OCTOBER, 1962
Vol. 25 No. 10

Journal of

MILK and FOOD TECHNOLOGY

Official Publication

International Association of Milk and Food Sanitarians, Inc.

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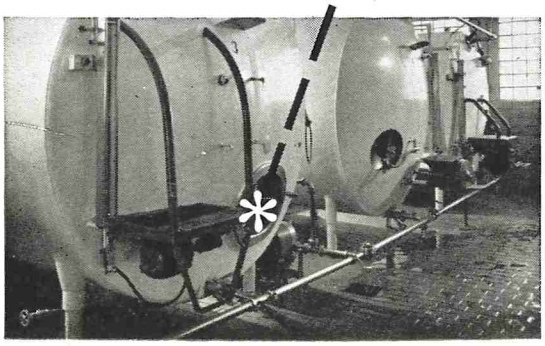

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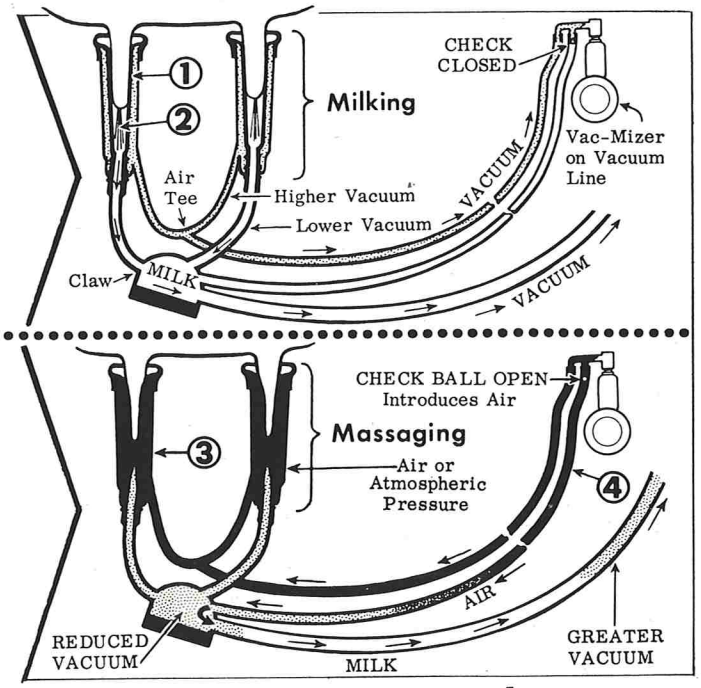

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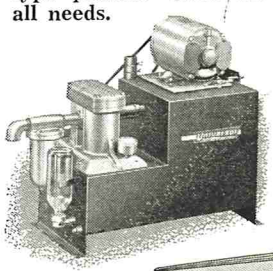

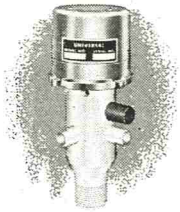

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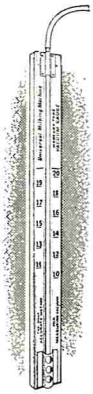

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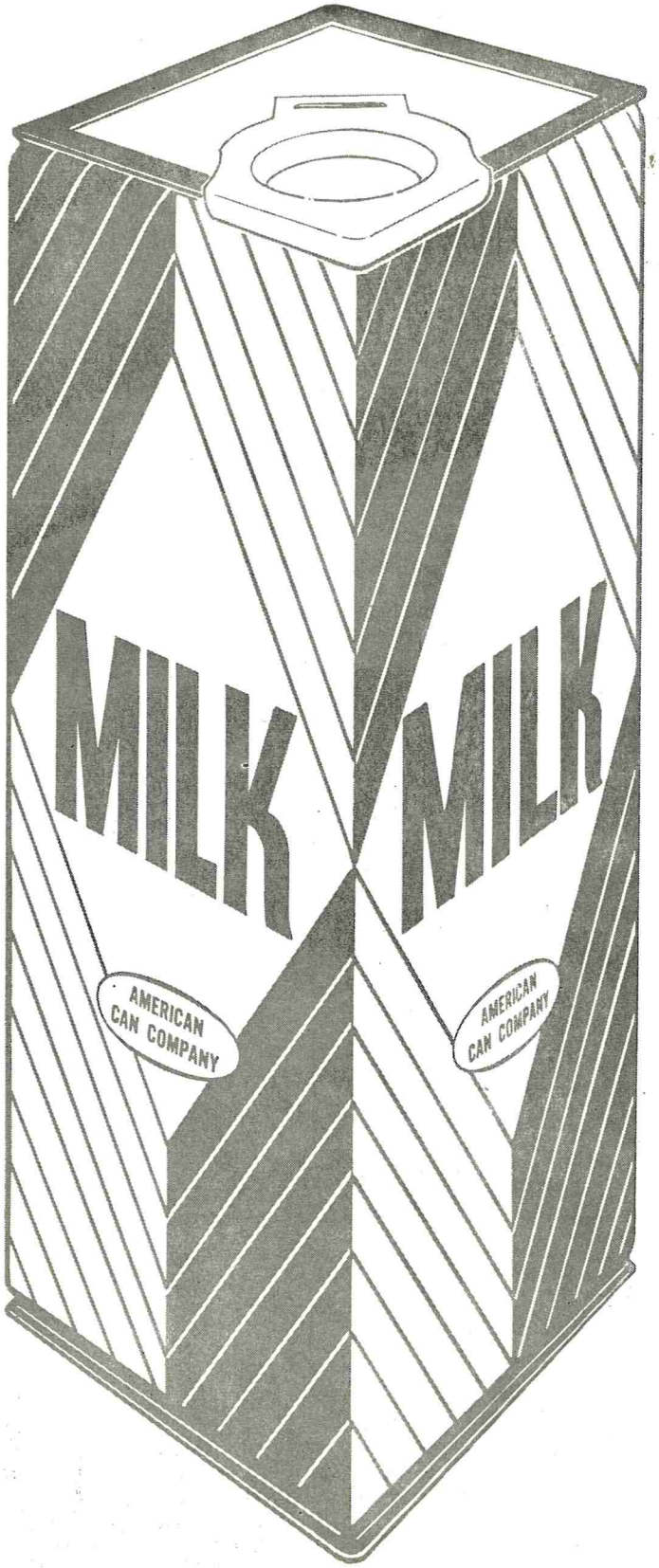

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EDITORIAL

The International Association of Milk and Food Sanitarians And You

EDITOR'S NOTE: The following editorial was published in the Fall issue of the New York State Association of Milk Sanitarian's Newsletter, Volume 6. No. 2.

In our habitual preoccupation with the many tasks which face us daily, we are likely to overlook or just take for granted some of the aids, facilities, and ideas which have been built up over the years and which we draw upon as needed, both consciously and subconsciously. We are likely to overlook the fact that knowledge is cumulative and we are largely indebted to the past for the knowledge which we consider to be our own.

The affiliate relationship which exists between the New York State Association of Milk Sanitarians and the International Association of Milk and Food Sanitarians is one of those things which are generally taken for granted, like distant relatives. For the most part, they are disregarded but, nevertheless, they are nice to have around in an emergency.

In the back of our minds most of us have a pretty well established realization of the value of I.A.M.F.S. to the State Association in general and to our individual members in particular but a recapitulation of some of these values may be in order.

The Journal of Milk and Food Technology

One of the most significant functions of the I.A.M.F.S is the monthly publication of the *Journal of Milk and Food Technology* which is a highly regarded periodical dedicated to present to milk and food sanitarians the latest studies and developments in their chosen vocation. This helps sanitarians attain a broad understanding of their work and an improved ability to fulfill their professional obligations. It goes without saying that even our Association possesses neither the scope, the financial or personel resources to publish such a periodical and this statement takes nothing away from our excellent Annual Report or Quarterly Newsletters.

National Relationships

An organization which is national in scope can function much more effectively than a local group on issues which have broad implications. Suggesting a format for laws pertaining to the registration of sanitarians, advocating minimum professional standards for sanitarians and maintaining liaison with other organizations such as the American Public Health Association, the American Dairy Science Association and the Association for the Advancement of Science are activities which illustrate this point. It is difficult to question the conclusion that, standing alone as an isolated State Association, we could not achive as close a relationship as is effected by the International.

Availability of Committee Studies and Reports

I.A.M.F.S. has a large number of standing committees which have the responsibility of investigating and making available through published reports, the results of their findings and conclusions. Among the more widely known of these committees are the Committee on Sanitary Procedure which participates in the formulation of 3-A Standards for Dairy Equipment, the Committee on Farm Practices which provides excellent guide lines in this area of activity and the Committee on Education and Development which, among other things, has formulated a 'Model Sanitarians' Registration Law."

Some of the other outstanding committee reports of I.A.M.F.S. include "Accepted Practices for the Sanitary Construction, Installation, Testing and Operation of HTST Equipment" and the classical "Procedures for the Investigation of Food Poisoning Outbreaks" which was developed by the Committee on Communicable Diseases Affecting Man. It may also be noted that the present National Mastitis Conference Program was sparked and initially sponsored by the International Association of Milk and Food Sanitarians.

Annual Meetings

The annual meetings of the International give a finely balanced program of timely interest presented by outstanding men in their respective fields. They also afford an opportunity of meeting and mingling with recognized leaders in environmental sanitation and related scientific fields and enable a free exchange of experiences by co-workers from other parts of the country so that members may enhance their knowledge and ability to deal with local situations.

Paul Corash
New York City Dept. of Health
New York, N. Y.

FEDERAL REGULATION OF BACTERICIDAL CHEMICALS USED IN BUILDING, INDUSTRIAL AND INSTITUTIONAL SANITATION PROGRAMS

L. S. STUART

Pesticides Regulation Division
Agricultural Research Service
United States Department of Agriculture

All bactericidal chemicals used in building maintenance programs and all germicides, disinfectants and sanitizers used in industrial and institutional sanitation programs except those recommended for application solely on or in the living body of man or other animals are subject to regulation under the Federal Insecticide, Fungicide and Rodenticide Act *(5)*. If a product is to comply with the requirements of this law it must be registered with the Department of Agriculture before shipment is made in interstate commerce, it must be offered for sale under claims and representations which do not differ in substance from claims and representations made in connection with its registration, packages must possess the net content claimed, the product must have the chemical composition claimed and give the results claimed when used as recommended and directed. The label must also bear a suitable product name and carry such caution and warning statements as may be necessary for the protection of the public.

The manufacturer and distributor will insist that the primary purpose of all labels and labeling is to promote the sale of the product. Frequently complaints are received to the effect that the requirements of the various labeling laws are such as to detract from the artistic appearance of the package and the sales appeal of the product. We would agree that a label artistically created in ignorance of these basic requirements may subsequently be seriously distorted by the addition of all the legally required information. If, on the other hand, the designer recognizes the necessity for these requirements provisions can be made for them so that the label will be both artistic and in compliance with the law. This has been demonstrated many, many times.

Label claims are second only to artistic appearance in promoting the sale of products. They are used as a primary basis for comparing competitive items and these must be given special attention by the Department in reviewing labels submitted for registration and examining official samples collected in connection with enforcement activities. This is important both from the standpoint of promoting fair trade practices and purchaser protection. Any program for evaluating label claims must be based on uniform definitions and a common understanding of words and terms *(6, 7)*. Therefore, we should review some of the words and terms which are commonly encountered in connection with the distribution of bactericidal chemicals.

The label claim "sterilizer," indicates that the product will destroy or eliminate all forms of life, applied as directed, which might ever be encountered in the applications recommended including all forms of vegetative bacteria, bacterial spores, fungi and viruses. The claim "sterilization" means the act or process of freeing from all living forms of life. These terms are quite often misused by laymen and scientists but there is no disagreement as to their technical meanings. The Department adheres to the strict technical definition and is supported in this position by the Council on Pharmacy and Chemistry of the American Medical Association *(1)* which has formally gone on record as disapproving of the use of the terms "sterile," "sterilize," and "sterilization" in any manner other than in their true meaning. They have stated in part "These terms are not relative and to permit their use in a relative sense not only is incorrect but opens the way to abuse and misunderstanding." Thus, such terms as "practically sterile," and "commercially sterile" are not considered acceptable. A product, an instrument, a surface is either sterile or it is not sterile. There is no intermediary state of sterility. The only chemicals that have been accepted for registration as sterilizers are ethylene oxide gas with application in especially constructed devices such as autoclaves and beta-propiolactone in the fumigation of tightly closed spaces.

The unqualified terms "kills germs" and "kills bacteria" are considered to be nearly synonymous to the term "sterilizer." Since no differentiation is made with respect to the type of germs which will be killed, the purchaser has a right to expect that the product will kill all germs and all bacteria including the most resistant bacterial endospores. These terms are badly misused in advertising media. The terms "kills most germs," "kills many germs," "kills most bacteria" and "kills many bacteria," are synonymous to the qualified terms "germicide," and "bactericide."

The term "germicide" refers to an agent that kills most germs. It is commonly considered applicable to substances that kill the growing forms but not necessarily the resistant spore forms of germs, except where the intended use is directed specifically against organisms forming spores, in which case, the spores must also be killed. The word is synonymous with the word "bactericide" except that the latter is a more precise term applying only to bacteria, whereas the word "germicide" may also be applied to substances active against microorganisms other than bacteria. The word "disinfect" means to free from infection, especially by destroying disease germs or other harmful microorganisms. Thus, a disinfectant is an agent that frees from infection. As with the word "germicide" it is commonly accepted as referring to products that kill the growing forms but not necessarily the resistant spore forms of bacteria except where the intended use is specifically against a spore forming infectious agent, in which case the spores would have to be killed. In a like manner, a disinfectant recommended for use specifically against an infectious virus would have to irreversibly inactivate the virus. The word implies a degree of specificity in that proper use is contingent on the purpose for which it is employed or the type of infectious agent which must be killed and/or for which there is reason to suspect may be present. A disinfectant is used where the complete elimination of an infectious agent is desired or required.

The word "sanitize" means to reduce the number of bacterial contaminants to safe levels as judged by public health requirements or to a significant degree where public health requirements have not been established or where the objective is not directly related to public health measures. The word "sanitizer" refers, therefore, to an agent which will sanitize. The words "sanitizing" and "sanitization" refer to processes which sanitize. They carry with them the connotation of cleanliness and are commonly used in reference to processes involving cleaning *(3, 8)*.

In a bacteriological sense to "disinfect" would be to "sanitize." However, due to the cleaning connotation referred to above it would probably not be acceptable to classify all disinfecting processes as sanitizing processes. To sanitize it might not be necessary to disinfect unless the object of the sanitizing process was the destruction of an infectious agent known or suspected of being present. The words "bacteriostatic," "fungistatic" and "germistatic" all refer to inhibition of growth with bacteria, fungi, and germs respectively as opposed to a cidal or killing effect. Since it has been shown that microorganisms in a state of chemical stasis can initiate infections in living animals, static treatments should not be recommended or used as replacements for cidal or disinfecting processes. It is apparent that this fact is not clearly understood by many sanitarians and for this reason the Department is now requiring label disclaimers on such products to the effect that they are not to be used in cleaning processes as a substitute for disinfectants. The word "antiseptic" has the broad dictionary definition of a substance opposing sepsis, putrefaction or decay. The Federal Food, Drug and Cosmetic Act *(4)* further defines this word as related to the labeling of drugs as a germicide, except in the case of a drug purporting to be or represented as an antiseptic for inhibitory use as a wet dressing, ointment, dusting powder, or such other use as involves prolonged contact with the body. Most scientists believe that this word should be restricted to use with products recommended for applications on or in the living body of man or other animals, and that applications in describing or labeling other types of products are misleading. According to such a restriction, the legal definition given in the Federal Food, Drug and Cosmetic Act *(4)* would be the only acceptable definition.

The word "sporicide" refers to a substance that will kill bacterial spores. Sporicidal claims may be accepted in connection with the labeling of germicides if the manufacturer submits acceptable data to show that the product will be effective against bacterial endospores, names the spores it will kill, and includes in the labeling specific directions for obtaining such results as opposed to the directions for disinfecting against the vegetative forms of bacteria. A "germicidal-detergent" would through basic definition have to possess the properties of both a germicide and a cleaner. Likewise, a "detergent-sanitizer" would have to have the properties of both a cleaner and a sanitizer. These designations may not necessarily indicate that the product will give the dual results named in one and the same application, but this is clearly implied and if it is not the case it is considered to be the responsibility of the manufacturer to provide adequate and clearly understandable directions on his label for obtaining both results.

The word "household" in the phrase "kills household germs" is usually considered to be qualifying in that it refers to the ordinary germs found in homes rather than germs associated with specific disease outbreaks. A claim such as "kills 99 percent of all household germs" would not be valid even for a disinfectant properly applied unless 99 out of each 100 species of bacteria found in households were killed. A 99 percent reduction in the total bacterial population in the household as measured by dilution plate counts on samples taken from representative surfaces would not support such a claim, although it

might support a claim such as "reduces the total number of household bacteria by 99 percent."

The claim "germ-proof" has been introduced in sales promotion programs by distributors of antimicrobial chemicals. There appears to be wide differences of opinion in the trade and among consumers over the meaning of this term. The dictionary definition of the combining form of the adjective "proof" firmly denotes imperviousness to, ability to withstand, and resistance against. Thus, the word must be assigned the basic meaning of resistance against the action of germs. Since it is recognized that germs attack, deteriorate, and destroy inanimate materials, and substances, it must be acknowledged that any process that protects materials against attack by bacteria is a germ-proofing process. On the other hand, the term frequently has been used in labeling and advertising with other words in a manner which clearly implies activities greater than this, and it has been claimed that a germ conscious public interprets this term as assuring freedom from infectious bacteria. This may be true, but it would seem technically unsound to classify a germ-proof material as equivalent to a material possessing self-disinfecting properties unless labeling and advertising claims associated therewith were such as to show that this was the intent of the manufacturer or distributor. "Self-sterilizing," "self-disinfecting," "actively germicidal," and "self-sanitizing" claims for surfaces and treated materials are frequently claimed and implied. Claims of this type have led to a great deal of confusion among sanitarians and deserve special attention. The nature of bacteria is such as to virtually rule out the possibility of the production of self-sterilizing, self-disinfecting or actively germicidal materials or surfaces. Bacteriostatic and self-sanitizing materials and surfaces may be encountered as the result of treatments with bactericidal chemicals but it should be emphasized that the value of such residual activities in sanitation programs must be considered to be within the mitigating category and should not be classified as protective insofar as preventing the spread of infectious bacteria is concerned.

Obviously, such a claim as "permanently germicidal" for a treated surface could not be justified.

Claims for effectiveness against specific diseases and specific infectious bacteria and viruses are commonly proposed and/or encountered. It is considered to be improper to claim that applications of any germicide or disinfectant to inanimate surfaces in a sanitation program will be effective against any specific disease. A disease is a condition and the words "typhoid," "tuberculosis," "cholera," "poliomyelitis," "anthrax," etc., describe specific pathological conditions. When used in labeling and advertising they imply that the product may have value in the treatment of the specific condition or conditions named and this is seldom if ever true. On the other hand, claims for effectiveness against the specific causative agents of diseases are acceptable, if true. Such claims are in basic agreement with the specificity connotation in the definition of the word "disinfectant."

In reviewing claims of this type proposed in connection with applications for registration the Department takes the position that it is the responsibility of the applicant to submit acceptable experimental evidence to show that the claim is true before it can be accepted. The type of experimental evidence considered to be acceptable will vary depending upon th organism and the nature of the disease. For example, with *M. tuberculosis* the manufacturer is required to submit data developed by *in vivo challenge* procedures because of the wide variations known to exist between virulent and avirulent strains of this organism and the difficulties encountered in growing these bacteria in artificial culture media.

The Federal law clearly states that bactericidal chemicals are *misbranded* if the labeling does not contain directions for use which may be necessary and, if complied with, adequate for the protection of the public. This has been interpreted by the Department to mean that the purchaser will obtain the results promised if he follows the directions given, without injury to person or property. It would seem obvious from this requirement that as the number of claims and recommendations are increased on the label so will the requirements for use directions in the labeling be increased. The concentration and mode of application of a specific product necessary to give an effective germicidal rinse with a cleaned beer glass could not ordinarily be expected to give effective disinfection in the cleaning of a terrazzo tile floor in a public wash room, or effective disinfection in a spray application to equipment, floors and walls of a dairy barn.

Germicidal chemicals vary with respect to acceptability in different applications. While strongly acid germicidal detergents may give effective disinfection of porcelain fixtures in bathrooms it would be difficult if not impossible to give directions for their use in disinfecting marble floors which would comply with the provisions of the Act. In a like manner, a highly odoriferous cresylic acid preparation might give effective disinfection of dairy farm milking equipment if applied according to certain directions but it is doubtful that any directions for such an application could ever be accepted as meeting the provisions of the law because of such factors as toxic residues and the contribution of off flavors and odors to milk. Thus, in general it can be stated that the

requirements for use directions vary according to the recommendations made, and the nature of the product.

With applications of chlorine type germicides, quaternary ammonium formulations and the so-called iodophors certain basic patterns of application in disinfecting dishes and glasses in restaurants and taverns and in sanitizing dairy and food processing utensils have been clearly established as acceptable to public health officials, and these patterns are used as a guide in determining the adequacy of the use directions proposed for or employed in labeling under the Federal law. It cannot be claimed that the minimum requirements of the Federal law in all these cases will meet all of the various local ordinance requirements on application procedures for such products, for these vary considerably with respect to such details as equipment requirements, concentration, temperature and exposure time. Nevertheless, some degree of uniformity does exist and by weighing the relatively uniform requirements against test results obtained under conditions of use a reasonably effective regulatory program has been developed.

In the case of products recommended for use on floors, walls, and fixtures in buildings and institutions, disinfecting and sanitizing procedures have not been studied by bacteriologists and public health officials sufficiently to develop uniform patterns of acceptable public health application procedures according to the chemical types of formulas available. During the past three years the emergence of the staphylococcus disease problem in hospitals and local communities has intensified interest in premise disinfectants and it is expected that studies initiated in connection with this problem will produce data which should eventually clarify this situation.

Currently in those situations where no official public health or professional medical recommendations exist, the Department bases its requirements on tests conducted in its own laboratories and/or information submitted by manufacturers on individual products. Most of the bactericidal chemicals employed in building maintenance routines and in industrial and institutional sanitation programs fall within this category.

Studies to determine effectiveness used as directed with these products require a certain amount of *in situ* testing as well as *in vitro* laboratory evaluations. However, *in situ* testing is very time consuming in that procedures of this type which yield statistically significant data usually have to be quite extensive. Thus, the Department places special emphasis on the development of *in vitro* laboratory methods which give results that can be interpreted accurately in terms of recommended use concentrations in various types of applications. Such methods are much more applicable to routine regulatory testing operations than *in situ* procedures.

The method most commonly applied in the evaluation of premise germicides and disinfectants is the Association of Official Agricultural Chemists' Use-Dilution Method (2). For example, it is held that with abrasive germicidal cleaners the decanted liquid from a slurry made with three parts of water and one part of product should kill the two test organisms named in this method. Results of tests by this procedure have correlated well *in situ* test results on such products. Likewise, it was found from *in situ* tests on toilet bowls that the concentration of porcelain cleaners which will kill in this method if vigorously appplied will give reasonably reliable disinfection of toilet bowl surfaces. In such evaluations a toilet bowl is considered to carry 96 ounces of residual water. Similarly, this method is employed to determine the maximum dilution of floor germicides which can be expected to be effective in disinfecting. *In situ* studies on floors have indicated that such products cannot be expected to disinfect at dilutions any higher than those effective in this method. They also indicated that the effective dilutions in this method might not provide for disinfection of floors if the product failed to provide a cleaning action in application or if an efficient precleaning job had not been done.

These latter results focused attention on combination germicidal-detergents. Such products have received wide acceptance for applications of this type and it is commonly recognized that their use avoids the serious problem of incompatibility between the specific germicidal chemical and residues of commercial cleaners inherent in two step applications. Unfortunately, an accurate method for determining the degree of cleaning necessary to get an acceptable result in disinfecting in either a one step or two step operation has not, as yet, been developed.

This brief review covers only certain aspects of the regulatory problem with the class of materials under consideration. However, the definitions and illustrations presented should provide an insight into some of the considerations involved in the Department's administration of the law.

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OBSERVATIONS ON THE EFFECTIVENESS OF BACTERICIDAL AGENTS IN RUBBER AND RUBBER-LIKE MATERIALS USED IN MILKING MACHINE INFLATIONS

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The weakest link in the sanitary chain between the cow and the consumer has often been the milking machine. While it is easy to keep the metal parts of a milking machine clean with relatively simple cleaning procedures, it is often difficult to keep the elastic parts in excellent condition because of the mutual solubility of the elastomers with fat. Fat is only one of the deteriorating agents of the elastic parts. Depending upon the formulation of the inflation, it is more or less vulnerable to light, oxygen, ozone, abrasion and other chemical and physical agents.

Inflations and other elastic parts are subject to many kinds of deterioration. Time alone is an important factor, and the relatively slow distribution of parts from manufacturer through distributor and jobber to the farmer, uses up a lot of the potential life of an inflation. To be completely satisfactory, an inflation must have good milking characteristics. It must not be tacky, it must have good resilience. It should be resistant to swelling from water absorption or fat absorption, and it should resist set, the tendency to take on a new shape when held under stress.

The stress of constant flexing should not cause cracking of the inflation, and the surface should not craze like old varnish. Some of the surface characteristics may not be due to the compound and its deterioration but are due to the nature of the surface of the forming mold. If the mold is rough, so is the inflation.

But most serious of all the problems is cracking caused by contact with ozone. Inflations are attacked by ozone and the surface may be permanently destroyed. Ozone is produced by electric motors and is present in small but destructive amounts in the atmosphere of most milk houses.

Surface deterioration of inflations is important because these changes produce conditions which can harbor bacteria. Often the elastomer cannot be properly cleaned. As bacteria grow, they not only help to destroy the inflation but, more important, increased numbers of bacteria are shed into the milk passing through the inflation. High bacterial counts are a principal quality problem of dairy farmers and, in our opinion, deteriorated inflations are a principal cause. Inflations are most often discarded because they are suspected of contributing to the bacterial count.

Previous work done in this laboratory *(3)* has indicated the overall superiority of neoprene inflations over natural rubber. This superiority was shown not only in greatly increased useful life on the farm and in better milking, but also in generally lower bacterial populations because the inflations exhibited surfaces which were much less likely to harbor bacteria mechanically.

In a further effort to reduce the bacterial population of the inflations on milking machines, work was initiated to find suitable bactericidal or bacteriostatic agents which could be incorporated into the elastomer to help control bacteria without impairing the quality of the inflation.

English workers, Cousins *et al. (2)*, have reported a study made with inflations containing tetramethylthiuram disulphide. Their inflations have been found to be mechanically poor and only very limited success with reduced counts could be shown.

Recent advances in bactericidal and bacteriostatic agents led us to believe that it might be possible to

incorporate an agent into rubber or synthetic formulations which would prevent bacterial growth. Inflations made of such materials might last longer and be more sanitary during their useful life.

METHODS

A large number of inflations have been studied containing different compounds[1]. It was finally established that the most suitable compounds were of the phenylphenol family, although many other agents were tried. Water soluble types did not prove as successful because they were difficult to distribute uniformly through the neoprene stock and their performance in the field was variable. Oil soluble types proved more satisfactory because of the mutual solubility between the compounds and the ingredients in neoprene. The data given herein are entirely based on inflations containing o-phenylphenol.

A large number of preliminary experiments had to be run to screen the compounds and determine the long-time effectiveness of the materials. For such evaluations the usual procedure was to fill the washed and plugged inflations with bacteriological media inoculated with large populations of the organism under test, or in some cases, a mixture of several organisms. The inflations were left full of this suspension and plated by standard methods at intervals, to determine the bactericidal and static effects.

The phenylphenol compounds were found to be very bactericidal for *Staphlococcus aureus,* pseudomonads, coliforms and mixed raw milk flora. The staphlococci used were food poisoning types or a culture isolated from bovine mastitis. Woodward and Bramble *(4)* have run similar experiments and their results are in agreement.

When satisfactory formulations were found, they were tested by continuous extraction with water to determine the bactericidal life. After two weeks of continuous extraction, no decrease in bactericidal effect could be detected.

We then attempted to place these experimental inflations on operating dairy farms for comparison with regular materials. However, the high cost of this procedure, the attrition of experimental materials through accident, and the lack of uniform predictable handling methods soon made it apparent that the experiments could not be properly performed. For this reason, an experimental apparatus was constructed in the laboratory where milking conditions could be simulated and uniform regular treatment given over long periods of time. This procedure held much less danger of mechanical injury of parts and insured a uniform treatment of all inflations.

The preliminary observations had indicated that it might be desirable to use inflations made from bactericidal elastomer and store them in water solution between milkings, theorizing that enough of the bactericide would be dissolved by the storing water to prevent growth of organisms. Another method of storing between milkings would be to store in lye solution which, of course, would minimize fat absorption. It was finally decided to give these inflations a number of different treatments and compare the results with those obtained using natural rubber without bactericide, buna-N without bactericide, neoprene without bactericide and neoprene containing bactericide. These inflations were then given a replicate of various treatments.

Inflations in metal shells were closed by putting a large rubber stopper in the wide opening. They were then filled with enough raw milk so that when the inflations were in the closed position the capacity was slightly exceeded. The inflations were connected by transparent glass tubing to a pulsating mechanism while they were suspended, wide opening down, in at waterbath of slightly over 100°F. The pulsating milk was in contact with the inflation surfaces and was visible in the glass tube at each stroke of the pulsator. The inflations were thus pulsated for a period of one hour, night and morning, each day during the course of the test. At the end of the milking period, the inflations were given differing treatments. Some were rinsed, and stored in distilled water, some rinsed and stored dry. Some were rinsed, washed, and sanitized, by good hand-washing methods and stored in distilled water. Others similarly cleaned were stored dry between milkings. The tests were run for approximately three months and a careful record was kept of the physical properties and the sanitary conditions as measured by bacterial counts.

The bacterial counts were made by the adaptation of the method of Claydon *(1).* The inflations were carefully plugged at the large end with sterile stoppers and using aseptic technique, 15 ml, or such amount as to just rise into the glass when flexed, of distilled water was introduced by pipette. The opening was plugged with a sterile pipette and pulsated for 5 minutes on the regular milking unit without immersing in water. Samples of the pulsated water were removed aseptically and plated by standard methods.

RESULTS AND DISCUSSION

At the end of the 12-week period, some of the inflations had set. This was the principal defect

[1]All bactericidal inflations were manufactured and provided by The D. S. Brown Co.

TABLE 1. LOGARITHMIC AVERAGES OF BACTERIAL COUNTS OF INFLATION RINSINGS OBTAINED DURING A 12-WEEK PERIOD

Type of inflation	Methods of cleaning			
	Cleaned, sanitized, wet stored	Rinsed only and wet stored	Cleaned, sanitized, dry stored	Rinsed only and dry stored
	(per ml)	(per ml)	(per ml)	(per ml)
Rubber	1,800,000	16,000,000	2180	2,640,000
Synthetic	410,000	26,000,000	517	14,600
Bactericide neoprene	35,000	1,280,000	9	850

TABLE 2. LOGARITHMIC AVERAGES OF BACTERIAL COUNTS OF INFLATION RINSINGS OBTAINED DURING THE 11TH AND 12TH WEEK OF A 12-WEEK PERIOD

Type of inflation	Methods of cleaning			
	Cleaned, sanitized, wet stored	Rinsed only and wet stored	Cleaned, sanitized, dry stored	Rinsed only and dry stored
	(per ml)	(per ml)	(per ml)	(per ml)
Rubber	4,800,000	120,000,000	4700	2,500,000
Synthetic	13,000,000	discontinued	67	7,600,000
Bactericide neoprene	3,160,000	32,000,000	10	430

found in the neoprene. However, the neoprene surfaces were still good at the test conclusion. The buna-N types showed serious ozone checking and the rubber types were at the end of their useful life.

The bacterial counts varied with the method of cleaning and storing. In Table 1, the logarithmic averages of the bacterial counts over the 12-week period, point up the effectiveness of the bactericide impregnated inflations. Regardless of type of inflation wet storage was unsatisfactory, although the bactericide impregnated inflations had significantly less population even under these conditions.

When inflations were dry stored, the impregnated inflations remained nearly sterile during the course of the experiment even though some inflations were allowed to dry for 30 minutes before rinsing and were not scrubbed. If the inflations were thoroughly scrubbed and sanitized, the rubber and buna-N inflations had reasanably low counts. The advantage of the bactericide impregnated inflations became apparent when the standarized cleaning procedure was reduced to a cursory treatment. It is evident that the presence of milk solids in trace amounts on the surfaces supported bacterial growth on all but the impregnated inflations. This is evident from Table 2. Here logarithmic average bacterial counts during the 11th and 12th weeks of the study (the last two weeks) are presented. These data emphasize the effect of age on the inflations. The rubber and buna-N inflations had deteriorated rapidly as was borne out by physical examination. If properly washed, deterioration was not very apparent from the counts but the poorly washed inflations were no longer bacteriologically satisfactory. Neoprene milking machine inflations formulated with a bactericidal agent resisted deterioration as was shown by physical examination. Bacterial growth was not supported even when washing methods were not perfect.

Good washing procedures must be recommended but the use of impregnated inflations would be a safeguard against marginal treatment of equipment.

As these experimental data were collected it became necessary to show that the use of these inflations would not result in contamination of the milk by the sanitizing compound or the elastomer itself. Accordingly, exhaustive tests have been run on the compound using the Federal Food and Drug Administration recommended procedures. Extractions with n-hexane, distilled water, 3% sodium chloride, and 3% sodium bicarbonate have been performed. The resulting data were submitted to the FDA. Subsequently, the USDA granted a registration number for the compound. This registration permits the labeling of this compound as a "self-sanitizing rubber." It would seem desirable that all elastomers used in contact with milk and food be examined by this rigorous examination.

The product can be produced in light colors, even white, which will "show the dirt." Unlike buna-N, this compound is made without heavy filling with

materials such as carbon black. Many CIP systems on farms and in plants which have carbon-carrying rubber components show a dark deposit when the stainless steel surfaces are swabbed. This compound is carbon black, ostensibly coming from the elastomers deteriorating in contact with chlorinated alkaline cleaners. The use of noncarbon-carrying elastomers might eliminate this "black deposit" problem since no carbon black filler is needed in the neoprene compounds.

These compounds hold promise for use in air and milk tubing on milking machines and for valves and gaskets in pipelines. Its possible uses in milk and food equipment are unlimited.

These inflations make better milk possible. They will save the plant money by reducing field calls; they will last longer and perform better. They will carry less bacteria from cow to cow. They represent a significant advance in the field of sanitation.

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A SCREENING TEST FOR DETERMINING THE SANITARY QUALITY OF PROCESSED POULTRY

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To show that a correlation exists between numbers of bacteria on processed poultry and the resazurin reduction test, a field study was made in hopes that a screening test could be used by the industry and health agencies to help determine the sanitary quality of processed poultry. The study was prompted by the findings of Walker, Coffin and Ayers *(3)*.

METHODS

The work done in this study was carried out by swabbing a series of different carcasses from various age groups. The age groups used were as follows: Fresh, 1 day, 2 days, 7 days. Fresh carcasses were swabbed shortly after killing and while they were still on the lines. All stored carcasses had been put into a chlorine ice slush for 24 hours for chilling and then packed in ice. The carcasses were sampled by swabbing an area 10 cm^2 *(3)*. To increase accuracy of the sample, a sheet metal strip, with a handle, was measured and cut to 2 cm^2. Using this metal strip as a guide, five different areas were swabbed. The areas swabbed were: the left and right rib cage, left and right thighs, and the lower back just above the tail.

Materials used and prepared were as follows:

1. Cotton swabs, three inches, sterilized in a screw cap vial by autoclaving at 121°C for 30 min.
2. Sheet metal strip with handle, measured area 2 cm^2, dipped in 95% alcohol and flamed before use.
3. Peptone, 10 ml of 0.02% solution at pH 7.0 ± 0.1., sterilized in 6-in screw cap vials at 121°C for 15 min.
4. Alcohol, 95% for sanitizing sheet metal strip.
5. Metal container suitable for sanitizing sheet metal strip between carcasses.
6. Sample case.
7. Recombined skimmilk, 5g/100 ml of distilled water sterilized at 115°C for 10 min to prevent "caramelization."
8. Trypticase soy broth.
9. Reduction incubator, preset at 30°C *(3)*.
10. Resazurin, certified for use in testing reduction in milk, prepared according to Standard Methods *(2)*.
11. Nutrient agar pH 7.0 ± 0.1 (Difco)
12. Buffered distilled water *(2)*.

Sampling was done as follows: the sterilized cotton swab was submerged in the sterile 0.02% peptone solution and pressed against the inside of the vial to expel excess solution. The five areas of the carcass previously described were swabbed. After each area was swabbed, the swab was rinsed in the peptone solution. After all areas had been swabbed, the swab was placed in a screw capped vial containing the peptone solution. The vials containing

the swabs were placed in the sample case containing crushed ice. Laboratory analyses were begun not later than 4 hrs after sampling.

The plating procedure was done in accordance with Standard Methods *(2)* with the following exceptions: swab vials were shaken 50 times in an arc of approximately 8 in, striking bottom of vial in palm of hand. Incubation was at room temperature. Plates were counted on the fourth day and counts were reported as number/ml or per cm^2.

The resazurin reduction test was as follows: to the peptone solution containing the swab, 1 ml of trypticase soy broth, 1 ml of recombined skim milk and 1 ml of resazurin solution was added. The vials were inverted twice and tempered to 30°C in the reduction incubator. After samples had tempered, readings were made every 30 minutes and samples were inverted twice at the end of each observation. Readings were recorded in minutes.

For color comparison a control tube may be prepared by using 10 ml of a 0.02% peptone solution, 1 ml of trypticase soy broth, and 1 ml of recombined skim milk and 1 ml of resazurin solution. Autoclave at 121°C for 10 minutes. This pink color will be the end point desired for the test specimens *(3)*.

RESULTS AND DISCUSSION

In order to illustrate graphically the results of this test, a modification of the Hubbs and Perlmutter method *(1)* was used. Figure 1 shows results obtained with carcasses when they were fresh, 24, 48 and 168 hrs. old. All except the fresh carcasses were packed in ice and under refrigeration up to the time they were sampled.

Fresh Poultry

The logarithmic mean bacterial count of 38 samples was 75,000/ml (Figure 1, A). The arithmetic average reduction time was 477 min (Figure 1, B).

After 24 Hours

The logarithmic mean bacterial count of 19 samples was 97,000/ml (Figure 1, C). The arithmetic average reduction time was 470 min (Figure 1, D). In correlating the results of fresh and 14-hr carcasses, it was found that the mean bacterial count for 24-hr. carcasses increased approximately 29% over that of fresh carcasses, while, at the same time the average reduction time decreased by 1.5%.

After 48 Hours

The logarithmic mean bacterial count of 19 samples was 260,000/ml (Figure 1, E). The arithmetic average reduction time was 459 min (Figure 1, F). This increase in bacteria count over the 24-hr carcasses was approximately 168%. The resazurin reduction time was correspondingly reduced by 2.3%.

After 168 Hours

The total count/ml of 19 samples increased to a logarithmic mean of 2,400,000/ml (Figure 1, G). This tremendous increase in bacterial population was closely paralleled by the resazurin reduction time which was reduced to an arithmetic average of 262 min (Figure 1, H). This group of carcasses when compared to 48 hr carcasses showed an 823% increase in the total number of bacteria. By a similar comparison, the resazurin reduction time was reduced by 43%. In comparing freshly processed carcasses with 168-hr carcasses, it was found that the bacterial count increase approximately 3100% during the 168-hr period. The resazurin reduction time was correspondingly reduced by 46.8%.

Based upon the results of this study, the grading of the carcasses in relation to the reduction time in minutes was considered as follows:

Excellent	>480 min
Good	360 min to 480 min
Fair	240 min to 360 min
Poor	<240 min

The preceding results relating reduction time to the condition of the the carcasses are practically identical to the results reported by Walker, Coffin and Ayer *(3)*.

As indicated in Figure 1, the results from approximately 100 carcasses were used in this paper. However, considerably more than 100 carcasses were swabbed and tested to find the desired dilution range for the bacterial plate count.

Approximately 80% of the fresh carcasses fell within plus or minus one standard deviation (43,000/ml) of the logarithmic bacterial mean of 75,000/ml.

The logarithmic bacterial count mean for carcasses after 24 hours was 97,000/ml with the standard deviation being plus or minus 50,000/ml. Of this age group, approximately 73% fell within this range.

The logarithmic bacterial count mean was 260,000/ml for carcasses after 48 hrs. The standard deviation for carcasses after 48 hours was plus or minus 120,000/ml. Approximately 73% fell within this range.

The logarithmic bacterial mean was 2,400,000/ml for carcasses after 168 hrs. The results from these carcasses showed the widest standard deviation range of all age groups, plus or minus 2,300,000/ml. Approximately 58% of this group fell within this range. At the same time, however, the correlation between average bacterial count and average reduction time was closer than for the younger carcasses.

SUMMARY AND CONCLUSIONS

The results indicate that there is a definite cor-

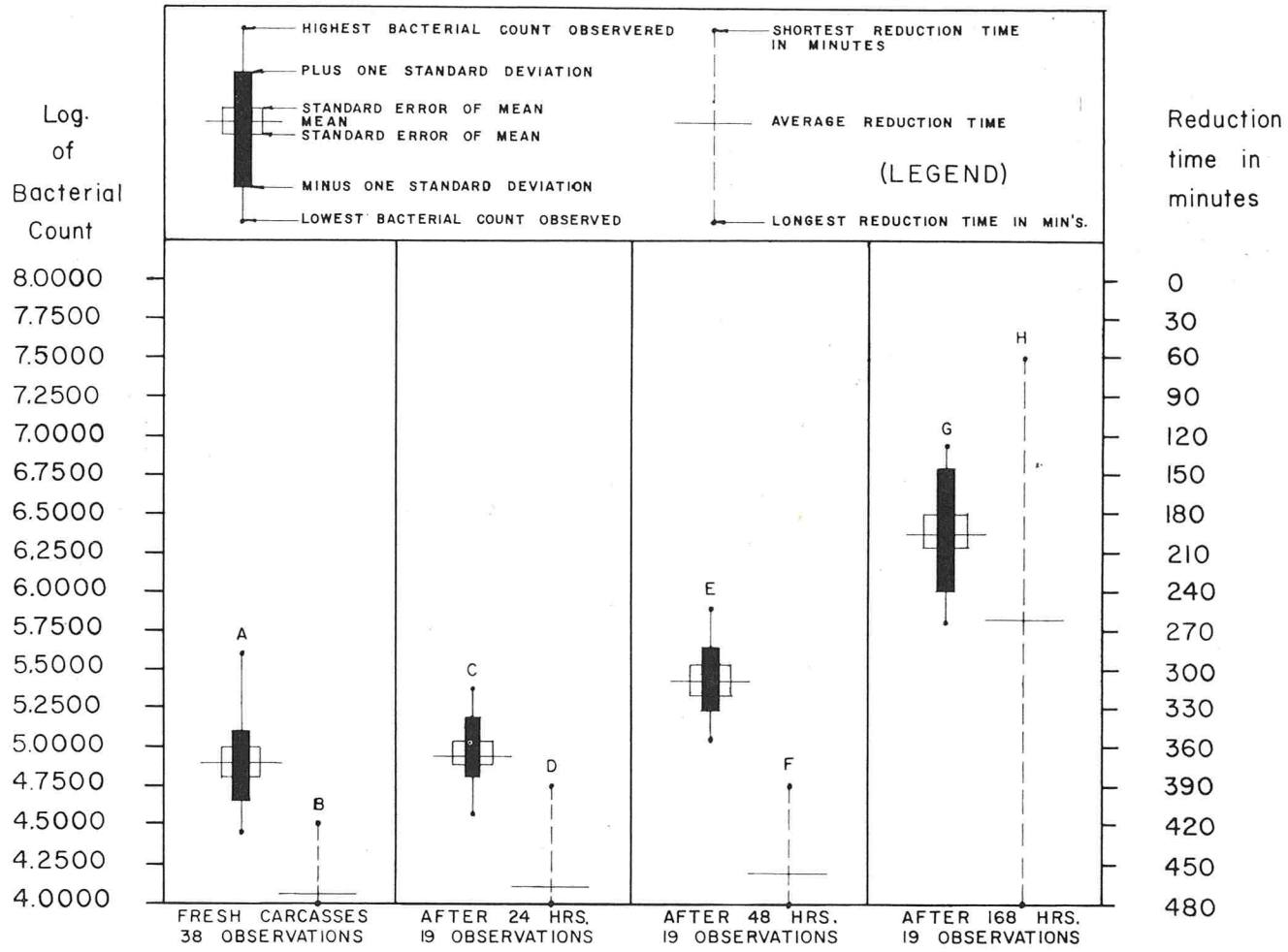

Figure 1. Correlation of Total Counts and Resazurin Reduction Times for Processed Poultry.

relation between the bacterial plate count and the resazurin reduction time. Since the resazurin reduction time was conducted for an 8-hr period, it was necessary for a total of 10^4 or more organisms per ml to be present to reduce the resazurin dye in this length of time *(3)*.

There are several advantages in utilizing the resazurin reduction test in a poultry sanitation control program. The test takes much less time than the plate count. Also, the greater the bacterial contamination, the quicker the result is obtained. Grossly contaminated carcasses might be detected in two hours or less. In a poultry sanitation control program, this test could be used for the purpose of periodically checking the sanitary practices in poultry processing plants. The results would aid the sanitarian in finding and eliminating improper practices.

ACKNOWLEDGEMENTS

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EFFECT OF POTASSIUM SORBATE ON SOME ORGANISMS ASSOCIATED WITH COTTAGE CHEESE SPOILAGE [1] [2]

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The per capita consumption of creamed cottage cheese increased from 2.9 to 5.5 pounds between 1948 and 1960 *(15)*. Consistent improvement in quality has been largely responsible for this increase, but spoilage by microorganisms continues to be the principal problem in this industry. Several individual manufacturers of cottage cheese have expressed an interest in the use of antimycotic agents. Federal regulations permit the addition of sorbic acid or its salts to several varieties of cheese, but not to cottage cheese. The work reported herein was performed for the purpose of extending the information on the ability of potassium sorbate to inhibit surface spoilage organisms and to determine whether these organisms utilized sorbic acid during normal storage periods.

The antimycotic activity of the fatty acids was first demonstrated by Clark *(2)*. Also, Kiesel *(11)* and Wyss *et al. (23)* contributed to the knowledge concerning the characteristics of fatty acids which make them inhibitory to microorganisms. Most important among these characteristics is the fact that the inhibitory activity of a fatty acid increases with decreasing pH and that unsaturated fatty acids are more inhibitory than the saturated acids. Keeney *(10)* reported fungicidal properties for the 5, 6, 8, 10, and 11 carbon fatty acids; whereas, the shorter chained acids exhibited only fungistatic properties.

Demaree *et al. (5)* and Deuel *et al. (6)* investigated the toxicity of sorbic acid in the diet. They showed that α, β-unsaturated fatty acids were readily metabolized and that they would not interfere with the digestion of foods or cause any histopathological changes to occur in the anatomy of rats fed rations containing as much as 8% sorbic acid. Melnick *et al. (14)* established that mold enzymes concentrated near the surface of cheese metabolized the sorbic acid used in wrappers or coatings. The work of Mukherjee *(16, 17, 18)* proved that the dehydrogenase system in *Aspergillis niger* was inhibited by β-hydroxybutyric acid. The accumulation of β-hydroxy acid inhibits the dehydrogenation which produces the β-unsaturate and the extent of inhibition is a function of the amount of β-hydroxy acid present. The continued production of the dehydrogenase enzyme eventually overcomes the inhibitor which can then be utilized as a source of carbon.

Melnick *et al. (14)* noted that a β-hydroxy acid occurred two times during the degradation of sorbic acid thereby increasing the effectiveness as an inhibitor. Samson *et al. (21)* observed that the inhibitory effect of fatty acids increased with decreasing pH because the cell was permeable only to the undissociated form of the acid. According to O'Neill *(19)* any food product with a pH of 6.5 or lower and a potassium sorbate concentration of 0.1% or less would have all the sorbate hydrolyzed to sorbic acid.

Bell *et al. (1)* reported that sorbic acid was an effective deterrent of growth for many species of bacteria, yeasts and molds in nutrient media ranging in pH from 7.0 to 4.5. Perry and Lawrence *(20)* indicated that sorbic acid did not suppress heavy microbial contaminations but did effectively retard the growth of small contaminations. Geminder *(8)* reported that 0.075% sorbic acid was effective in controlling the growth of contaminants in cottage cheese and that higher concentrations produced a bitter flavor in the cheese.

Experimental Procedure

Cottage Cheese Manufacture.

Skimmilk pasteurized at 145°F for 30 min. was obtained from the Michigan State University Dairy Plant. Cottage cheese was made from this skimmilk by the short-set method. The creaming mixture containing 12% milk fat was pasteurized by steaming in an autoclave for 30 minutes, after which 3% salt was added and the mixture was cooled to 40°F.

Propagation of the Organisms.

The following organisms associated with surface spoilage in cottage cheese were used in this study: *Pseudomonas fragi, Alcaligenes metalcaligenes, Geotrichum candidum, Penicillium frequentans, Rhodotorula mucilaginosa,* and *Torulopsis candida.* Active strains were developed by initiating daily transfers into nutrient broth three days before using the organism. Cultures were incubated at 72°F.

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[1] Michigan Agricultural Experiment Station Journal Article no. 3008.

[2] From a thesis presented by the senior author in partial fulfillment of the requirements for the Master of Science degree.

The creaming mixtures were inoculated with a broth culture of the bacteria, yeast or mold which had been incubated for 24 hours. The bacteria populations were determined on violet red bile (VRB) agar and the yeasts and molds were enumerated on potato dextrose (PD) agar acidified to pH 3.5 with tartaric acid.

Preparation of Samples.

Twelve lots of cheese were prepared and analyzed, with each of the six spoilage organisms mentioned previously being used to contaminate two lots. Each lot was composed of five groups of samples prepared as follows: *(a)* non-inoculated control; *(b)* inoculated control; *(c)* inoculated + 0.050% potassium sorbate; *(d)* inoculated + 0.075% potassium sorbate; and *(e)* inoculated + 0.100% potassium sorbate.

Analysis of Samples.

In the trials involving the cheese samples inoculated with the psychrophiles, one sample from each of the five groups was analyzed daily for sorbic acid content, organism populations and pH. In the trials in which the samples were inoculated with yeasts or molds, one sample from each of the five groups was analyzed every other day. In preparation for analysis each sample was mixed for two minutes in a sterilized Waring blender jar at slow speed to assure thorough mixing. (At high speed, curd particles adhered to the upper surfaces of the jar and were not blended properly.) An 11-g sample of this homogenate was added to 99 ml of peptone water (0.1% Bactopeptone in distilled water) and mixed for an additional two minutes in a sterilized Waring blender jar. Appropriate dilutions were plated with VRB agar to determine psychrophiles or PD agar acidified to pH 3.5 to determine yeast and/or mold populations. Some data are included showing total counts obtained on tryptone glucose yeast (TGY) agar. The VRB and PD agar plates were incubated at 72°F for 3 and 5 days, respectively. TGY agar plates were incubated at 89.6°F for 48 hours.

Determination of Sorbic Acid.

A 2-g portion of the homogeneous sample of cheese was analyzed for sorbic acid by the method of Melnick and Luckmann *(12)*. A Beckman DK-2 spectrometer was used to record the absorbancies of the distillates. The controls having no potassium sorbate added were used as a basis to determine the irrelevant absorbancy and appropriate corrections were made. A standard curve was prepared to use in converting the absorbancies of the distillates to percentages of potassium sorbate. pH measurements of each sample were made with a Beckman Zeromatic pH meter using a calomel half-cell and a glass electrode.

The analyses of the inoculated samples were terminated when visible spoilage had occurred and no further analyses of the non-inoculated control samples were performed after all the inoculated samples in the same lot had spoiled.

RESULTS AND DISCUSSION

The principal limitation in working with inoculated samples of cottage cheese involves the fact that cheese curd cannot be sterilized without adversely altering its physical structure. However, a comparison of the microbial populations of both the inoculated samples and the non-inoculated controls on the zero day indicate that the inoculum represented the majority of the organisms present in the cottage cheese used in this work. In all of the samples except those inoculated with *R. mucilaginosa*, the spoilage was typical of that caused by the organism used to inoculate the cheese. Among the group of samples inoculated with *R. mucilaginosa* only the inoculated control and the samples containing 0.050% potassium sorbate exhibited spoilage typical of this organism. The lack of growth of *R. mucilaginosa* in the other samples in this group was attributed to the inhibitory activity of the potassium sorbate.

The flavor hazard is a limitation in the use of sorbic acid or sorbate. Occasional organoleptic determinations supported previous work *(8, 9)* which showed that no off-flavor is present when 0.075% sorbic acid is added to cottage cheese, but an off-flavor attributable to sorbic acid frequently occurs when 0.10% is added.

The data in Figures 1 and 2 show the results of analysis of representative lots of cheese inoculated with each spoilage organism. Throughout the entire work the growth curves show a lower initial population with the inoculated samples containing potassium sorbate than with the inoculated control sample. These results indicate that the potassium sorbate was bacteriostatic and mycostatic, particularly since the inhibition against the populations in the inoculated samples seemed to increase as the percentage of potassium sorbate increased. The inhibitory effect was evident in the forms of an initial reduction in organism populations and extended lag periods in the early phase of the growth curve. The latter particularly seemed to be related to the concentration of potassium sorbate added. Following the lag period, the rates of growth and the maximum populations attained in all of the inoculated samples of cheese containing potassum sorbate were approximately the same as the growth rates and maximum populations attained in corresponding inoculated con-

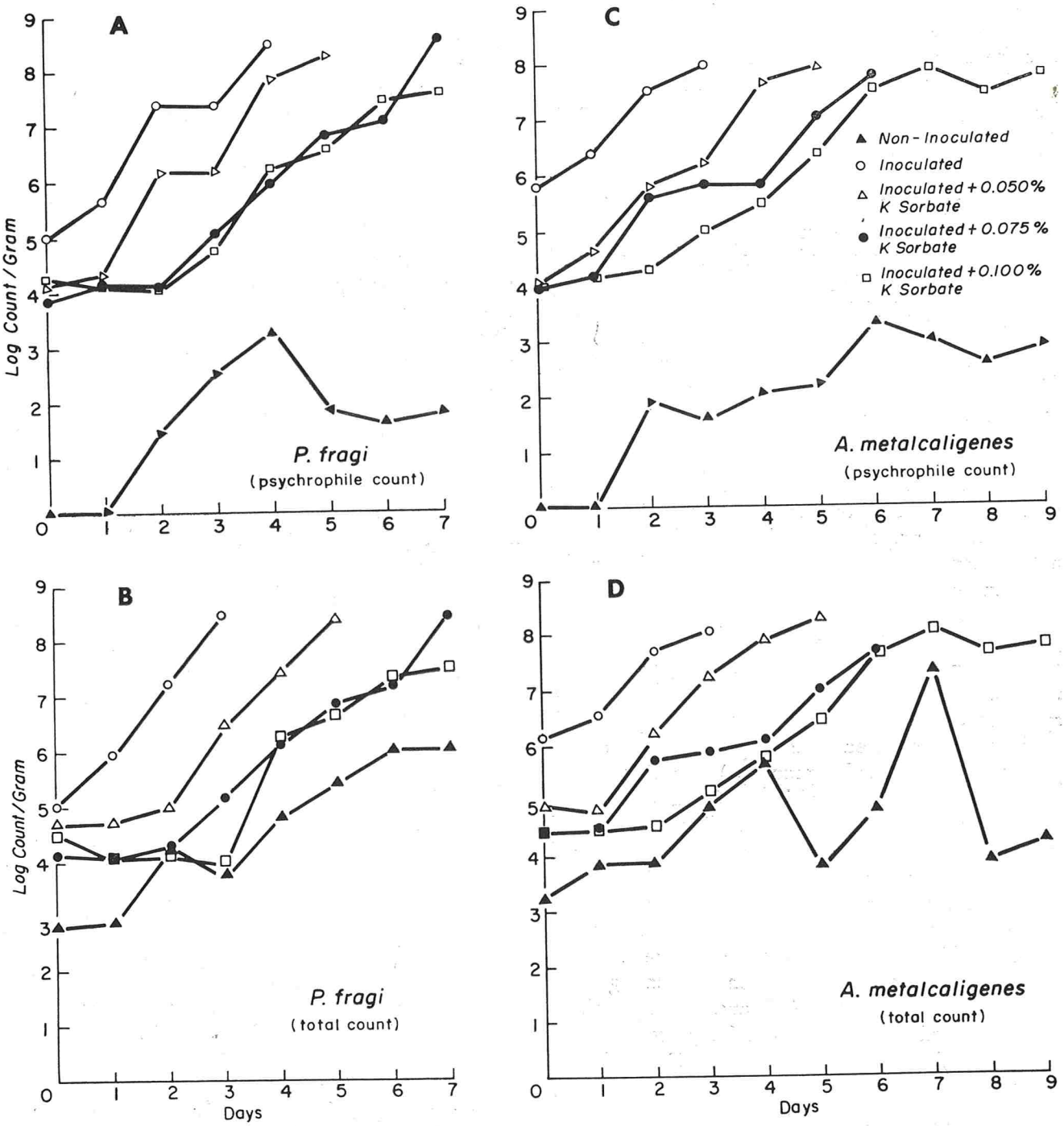

Figure 1. The effect of potassium sorbate on the rate of increase of *P. fragi* or *A. metalcaligenes* inoculated into creamed cottage cheese and stored at 50°F.

trols which contained no sorbate. These results substantiate the opinion of Mukherjee *(16-18)* that continued production of dehydrogenase enzyme by microorganisms would eventually overcome the inhibitory effect of sorbic acid.

Cottage cheese inoculated with *P. fragi* and *A. metalcaligenes* spoiled after 2 or 3 days, respectively, (Figure 1-A, C) when no potassium sorbate was added. Spoilage was associated with populations of approximately 10^8 per g. In samples containing potassium sorbate the populations at the time of spoilage also were approximately 10^8 per g but the time required for spoilage was 5 to 7 days, depending on the amount of potassium sorbate present. The total counts on both of the above organisms enumerated on TGY agar (Figure 1-B, D) represent the sum of the inherent and the induced contamination.

In the cheese inoculated with *G. candidum* and *P. frequentans* (Figure 2-A, B) spoilage was associated with populations on acidified PD agar of ap-

proximately 10^5 to 10^6 per g, regardless of the presence or absence of potassium sorbate. However, the length of time required to attain these populations varied from 4 days in the inoculated cheese containing no potassium sorbate to 8 days in the cheese inoculated with *P. frequentans* and containing 0.1% sorbate.

The data in Figure 2-C show that potassium sorbate had little effect on the growth rate, maximum population attained or keeping quality of cheese inoculated with *T. candida*. At the time of spoilage the organism populations on acidified PD agar varied from approximately 10^7 to 10^8 per g.

R. mucilaginosa seemed to be more sensitive to potassium sorbate than the other organisms used in the experiment (Figure 2-D). The spoilage time varied from 8 days in the samples containing 0.05% potassium sorbate, to 18 days in the samples containing 0.1% sorbate. The organism populations on acidified PD agar varied from approximately 10^6 to

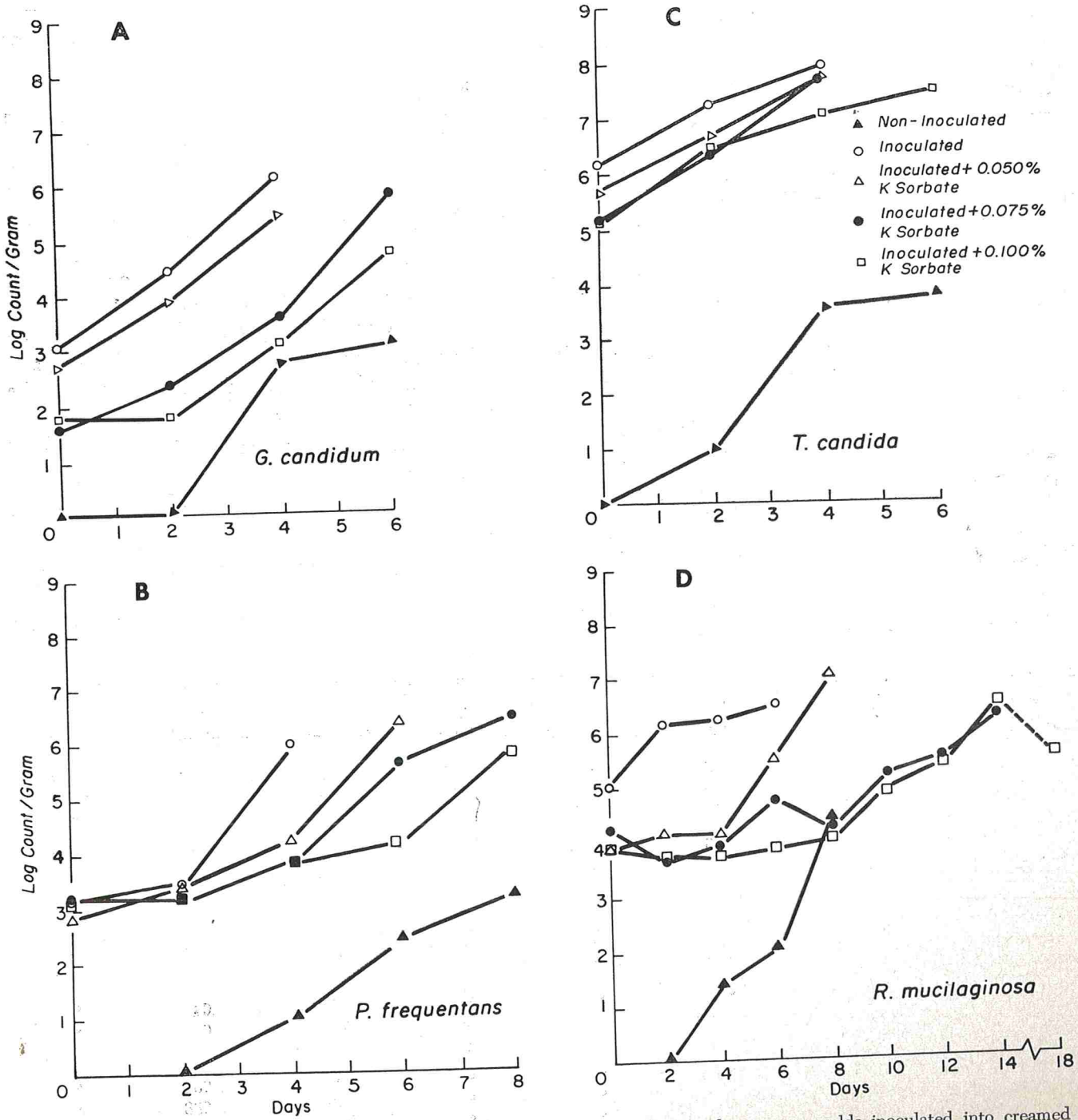

Figure 2. The effect of potassium sorbate on the rate of increase of selected yeasts or molds inoculated into creamed cottage cheese and stored at 50°F.

10^7 per g. Visible surface mold appeared on the non-inoculated control sample after 8 days of storage, and analysis of this sample was terminated.

Several authors *(13, 14, 22)* have reported that molds metabolize sorbic acid as a source of carbon; however, Costilow, *et al. (3)* found no evidence of utilization of sorbic acid in pickle brines containing a large inoculum of yeast *(Torulopsis holmii)*. Emard and Vaughn *(7)* reported that sorbic acid could be used as a nutritional component in selective enrichment media for catalase-negative bacteria.

In the work reported herein, fluctuations in the amounts of sorbic acid recovered at examination intervals during storage were probably within the range of analytical error (Table 1). There was no evidence that sorbic acid was utilized by any of the organisms. If the organisms use sorbic acid, spoilage of the cheese was accomplished by lower populations than required to cause measurable diminution of the sorbate.

Some evidence of bactericidal action by potassium sorbate is suggested by the decreases in the populations enumerated on TGY and VRB on the zero day in the inoculated samples containing sorbate (Figure 1, 2). This property of sorbic acid was also observed by Cowles *(4)* who stated that fatty acids have bactericidal properties at pH 4.7 and lower. Because of the two conjugated double bonds sorbic acid should be active at a higher pH and should possess greater bactericidal ability than caproic acid, the saturated fatty acid of the same chain length.

There was no evidence that the keeping quality of any particular group of samples was influenced by pH which varied from 5.0 to 5.3, the normal range for creamed cottage cheese.

SUMMARY

Samples of creamed cottage cheese containing 0.050, 0.075, and 0.100 per cent potassium sorbate were contaminated with *Pseudomonas fragi, Alcaligenes metalcaligenes, Geotrichum candidum, Penicillium frequentans, Rhodotorula mucilaginosa* or *Torulopsis candida* and stored at 50° F. Samples inoculated with the psychrophiles were analyzed daily and those inoculated with yeasts and molds were analyzed on alternate days for total, psychrophile, yeast and mold counts, pH, and percentage of potassium sorbate. The initial counts indicated that some destruction of the organisms occurred during the first few hours after the cheese was inoculated, and the reduction in population usually increased as the amount of potassium sorbate increased.

The presence of potassium sorbate usually caused a definite lag in the growth curve of the organisms. The lag extended for a period of 1 to 8 days depending upon the concentration of the sorbate and the sensitivity of the organism. The extension in the shelf-life of the cheese was approximately equivalent to the length of the lag period. Upon expiration of the lag phase, the rate of growth and the maximum population attained in the cheese were approximately the same as in the inoculated control samples which contained no potassium sorbate. An off-flavor was

TABLE 1. AMOUNT OF POTASSIUM SORBATE RECOVERED FROM CREAMED COTTAGE CHEESE INOCULATED WITH VARIOUS SPOILAGE ORGANISMS AND STORED AT 50°F. (VALUES CORRECTED FOR IRRELEVANT ADSORPTION).

Age of the cheese when analyzed (in days)	Percentage potassium sorbate added to the cheese	Percentage potassium sorbate present in samples of creamed cottage cheese contaminated with:					
		P. fragi	*A. metalcaligenes*	*G. candidum*	*P. frequentans*	*R. mucilaginosa*	*T. candida*
0	0.050	0.048	0.043	0.046	0.039	0.046	0.046
	0.075	0.069	0.060	0.077	0.070	0.065	0.078
	0.100	0.112	0.098	0.098	0.117	0.085	0.092
2	0.050	0.046	0.045	0.043	0.037	0.039	0.046
	0.075	0.078	0.065	0.067	0.080	0.079	0.076
	0.100	0.111	0.092	0.102	0.085	0.085	0.086
4	0.050	0.042	0.046	0.035	0.049	0.040	0.034
	0.075	0.064	0.069	0.082	0.073	0.061	0.064
	0.100	0.107	0.076	0.095	0.079	0.074	0.094
6	0.050	*	*	*	0.046	0.044	*
	0.075	0.068	0.065	0.059	0.080	0.081	*
	0.100	0.108	0.085	0.098	0.093	0.099	0.072
8	0.050	*	*	*	*	0.052	*
	0.075	*	*	*	0.052	0.088	*
	0.100	*	*	*	0.080	0.094	*

*Samples spoiled; no analyses performed.

frequently present in samples of cheese containing 0.1% sorbate but not in cheese containing 0.75%.

No evidence was found indicating that any of the organisms utilized potassium sorbate. However, the populations may have been insufficient to cause measurable diminution of the sorbate.

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News and Events

Reports To Be Released On Radiation Countermeasures

[1]Soon to be issued is a complete report from the Utah State Health Department on the recent experience in the Salt Lake City area where farmers were switched to dry feed in the areas of heavy radioactivity residue levels in milk. It is understood that the way dairy farmers in the Salt Lake City area responded to the requests made of them by their cooperatives was most impressive. It does not appear, however, that the Salt Lake City experience will furnish any conclusive evidence that a switch from pasture feeding to stored feed will produce a specifically measurable result.

The chief conclusion that can be drawn is that farmers can be expected to accede quickly and willingly to requests to go on stored feed. However, even this may not prove to be as true in other areas as it was in Utah. The Mormon Church, which is very influential in the area, was active in seeking the cooperation of the milk producer members of its congregation. In such a situation, there is an element of persuasion which may be absent in other areas of the country.

The experience in Minnesota, on which a report is expected in the near future, will probably be a more representative evaluation of what can be expected of dairy farmers in general when countermeasure activity is, of necessity, instituted.

As to the future need for and application of countermeasure procedures, an anomalous situation exists. Iodine-131 levels appear to be lowering in most sections of the country, although late September figures indicate that the Russian tests are having an effect in Palmer, Alaska and in some sections of the Middle West. However, the recent pronouncement by the Federal Radiation Council against countermeasure activity and its statements that the Radiation Protection Guides are not a dividing line between safety and danger or intended to set a limit at which protective action should be taken in fallout situations have left health officials without a standard to be applied for the determination of an appropriate time to institute countermeasure action.

The USPHS position is that every effort should be made to keep radionucleide levels low and that the Federal Radiation Council should be advised and persuaded to provide some standards of guidance for health officials. The Federal Radiation Council is very actively working on the preparation of some kind of standards or numerical limits which health officials and authorities may use as guides for the institution of countermeasure activity.

In the meantime, the Joint Committee on Atomic Energy has published a summary analysis of the fallout hearings held last June. Accompanying the publication was a statement from the Committee's Chairman, Melvin Price (D., Ill.), to the effect that the hearings showed that the role and responsibilities of the Federal Radiation Council and various Federal agencies involved in radiation protection, particularly the Public Health Service, remain unclear. Prompt clarifying action was urged and emphasis was placed on the need for an adequate program of radiation exposure assessment and protection for the general population. The Joint Committee feels that there is urgency about getting an answer to this question because of the iodine levels of radioactive iodine in milk in some areas last year.

[1]Reprinted from *"Dairy Industry Newsletter,"* Vol. 8, No. 14.

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3 VIEWPOINTS REPRESENTED

CALIFORNIA MEET FEATURES VARIED GROUP OF SPEAKERS

On October 8, President Lawrence Groff called the 44th Annual Meeting of the California Association of Dairy and Milk Sanitarians to order to begin a three day session of lectures, panel discussions and study by men prominent in industry, education and governmental health positions.

The Meeting was held at the Charter House Hotel, Anaheim, California. Those speaking and conducting sessions were: Dr. Walter Dunkley, professor food science and technology, University of California; Jessie Marmorstan, M. D., F.A.C.P., clinical professor of medicine, University of Southern California; Dr. John M. Heslop, acting chief, Bureau of Radiological Health, California State Department of Health; Milton Natapoff, California State Board of Agriculture; Charles Paul, director, California State Department of Agriculture; Jack Covert, chief dairy inspector, Los Angeles City Health Department; H. E. Behlmer, machine specialist, Cherry-Burrell Corporation; R. B. Barrett, technical director, Klen-

zade Products; Dr. R. L. Metcalf, chairman, Division of Entomology, University of California; Don Cordray, Bureau of Dairy Science; Wilson Fairbank, extension engineering technologist, University of California.

Tuesday evening featured an informal social hour at the poolside followed by a Luau and dancing. The final event of the Meeting was the Dairy Sanitarians Refresher Course held Wednesday, October 10 presented by the Bureau of Dairy Service. A. E. Reynolds, chief, Bureau of Dairy Service, was in charge of the course.

Topics of current interest such as "Radioactive Fallout and Its Implications for the Dairy Industry" and some of a long-term, recurring nature, namely, "Public Relations, Inspector, Consumer" received attention during the two days of group sessions.

LSU Study Shows Milk With Fluoride Added Cuts Cavities

Louisiana State University scientists have reported that experiments with fluoridated milk—which may offer a successful alternative to fluoridation of water—have resulted in a 75 per cent decrease in dental cavities among young children.

Some 170 children from two Baton Rouge elementary schools, ranging from 6 to 9 years of age at the beginning of the experiment, voluntarily participated in the study.

Final results of the seven-year LSU project, a pilot study in milk fluoridation research, were reported in an article appearing in the current issue of the "American Journal of Clinical Nutrition." Dr. L. L. Rusoff, LSU professor of dairy science and director of the project, said that milk fluoridation could be desirable, not as a substitute, but as an adjunct or alternative to the fluoridated water program.

It is estimated that about half the people in the United States live in areas not served by community water supplies and that few community water supplies have been fluoridated, according to the LSU scientists.

The LSU studies show that after a 3½-year period, children drinking fluoridated milk with their school lunches (as compared with the "Control Group" which did not) showed a 75 per cent decrease in cavities in teeth erupting since the beginning of the experiment. The fluoridated milk had a "carry-over" effect in that 18 months after the children stopped drinking the fluoridated milk they still had 50 per cent less dental cavities than did the control group, it was reported.

"There was also an indication that fluoride appears to be of value in reducing the cavities rate in newly-erupted molars . . . and the study demonstrates that fluoridation during calcification of teeth and prior to eruption is valuable in increasing resistance to cavities," the report states.

Along with Dr. Rusoff, authors of the final report on the milk studies included Dr. B. S. Konikoff, clinical assistant professor and project dentist; Dr. J. B. Frye Jr., professor and head of the dairy science department at LSU; Professor J. E. Johnston; and Dr. W. W. Frye, dean of the LSU School of Medicine.

A report on the first 3½ years of the study was delivered at the Fifth International Congress of Nutrition in Washington, D. C., in the fall of 1960.

According to Dr. Rusoff, the idea of using milk as a fluoride vehicle was conceived as early as 1952, but almost three years were required to work out mechanics of the study. The LSU research team reasoned that milk was an obvious choice as a new vehicle for fluoride (alternative to water) because it is the food most universally used by pregnant women, infants and children during the period of tooth formation.

"The beneficial results obtained in this study through use of fluoridated milk to prevent dental cavities in young children are similar to published reports in which fluoridated water was consumed," the report said. The LSU researchers recommend further public health studies with large numbers of younger children and infants using fluoridated milk during calcification of the teeth and prior to eruption.

The "American Journal of Clinical Nutrition" commended the LSU study for its "well controlled procedures" and described it as "highly significant from a public health standpoint."

F D A OFFICIAL TAKES STAND ON MISLEADING LABELING

[1]Early in September, the Deputy Director of the Advisory Opinions Division of the Food and Drug Administration made some statements which are somewhat significant as a reflection of FDA's policy with respect to determining when claims used in labeling food are false and misleading.

The speaker, Ralph F. Kneeland, said: "It is our belief that products and their labeling should be formulated upon the basis of the reliable scientific evidence and authoritative opinions that currently are

[1]Reprinted from *"Dairy Industry Newsletter,"* Vol. 8, No. 13.

available. We do not believe it either in the public interest or in accordance with law to promote products on the basis of unproven and speculative ideas. Gaps in scientific knowledge should not be made highways to transport products of unestablished value. As research reveals new facts, product formulations and labeling changes can then be made to accommodate the new findings. As an enforcement agency, we believe it is our responsibility to hold claims within the bounds of established facts that are acceptable to those whose training and experience qualify them to make such judgments."

Winner Of Milking Methods Contest Announced By I A S

The 1962 winner of the 4-H Club Milking Methods Contest is Larry Reed, R.R. 1, Kendallville, Indiana. In addition to the plaque awarded by the Indiana Association of Sanitarians, Larry also received a $25.00 U.S. Savings Bond, donated by the Indiana State Dairy Association for continuously demonstrating his ability to practice the most sanitary milking procedures during the 4-H Club phase of the Indiana State Fair.

Activities in the cattle barn for the first few days of the Indiana State Fair are restricted to those of the 4-Her's. A familiar sight to these exhibitors of dairy cattle are representatives of the Indiana State Board of Health who are on hand to supervise the milking operations and to select the winner of the Milking Methods Contest which is conducted annually.

At its 1962 Annual Meeting in Indianapolis, the Indiana Association of Sanitarians authorized the annual purchase of an appropriate plaque to be awarded to the winner of this Contest.

l. to r.—Art Howard, Noble Co. Agent, Albion; Ed Gannon, Dairy Extension, Purdue University; Larry Reed, R.R. 1, Kendallville; H. H. Vaux, Treasurer, Indiana Assn. of Sanitatarians.

Rating Officers Are Authorized By PHS

A total of 124 State employees in 43 State Departments of Health or Agriculture have been authorized by the Public Health Service to certify milk pasteurization plants and their producing farms, the PHS announced.

Ratings made by these officers are eligible for inclusion in Sanitation Compliance Ratings of Interstate Milk Shippers and/or Milk Sanitation Honor Roll published periodically by the Public Health Service.

Initial inclusion of each officer on the list, as well as his continuation on it, is based on periodic evaluation of his inspections by representatives of the USPH Milk and Food Branch.

States	State Rating Officers	Agency
Alabama	R. C. Burkhardt	SHD
	Joseph F. Fail	"
	U. D. Franklin	"
	E. E. Herrmann	"
	G. R. Wright	"
Arizona	George H. Parker	SHD
Arkansas	Joe Hall	SHD
	W. D. Hanns	"
	W. L. Roberts	"
California	Lee Biggs	SDA**
	D. A. Cordray	"
	H. C. McCausland	"
	D. J. Radmacher	"
	Haydn J. Sartori	"
	Wendell C. Weaver	"
	O. M. Williams	"
Colorado	John A. Baghott	SHD
	Eugene A. TeSelle	"
	Fred L. Vogt	"
Delaware	Ward H. Meredith	SHD
Florida	Samuel O. Noles	SHD
	Lewis W. Willis	"
Georgia	Joel H. Adkins	SHD
	J. R. Culp	"
	Garnett H. De Hart	"
Idaho	Charles J. Hammond	SHD
	Carroll E. Despain	"
Illinois	Enos Huffer	SHD
	Howard McGuire	"
Indiana	Verne Cavanaugh	SHD
	Wilbur G. Stevens	"
	Herbert H. Vaux	"
	James H. White, Jr.	"
Iowa	Harold A. Bayes	SHD
	R. L. Sanders	"
	Richard E. Stedman	"
Kansas	O. L. Honomichl	SHD
	Frank L. Kelley	"
Kentucky	Joseph W. Durbin	SHD
	Louis E. Smith	"
Louisiana	Jack Blanks	SHD
	Charles F. Miller	"
	Riley J. Richards	"
Maryland	Alexander A. Pais	SHD
	Ward Barstow	"
Michigan	Robert A. Dalton	SHD
	Kenneth D. Feighner	SDA
	Mason I. Smith	"
	Kenneth Van Patten	"
	Frederick J. West	"
Minnesota	Orlowe M. Osten	SDA
	Leonard J. Waldock	"
Mississippi	P. L. Bradshaw	SHD
	Jesse Olen May	"
	A. R. Russell	"
	Clinton Van Devender	"
Missouri	Erwin P. Gadd	SHD
	Eugene C. Viets	"
Montana	Kenneth W. Conklin	SLSB***
	James R. Gray	"
Nebraska	Charles W. Fahrenbach	SHD
	Harold H. Gannon	"

Nevada	W. B. Hunter	SHD
	S. D. Mastroianni	"
	Sigvard J. Nielsen	"
New Hampshire	Richard J. Copson	SHD
	W. F. Oakman	"
New Jersey	Calvin S. Tabler	SHD
New Mexico	Grant R. Jones	SHD
	Tom W. Proctor	"
New York	Nelson J. Hohl	SHD
	Paul Kloser	"
North Carolina	Ford P. Brendle	SHD
	Carson C. Foard	"
	E. E. King	"
North Dakota	Everett Lobb	SHD
	Alfred B. Johnsgard	"
Ohio	Ivan R. Baker	SHD
	Ned Baker	"
	Max L. Bunce	"
	O. Lynn Denniston	"
	Bernard M. Hull	"
	Richard Hunter	"
	Richard M. Martin	"
	Frank J. Slaton	"
	James E. Warfield	"
	Robert Zaleha	"
Oklahoma	Glen W. Earley	SHD
	Berl I. Poe	"
	Hardy Watson	"
Oregon	Joseph A. Gray	SDA
	Vergil N. Simmons	"
	Alvin E. Tesdal	"
Pennsylvania	George W. Fouse	SDA
	John A. Ginck	"
South Carolina	John D. Cagle	SHD
	E. M. Causey, Jr.	"
	W. W. Weston	"
South Dakota	Charles Halloran	SHD
Tennessee	Frank L. Cheney	SHD
	Glenn C. Fulkerson	"
	Clifford Gulley	"
	Robert E. Maxwell	"
	M. R. Winfrey	"
Texas	Sidney R. Allen	SHD
	Eddie R. Caraway	"
	Floyd N. Cobb	"
	W. W. Greer	"
	Larry Heinatz	"
	L. D. Kenney	"
	D. H. Price	"
Utah	Edgar M. Hayes	SHD
	Guy P. Stevens	SDA
Vermont	Wendell I. Carr	SDA
Virginia	G. S. Kennedy	SHD
	C. B. Neblett	"
Washington	C. C. Gehrman	SDA
	Roy J. Myklebust	SHD
	L. O. Tucker	SHD
West Virginia	Richard A. Moats	SHD
Wisconsin	Glen C. Drake	SHD
	Raymond W. Larson	"
	C. O. Widder	"

*State Health Dept.
**State Department of Agriculture
***State Livestock Sanitary Board

Study Of Electrochemical Treating Awarded To Pennsalt Chemicals

Pennsalt Chemicals Corporation announced that it has been awarded a $35,780 USPHS contract to study electrochemical methods for removing contaminants which resist conventional waste water treatment. The contract is part of the Public Health Service's Advanced Waste Treatment Program, which is seeking long range solutions to the nation's water pollution problems.

The contract with the Service's Division of Water Supply and Pollution Control calls for a one-year study by Pennsalt Chemicals' scientists.

The firm has more than a century of experience in water sanitation and in the related fields of cleaning and sanitizing compounds for the dairy industry. The company is a producer and marketer of industrial, intermediate and specialty chemicals.

CONFERENCE TO BE HELD AT PURDUE

The Dairy Fieldmen's and Dairy Plant Operators' Conferences will be held November 13 and 14 respectively, in the Memorial Center at Purdue University, Lafayette, Indiana. The Conferences are an annual affair sponsored in cooperation with the Indiana Dairy Products Association.

MASTITIS CRUSADE MEETING SPONSORED BY BABSON BROS.

The effect of mastitis on milk and dairy food technology was one of the subjects studied at a kick-off meeting of the "Crusade Against Mastitis" held at Syracuse, New York, under the sponsorship of Babson Bros. Co., for their milking system dealers.

Authorities from three states led discussions in this crusade on the various aspects of the disease. The meeting was in following the suggestion of the National Mastitis Council in helping to educate all groups in the dairy industry about the dangers of mastitis. The causes of as well as the ways to fight mastitis were studied. Dr. S. B. Guss, Penn State University Mastitis Expert, who leaves in November for a trip around the world, gave the results of his Mastitis work on a considerable number of Pennsylvania dairy farms.

Dr. Samuel B. Guss, Pennsylvania State University Dairy Authority, shows a group of Mastitis Control Crusaders a new device which guages the flow of vacuum in a milking system. This is used in connection with studies of mastitis on various dairy farms.

Seated, left to right, are Dr. G. H. Schmidt, Cornell University, and Dr. C. J. Haller, chairman of the mastitis committee, New York State Veterinary Medical Society. Standing, left to right, are Theodore Tieken, Dr. R. W. Metzger, Thomas Merritt, Jr., and G. L. Babson.

NOVEMBER 13 AND 15, 1961

Abstract Of Sanitarians Joint Council Meeting

1. On the above dates the Sanitarians Joint Council met in Detroit, Michigan, with all six delegates of the three participating associations present. Additionally APHA and International Association of Milk and Food Sanitarians had their alternates present. The APHA's designated new delegate for the period 1962-65 was present as an observer.

2. Mr. Robert Hay, as a representative of the Institute of Sanitation Management, discussed with the Council the participation of I.S.M. in S.J.C. Mr. Hay's presentation was exploratory. He did not have details of specific instruction from I.S.M. He agreed to present additional information such as membership categories and a copy of the Constitution of I.S.M. He was invited to complete the presentation on November 15, 1961 but was not able to return to do so.

3. The council was advised by its Chairman that the offices of the National Society for Professional Sanitarians had not accepted the Council's invitation to send a representative without voting privileges to Council meetings. The Chairman gave the Council the background of the development of the Inter Society Committee on Sanitarian's Relations which has been formed by the National Association of Sanitarians, International Association of Milk and Food Sanitarians, and the National Society for Professional Sanitarians. Messrs. Walton and Adrounie, presidents respectively of IAMFS and N.A.S., described the activities and purpose of the Inter Society Committee which is concerned with immediate relationship among the three societies.

4. N. S. Adams reported the action of the Engineering and Sanitation Section of A.P.H.A. of 1960 at San Francisco which endorsed the Model Registration Act for Sanitarians which had been prepared and presented to the parent sponsoring associations by the S. J. C. The Model Registration Act has also been endorsed by the N.A.S. and IAMFS and has been published in the journals of the associations.

5. Officers for the coming calendar year which were elected are A. Harry Bliss, chairman, and N. S. Adams, secretary-treasurer. Emil T. Chanlett completed his term as A.P.H.A. delegate and is replaced by A. F. Parrish, effective January 1, 1962. Mr. John Faulkner completing a term as IAMFS delegate has accepted an interim appointment until further action is taken by IAMFS. To provide improved communications between S.J.C. and the parent associations, the Secretary was given specific instructions to (a) Prepare an information abstract for publication by the parent associations; (b) To keep the following offices informed in each association: (1) IAMFS—the President, Secretary, and the Executive Secretary; (2) N.A.S.—President and Executive Secretary; (3) APHA—Executive Director, the Engineering Associate, and the Secretary of the Engineering and Sanitation Council.

Council Discusses Certification

6. The principal matter of deliberation by the Council was the report by the Sub-committee on "A Specialty Board for Certification of Sanitarians." The Subcommittee was made up of Messrs. Chanlett, Ruppert and Faulkner. The paragraph by paragraph review of the Subcommittee report occupied two one-half day sessions. The review and comments prepared as instructions by the Council as a whole to the Subcommittee were in sufficient detail so that the Subcommittee may proceed with a further draft for presentation to the parent associations. Items which received careful consideration are (a) A definition of the term, Sanitarian, which will identify for professional uniqueness; (b) Educational requirements which will be high enough to define the educational path for a professional sanitarian. There was no expressed disapproval to the Subcommittee's statement that this requirement shall be a Master's Degree; (c) The nature and length of professional experience and the scope of practice and achievement; (d) The relationship of registration as a legal license to practice and certification as a recognition of professional achievement; (e) The use of written and oral examinations and other evidence of professional growth and moral character; (f) The criteria for establishing a founder's group; (g) The procedures for organization and implementation of a specialty board in regard to sponsoring societies, incorporation and staff.

7. The Specialty Board for Certification of Sanitarians' report was returned to the Committee for completion of its action in line with the Council's review with a request that the revised draft be submitted to each Council member to be followed by presentation for discussion to the parent associations and for their expression of intent to support the development of such a Specialty Board.

Prepared and Submitted by
Emil T. Chanlett, Secretary-Treasurer
Sanitarians Joint Council
(to December 31, 1961)
Approved: John Faulkner, Chairman
Sanitarians Joint Council
(to December 31, 1961)

Dairy Professor At Rutgers, Dr. S. A. Lear, Dies At 53

Dr. Samuel A. Lear, 53, professor of dairy industry at the College of Agriculture, Rutgers University, died September 18 in Middlesex General Hospital after a long illness.

Notable achievements in research of milk enzymes and the bacteriology of milk, won Dr. Lear wide recognition in the milk industry. He taught courses in dairy administration, milk sanitation and milk testing, and assisted in a short course in ice cream making.

He was a native of Bucks County, Pa., received his bachelor of science and doctor of philosophy degrees from Penn State University and a master of Science degree from the University of Minnesota. Dr. Lear was appointed to the Rutgers faculty in 1946.

Recently president of the Metropolitan Dairy Society, Dr. Lear was a member of several professional societies and fraternities.

He leaves his wife, Lucille; three children, Richard, 14, Janet, 12, and Bruce, 10; one brother and three sisters.

Turner Heads N. Y. Sanitarians; Corash Receives Highest Award

Harvey G. Turner, Sealtest Foods, New York, N. Y. was elected president of the New York State Association of Milk Sanitarians at its annual meeting September 24-26, 1962. The two and one half day session was held at Niagara Falls, N. Y.

Mr. Turner is manager of the Sealtest operation at Jamaica, L. I., New York. He succeeds Wade F. Alexander, New York State Department of Health District Sanitarian from Saranac Lake, N. Y.

Over 525 members and guests attended the convention which featured sessions for dairy fieldmen, food sanitarians, and laboratory personnel. Highlighting the meeting, which was held jointly with the Cornell Dairy Industry conference, was the awards ceremonies during the annual banquet.

Recipient of the associations highest honor was Paul Corash, Executive Director of the Metropolitan Dairy Institute, New York, N. Y., who received the Emmet Gouhn Memorial Award. Mr. Corash is past president of both the New York State Association and the International Association of Milk and Food Sanitarians. Until recently Mr. Corash was Chief of the Milk Division in the New York City Department of Health.

The Paul M. Brooks Memorial Award was presented to W. M. Farnsworth, New York State Agricultural and Technical Institute, Delhi, N. Y. in recognition of his outstanding service in advancing the objectives of the local affiliated associations.

Other officers of the association are: president-elect, Caryl H. Dumond, Syracuse Department of Health; secretary-treasurer, Richard P. March, Cornell University. The other four members of the Executive Committee are immediate past president Wade F. Alexander, Donald H. Race, Dairymen's League Cooperative Association, Dr. Robert F. Holland, Cornell University, and the newly elected member Edward Jensen, Borden's Farm Products.

Among the distinguished guests attending the meeting was H. L. "Red" Thomasson, Executive Secretary of the International Association of Milk and Food Sanitarians.

QUESTIONS AND ANSWERS

Note: Questions of technical nature may be submitted to the Editorial Office of the Journal. A Question in your mind may be in the minds of many others. Send in your questions and we will attempt to answer them.

QUESTION:

Is it possible for the toxin of *Clostridium botulinum* to be transmitted by smoked fish?

ANSWER:

Definitely yes. Incidents of intoxication by botulism from the consumption of fish and seafoods are usually attributable to the toxin of type E *Clostridium botulinum*. This organism was first isolated in 1937, and differs from other types that are toxic to humans in several aspects.

Clostridium botulinum type E has been isolated from mud in the market places where seafoods are sold, from fish, whales, the sea bottom and sea water. This organism will grow and produce toxin in salt brines up to 8% salt by weight, at pH from 5.5 to 8.3 and in foods at temperatures as low as 38°F. Other serological types of *Clostridium botulinum* also have been responsible for poisoning from seafoods.

Incidents of intoxication can be reduced by proper handling of the foods. Modern methods of smoke curing of fish provide only enough salt combined with light smoking to provide the desired flavors, with little attention being paid to the preservative aspects. A rule of thumb that may be followed is a maximum shelf life at 32°F for 7 days and 3 days if held at 60°F. The edible condition may be much longer than this but flavor changes due to chemical and microbial action bring about a very rapid flavor change. Consumers should not hold smoked fish in their refrigerators for more than 24 hours. If it is necessary to hold for longer periods, the fish should be frozen and held frozen until consumed.

The growth and subsequent toxin production of type E *Clostridium botulinum* in fish is not always accompanied by off odors or softening of the tissues and is therefore not a reliable index of the presence of toxin. One should never taste fish that has an off odor or appear spoiled.

Indiana Affiliate Works For Registration

Passage of a bill for the registration of sanitarians in the state of Indiana is of immediate concern to the Indiana Association of Sanitarians. The Association is doing much work to promote not only the passage of the registration bill, but also a greater understanding of the value and significance of such a bill to both the general public and the sanitarians throughout the state of Indiana.

The IAS is working diligently to include Indiana among the approximately 20 states in the United States possessing a registration bill. Much time and effort has been expended in the careful preparation of the written material being used for the promotion of the bill. Below is a reproduction of the educational material being utilized.

The following information is presented by IAS with the apparent purpose of presenting a capsule summary of the issues concerning the registration bill.

REGISTRATION FACT SHEET

1. Registration of Sanitarians will set basic qualification standards for persons who are hired to do public health protective work in Indiana. However, it does not set prerequisites for employment.

2. As problems of health are now more complex due to population increase, expansion in housing developments outside city limits, and the greater use of chemicals in soil, water, food, drugs, etc., better trained people are needed to cope with these new problems.

3. The sanitarian works with the doctor, nurse and engineer as a member of the public health team. The doctor, nurse and engineer must meet professional qualifications. The Sanitarian should also.

4. The Registration Bill has the endorsement of the State Board of Health, the Indiana Public Health Association and the Indiana Health Officers' Association. Each of these agencies knows the value of good training and competent personnel.

5. The Indiana Association of Sanitarians represents nearly all those who practice environmental health work in Indiana. Its present membership is about 300. Better qualified health workers is an important objective of this association.

6. Under the proposed act, a Board of Registration for Sanitarians will be established. It will be a self sustaining board. *No legislative appropriation will be necessary!*

7. The proposed act is modeled after similar acts used throughout the country. Twenty states now have an act of this kind.

8. All citizens of Indiana stand to benefit through competent management of environmental health problems. The people of our state want and merit the best in Public Health protection.

On the opposite page is a reproduction of the information sheet which has been prepared to acquaint the public with its local and state sanitarian. Appearing on the reverse side of that sheet is the following:

THE PROPOSED BILL FOR THE REGISTRATION OF PROFESSIONAL SANITARIANS

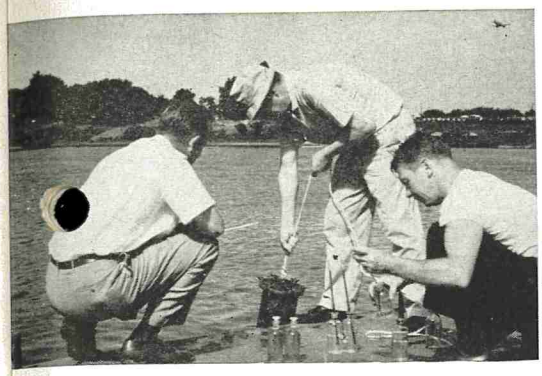
"The Indiana Association of Sanitarians is sponsoring a bill for registration which will set educational and other qualifications for the Sanitarian. The Association believes that persons who do this responsible work should have training and be well qualified to do their job. The advice the public health sanitarian gives must be sound and meaningful. Frequently, he requests industry and others to spend substantial sums to make sanitary improvements. This is a responsibility that calls for good judgment and an understanding of the scientific principles involved.

Health is a great community asset. If community sanitation is to be improved and all citizens are to enjoy the fullest health protection, the man initiating improvements and getting the community to act must be competent and meet reasonable qualifications which fit him for the job.

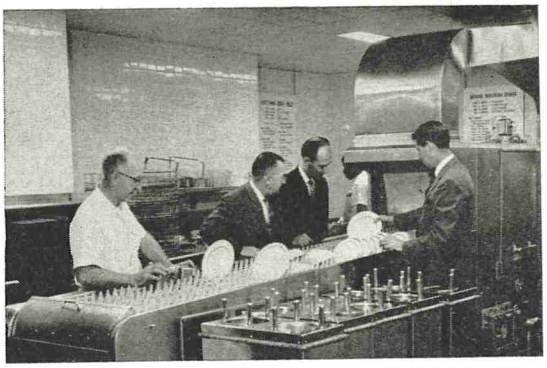
The Bill in question is a step toward meeting the need for good training and preparation. At the present time, there are no uniform state-wide standards for personnel engaged in this work in local communities. The Indiana Association of Sanitarians recognizes that public health protection, in competent hands, is a great and important function and that the citizens of our State are entitled to the best available."

The registration bill itself has been reprinted in its entirety in a 10-page brochure entitled "A Bill Proposed By the Indiana Association of Sanitarians to Promote Better Public Health Services."

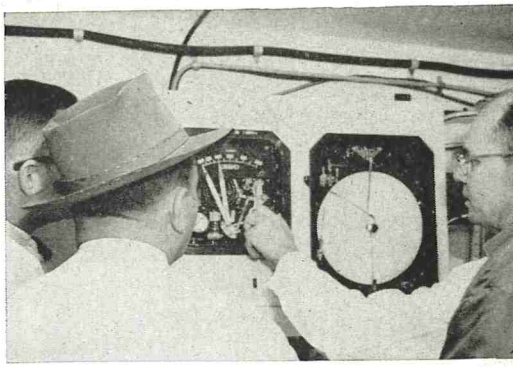
(Continued on page 332)



Water Sampling



*Food Inspection



Milk Pasteurization Control

SANITARIANS PROTECT *Your* HEALTH

Good Qualifications are Necessary for an IMPORTANT Job

Perhaps you are not too well acquainted with the PUBLIC HEALTH SANITARIAN and his work. If not, this article may help you understand his job and know how he protects your health. Generally, he works for a local department of public health or for the food and dairy industry. He is called upon to perform many functions all of which protect health and stem the tide of disease. His special area of activity involves the control of hazards in man's surroundings that influence his health. What then are some of the things the SANITARIAN does?

Water Supplies—For the most part we have safe water in the State. However, there are thousands of wells at schools, institutions, factories, food plants and homes which require checking. Not only checking for sanitary quality but to see that the well is properly located and correctly constructed so it will remain a good and safe supply. The SANITARIAN is constantly concerned with safety of water supplies. Contaminated unsafe water can and does spread disease. Frequently an owner may not know his supply is bad. The SANITARIAN finds this out and warns him of the defect. When correction is made illness is prevented.

Food Inspection—Food is one of the essential elements of man's existence. Today man has a great variety of food with new combinations coming on the market constantly. How safe is this food? Is it processed and sold under hygienic conditions? Are the people who prepare and serve it well informed as to its proper care? These, and many others like them, are the questions the SANITARIAN must answer. He must make inspections of all food places and give instruction concerning sanitary handling methods. He must understand pure food laws and see that they are not violated.

Institutional Hygiene—Schools, hospitals, homes of the aged, nursing homes and similar places need to be inspected to see that every reasonable precaution is taken to protect the health, comfort and safety of children and other patients. Institutional care of the aged is an increasingly important activity. The SANITARIAN works with the operators of these institutions to promote healthful surroundings.

Milk and Dairy Inspection—Milk is a highly essential food for all age groups. It is a universally used food. The protection and processing of it requires sound knowledge of animal care, sanitary procedures and the technical procedure of pasteurization. Here again the SANITARIAN devotes a good deal of his time to supervision of milk quality from farm to the consumer. This is a technical business and a good basic knowledge of dairy hygiene is required. Other dairy products are also subject to his inspection and sampling for laboratory testing.

Sewage Disposal—Today, with the tremendous growth of suburban living and the movement of population to the outskirts of cities, the disposal of domestic sewage and similar waste is a real problem. When outside the corporate limits, the home owner must depend almost universally upon a septic tank system for waste disposal. There are many principles to be followed when making such installations. The SANITARIAN has knowledge of these problems. This knowledge is passed on to builders, contractors and home owners so the system will be installed properly and not cause a health hazard.

Education and Enforcement—The SANITARIAN is, above all, an educator. He explains sanitary control to the community. He outlines steps and suggests procedures which make for more healthful community conditions. He must know and follow the public health laws and explain them to all types of industries and to the public. Sometimes he must begin legal action to enforce the public health laws, but such action is taken only when all other measures fail.

School Sanitation

*Courtesy of the J. B. Ford Co.

Septic Tank Lay Out for the Home

Testing Swimming Pool Water

Commenting on the Sanitarian Registration Bill for Indiana, Harold S. Adams, associate professor of public health at Indiana University Medical Center, spoke to the members of IAS as follows:

"Your Committee (on Education and Professional Development) believes that legal registration is one of several ways to advance the status of our profession. It is not expected that benefits will accrue over night. In fact, it may be some years before the full impact of such an act is realized. In California, for example, where a registration act was passed in 1945, there were no immediate effects. Now, however, some seventeen years later, the professional quality of sanitation personnel is probably the best in the country. We think Indiana is entitled to the same standard. We think, too, that public health is so important that more than passing attention must be given to job qualification."

Editor's Note: It is the desire of the Journal that the presentation and reproduction of the above material can be utilized to assist other affiliates in obtaining ideas for promoting registration in their own states.

Borden Chemistry Award Granted To Dr. Timasheff

A U.S. Department of Agriculture scientist who solved a riddle about one of the proteins of milk that had baffled researchers for 20 years, is to be honored for his work next year by the American Chemical Society.

Dr. Serge Timasheff, of the Agricultural Research Service's Eastern Utilization Research and Development Division in Wyndmoor, Pa. (near Philadelphia) will be the 1963 recipient of the Borden Award in the Chemistry of Milk. The announcement was made September 10 at the 142nd National Meeting of the American Chemical Society in Atlantic City, N. J. The Borden Award, consisting of $1000 and gold medal, will be presented to Dr. Timasheff at the Society's meeting next April in Los Angeles, where a symposium will be conducted in his honor.

Dr. Timasheff's research has been conducted on one of the principal proteins of milk known as beta-lactoglobulin. Because this protein exists in two almost identical forms (i.e.-beta-lactoglobulin A & B) it has yielded important clues on the relationship between a protein's chemical structure an its biological or physical behavior.

Born in Paris in 1926, Dr. Timasheff became an American citizen in 1944 and was graduated magna cum laude from Fordham University in 1946. He received his M.S. and Ph. D. degrees from the same University, where he also taught until 1950. Since 1955, he has been a member of the staff at the USDA laboratories in Wyndmoor. In 1958, Dr. Timasheff won an American Chemical Society travel grant to the International Congress of Biochemistry in Vienna. In 1959 he was awarded a senior post-doctoral fellowship by the National Science Foundation for studies at the University of Strasbourg, France.

Dr. Timasheff's wife, Dr. Marina Timasheff, is also a scientist at the Eastern Utilization Research and Development Division.

PROJECT HOPE PRESIDENT ADDRESSES D S I MEETING

Featured speaker at Dairy Society International's Sixteenth Annual Meeting Luncheon was Dr. William B. Walsh, founder and President of Project HOPE, the people-to-people medical training mission now stationed in a Peruvian port. Dr. Walsh's address, which dealt primarily with the impact of nutrition on health, as revealed by Project HOPE's experience and his own medical practice, climaxed a concentrated session of the Society, which started at 10:30 a.m., Sunday, October 28, at the Ritz Carlton Hotel, Atlantic City, N. J.

Reversing the usual order of DSI procedure, in order to conform to the new schedule of the Dairy Industries Exposition, the meeting was opened by a brief annual business session, including the election of officers. Following this was a review of the Society's activities, illustrated by slides, and given by the two DSI key staff members, George W. Weigold, managing director, and W. L. Phillipsen, assistant administrator, assisted by other DSI mission personnel.

During the current year, Mr. Weigold supervised projects in which the Society is cooperating with the U.S. Foreign Agricultural Service in the Middle East, Asia, and the Far East, and studied prospects for further increasing use of dairy products in these areas. Mr. Phillipsen carried on similar activities in Latin America. During the DSI year, also, industry teams conducted surveys in Venezuela, Spain and Peru, and handled dairy products demonstrations at international trade fairs in Ghana, England (2), and Germany. At the time of the DSI meeting, two other teams were in the field in Indonesia and Nigeria.

The dairy industry has had a vested interest in Project HOPE since its inception. It was decided early, through efforts of Dairy Society International,

Milk Industry Foundation and a DSI member-company, the Ex-Cell-O Corp., to ask industry to contribute a milk recombining plant to the recommissioned hospital ship, the S. S. HOPE, to demonstrate to doctors, nurses and health officials the importance of good, safe milk products in the diet. The plant was successfully assembled, the bulk of the required supplies donated, and the plant engineered and manned by another DSI member-company, Foremost Dairies. A motion picture record of the first voyage (to Indonesia), made by Ex-Cell-O, won an "Oscar" as the best documentary of 1961.

Dr. Walsh, who is assistant professor of Internal Medicine at Georgetown University, an internist and heart specialist of note in Washington, was asked in 1958 by President Eisenhower to develop a dramatic and worthwhile medical project for the People-to-People Program. Project HOPE was the result.

"My interest stemmed from my service as a medical officer on a destroyer in the Pacific during World War II," he said. "Anyone who has been in that part of the world knows how badly better health care is needed. Health is a real weapon in the struggle for world peace.

"The basic economic unit of any country is still the human being. The first thing to do is get him on his feet, improve his health . . . . then help the economy afterwards."

Dr. Walsh's enthusiasm and the public response led the government to turn over a $35 million hospital ship. On March 16, 1960 the CONSOLATION was loaned to the People-to-People Health Foundation (Propect HOPE), and converted for her new role on the frontiers of peace. In September of 1961, the 15,000-ton teaching-training vessel, renamed the S. S. HOPE for the initials of the Foundation's goal, Health Opportunities for People Everywhere, returned from her maiden voyage to Southeast Asia, with a year's experience, 28,000 patients and 20,000 miles of mercy missions behind her.

The S. S. HOPE is now docked in Salaverry, port for Trujillo, Peru, where her medical staff is setting up a third-year medical program with the University of Trujillo.

Following the Annual Meeting, DSI was again in charge of an International Lounge at the Dairy Industries Exposition.

NO TROUBLE WITH IODINE—131

Iodine–131 concentrations in pasteurized fluid milk as monitored by the U. S. Public Health Service showed no serious trouble spots during the last week of September except for Palmer, Alaska.

RISMAN, VENDING EXECUTIVE, ELECTED N A M A PRESIDENT

Louis J. Risman, president, Mystic Automatic Sales Co., Medford, Mass., has been elected president of National Automatic Merchandising Association (NAMA).

He was elected to a one-year term which begins January 1, 1963, at the Automatic Vending Industry's annual Convention and Trade Show held in San Francisco, October 13-16.

National Automatic Merchandising Association is the national trade group of the $2.7 billion food, merchandise and service vending industry.

Risman succeeds Herb A. Geiger, Geiger Automatic Sales Company, a Division of United Servomation Corporation, Milwaukee, Wisconsin.

Other association officers elected with Risman are Senior Vice President–Carl Millman, president, Automatic Merchandising Corp., Milwaukee, Wis.; Vice President–J. Richard Howard, president, Howard Vending Service, Division of Automatic Retailers of America, Inc., Indianapolis, Ind., and Treasurer–Walter J. Manning, Jr., vice president in charge of marketing, Rudd-Melikian, Inc., Hatboro, Pa.

Long active in vending industry affairs, Risman most recently served as NAMA senior vice president. In addition, he has served on numerous industry committees and has been a member of the association's Board of Directors continually since 1953.

FSEA 1963 Convention To Feature Food Exposition

The FOOD SERVICE EXECUTIVES ASSOCIATION's 62nd annual convention to be held in Las Vegas, August 13-15, will be highlighted by extensive professional and educational features including an industry exposition, a culinary arts show and numerous speakers and panel sessions on varied aspects of the industry.

All professional activities will be in the Las Vegas Convention Center where the meeting rooms for the educational activities, culinary art show and other events will be adjacent to the industry trade show. There will be booths representing many of the country's leading food and hospitality industry purveyors. The program for FSEA business meetings has been tailored to provide maximum opportunity for members to take advantage of the exposition.

(Continued)

For the first time an FSEA convention will throw its professional and educational activities open to all qualified representatives of the industry. A special invitation will be extended to all food and beverage operators in the Western states to attend.

Mike Maini, Las Vegas Branch past president, is 1963 General Convention Chairman heading a host branch committee which is already at work on an outstanding hospitality program. Sales of booth space is being handled by Trade Associates, Inc., 2818 Pennsylvania Avenue, N. W., Washington, D. C., which has been retained to provide professional management of the exposition.

Professional programs and other details of the convention are under the direction of FSEA International President Max Jaeger, FSEA Educational Chairman Joseph P. Tonetti, and FSEA Executive Committee working through Executive Vice President Ray S. Ewing of the FSEA International Office in Washington, D. C.

Calendar Of Events-1962

Nov. 7-8—Wisconsin Cheese Makers' Association, 71st Annual Meeting and 1962 Worlds Championship Cheddar Contest, Northland Hotel, Green Bay, Wisconsin. Administrative Officer, Joseph J. Bauer, 115 W. Main St., Madison 3, Wisconsin.

Nov. 9-10—Missouri Butter and Cheese Institute, Educational Conference and Convention, Missouri Hotel, Jefferson City, Mo. Administrative Officer, W. H. E. Reid, Eckles Hall, University of Missouri, Columbia, Mo.

Nov. 12-14—Grocery Manufacturers of America, Inc., Annual Meeting, Waldorf Hotel, New York, New York. Administrative Officer, Paul S. Willis, 205 E. 42nd Street, New York 17, N. Y.

Nov. 13-14—The Dairy Fieldmen's and Dairy Plant Operator's Conference, Memorial Center, Purdue University, Lafayette, Indiana. Administrative Officer, F. N. Andrews, Animal Science Department, Purdue University, Lafayette, Ind.

Nov. 19-20—South Dakota State Dairy Association, Annual Convention, Sheraton Cataract Hotel, Sioux Falls, S. Dakota. Administrative Officer, Ervin Kurtz, Brookings, S. Dakota.

Nov. 26-29—Southern Association of Ice Cream Manufacturers and Minnesota Milk Council, Annual Convention, Americana Hotel, Bal Harbor, Fla. Administrative Officer, Edward J. Koontz, Box 5107, Biltmore, N. Carolina.

Nov. 27-28—Northwest Association of Ice Cream Manufacturers and Minnesota Milk Council, Annual Convention, St. Paul Hotel, St. Paul, Minn. Administrative Officer, D. T. Carlson, P. O. Box 72, Willmar, Minn.

Dec. 2-4—Western States Dairy Convention, Cosmopolitan Hotel, Denver, Colo. Administrative Officer, C. E. Dunlap, 955 11th St., Denver, Colo.

Dec. 6—Evaporated Milk Association, bi-monthly meeting of the Industry, Builders Club, Chicago, Illinois. Administrative Officer, E. H. Parfitt, 228 N. LaSalle Street, Chicago, Ill.

Dec. 12-14—Wisconsin Dairy Foods Association, Inc., Annual Convention, Schroeder Hotel, Milwaukee, Wisconsin. Administrative Officer, A. E. Van Thullenar, 222 S. Hamilton St., Madison, Wisconsin.

Dec. 13—Evaporated Milk Association, Industry Meeting, Sherman House, Chicago, Ill. Administrative Officer, E. H. Parfitt, 228 N. LaSalle St., Chicago 1, Ill.

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Auditor, Verlyn Owen -------- Rosebud, South Dakota

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Pres.-Elect, Mason Lang -----Phoenix
Sec.-Treas., Hiram Shouse ---- Room 430, State Office Bldg., Phoenix

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Hubert H. Vaux ----Indianapolis
Karl K. Jones -------Indianapolis
Ronald Brown ------Indianapolis
Samuel Elder --------Evansville
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PAPERS GIVEN AT AFFILIATE MEETS

Editorial Note: The following is a listing of subjects presented at recent meetings of Affiliate Associations. Copies of papers presented may be available through the Secretary of the respective Affiliate Association.

NEW YORK

"Meeting Competition By Reducing Cost," Dr. R. D. Aplin, Department of Agricultural Economics, Cornell University.

"Costs of Producing and Marketing Milk Concentrates," Professor L. C. Thomsen, Department of Dairy and Food Industries, University of Wisconsin, Madison, Wisconsin.

"A Milk Quality Study In Minnesota," Dr. J. C. White Department of Dairy and Food Science, Cornell University.

"Training of Dairy Personnel In Britain, Denmark, Holland and Germany," Professor Alec Bradford, Department of Animal and Dairy Husbandry, University of Vermont, Burlington, Vermont.

"Engineering Trends In Dairy Processing," H. L. Mitten, Jr., Research Engineer, Creamery Package Manufacturing Co,. Chicago, Illinois.

"Problems In Establishing A Protein Test Which Can Be Approved For Payment of Milk," Dr. B. L. Herrington, Department of Dairy and Food Science, Cornell University.

"Progress Report On Uniform Labeling of Dairy Products," A. J. Barnum, Secretary, National Labeling Committee, Ithaca, New York.

"Progress Report On National Mastitis Program," Dr. R. W. Metzger, Director of Quality Control, Dairymen's League Cooperative Association, Syracuse, New York.

"New Concept for Loose Housing Dairy Cattle," R. O. Martin, H. P. Hood and Sons, Boston, Massachusetts.

"An Improved Dairy Barn," Dr. R. W. Lewis, Veterinarian, Lockport, New York.

"Effect of Feed On Milk Composition," Dr. J. K. Looslie, Department of Animal Husbandry, Cornell University.

"Progress Report On Whiteside Test," W. H. Grunge, New York City Department of Health, New York City.

"The Challenge and Responsibilities of Professional Field Work," J. O. Hill, Director of Dairy Extension, Carnation Co., Los Angeles, California.

"The State Meat Inspection Program," Dr. W. E. Jennings, Director of Meat Inspection Service, Department of Agriculture and Markets, Albany, N. Y.

"The Keys to Creative Problem Solving for Sanitarians," A. M. Darroch, Supervisor of Training, Loblaw Inc., Buffalo, N. Y.

"Pest Control Service for Food Establishments," Ray Honeyford, Assistant Manager, L. A. Moore & Co., Inc., Utica, New York.

"Progress Through Improved Industry-Health Officer Teamwork," L. J. Hoebel, President, Buffalo & Western New York Restaurant Association, Buffalo, New York .

"The Characteristics and Importance of the Psychrophilic Bacteria," Dr. P. J. VanDemark, Department of Dairy and Food Science, Cornell University.

"Detection of Pesticide Residues In Milk and Other Dairy Products by Paper Chromatography," T. E. Byers, Chief Chemist, New York District Food and Drug Administration, New York City, and Maxim Lieber, Assistant Director, Division of Laboratories and Research, Nassau County Department of Health, Hempstead, N. Y.

"The Influence of Some Chemicals On Milk Counts," Charles Paley, Bernard Tzall and R. Nyman Soroker, Certified Laboratories, Inc., New York City.

"The Use of the Modified Whiteside Test in the New York City Milkshed," Dr. Theodore Reich, Veterinarian, New York City Department of Health, Middletown, N. Y.

"Assay of Radionucleides In Milk and Food," Dr. F. W. Lengemann, Biochemist, Atomic Energy Commission, Washington, D. C.

"Fallout—Its Public Relation Aspects," Norman Myrick, Dirrector of Public Relations, Milk Industry Foundation, Washington, D. C.

"The Cooperative State-Public Health Service Program for the Certification of Interstate Milk Shipers," D. W. Taylor, Public Health Service, United States Department of Health, Education, and Welfare, Washington, D. C.

"Rating New York State Farms Under United States Public Health Service," N. J. Hohl, Assistant Chief, Sanitation Services Section, New York State Department of Health, Albany, New York.

Panel: "Improving the Flavor of New York State Milk," Dr. A. C. Dahlberg, Cornell University, Moderator.

"Present Situation In New York State," M. H. Roman, New York State Department of Agriculture and Markets, Lowville, N. Y.

"Progress In Vermont," Professor Alec Bradfield, University of Vermont.

"Ways To Correct the Situation In New York State," W. F. Alexander, New York State Dept. of Health.

WISCONSIN

"The Poor Man's Safari," Leo W. Roethe, National Agricultural Supply Company, Fort Atkinson, Wisconsin.

"Should We Sell Milk On the Basis of Protein Content?", A Panel Discussion—

"A Plants'-eye View"—Gavin McKerrow, Golden Guernsey Dairy Co-op, Milwaukee, Wisconsin.

"Laboratory Testing Techniques"—Dr. William C. Winder, University of Wisconsin.

"Factors Affecting Protein Content"—Dr. James Crowley, University of Wisconsin.

"Radioactivity and Milk"—Norman Myrick, Milk Industry Foundation, Washington, D. C.

"Uniformity of Labeling"—Harvey J. Weavers, Wisconsin State Department of Agriculture.

"Do Present Quality Tests Tell the Story?",—Dr. Edwin M. Foster, University of Wisconsin.

"USDA Proposals for Milk Quality Standards for Manufacturing Purposes"—Edward Small, Dairy Division, United States Department of Agriculture.

CALIFORNIA

"The University's Program for the Dairy Industry," Dr. Walter Dunkley, Professor Food Science & Technology, University of California, Davis.

"Diet and Hormones As They Pertain to Coronary Artery Disease," Jessie Marmorstan, M. D. F.A.C.P., Clinical Professor of Medicine, University of Southern California, Los Angeles.

"Radioactive Fallout and Its Implications for the Dairy Industry," Dr. John M. Heslop, Acting Chief, Bureau of Radiological Health, California State Department of Health.

"Activities and Functions of the California State Board of Agriculture," Milton Natapoff, California State Board of Agriculture.

"Duties and Responsibilities of the California State Director of Agriculture," Charles Paul, Director, California State Dept. of Agriculture.

"Public Relations, Inspector and Consumer," Jack Covert, Chief Dairy Inspector, Los Angeles City Health Department.

"The Future of Ultra High Temperature Pasteurization," H. E. Behlmer, Machine Specialist, Cherry-Burrell Corporation, Cedar Rapids, Iowa.

"History and Development of Detergents and Sanitizers," R. B. Barrett, Technical Director, Klenzade Products, Beloit, Wis.

"Evaluation of Research for the Control of Flies," Dr. R. L. Metcalf, Chairman, Division of Entomology, University of California, Riverside, California.

Panel: *"Low Level Dairy Pipe Line"*
Moderator: Don Cordray—Bureau of Dairy Service
Dr. Walter Dunkley, University of California, Davis
Richard Toschi, Department of Health, San Francisco, Calif.

W. Fairbank, University of California, Davis.
Harold Heiskell, Babson Brothers, Sacremento, Calif.

"History, Physical, and Mechanical Principles, and Engineering Concepts of Milking Machines," William Fairbank, Extension Engineering Technologist, University of California, Davis.

"Practical Application of Detergent and Sanitizing Materials," R. B. Barett, Technical Director, Klenzade Products, Beloit, Wis.

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.

Bibliography Abstracts of Research Literature. Pesticide Residues in Milk and Other Agricultural Products. Published by the Dairy Industry Committee, Washington, D. C.

Control Flies, Special Circular 59. College of Agriculture, University of Wisconsin, Madison, Wisconsin.

Large Milking Operations in Wisconsin, Bulletin 556. College of Agriculture, University of Wisconsin, Madison, Wisconsin.

Insect Prevention & Control in Plants Processing Dry Milk. U. S. Agriculture Marketing Service AMS 302. Revised May, 1962, U. S. Dept. of Agriculture, Washington, D. C.

Brucellose's Eradication. Recommended Uniform Methods & Rules. U. S. Agric. Service AR 8 91-10-2, Feb., 1962. U. S. Dept. of Agriculture, Washington, D. C.

Legal Aspects of Marketing Sterilized Concentrated Milks. Wisconsin Agri. Expt. Station. Res. Bul. 232, Madison, Wisconsin.

Fly Control for Dairy Farms. Washington State University Agric. Extension Service, Extension Circular 312, Pullman, Washington.

Keep Milk Safe—Control Flies. Wisconsin Agriculture College Extension Spec. Circular 59, Madison, Wisconsin.

Control Mastitis. Wisconsin Agric. College, Ext. Spec. Circular 68, Madison, Wisconsin.

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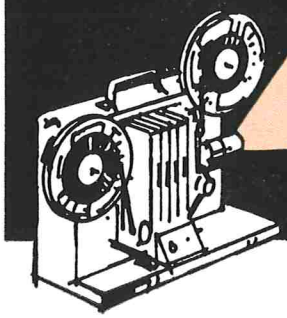

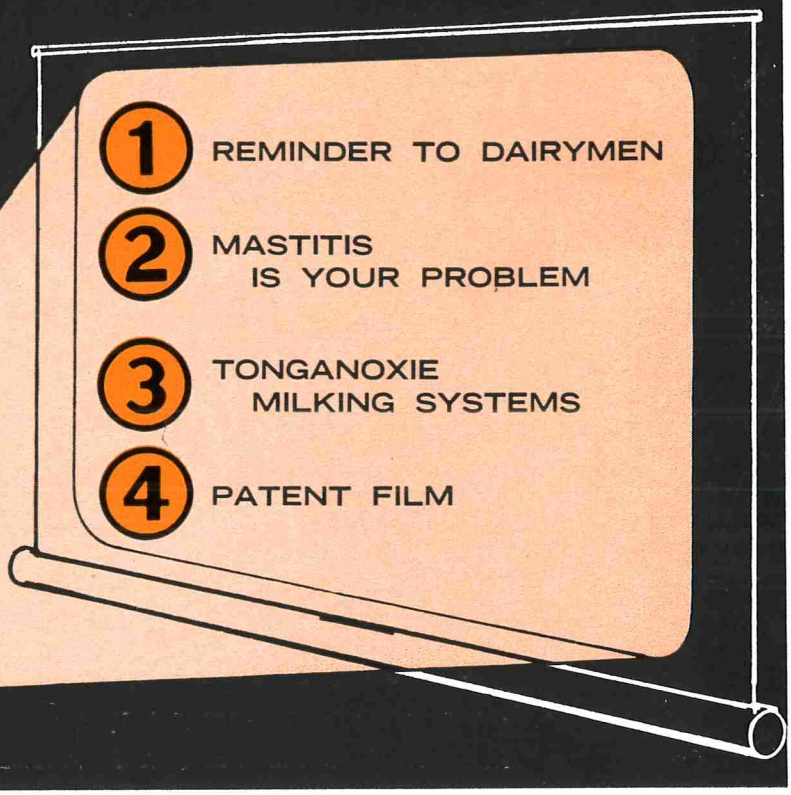

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