a sump pump, if used, should discharge "to the ground surface so it will flow away from the well," or drain, "to a dry well 30 feet from the well."

The Committee is of the opinion, in respect to item 1, that the acceptance of pits within 10 feet of the

[1]Presented at the 44th Annual Meeting of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., at Louisville, Kentucky, October, 7-10, 1957.

well for pumps or pump machinery, in the case of new construction, would tend to retard the development of water supplies embodying a protection feature without which they are more likely to become contaminated from surface or other drainage. In respect to item 2, however, the Committee is in accord with provision that water discharging from a sump pump should flow away from the well.

The Committee, however, has referred this resolution to the U.S. Public Health Service for further study when revisions to the Milk Ordinance and Code are being considered.

The 1956 report of the Committee on Ordinance and Regulations recommended that adequate definitions for "frozen dairy foods retailer" and "counter freezers" be developed, which can be incorporated in the U.S. Public Health Service Recommended Code Governing Eating and Drinking Establishments. The present Committee will proceed with this assignment and submit proposed definitions for "frozen dairy foods retailer" and "counter freezers" at the 1958 Annual Meeting.

During the course of this Annual Meeting, the Committee has received a request to initiate an investigation of variations in labeling requirements. The extensiveness of this project and the ways and means of accomplishing uniformity in labeling will be carefully studied by the Committee during the ensuing year.

The Committee on Ordinances and Regulations earnestly invites the membership of the Association to submit for review, directly or through their affiliate Association, comments, suggestions, and proposals which will advance the uniformity, practicability, and enforceability of regulations. It is through such cooperation that this Committee can most effectively serve the membership of the International Association of Milk and Food Sanitarians and also attain its objective.

Donald H. Race, *Chairman*

C. V. Christiansen

J. C. Flake

O. H. Ghiggoile

K. A. Harvey

C. H. Holcombe

W. R. McLean

E. Small

Stephen J. Wolff

REPORT OF THE COMMITTEE ON SANITARY PROCEDURE — 1957[1]

Following custom, two joint-meetings of the 3-A Sanitary Standards Committees have been held since the 1956 Annual Meeting of this Association, in Seattle. The first of these joint-meetings was held at The Elms, Excelsior Springs, Missouri, December 10-13, 1956. Twelve of the seventeen members of the Committee attended this joint-meeting. During joint-meetings, all tentative drafts of Sanitary Standards, or revisions or amendments, are reviewed in collaboration with members of the staff of the Milk and Food Sanitation Program of the U.S. Public Health Service. Four members of that staff attended this joint-meeting. In addition, representatives of the U.S. Department of Agriculture and of the U.S. Navy attended as observers.

Drafts of Tentative Sanitary Standards for Batch Pasteurizers and for Coin-Operated Bulk Milk Venders were reviewed, but were rejcted as incomplete and unsatisfactory. A report on the blend temperatures reached in farm bulk milk cooling tanks currently being marketed, requested at the last preceding joint-meeting in Bethesda, Maryland, in April, 1956, was presented by the chairman of the Farm Tank Task Committee. This report was discussed at length; but, since the survey had been conducted for exploratory purposes, and a draft of the Revision of 3-A Sanitary Standards for Holding and for Cooling Tanks had not been presented for consideration, no formal action was taken, except that the Task Committee was urged to find a solution satisfactory to sanitarians.

Agreement was reached upon the types of plastic materials acceptable for named parts of fillers and sealers of single service milk containers, provided they meet the non-toxicity standards of the Food and Drug Administration. The provision pertaining to defoaming devices in these tentative sanitary standards did not satisfy the Committee, however and the Task Committee was requested to seek a solution.

In collaboration with three members of the Committee on Farm Methods, the caucus prepared a list of features and appurtenances of milker pipeline systems to be incorporated into sanitary standards by a Task Committee of milking machine manufacturers. The chairman of this Task Committee was also requested to accept the bucket-type milking-machine check-valve test procedure developed by a subcommittee appointed at the April, 1954, joint-meeting, or to present a substitute test which would be acceptable.

An amendment to Section D7 of the 3-A Sanitary Standards for Stainless Steel Automotive Transportation Tanks for Bulk Milk Delivery and or Farm Pick-Up Service, pertaining to a permissive structural detail of the manhole dust cover, was approved, and has been published (J. Milk and Food Technol., **20**:104. 1957).

During the joint-meeting a number of conferences were held between members of the Sub-Committee which had formulated the 3-A Accepted Practices for the Installation, Operation, Testing, and Cleaning of High-Temperature Short-Time Pasteurizers, and the Committee, regarding the precise coverage of these Accepted Practices, and concerning the conditions under which a homogenizer may be located downstream from the flow-diversion valve.

Because of his retirement from his position with the New York State Department of Health, and for reasons of professional ethics, Clarence W. Weber, a valued member of the Committee since 1942, presented his resignation at the last session of the Excelsior Springs joint-meeting. His letter of resignation, and the Committee's expression of loss, appeared in the January, 1957 issue of the *Journal of Milk and Food Technology*.

The second joint-meeting of 3-A Sanitary Standards Committees was held at the Kenwood Golf and Country Club, Bethesda, Maryland, May 13-16, 1957. Seven members of the Committee, six representatives of the U.S. Public Health Service, and one representative each from the Army, Navy, and Department of Agriculture attended the caucus sessions of sanitarians.

A modification of the test for the effectiveness of check-valves of bucket-type milking machines, recommended by the subcommittee appointed in April, 1954, was approved. An editorial committee, charged with the duty of incorporating this check-valve test procedure into the Sanitary Standards for Bucket-Type Milking Machines, tentatively approved at the Bear Mountain Park joint-meeting, in April, 1954, met in Chicago on August 6. The tentative draft evolved will be submitted to the caucus of sanitarians at the next joint meeting of 3-A Sanitary Standards

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[1]Presented at the 44th Annual Meeting of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., at Louisville, Kentucky, October, 7-10, 1957.

Committees, and prospects for approval there, and final adoption, are favorable.

The submission of the outline of proposed coverage of the 3-A Suggested Method for the Installation, Operation, and Cleaning of Milker Pipeline Systems, devised at the Excelsior Springs joint-meeting, has resulted in progress in an initial draft of tentative sanitary standards for such pipeline appurtenances as receiving jars or vacuum breakers, weight jars, can-filling valves, weigh-jar valves, milk-cocks, etc.

Agreement was reached on the provision of the Tentative Sanitary Standards for Fillers and Sealers of Single Service Containers pertaining to defoamers. Publication of this 3-A Sanitary Standards has been delayed because of a question as to the toxicity of boiler compounds named in this sanitary standards, the use of which had been declared permissible. This question is still unresolved.

Because of the request, by several manufacturers of separators and vacuum pans, for greater clarity in the provision of the unpublished sanitary standards for the prevention of overflow of condenser water into the product being processed, and the time consumed in effecting the necessary editorial revisions, the publication of the 3-A Sanitary Standards for Milk and Milk Products Evaporators and Vacuum-Pans was delayed. These now have been published (J. Milk and Food Technol., 20:194. 1957).

Changes in the Tentative Sanitary Standards for Coin-Operated Bulk Milk Venders, recommended by the Sanitary Standards Subcommittee of the Dairy Industry Committee, were briefly presented to the caucus of sanitarians but were not formally discussed.

The Tentative Sanitary Standards for Separators, Clarfiers, and Standardizers were again rejected by the caucus of sanitarians due primarily to conflict in several provisions.

The Tentative Revision of the 3-A Sanitary Standards for Holding and/or Cooling Tanks did not reach the caucus of sanitarians for consideration, due to the fact that it did not satisfy the Sanitary Standards Subcommittee of the Dairy Industry Committee.

In Summary, during the interval between the 1956 and 1957 Annual Meetings of this Association, there were published (*a*) an amendment to Section D7 of the 3-A Sanitary Standards for Stainless Steel Automotive Transportation Tanks for Bulk Milk Delivery and/or Farm Pick-Up Service, and (*b*) 3-A Sanitary Standards for Milk and Milk Products Evaporators and Vacuum Pans. Type for publication of the 3-A Accepted Practices for the Installation, Operation, Testing, and Cleaning of High-Temperature Short-Time Pasteurizers is being set up, and publication should occur in the relatively near future. The 3-A Sanitary Standards for Fillers and Sealers of Single Service Milk Containers also will be published soon.

Sanitary Standards expected to be adopted at the next meeting, and to be published early in 1958, include those pertaining to bucket-type milking machines, and separators and clarifiers.

Sanitary Standards being developed include those pertaining to: plastics, rubber and rubber-like materials, freezers, air under pressure, coin-operated bulk milk venders, cottage cheese package filling equipment, ice cream package filling equipment, dry milk equipment, and batch pasteurizers. In addition there are the revisions of the 3-A Sanitary Standards for Holding and/or Cooling Tanks, and of suggested methods pertaining to milker pipelines cleaned in place.

The roster of members of this Committee includes the names of three new members. These are: John Andrews, Chief, Sanitation Section, Sanitary Engineering Division, State Board of Health, Raleigh, North Carolina; D.C. Cleveland, Director, Dairy and Food Division, Oklahoma City, County Board of Health, Oklahoma City, Oklahoma; and James A. Stalbird, Chief, Milk and Restaurant Section, State Department of Health, Albany, New York.

C. A. Abele, *Chairman*
John Andrews
H. E. Breer
E. B. Buchanan
D. C. Cleveland
Paul Corash
M. R. Fisher
H. Clifford Goslee
Mark D. Howlett, Jr.
Ben Luce
C. K. Luhterband
James A. Meany
Samuel O. Noles
Ivan E. Parkin
James A. Stalbird
D. B. Whitehead
H. L. Thomassen, Ex. Officio

NEWS AND EVENTS

FIRST INTER AMERICAN FOOD CONGRESS TO MEET

The first Inter-American Food Congress will be held at Bal Harbor, Florida, June 8 - 12, 1958.

Representatives from twenty one Latin American countries will attend and participate with representatives from the U. S. food industry, state and federal governments. Technical and industrial exhibits from Latin America and the United States will be on display.

The program is technical in nature with papers to be presented on nutrition, canning, meat products, citrus fruits, dairy plant operation, coffee research, quality control and marketing.

The Inter-American Food Congress will not only create better relationship between the Americas, it will also be the answer to the long existing need of the Latin American food scientist to gain recognition. As an outgrowth of this first congress a permanent organization will be formed with the prospect of meeting in both North and South America.

Proceedings of the Congress will be printed in both Spanish and English with bound copies made available to participants and others. Director of the Congress is J. Arthur Lewis, Chairman, Department of Food Technology, University of Miami, assisted by William Sainz of the Marine Laboratory, University of Miami and Arthur C. Fay, formerly with H. P. Hood & Sons of Boston.

1959 BUDGET REQUEST FOR WORLD HEALTH ORGANIZATION IS $14,300,000

A working budget of $14,300,000 for World Health Organization activities in 1959 was recommended by the WHO Executive Board at its meeting in Geneva, Switzerland. The 1959 sum represents an increase of $700,000 over the effective working budget established for 1958. The Board's recommendation will be submitted to the 11th World Health Assembly, opening in Minneapolis on May 28.

The Executive Board also recommended that the forthcoming Health Assembly approve the general program of work for 1959 submitted by Dr. M. G. Candau, Director. Malaria control, veneral diseases and treponematoses, endemo-epidemic diseases, public health administration, nursing, maternal and child health, mental health, and nutrition, are among the several areas of interest.

Progress in the five-year plan of malaria eradication was noted and the Board expressed the hope that governments would make voluntary contributions to the World Malaria Fund.

The board also authorized the publication of the reports of Expert Committees on addiction-producing drugs, biologic standardization, the international pharmacopeia, malaria eradication, poliomyelitis, water fluoridation, nutrition, brucellosis, and food additives.

During the session the board approved arrangements made for the Commemorative Session of the World Health Assembly to be held this year to mark WHO's 10th anniversary. This special session will take place in Minneapolis from May 26 to 28 and will be the occasion for addresses by high officials of the host country, Dr. Brock Chisholm of Canada, the first Director-General of WHO, and delegates from WHO member states will be in attendance.

FDA RULES ON COLOR LABELING

Placards may be used on retail displays of bulk citrus fruit to show that the fruit has been treated with a preservative without naming the chemical used, under a proposed regulation published by the Food and Drug Administration.

The action was taken as a result of petitions by grower organizations which contended that label declaration of preservatives on bulk fruit is impracticable.

This label declaration is required by law. Naming of the preservative chemical is also required by law, unless this is found to be impracticable. The proposed regulation is one step in arriving at a final determination on that point.

The FDA Commissioner George P. Larrick said the proposed regulation was issued for the purpose of obtaining as much information as possible as a basis for a final decision. The proposal would not change the present requirement of the law that preservatives may be used only in a way that will be safe.

Requests for exemption from the requirement for declaration of the preservative were filed by the American Farm Bureau Federation, United Fresh Fruit and Vegetable Association, and Sunkist Growers. Evidence was submitted tending to show that the declaration of the specific preservative used was impracticable because retailers may have at the same time several lots of the same citrus fruit bearing different preservative treatments. Petitioners said this could lead to errors in the labeling of bins, while to provide separate displays would be impracticable because of the increased labor cost and display space required.

Under the FDA proposal citrus fruit in packages, crates or net bags, for example, would continue to show the common or usual name of any preservative used. The FDA said that the petitions did not furnish reasonable grounds for publishing a proposed exemption that would apply to citrus in packaged form, to citrus before it is offered for retail sale, or to any other fruit or vegetable, whether or not in packaged form.

INTERIM MEETING HELD BY EXECUTIVE BOARD

The Executive Board of the IAMFS met in New York City, April 25 and 26 to consider a number of important issues which required discussion and action.

The program for the 45th annual meeting was reviewed in detail. The meeting will be held early in September at the Hotel New Yorker. Speakers have been engaged and arrangements are moving along satisfactorily. The New York Association and the Cornell Dairy Institute will serve as co-hosts.

The Board deliberated at some length on the matter of the professional development of the Sanitarian. A number of avenues of approach were discussed. Registration by legislative enactment appears to be one of the preferred ways of defining education and qualifications for building toward professional status. Some dozen states and one territory now have such requirements. Three other states have developed and are using voluntary certification sponsored by their affiliates.

While IAMFS took a positive and affirmative action favoring registration at the annual meetings in 1954 and 1955, it was felt that more promotion is needed over and above the suggested model act that was developed in 1955. The need for a committee on Registration which would explore methods of procedure, mechanics of introduction of the Act and the content of such legislation seemed highly essential. Such a Committee is to be appointed.

Another matter discussed at considerable length was the professional program of the Association and how it can best serve the interest of members. The need for a planned objective program was indicated. The whole area of future growth and Association obligations were given consideration. In this case it was felt a study committee consisting of members with broad backgrounds in their professions and with a thorough knowledge of Association affairs should be appointed to make a careful analysis of the situation followed by recommendations for positive action.

Other subjects discussed included budgetary and financial matters, committee objectives and appointments, relationship with other organizations, and constitutional revisions.

While there are a number of problems requiring special study the affairs of the Association and the Journal are currently in excellent shape.

NEW STATE REGULATION ON FARM BULK MILK IN NEW JERSEY

The New Jersey State Department of Health recently promulgated, *Rules and Regulations Governing the Production and Handling of Farm Bulk Milk.*

In the regulations, "Farm Bulk Milk shall mean and include all milk produced on a dairy farm which is deposited in one cooling or refrigerated tank on the farm."

In addition to the usual sanitary requirements for operation and maintenance, a section entitled, "Quality Control", includes the following provisions:

(a) Persons transporting Farm Bulk Milk shall collect the same from the producer at least every other day.

(b) All persons transporting Farm Bulk Milk shall at least twice each month collect a sample of each producer's milk. From one sample, a bacterial estimate shall be made by the standard agar plate method and also a thermoduric estimate. From the other sample, a bacterial estimate shall be made by the standard agar plate method and a direct microscopic clump count including an interpretation of possible causes of any poor sanitary quality.

(c) All persons transporting Farm Bulk Milk shall collect at least once each week a sample of milk from each compartment of each transportation tank and have made thereon a bacterial count by the standard agar plate method and a thermoduric count after laboratory pasteurization.

(d) Persons collecting samples under the provisions of (b) and (c) above shall investigate the cause and take appropriate action to correct any conditions causing any body cell count which is abnormally high or otherwise suspicious and which exceeds the following limits:

Thermoduric Count for farm bulk milk as produced	10,000
Thermoduric Count for farm bulk milk as transported in tanks	20,000
Producer's samples	50,000
Transportation tank samples	100,000

(e) Persons transporting Farm Bulk Milk shall cause sidiment tests to be made at least each month of each producer's milk by methods and standards acceptable to the Department.

(f) Persons transporting Farm Bulk Milk shall inspect the milk of each producer at the time of its collection and reject all such milk that is abnormal

in appearance or odor, or is unacceptable for any other reason.

(g) All sampling and measuring devices for Farm Bulk Milk shall be maintained in a sanitary manner and shall be sanitized immediately prior to insertion into that milk.

(h) Persons transporting Farm Bulk Milk shall obtain and record the temperature of such milk at the time it is collected for transportation.

(i) All inspection and quality control records of the dairy farms from which Farm Bulk Milk originates shall be filed with the fieldman directly responsible for inspecting those farms.

(j) Persons now transporting Farm Milk shall within 90 days of the effective date of these regulations provide the State Department of Health with the names and addresses of each producer of Farm Bulk Milk which is collected by them and inform the Department whether such milk is collected daily. Such persons shall also inform the Department of the name and address of each person who is to take samples for quality determinations and the name and address of the laboratory making chemical and bacterial examinations.

Persons desiring to engage in the transportation of Farm Bulk Milk after the effective date of these regulations shall provide all the information as above prescribed to the State Department of Health prior to transporting such milk.

PAPERS PRESENTED AT AFFILIATE ASSOCIATION MEETINGS

Editorial Note: The following listing of subjects presented at meetings of Affiliate Associations is provided as a service to the Association membershp. Anyone who desires information on any of these subjects is encouraged to write to the Secretary of the Affiliate Association concerned for the address of the speaker. Information desired then may be requested from the speaker (a copy of the paper presented may be available for the asking).

MINNESOTA SANITARIANS ASSOCIATION

(Annual Meeting — Sept. 19, 1957)

Mr. G. H. Steele, Sec.-Treas., Minn. Dept. of Agriculture, State Office Building, St. Paul, Minnesota

MILK SECTION

Economic aspects of loose housing. Dr. S. A. Engene
Off-flavors in raw milk. Dr. E. L. Thomas
Some field investigations on rancidity. Mr. V. S. Packard
3-A Sanitary standards for farm dairy equipment. Mr. C. A. Abele
Detection of abnormal milk by filtration methods. Mr. B. B. Kiser
New tests for detecting mastitis. Dr. J. C. Olson, Jr.
Factors to consider in the cleaning of bulk tanks. Dr. W. C. Lawton, Dr. J. C. Olson, Jr., Dr. J. J. Jezeski
Grade A field work — its importance and responsibilities. Mr. L. C. Peckham

FOOD SECTION

Antibiotics. Dr. Milo Swanson
Irradiation. Dr. Howard E. Bauman
Refrigeration — How It Works. Mr. Arnold Flikke
Changes Occurring in Handling Frozen Foods. Mr. J. D. Winter
Foreign Matter in Foods. Mr. Ronald T. Ottes
The Development and Public Health Significance of Vending Machine Standards. Mr. David E. Hartley

(REGIONAL MEETINGS — JULY 29, 30 AND AUG. 5, 7, 1957)

Mastitis — Its Causes, Prevention and Influence on Industry. Dr. R. K. Anderson
A Sanitarian Looks at Loose Housing. Mr. G. H. Steele
Rancidity — A Problem — Cause and Effect. Dr. J. C. Olson, Dr. J. J. Jezeski
"Government Standards" — How to Meet Them. Mr. E. R. Bartle
"Tools of the Trade" — How to Use Them. Mr. B. M. Zakariasen
Problem of Farm Bulk Tanks — Panel Discussion. Dr. J. H. Gholson, Mr. H. E. Birdsall, Mr. Marshall Inman
Follow-up on Inferior Milk in a Grade A Program. Dr. W. C. Lawton
Finished Product Evaluation. Dr. J. C. Olson, Jr.

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HELPFUL INFORMATION

Editorial Note: Listed below are sources of information on a variety of subjects. Requests for any of the material listed should be sent by letter or postcard to the source indicated.

Marketing Milk by the Bulk Tank Method. Circular available from Georgia Agric. Expt. Sta., Bulletin Room, Athens, Ga.

Agridata. A new periodical bulletin published by Chas. Pfizer and Co., Agric. Res. and Develop. Dept., Terre Haute, Ind. Feature article, Aug. issue, *Mastitis.*

Textbook of Meat Inspection. By Horace Thornton, published by Wilkins and Williams Co., Baltimore, Md. 3rd ed. 566 pgs. *A Manual for Dairy Testing.* Available from Kimble Glass Co., Toledo, O.

Bacterial Food Poisoning and Its Control. Bulletin 493 available from Bulletin Room, College of Agric., Univ. of Mass., Amherst, Mass.

Blackleg of Cattle. Available from Supt. of Documents, Washington, D. C. 5 cents.

Diptheria Health Information. Available from Supt. of Documents, Washington, D. C. 5 cents.

An Analysis of Federal Court Decisions Relating to Marketing of Fluid Milk. Res. Bul. 200, Journal 1957, Wisc. College of Agric., Madison, Wisc.

Cleaning and Sanitizing Bulk Milk Tanks on Farms. Kan. Agric. Expt. Sta., Circular 344, Manhattan, Kan.

Bulk Milk Tanks on New Mexico Dairy Farms. Res. Rept. No. 9, Agric. Expt. Sta., State College, New Mexico.

Methods of Determining the Total Solids of Fluid Milk. Tech. Bul. No. T-67, Okla. A & M Expt. Sta., Stillwater, Okla.
Cost of Operating Bulk Milk Tanks on Kansas Farms. Bul No. 383, Kansas Agric. Expt. Sta., Manhattan, Kan.

Financing and Operation of Local Grade A Milk Ordinance in Indiana. Bul. No. 645, Ind. Agric. Expt. Sta., Lafayette, Ind.

Judging and Scoring Milk. Farmers Bul. 2111, Office of Information, USDA, Washington, D. C.

Dairy Bacteriology. A book by B. W. Hammer and F. J. Babel. 4th Ed., 614 pages, Published by John Wiley and Sons, New York, N. Y. $9.00.

Brewers Guide to Effective Sanitation. Bulletin available from Oakite Products Co., 19 Rector St., New York 6, N. Y.

Manual of Septic Tank Practice Developed in Cooperation with the Joint Committee on Rural Sanitation. Bul. available from Supt. of Documents, Washington, D. C. 35 cents.

Sporadic Bovine Encephylomyelitis. Tech. Bul. 18, So. Dak. Agric. Expt. Sta., Brookings, So. Dak.

Are Milk Sanitary Regulations Trade Barriers? Special Circular, Economic Information, U. S. Dept. Agr., Vol. 27, No. 2, May, 1957.

Recommendations for More Effective School Milk Programs. Res. Bul. 74, Bulletin Room, Ohio Agric. Expt. Sta., Wooster, O.
Non-Corrosive Sanitizing of Stainless Steel. Tech. Bul. 203, Res. Dept. of Diversey Corp., 1820 W. Roscoe St., Chicago 13, Ill.

Dairy Microbiology. A book by E. M. Foster *et al.* published by Prentice Hall, Inc., Englewood Cliffs, New Jersey. $7.50.

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Farm Bulk Milk Tanks; financing and servicing, and other information related to bulk milk handling on Washington farms. Washington Agric. Expt. Sta., Pullman, Wash. Cir. 299. Jan. 1957.

Procurement Policies and Practices of a Selected Group of Dairy Processing Firms. Wisc. Agric. Expt. Sta. Res. Bul. No. 199, Madison, Wisc.

Sanitarians Handbook — Theory and Administrative Practice. By B. Freedman. 1083 pages. Published by Peerless Publishing Co., New Orleans, La. $14.75.

Questions and Answers About Bulk Milk Tanks. Circular No. 120. Available from Alabama Agric. Expt. Sta., Auburn, Ala.

Bacterial Food Poisoning and Its Control. Bul. No. 493. Available from Mass. Expt. Sta., Mailing Room, Munson Hall Annex, Univ. of Mass., Amherst, Mass.

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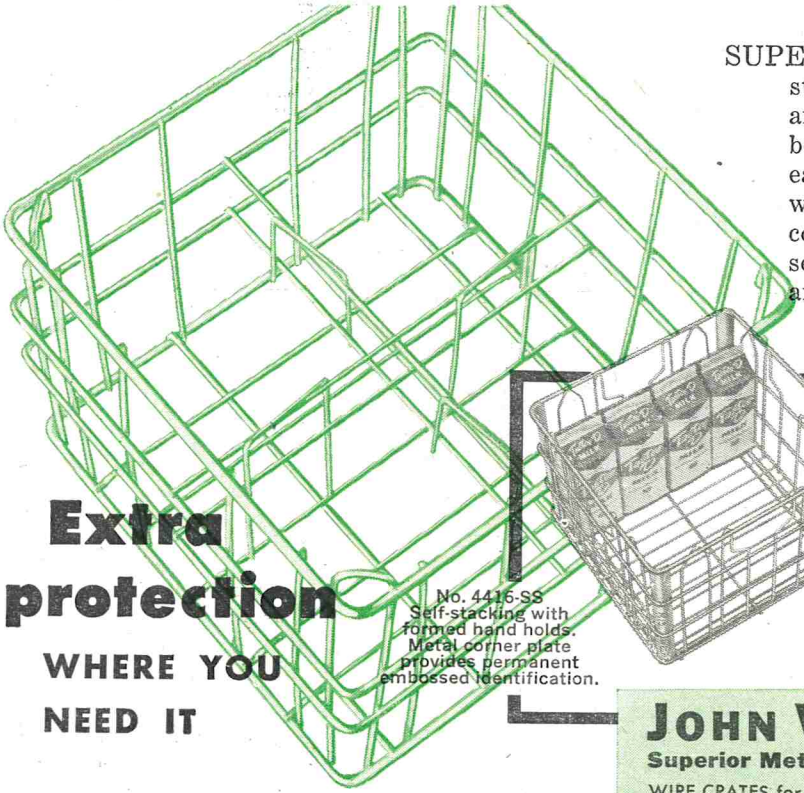

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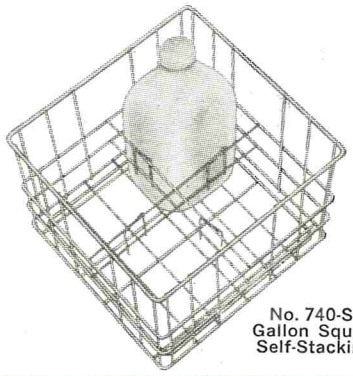

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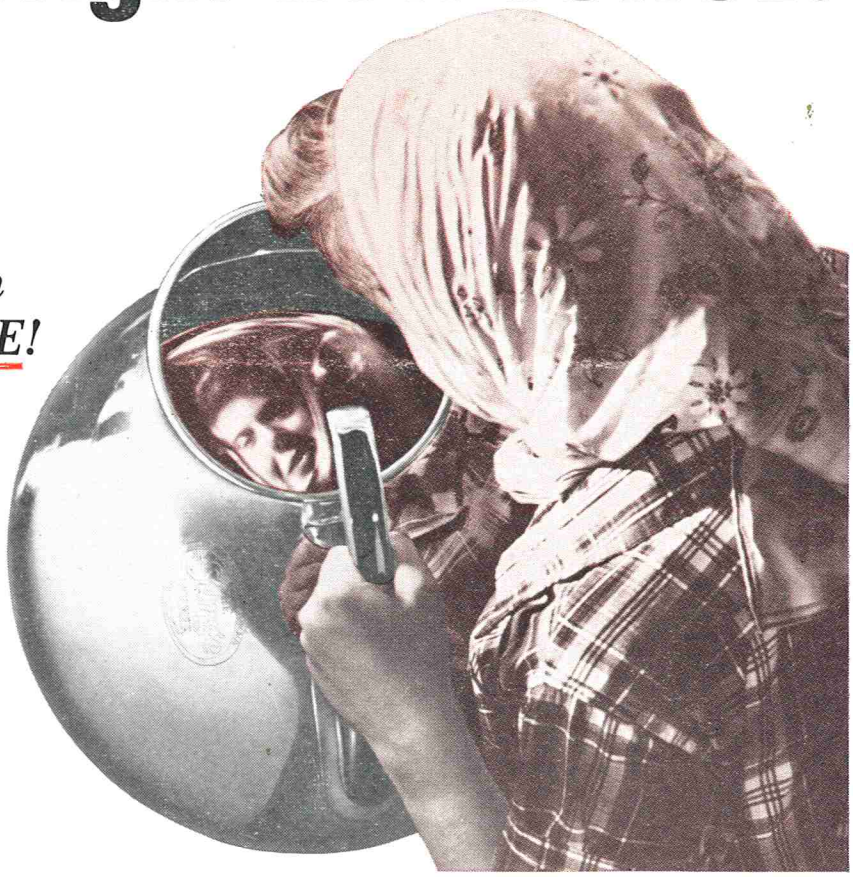

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