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Official Publication

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

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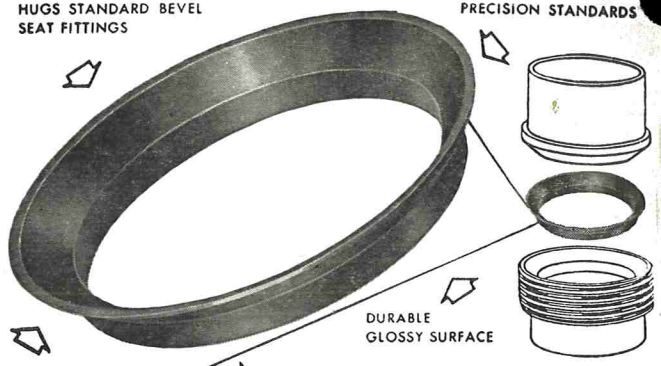

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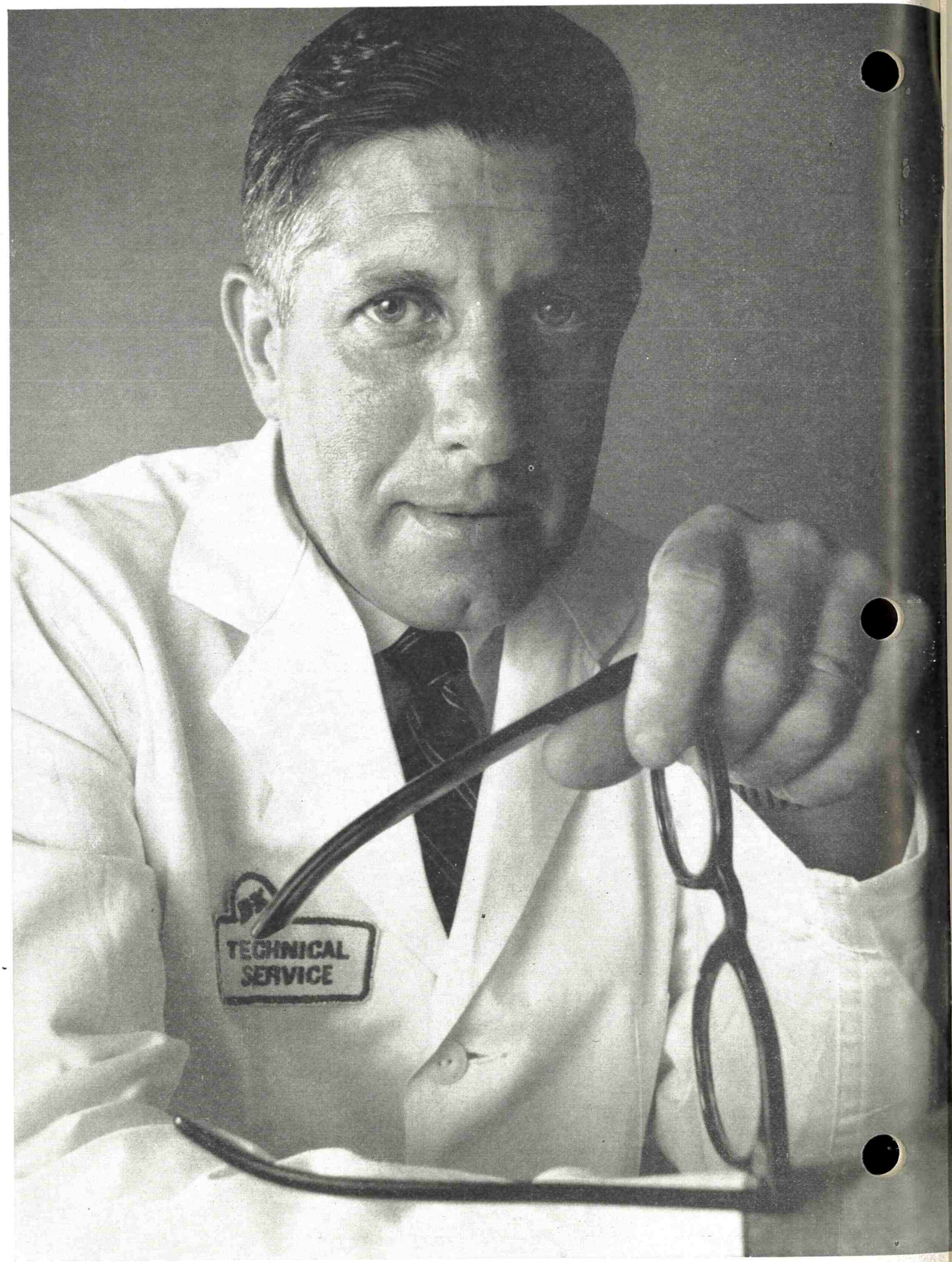
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DETERMINING CLEANLINESS OF MILK CONTACT SURFACES BY ANALYZING FOR CALCIUM RESIDUAL: PRELIMINARY STUDIES[1]

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(Received for publication September 1, 1967)

Summary

A new procedure for determining cleanliness of milk processing equipment is discussed. Calcium was removed from milk-contact surfaces by applications of 1 M HCl and scraping with a plastic spatula. Quantities removed were determined by atomic absorption spectroscopy. The mean residual concentration of calcium on equipment after "control cleaning" was equivalent to 0.07 mg/100 cm², and 95% confidence limits indicated insufficient cleaning if the residual was 0.08 mg/100 cm² or higher. Suggestions for improving the method are included.

Methods for determining cleanliness of milk processing equipment have previously been based on recovery of microorganisms *(1)*, use of radioactive isotope tracers *(3)*, inactivation of hypochlorite by soil *(4)* and miscellaneous methods. Disadvantages of these methods are many and varied ranging from poor repeatability to extreme complexity. We were seeking a simple, reproducible method that could be applied industrially and in research.

Our hypothesis for study stated that since calcium is a major constituent of milk, of milkstone, and presumably of the majority of films left on milk processing equipment, quantitative removal and analysis of calcium from milk films would produce a reliable measurement of equipment cleanliness. Highly sensitive and relatively rapid quantitative tests are now available for calcium. We theorized that quantitative removal of calcium could be achieved by thorough washing of the sample surface using a strong acid.

Materials and Methods

Applications of milk films. Skimmilk was applied to the tank walls using a sanitizer fogging device. The droplets were allowed to collect until the film just started to flow down the walls. The film was then allowed to become visibly dry prior to analyses or the rinse or wash experiments.

Rinse and wash procedures. Cleaning was done with an automatically controlled CIP spray ball system mounted in a rectangular 2500 gal. insulated storage tank. The single spray ball was mounted in the center of the tank which measured 5' x 9' x 11'. The cycle provided for a 3 min rinse with tap water at 32 C, a 9 min detergent wash at the specified temperature and a 2 min cold water rinse.

Detergent evaluations. Preliminary trials were made to determine the applicability of this method for evaluating efficiency of cleaning by cold water detergents. Detergents tested were as follows: AIM, a bulk milk-tank cleaner (A); 2214, an experimental formulation by Economics Laboratories (B); and Klenz-mate formula 2124, a liquid mechanical dishwasher detergent (C).

Template. A frame (Figure 1) made of extruded aluminum alloy was welded and coated with epoxy paint (O-Brien Mira-Plate) to preclude corrosion. A gasket made of silicone rubber (Dow-Corning) was formed around the bottom of the template to prevent sample escape and facilitate recovery of test solutions. The handle was constructed to provide even pressure distribution on the gasket.

Calcium removal. The 440 cm² sample area formed by the template was flushed with 10 ml portions of 1 M HCl and distilled water. Dry milk films were removed by 2 applications of water, 3 of acid, and 1 of water; whereas, after rinsing or washing, the order of application was acid, acid, water, acid, water, water. It was necessary to first apply water to the heavy milk film to prevent excessive protein coagulation. Solvent applications were made using a glass syringe, and the area was scraped between flushings with a plastic spatula moving from upper right to lower left (Figure 1). This loosened the film and swept the solution from the surface. Samples were collected in plastic milk sample bags which were tied beneath the template.

Each wall of the tank was sampled after performance of the treatment being tested. Thus, 4 samples were available for analysis from each trial. When a series of different treatments was necessary, samples were taken from adjacent areas so no overlap of sampling areas occurred. Duplicate determinations were made of calcium content of each sample.

To evaluate the sample collection method, 3 series of 8 consecutive applications of 10 ml acid were made. With 1 exception each 10 ml portion was collected separately and analyzed for calcium content to determine at what point residual calcium reached a level equivalent to that in the

[1]This study was in part supported by a fellowship grant to the senior author from the Dairy and Food Industries Supply Association.

[2]Present Address: Meyer-Blanke Company, St. Louis, Missouri. Contribution from the Missouri Agricultural Experiment Station. Journal Series Number 5247.

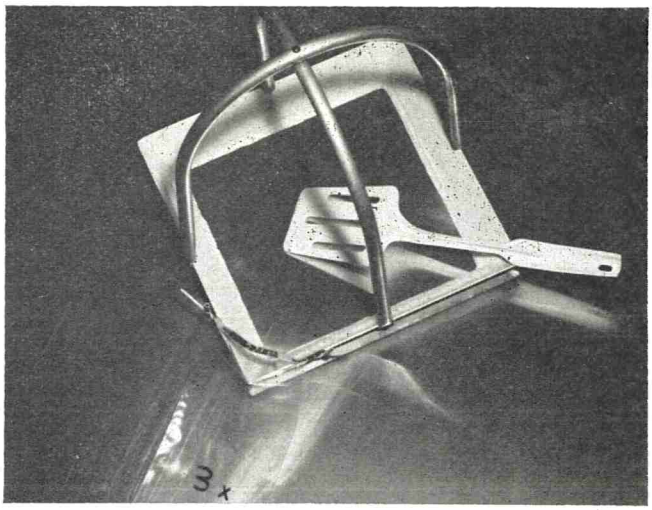

Figure 1. Template constructed of aluminum alloy coated with epoxy paint. The area within the silicone rubber gasket is 440 cm². The spatula and sample bag are made of plastic.

acid rinse solution (0.2 ppm).

To avoid film buildup, and possible interactions between treatments, "control cleaning" was used after a treatment or treatment series was completed. This consisted of consecutive applications for 15 min each of alkaline (Klenzade HC-41 at 66 C) and acid (Klenzade AC-3 at 60 C) detergents, respectively. This was followed by a 3 min rinse with tap water.

Because tap water contained about 15 ppm. calcium, surfaces were rinsed with distilled water before sampling to remove traces of tap water. Preliminary experiments indicated this to be essential.

Calcium analyses. Atomic absorption spectroscopy was used *(2, 5)*. To a 10 ml volumetric flask was added 8 ml sample, 0.5 ml of 2% lanthanum solution *(5)* and deionized-distilled water to bring to volume. Only 4 ml of sample were used when a highly soiled surface was sampled.

Concentrations of calcium in the standards were representative of the samples, and a control containing no added calcium was prepared. A standard curve was plotted from which sample calcium concentrations were determined.

Analyses were performed on a Perkin-Elmer 290 atomic absorption spectrometer equipped with a zinc and calcium lamp and a strip chart recorder. Acetylene was the fuel gas and filtered compressed air the supporting gas.

RESULTS AND DISCUSSION

Removal of calcium from the milk film was essentially complete after the third application of 10 ml of acid (Figure 2) when either highly or slightly soiled walls were tested. When the surface was heavily soiled, samples 1 and 2 were collected together and this value was plotted in the intermediate position. Quantities of calcium in control samples of acid are represented by the horizontal dotted line. Three applications of acid resulted in practically quantitative calcium removal.

When a surface was heavily soiled, protein coagulation resulted when acid was applied making the soil difficult to remove. This could be avoided by first applying 10 ml water and collecting the sample with the aid of the spatula. This should be considered in establishing a standard procedure.

Data in Table 1 represent 4 determinations each, 1 sample from each tank wall, for the various test conditions. Trials evaluating the "control-wash" and the "after rinse" residual were replicated 4 times (4 tanks-4 samples per tank). Others were duplicated (2 tanks-4 samples per tank). The mean calcium concentration after control cleaning was 0.5 ppm. which is equivalent to 0.07 mg/100 cm². Ninety-five per cent confidence limits placed the true mean within the range 0.214-0.786 ppm. Therefore, it should be valid to consider concentrations of 0.8 ppm (0.11 mg/100 cm²) and higher as indicative of excessive milk residual if the control wash was satisfactory. Such an interpretation indicated that none of our experimental detergent/temperature combinations were completely effective. However, detergent A (66 C) in trial 2 and detergent B (35 C) in trial 1 produced good results. In other instances one or more areas were "acceptably" clean but not all areas. Twice we observed "acceptable" residual after only rinsing. The relatively large amount of calcium removed by the rinse procedure is noteworthy. We had expected greater differences in quantities of calcium removed from the rinsed surfaces and the washed surfaces.

Variations in cleanability of the tank walls probably influenced these data. Visual observations in-

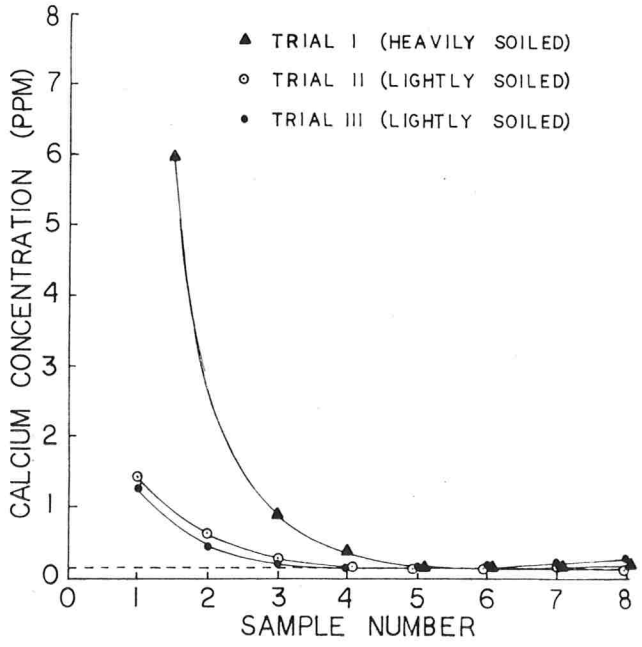

Figure 2. Parts per million of calcium in solutions taken in consecutive samplings of soiled milk-contact surfaces using 10 ml of 1 M HCl per sample.

TABLE 1. PARTS PER MILLION OF CALCIUM IN 60 ML OF SOLUTION USED TO REMOVE CALCIUM FROM 440 CM^2 TEST AREA AFTER VARIOUS TREATMENTS OF THE SOILED SURFACES

Trial No.	Control Wash	Dry Milk Film	After Rinse (32 C)	Detergent A (66 C)	Detergent A (35 C)	Detergent B (35 C)	Detergent C (35 C)
1	0.5	8.3	2.0	1.0	1.3	0.4	1.1
	0.4	7.2	2.0	0.7	0.9	0.5	1.0
	0.3	7.8	0.6	0.9	0.9	0.7	0.9
	0.4	6.3	1.2	0.8	0.8	0.5	1.0
Trial mean	0.4	7.4	1.4	0.8	1.0	0.5	1.0
2	0.8	10.3	1.5	0.6	0.6	1.0	1.9
	0.3	9.4	1.6	0.4	0.5	0.6	0.6
	0.4	9.0	0.9	0.6	0.7	0.6	0.7
	0.4	8.4	1.0	0.4	1.0	1.0	0.6
Trial mean	0.5	9.3	1.2	0.5	0.7	0.8	0.9
3	0.6		1.9				
	0.5		1.7				
	0.6		1.6				
	0.7		1.9				
Trial mean	0.6		1.8				
4	0.6		1.4				
	0.5		1.4				
	0.5		1.4				
	0.5		0.6				
Trial mean	0.5		1.2				
Treatment mean	0.5	8.3	1.4	0.6	0.8	0.6	1.0

dicated considerable differences in velocity of water runoff from tank walls.

Use of the confidence limits in interpreting these results provides an objective measurement of cleanliness. Our visual observations indicated a well-cleaned tank after the "control cleaning". Also recognized is the probability that some calcium will be found in samples from acceptably clean surfaces because of residual from tap water. However, we anticipate that the confidence interval can be reduced by procedural modifications.

A potential source of error is leakage around the template gasket. During our latter experiments, samples were weighed to assure recovery of essentially all the acid and water. Since we did not weigh them during earlier studies, this could have been the cause of some variation. The template gasket was flexible but not sufficiently so to allow sampling from curved or very uneven surfaces.

These results constitute a preliminary report of a method considered potentially quite useful. Refinements and standardization of procedure will be necessary. The following are suggested: (*a*) reduce the quantity of calcium solvent to 25-30 ml, applying in 5 ml increments; (*b*) incorporate a non-ionic wetting agent in the solvent; and (*c*) allow buildup of film during evaluation of cleaners rather than stripping the walls clean after each trial. Such procedural changes will increase differences in calcium concentrations between control samples and those from incompletely cleaned surfaces.

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THE ROLE OF MANAGEMENT IN DAIRY AND FOOD SANITATION[1]

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It is first necessary to draw a guideline as to what area management comprises. The Winston Dictionary defines "management" as "the act or art of conducting or controlling, administration, control, prudent dealing, skilful direction, those collectively who are responsible for the direction of an enterprise or business." It is unfortunate that many in positions of responsibility have forgotten the word "collectively" in the definition. Consequently, management in the minds of many depends on the position they hold in the so-called chain of command. Management may be from General Manager up to President, or it may start with the foreman, depending on the thinking of the individual. Often foremen are in a "no man's land" due to top management action. In short, they are foremen in name only. They don't belong to a union but they don't fit into the management and, as a result, are men who (*a*) are paid wages, (*b*) are not given any real authority and (*c*) are intentionally kept "uninformed" by a management that's interested only in executives at the top.

The importance of sanitation in the manufacture of all food products in today's market cannot be overemphasized. Laboratories all over this continent are continually devising new methods and techniques to assist in extending the shelf life of food products. Our laboratory, in conjunction with Mr. A. Catchick, quality control supervisor of the Dairy and Poultry Pool, has a paper in the press outlining a method which will assist the laboratory in pinpointing post-pasteurization contamination of dairy products in 16 hours. It has an accuracy of about 80 percent and is far superior to the coliform test for routine control. This type of information is crucial to management. If it had been available earlier, it might have assisted in eliminating a pathogenic strain of *Escherichia coli* (serotype 026:B6) which was isolated from a Canadian dairy product during a survey of isolates obtained from various public health laboratories across Canada, which was conducted by our laboratory last year.

[1]Presented at the 54th Annual Meeting of the International Association of Milk, Food and Environmental Sanitarians, Inc., at Miami Beach, Florida, August 14-17, 1967.

MANAGEMENT MUST RECOGNIZE ITS RESPONSIBILITIES

This brings us to the first and most important role of management in sanitation. Management itself must recognize the necessity of a sanitation program and must be convinced that good sanitation is the basis for the manufacture of top quality products.

It may be that communications by the press, radio and T.V. have over-accentuated the number of foodborne infections occurring on this continent but just in the recent past there have been a number of incidents reported, such as salmonellae in dry milk and barbecued chicken as well as *Clostridium botulinum* in smoked and canned fish. Those of you who are in the milk business know that the 1966 Surveillance Report No. 49 showed 22 dry milks in this country containing salmonellae. This is inexcusable and management must accept the responsibility.

Not long ago an interested visitor went through 3 dry milk plants. At one he was told that the laboratory had isolated *Salmonella* organisms from 1 dry milk run. The sample was forwarded to an independent laboratory for confirmation. The result came back negative and all in that plant breathed a sigh of relief and completely forgot their plan of action for a complete sanitation program—and it was certainly needed.

It is significant that the managers of all these operations were originally trained in small plants. In the past, the amount of quality control and sanitary practices followed usually depended on the size of the operation—the larger the operation the greater the amount of quality control conducted and sanitary procedures followed. In many instances small operators have had good records in overall plant gradings. This, we are aware, was due primarily to the small operation which had a few producers and these were personally known to the manager and were easily controlled. Further, produce was handled the same day, absence of complicated equipment made cleaning a simple procedure and multiplicity of package size was no problem. It is rather unfortunate that small operators had such a good record of quality because many in the position of management today have come up through this type of oper-

ation and sometimes do not realize the significance of all facets of sanitation (the practical application of scientific knowledge to the preservation of health).

Matthew Arnold wrote over 100 yr ago, "Faith in machinery is our besetting danger . . . as if it had a value in and for itself." In this age of computers and automation, there is still the tendency of management to rely on machines and to give too little emphasis to lower echelon workers. The prime requisite to insure the success of a complete environmental sanitation program is the interest taken and the example set by management. In the eyes of the employees any disinterest at the top is magnified a hundred times and will quickly be reflected in the employees' actions and attitudes.

NEED FOR MANAGEMENT INTEREST IN QUALITY CONTROL

History has a habit of repeating itself and in looking back to Solomon, one of the world's most brilliant minds, we find that he said, "Where there is no vision, the people perish"—(Prov. 29:18). Management, or any member of management, approaching the task of facing up to the problems of the food industry in a purely selfish way and without the interests of the consuming public in mind, lacks the vision which must exist if the organization is to continue as an effective instrument. It can be seen, therefore, that it is most necessary to have a clear insight into and a firm grasp of the principles and purposes of a complete sanitation program. W. C. Lawton has stated, "The food industry in general knows the concepts of quality, but many do little about it unless motivated by one of three things: (1) Regulation; (2) Customer complaints; and/or (3) Economics. In the past there used to be a pride of label built into products, where companies took special care to turn out the best product their knowledge permitted in an effort to satisfy the customers. Today, many practise the idea of minimum quality."

It is known that laboratory control and supervision of all operations in a food plant by competent technicians is, of course, a must. Too often this phase of management becomes so routine that it ceases to be effective. One example, concerning regulation, will illustrate this point. For some time sediment tests on butter have been conducted by central laboratories in Canada and the results are reported to the individual plants. One plant in our area had been running from 0 to 10% acceptable and management advised that they were following all procedures to produce an acceptable product. When 10 out of 10 churnings were reported unacceptable, an inspection was made. Neither salt nor neutralizer was properly protected. No attempt was made to filter the water. Cans were inadequately washed and returned to the producer. Only one very inadequate attempt was made at filtering the cream—and that in the wrong place. Not one of the recommendations for prescribed methods for handling the product had been followed. Changes were made and the following grading report showed 100% acceptable results.

This is only one example of many that could be cited, but it does point out the veracity of the statement of J. L. Goddard, U. S. Food and Drug administrator, when speaking about salmonellosis: "Although a major part of the initial contamination comes from such things as fish meal and a wide variety of animal and poultry products, we are convinced that a prime offender is a general carelessness about the basic principles of sanitation in many processing plants." Thus, K. F. Meyers' statement, "Filth is filth, whether it is cooked or raw, safe or harmful, visible or invisible to the naked eye", should be a prime factor in motivating food plant management personnel to maintain strict sanitary control.

EMPLOYEE TRAINING A MANAGEMENT FUNCTION

During the past decade there has been a major consolidation of food plants and, as a result, operations are much larger. Out of this has grown an organizational chart which shows on paper clear-cut goals and responsibilities. Unfortunately, clear-cut responsibilities are usually limited responsibilities which, like the army, follow a chain of command, where the employee is expected to respond wholeheartedly. This is supposed to minimize the amount of training necessary for the rather large turnover in help. As C. Argyris states, "Many employees adapt to the organization world by withdrawing from their work and by limiting their involvement in it." It is the only safe way the employee has of maintaining some semblance of self-esteem and still producing. It is extremely necessary that employees below the rank of foreman be recognized for their worth, yet the lower one looks down the organization chart, the more technology controls human behavior and attitudes in this day and age. Consequently, it is essential to give better training rather than less to these employees instead of depending on automation.

The last decade has seen the highly specialized occupation become commonplace. Thus the growing complexity of our various food plant operations has reopened the gap between school and employment. It has been found that many of the special skills and much of the knowledge required today can only be properly acquired through a system of "on

the job" training. However, this type of training in no way resembles the old apprenticeship training under a new name. It is designed to create through selective training potential management personnel for the future as well as a stimulus to better morale and greater efficiency. P. T. Young wrote, "Human efficiency depends (also) upon what is commonly called morale. The morale of a man is his attitude toward his work. The morale of a worker is changed by such incentives as praise and reproof, rewards and punishment, working against a competitor or as a member of a co-operating group, working with knowledge of results or no knowledge, achieving success or failure, working with a definite aim or with no purpose."

A well-planned staff training program need not necessarily be an expensive undertaking but it does take time and thought and persistence. The lack of any such program, however, can be very costly. For example, the withdrawal from the retail market of dry milk solids containing salmonellae has created a feeling not only of uneasiness on the part of many consumers regarding the wholesomeness of milk powder but also a doubt as to the safety of prepared foods in general. If sanitation, safety and housekeeping training programs had been in force, it is very doubtful that this would have happened. Staff training reduces turnover, increases production and improves co-operation and morale. However, probably one of the most interesting by-products is that communication between management and employees becomes easier and more direct.

How much training is necessary and what form it takes varies greatly from one food industry to another and from job to job. But the fact is becoming clearer every day that every food plant requires a training program for personnel, regardless of their past experience or educational qualifications and it is a sound investment.

EMPLOYEE ATTITUDES IMPORTANT TO MANAGEMENT

Too many top management personnel are too busy to realize that industrial relations within the plant are made up largely of attitudes. It's the way that people look at things that counts and, unless employees understand the what, why and how of sanitation, housekeeping and safety as outlined by management the fullest support of any program cannot be expected. This imposes on management the obligation of building on two fronts: the emotional front and the intellectual front. When a meeting of minds is desired, nothing is more important than to explain, and there is nothing in a good training program that management cannot make intelligible if it is approached the right way. But following immediately behind the facts must come a relation of the facts to the individual lives of those affected by them. It is possible, in some extreme cases, that the relationship between management and employees has reached the point of no return and cannot be brought back.

Be that as it may, what management can do is to point out how essential environmental sanitation is in a food production plant, – that an atmosphere of good maintenance, interest and care are all part of a sanitary program. Without a "do it now" philosophy on the part of management, every day maintenance degenerates into a serious problem which will affect all sanitation practices in a plant. All too frequently, sanitation and maintenance are haphazard procedures. Unless someone is made responsible (and that someone must have an interest as well as initiative to keep on top of the many problems which develop), the conducting of a program for stabilization is impossible. This is the duty of supervisors or foremen but they must have the support of all senior personnel.

Unless management views the sanitation program and any changes contemplated through the eyes of the worker, how can it tell what needs to be clarified so that the good points of the program can be made visible to the worker? The senior executives sometimes ask at this point, "But what about the supervisors and foremen, isn't that their job?" Certainly, the supervisor is the key man and the natural person for an employee to turn to when he wants to know something. However, he can only do an adequate job when delegated that authority. This is the area where programs break down – where the general manager does not in many cases consider the rank of foreman as management and will not delegate responsibility.

Recently a visitor to several food plants asked the following question in each: "Do you have a training program on environmental sanitation operating and, if so, what are the results?" The answers ranged all the way from embarrassment, evasion, halting answers to a discussion of well-organized plans. In better operated plants it was mentioned that they had not achieved their goal by an overnight crash program of inspection and criticism–rather it was a plan developed over a period of time and included safety as well as sanitation. The original system began as a safety program but it was realized that housekeeping, maintenance and sanitary practices were of such an order of importance that if these were controlled, so was safety. The top management in these plants not only established but maintained an active interest in the whole training program.

Probably one of the best ways of interpreting why some food plants have excellent records of safety and have extremely well-operated sanitation programmes is to look at the reasons for complete failure in others. As an example, there are listed below the reasons for business failure (in these instances, complete collapse) in percentages in Canada for a rather typical year by Dun and Bradstreet.

Cause	*Per cent*
Neglect	2.2
Fraud	0.3
Lack of experience in the line	4.4
Lack of managerial experience	46.2
Unbalanced experience	12.2
Incompetence	32.9
Disaster	1.3
Reason unknown	0.5

More than 95% of business failures reported were due to lack of experience, lack of managerial experience, unbalanced experience and incompetence. In other words, nearly every collapse could be placed on the shoulders of management and the same can be said for poor environmental sanitation programs in food plants.

CONCLUSION

No attempt has been made in this paper to tailor a set program for environmental sanitation in any specific food plant, nor have any hard and fast rules been elucidated on co-ordination between top management, superintendency, supervisory and foremen personnel and laboratory control. The synchronization of these groups in plant maintenance, safety and housekeeping will form the nucleus of an environmental sanitation program—but certain rank and file employees must be included to insure success. Too much emphasis has been placed on plants having modern equipment which is designated "fully automated" but require personnel to operate, and frequently the equipment is more prone to ills than man. In closing, the old cliche is stated, "Poor sanitation in a modern food plant is much less desirable than a plant with more modest appointments but with an awareness of sanitary practices for satisfactory processing." Only interested management can indoctrinate all employees on the necessity of environmental sanitation with a continuing well planned educational program, and two major accomplishments will ensue: (1) food products will be safe from a public health standpoint; and (2) food spoilage will be controlled.

RELATIONSHIP BETWEEN DISEASE AND REFUSE

The Public Health Service's National Center for Urban and Industrial Health in Cincinnati has released the first survey of literature dealing with the relationship between disease and the 800 million pounds of refuse Americans throw away every day. The engineer's term for this kind of pollution is solid waste.

Jerome H. Svore, Director of the Center, said the publication, *Solid Waste/Disease Relationships*, may prove to be a landmark on the road toward safe and sanitary solid waste disposal.

The book was written under contract with the National Center by Thrift G. Hanks, M.D., of Aerojet-General Corporation, Azuza, California.

Among other things, it was found that there is strong evidence that the collection of refuse is one of the most hazardous occupations, partly because of an absence of injury prevention programs among sanitation workers. The book discusses disease associated with such problems as chemical wastes, flies, human waste, animal waste, rats and mosquitoes.

The author scanned approximately 350,000 titles to write the 179-page publication. It will be used primarily by the health professions and by researchers in the basic medical sciences.

Four companion volumes to the publication contain the annotated bibliography of the 755 titles cited by the author. These volumes are on microfilm and are available at the University Microfilm Company, Ann Arbor, Michigan 48107.

Single copies of the basic publication may be obtained by writing to Richard Vaughan, Chief, Solid Wastes Program, National Center for Urban and Industrial Health, 222 East Central Parkway, Cincinnati, Ohio 45202; or from the HEW Press Office, Room 5541, North HEW Building, 4th and Independence Avenue, S.W., Washington, D.C. 20201, telephone 962-2548.

SANITATION IN RECREATION AREAS[1]

JOSEPH. P. SCHOCK

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National Center for Urban and Industrial Health

Cincinnati, Ohio

Historically, public health workers have been charged with the unhappy responsibility of warning the public of health hazards—real or potential. The rapid change in the pattern of our environment during the past few decades has provided ample opportunity for such warnings. Air is becoming a problem in air pollution—so stop breathing. Our foods are becoming implicated in food borne disease—so stop eating. Alcoholics Anonymous are in a difficult position since our water supplies have been shown to contain increasing amounts of toxic chemicals—so stop drinking water. The Surgeon General's report on smoking condemns the practice as hazardous—so stop smoking. Statistically, we can prove that sleeping is the most hazardous activity in the world, since most deaths occur in bed—so stay out of bed.

It is with a feeling of utter relief and tremendous enthusiasm which results from my being able to say "Recreation and Public Health are synonymous." Here we have a positive program we can support—one which contributes to the health, physical well-being, and social improvement of our people.

Although we may have had a slow start, public and governmental recognition of the values of recreation have grown at a tremendous rate, particularly since the end of World War II. This has tended to parallel the gains of our economy and the increase in leisure time. Do you know that at the turn of the century the average work-week in this country was 60 hr? Today, the average work-week is 40 hr, and many predict that by the year 2000, it will be 30. An understanding of the demand for recreational opportunities and the extent of present and planned governmental activities are essential to any meaningful discussion of recreation area sanitation.

Dollar-wise, recreation is big business. The combined expenditures of all forms of government—Federal, State, and local—are estimated to be over a billion dollars annually. In addition to the governmental expenditures, there is a twenty-billion-dollar market for goods and services utilized in outdoor recreation.

We also must recognize that recreation is not limited to any segment of our population, or confined to any group with a burning desire or interest, such as in fishing or golf; but it is an activity participated in by fully 90% of the population.

An insight into the things that people do for recreation is also necessary if we are to deal successfully with these problems. Surprisingly the most popular activity is driving for pleasure, followed very closely by walking for pleasure. Activities in order of popularity following walking are: outdoor games or sports, swimming, sight-seeing, bicycling, fishing, attending sports events, picnicking, nature walks, boating, camping, ice skating and water skiing, to name a few. These activities bear out the fact that water is a focal point of recreation, and this fact presents additional problems for health agencies because many of these activities on the water and the watersheds tend to degrade the quality of water which is ultimately used for human consumption.

Outdoor opportunities are most urgently needed near metropolitan areas as three quarters of the people will live in these areas by the turn of the century. They will have the greatest need for outdoor recreation, and their need will be the most difficult to satisfy as urban centers have the fewest facilities (per capita) and the sharpest competition for land use.

Across the country, considerable land is now available for outdoor recreation, but it does not effectively meet our needs. Over a quarter billion acres are public designated outdoor recreation areas. However, either the location of the land or restrictive management policies, or both, greatly reduce the effectiveness of the land for recreation use by the bulk of the population. Much of the West and virtually all of Alaska are of little use to most Americans looking for a place in the sun for their families on a weekend—when the demand is overwhelming. At regional and state levels, most of the land is where people are not. Few places are near enough to metropolitan centers for a Sunday outing. The problem is not one of total acres but of effective acres.

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[1]Presented at the 54th Annual Meeting of the International Association of Milk, Food and Environmental Sanitarians, Miami Beach, Florida, August 14-17, 1967.

PUBLIC HEALTH ASPECTS OF RECREATIONAL AREAS

According to available information and reports, the planning, provision and maintenance of environmental sanitation facilities basic to health protection in recreational areas are not keeping pace with recent trends and the rapidly increasing population using the various types of recreation areas. As a result, optimum use of such areas is not possible and rapid deterioration of overtaxed facilities is all too common. Where facilities such as water supply, sewage disposal and refuse handling are inadequate or totally lacking, pollution creates conditions which are grossly insanitary and the door to serious environmental health hazards is being opened on vacationers and neighboring community residents. Because the cost of adequate environmental health utilities and facilities often are approximately one-third of the cost of developing total new recreational areas, the role of the environmental health specialist in requiring and assuring proper environmental conditions should be recognized by recreation, park and public health agencies as a very important and vital aspect of recreation area development. An example of a new trend in vacationing occurring in the past 5 yr is the increasing use of travel trailers containing individual water and sewage systems.

The overall Federal recreation policy developed by the Bureau of Outdoor Recreation in the Department of Interior gives full recognition to the need for high standards of public health protection in recreational areas. Emphasis is placed on the need for the cooperative participation of all levels of government and private enterprise for the planning, provision and maintenance of sanitary facilities in recreation environments. This is outlined in the Recreation Advisory Council's Circular No. 3, "Policy Governing the Water Pollution and Public Health Aspects of Outdoor Recreation." This Council has been re-established as the President's Council on Recreation and Natural Beauty by Executive Order 11278. Let me cite two excerpts dealing specifically with the role of public health authorities in this matter and with their relationship to officials having direct managerial responsibilities for recreation and park development, construction and maintenance:

> "It is incumbent upon agencies responsible for the planning, development, and operation of outdoor recreation areas to provide the health and sanitation safeguards required to protect the health, safety, and well-being of the recreation users."
>
> "To achieve that objective, agencies responsible for the management of outdoor recreation areas shall utilize the recommended health standards of the Federal, State, or local public health authority having jurisdiction; and they shall maintain close cooperation and consultation with the appropriate public health authority."

As large as the Federal program is, it is still recognized that State and local governments have really the key role in the development of recreational facilities, since, being closer to the people, they may shape their programs to meet particular needs and problems. The function of health agencies continues and extends into recreational activities under their jurisdiction. In the field of recreation, the Public Health Service is attempting to perform its normal function of collating information, providing technical assistance and consultation, development of uniform standards, and fostering research. However, we also have an operational program because many of the National Park Service areas are under the exclusive jurisdiction of the United States Government. Since 1922 we have had an operating agreement with the National Park Service for consultation, including inspection and plan review of environmental health facilities and programs in national parks. Most other areas under Federal management, i.e., Forest Service land, Bureau of Land Management land, Bureau of Reclamation land, etc., do not fall within the exclusive jurisdiction classification, and State laws and regulations are applicable. The authority of health departments to regulate sanitation facilities in recreation areas on land other than that owned by the Federal government and on private property will vary depending upon the strength or weakness of State law.

ENVIROMENTAL HEALTH PROBLEMS INVOLVED

Let us now turn our thought to environmental health aspects of outdoor recreation. First of all, we can ask "Why does this merit special attention when considered with all the other pressing and important functions that we have?" One obvious answer to that question is that there are far too many outbreaks of disease occurring in our recreation areas. The unfortunate typhoid outbreak in Zermatt, Switzerland, could easily be repeated in many of our recreational areas. In March of 1962, 75% of the tourist population visiting a popular ski area in the west was struck low by an outbreak of gastroenteritis. Investigators were not really surprised when they discovered that the condition was practically endemic, and had been recurring periodically for many years. Outbreaks of gastroenteritis have occurred so frequently in many areas that local residents have applied descriptive terms to them, such as "Yellowstone-itis," "Sheridan Glink," "Belton Belly," and "Rocky Mountain Quick-step." The Public Health Service has investigated many of these outbreaks, and describes them with the term, "resort diarrhea."

We have been somewhat unsuccessful in controlling these outbreaks and other conditions deleterious to health because we have not fully recognized that there are many special and unusual conditions pertaining to recreation which thwart our efforts to apply procedures found satisfactory in community programs. A few of these unusual or special conditions may be listed as follows:

1. *Seasonal operation.* This raises many economical problems for private individuals or companies operating recreation facilities, such as dude ranches and lake resorts. Although the visitor may be delighted to return to nature and live in primitive surroundings, adequate public health precautions require use of devices and equipment such as chlorinators, dishwashing machines, and sewage treatment facilities, to name a few, which often are expensive and pose a very real question and sometimes a dilemna, about the feasibility of financial investments in seasonal operations. The economic question may be transposed to a whole host of problems even in government operation. For example, packer-loader equipment would be a great time and labor saver for solid waste collection in campground areas in many large parks and recreational areas, but can the considerable cost of this equipment be justified if it will be used only three or four months of the year?

Seasonal operation also creates many problems related to personnel and staffing. A majority of food service personnel in recreation areas could be classified as amateurs, and this refers primarily to college students. Could this use of unskilled food service personnel be in any way related to the frequent outbreaks of gastroenteritis in recreation areas? Staffing for seasonal operation is also a problem when it is necessary to employ modern-type water and sewage treatment facilities. It is necessary that operators be trained and the "bugs" worked out of the plant from the initiation of operations in June. By the time this is accomplished, it may be Labor Day and time to close the plant down for winter.

2. *Public Behavior.* This also is a matter which makes the whole question of recreation sanitation different. A quote from the report on Outdoor Recreation for America on this topic reads, "Perhaps the most serious difficulty in public use of private lands is the problem created by the guests. Complaints are common about vandalism, theft, and thoughtless actions injurious to property and to the general recreation environment. Picking up trash and litter left by guests, and repairing petty damages, are often a major expense . . ." We have all seen many, many examples of problems caused by thoughtless visitors to recreation areas. Careless disposal of garbage, such as the ever-present watermelon rind, is the major contributing factor to fly population in recreation areas. There are many examples we could cite of vandalism, but perhaps it is sufficient to say this is a problem, and suggest that you think for a moment of the pit-privies which you have observed from time to time in some of our recreation areas. These are often a special target of vandalism. The solution to this problem of public behavior may require major expenditures for more caretaking personnel and may also require an extensive public education program similar to the Smoky Bear effort in fire prevention.

3. *Accidents.* Frequent accidents are also a characteristic of recreational activities which should not be overlooked by health agencies. A recent study has indicated that one out of four patients treated at hospitals in one northeastern city were injured while participating in sports, recreation, or entertainment. There are some sports, such as skiing, sledding, hunting, and swimming, which are inherently hazardous, but frequent accidents generally are associated with recreational activities because these are activities which are new to people or in which they engage only occasionally.

4. *Vector and Animal Problems.* Recreation in the outdoors provides the recreationist with much more exposure to animals, reptiles, and insects which in many instances may pose a threat to health and safety. Infection by encounters with rabid bats, ticks causing Rocky Mountain spotted fever, encephalitis, and fleas from rodents infected with plague is potential in many areas. Insects crawling into the ears of outdoorsmen have created painful conditions that require surgical procedures for removal. Visitors are sometimes bitten or attacked by animals as bears or snakes. Mosquito bites may cause such discomfort to visitors that some recreation areas are unused or full enjoyment is not possible.

5. *Noxious Plants and Weeds.* This again will be an increasing problem as greater numbers of people are exposed to the outdoor environment. The major problems are related to hay fever and other allergic reactions, such as poison ivy and poison oak. Millions of Americans annually suffer from these conditions. Control measures, which are in the embryonic stage, offer much promise for relief in the future.

6. *Remote Locations.* Lack of electric power and roads in remote areas cause many design and operation problems. If electric power is unavailable pressure for a water distribution system must be provided by other means. Intakes may be located high enough upstream to produce sufficient pressure by gravity flow or internal combustion engines may be used for pumping. Transportation of construction materials and operational supplies to a remote water intake or treatment location may be difficult.

7. *Landscape and Wildlife Protection.* The ob-

jectives of many recreational activities require, among other things, the preservation and development of the natural scene for enjoyment by present and future generations. This entails considerable effort on the part of planners to assure that the natural scene will not be despoiled by man-made structures such as elevated steel water tanks, water and sewage treatment facilities located within view of visitors. This factor of landscape protection requires many sanitary engineering innovations and often times results in the use of alternative methods which are most costly.

There are many additional factors too numerous to be listed here, which call for new approaches and approaches which are different from those employed on our every-day community sanitation programs. Dealing with these environmental health problems successfully will require a partnership approach of health agencies at all levels.

RECREATION ENVIRONMENT

Among the requisites for a safe and healthful environment are the following:

Site Selection—Proper consideration of drainage, soil permability, topographical or geological hinderances, accessibility to proposed sources of water supply or sewage works, mosquito and disease vectors, location and possible effects of swamps, streams, lakes on health and safety.

Watershed Management—Supervision, regulation, maintenance, and wise use of the aggregate resources of a drainage basin to provide the maximum yield of desirable quality, including the control of erosion, pollution, and floods. The principal activities include: construction, logging, grazing, mining, waste disposal, pesticide control, conservation fire control, and recreation use of watersheds.

Water Supply—Development of sources, treatment and distribution of water supply for domestic and culinary purposes that meet physical, chemical, and bacteriological requirements of the Public Health Service Drinking Water Standards or equivalent.

Sewage Disposal—Proper sewage collection, treatment, and disposal facilities prevent defilement of land and water areas, and to prevent pollution of surface or underground waters or other conditions conducive to the transmission of communicable diseases and to enable maximum enjoyment of water areas.

Plumbing—Adequate fixtures, approved materials, and proper installation and maintenance procedures to prevent cross-connection and backflow conditions in plumbing systems. Utilization of permanent and mobile comfort stations and portable toilets.

Building and Housing Hygiene—Adequate and safe housing, including campsites, cabins, dormitories and other public use buildings.

Food Service Sanitation—Design of kitchen, dining and other facilities to insure that safe handling and serving of food and drink to the public can be accomplished. Certification of sources of foods, frozen desserts, and milk and milk products during operation.

Refuse Handling—Proper storage, collection, and disposal of garbage and other refuse.

Swimming Pools and Outdoor Bathing Places—Design and operation of swimming pools. Evaluation of water quality and bacteriological standards for outdoor bathing places.

Travel Trailer Parking—Development of adequate travel trailer parking areas to provide parking accommodations, service building facilities, water and sewage hook-ups and other liquid wastes disposal facilities, including a sanitary station for sewage disposal from holding tanks.

Boating—Design of marinas to provide adequate facilities for launching, docking, collection and disposal of domestic sewage, waste oils and fuels, and solid wastes as garbage and refuse. Requirements for operation of boats equipped with marine toilets.

Fish Cleaning Facilities—Provision of adequate facilities to control nuisances, odor, and pollution from cleaning fish and disposal of waste products.

Insect and Rodent Control—Provision of adequate prevention and control measures during the planning, construction, and operational phases of recreation areas to minimize public health hazards created by insects and rodents.

Recreation Safety—Elimination of accident hazards and promotion of safety.

Campgrounds and Picnic Areas—Development of campgrounds and picnic areas for the enjoyment of the recreation with proper consideration given for environmental health factors relating to this mode of recreation.

Stable Sanitation—Provision of adequate facilities for stabling of horses and proper removal, storage, and disposal of manure.

NEED FOR COORDINATION OF AGENCY ACTIVITIES

Our most immediate and pressing need is to apply the knowledge and abilities which we already possess to these problems. The Public Health Service can contribute in this area by collecting and collating data, preparing criteria and standards, and other publications specifically related to environmental health aspects of recreation areas. Examples of these publications which have been developed are: *(1)* Environmental Health Practice in Recreation Areas, *(2)* Environmental Health Guide for Travel Trailer Parking Areas.

State and local health agencies have the prime responsibility for enforcement of public health programs. The basis of this is inspection and effective follow-up to assure that sanitary defects and health hazards are eliminated. One rather simple and effective procedure which could bear improvement in many States is that of effective coordination between park and recreation commissions or agencies, and health agencies. If someone asked me what is the most important single factor to improve sanitation in recreation areas, the answer is "Plan Review." In the area of recreation, this can only be accomplished by developing procedures for coordination between the various agencies having responsibilities for recreation. Again our most immediate and pressing need is to apply the knowledge and abilities which we already possess.

Secondly, all of us—Federal, State, and local—must

do a better job in defining needs in recreation areas so that efforts to obtain the necessary funds for adequate facilities will be reinforced. I point with pride to the Public Health Service's consultative program with the National Park Service. We have been of tremendous help to the National Park Service in identifying needs and providing public health support for water, sewerage, and other sanitation projects. State and local health agencies generally can also do much to assist and support budget requirements of other agencies of government having the responsibility for construction, maintenance, and operation of environmental health facilities in recreation areas. We should not neglect to define our own increased activities in recreation and, hopefully, these activities would be reflected in increased budgets for health surveillance.

And, third, there is a real need to develop and nurture a research program for environmental health aspects of recreation.

SUMMARY

Considerable attention is being focused on the outdoor recreation resources of this country by all levels of government, public and private agencies, concessionaires, and the recreationist. Our recreation environment is becoming greatly overcrowded, many existing areas lack adequate health and sanitary facilities, and the development of new areas requires investment of money, resources, and effort.

There are many environmental health planning aspects which must be considered in the over-all planning, development, and operation of existing and future recreation areas to provide the health and sanitary safeguards to protect the health, safety, and well-being of the recreation users. We all have a necessary and significant role in this endeavor.

The need for greater participation and cooperation between health, planning, and recreation agencies to determine recreation trends and provide adequate recreation opportunities and facilities is one of the most challenging of the metropolitan planning jobs to be done.

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STATE WATER LAWS REACH RECORD VOLUME

With nearly 500 new measures, state laws dealing with water conservation and pollution reached a record volume in 1967, says Commerce Clearing House.

This significant amount of legislation is attributable in large part to the Federal Water Quality Act of 1965 which required all states to submit water quality standards to the federal government by June 30, 1967.

States were faced with the problem of determining whether they could comply with the federal law, and, if not, of taking steps which would bring them under the federal requirements rather than having water quality standards imposed by the federal government, said CCH, publishers of *Water Control News*.

Among the subjects covered in this 1967 legislation were flood control zones, pollution control schedules, water pollution taxes, water authorities, sanitary and sewer facility financing, state water control compacts, soil erosion and siltation and refuse in waters.

Other subjects included industrial pollution, watershed controls, tax incentives and exemptions, wildlife preservation, land and water recreational resources, irrigation districts, water standards, water and sewage research, local water regulation, water drainage, water districts and environmental pollution problems.

Illinois led the nation in new enactments of water-related proposals with 58 followed by California with 45, Florida with 35 and Maryland with 30.

On the important tax incentive front wherein states grant tax breaks to private enterprise for the installation, operation and maintenance of water pollution control devices, property tax relief is now granted by nineteen states, corporate or personal income tax breaks, or both, are afforded in eleven states, while sales tax breaks are granted in eight states, CCH reported.

INTERNATIONAL MICROBIOLOGICAL STANDARDS FOR FOODS[1]

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Interest in the development of microbiological criteria for foods and food products is by no means a new development, and within the last 5 yr, it has become an increasingly important topic at many formal conferences. The number of groups involved, and the multiple conferences and meetings held by each of them, attests to the importance attached to the public health need for effective control of the microbiological content of foods.

In addition, it emphasizes the difficulties encountered in arriving at microbiological parameters of safety, agreeable to the many and varied groups. They have recognized not only the different points of view held by industry and by regulatory officials, but as well, the variation in methodology which exists among scientific groups from different countries and also within the same country.

Between countries, the problems are all too frequently further complicated by fundamental, and often unrecognized, lack of complete understanding of basic goals and by suspicion. Agreement on methodology and on attainable bacterial levels can not and should not be attempted until rapport has been established.

Need for and Benefits from Microbiological Standards

The overall problem of the need for microbiological criteria and the benefits that may accrue from them will first be considered. Probably the question of need does not require extensive elaboration, for it is well known that the rapid expansion in the production and distribution of commercially prepared ready-to-eat foods has created concern on the part of regulatory officials and responsible industry alike. This concern is emphasized by the very apparent lack of reduction in the incidence of illnesses generally associated with food products. This is in sharp contrast to the marked decrease in those illnesses attributed to milk and water, where control has been applied for many years along with well enforced standards.

Thus, protection of public health through reduction of food-borne illnesses is the first and most important goal. It is, of course, not to be expected that the adoption of realistic microbiological limits will ensure complete safety of a food any more than it has done in milk and water. In fact, it is possible that the record would be much less perfect considering the homogenity of the liquid products and the greater ease with which they can be processed, packaged, and distributed.

The second objective sought is to improve and control the sanitation under which foods are processed. Here the likelihood of success is much greater if the limits are properly conceived and properly applied. If in this fashion the hygienic level of food products is raised it will, in all probability, reduce the hazards of food poisoning to a marked degree. Such has been the experience, even in those instances where the limits were set in a more-or-less arbitrary fashion.

Problems in Establishing Microbiological Standards

There are, however, many problems that must be recognized in an attempt to establish meaningful and useful bacteriological limits. There must be complete and thorough knowledge of production, processing and distribution of the food in question. Limits for each type of food must be derived depending on the type of raw materials used, processing procedures employed and the stage in production at which lethal processes, if any, are applied. Also, and of utmost importance, the influence of storage upon the different microorganisms in each food must be recognized and properly accounted for.

These problems have led many in industry and health agencies alike to propose that limits be preferably applied at production source and that their most useful purpose is to supplement rigid processing controls and thorough inspection procedures. In this fashion they would serve to ensure that a particular plant or industry was operating and continues to operate at a high level of sanitary excellence.

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[1]Presented at the 54th Annual Meeting of the International Association of Milk, Food, and Environmental Sanitarians, Miami Beach, Florida, August 13-16, 1967.

ORGANIZATIONS ACTIVE IN SETTING STANDARDS

All of the foregoing have been previously emphasized by many writers and are doubtless well known. They have been emphasized on numerous occasions by the many groups concerned with the development of microbiological limits. Among the organizations in the United States active in this area, probably the first was the Association of Food and Drug Officials of the United States (AFDOUS) which in 1956 expressed concern over the quality and handling of frozen foods and undertook studies of the microbiology of frozen foods at production levels. In this they were joined by the National Association of Frozen Food Packers and by Federal and local regulatory agencies. In 1963 a subcommittee on Food Microbiology of the Food Protection Committee of the National Academy of Science/National Research Council was established with one of its charges being to "formulate principles on which microbiological criteria could be based." Both of these groups are currently active.

In the international field there are presently many groups that have expressed a concern with, or who have entered or plan to enter, the field of microbiological standards. One of these, the one in which the author is involved, had its beginning in 1962, when the Committee on Food Microbiology and Hygiene of the International Association of Microbiological Societies (IAMS) arranged a conference in Montreal to discuss microbiological content in food. This resulted in the establishment of an International Committee on Microbiological Specifications for Foods under the IAMS.

COMMITTEE ON MICROBIOLOGICAL SPECIFICATIONS FOR FOODS

As presently constituted this Committee is limited to 20 members and has representatives from 12 countries, including Sweden, France, Netherlands, Denmark, Japan, Italy, Peru, USSR, England, Canada, and the United States. While governmental and industry groups are represented, all members serve as individuals, not as representatives of their respective organization.

The stated purpose of the Committee is to appraise the public health aspects of the mircrobiological content of foods, particularly those of international interest; to offer guidance in interpretation of the significance of microorganisms in foods; to recommend microbiological limits for specific types of foods; and to recommend methods for isolation of microorganisms and toxins from foods. The Committee has clearly stated that its objective was not one of formulating legislation, but to seek agreement on realistic limits for the bacteriological content of specific classes of foods as a preliminary step in appraising ways to improve microbiological safety, whether by processing procedures, improved sanitation, or by laboratory testing.

The report of the first meeting of the Committee was published by its Chairman, Dr. F. S. Thatcher, in the *Journal of Applied Microbiology*, Volume 26, August 1963. It covered a broad range of subjects from sampling schemes in current use, rationale of microbiological limits and their interpretation for specific foods, and research needs. The Committee found wide variation in methods currently being employed and recognized that this topic would require much greater studies and deliberation.

New committee report.

The Committee met again in 1965, and among other items established recommendations on microbiological methods for the already agreed upon food categories. These agreements were further discussed at a meeting in 1966, and a draft prepared for review and discussion. This draft was reviewed in 1967, and currently is in the final stage of revision, prior to publication.

Basically, the report, entitled the "Significance of with a discussion of factors to be considered in the Microorganisms in Foods and Methods for Their Enumeration," will be in two parts. The first deals selection of methods and the interpretation of the significance of microorganisms in foods. The second part will cover recommended methods for isolation and identification of indicator organisms and of pathogens.

Whereas in the report of its first meeting, the Committee touched on bacteriological levels broadly, and will, in its published report, discuss the significance of particular species or groups of microorganisms, it has made no further attempt to suggest numerical values for individual or classes of foods. It has, however, enunciated certain basic concepts which it is hoped will serve as a guide for those countries with sophisticated facilities for control and for developing countries.

Pathogenic organisms.

In the case of the pathogenic organisms the Committee has stated a firm position that no tolerance shall be established for significant, infectious pathogens. *It is recognized that absolute absence of pathogens is both difficult to attain and to determine, and that a standard based on the sensitivity of a reasonable method and on a reasonable sampling plan can be both realistic and productive in reducing hazards to the public health.*

It is further recognized that what constitutes a significant pathogen is not always obvious and that judgment based on experience is essential. Thus, the

mere finding of toxigenic organisms, as distinct from an infectious pathogen, does not necessary call for removal of food from the market. Consideration must be given to such factors as further processing procedures, the nature of the food, storage conditions, and the role of natural competitive flora in inhibiting the growth of the specific pathogen or in producing obvious decomposition before toxin can be formed.

In applying these considerations the role of the specific microorganisms must not be overlooked. Thus, *Staphylococcus* may in specific circumstances be a specific pathogen, a source of food-borne toxin, an indicator of insanitary practice, or of little significance and concern. Unless these different roles are clearly recognized and understood, considerable confusion will result.

With the infective enteric pathogen, some consideration should always be given to the potential for multiplication in the food. However, secondary contamination of other foods and of the environment must never be disregarded. We must not become so preoccupied with *Salmonella* that we ignore the other enterics—*Shigella*, virus, *Vibrio*, and zoonotic parasites.

Non-pathogenic organisms.

The Committee recognized that limits or criteria for non-pathogenic microorganisms must be based on data, derived from surveys for like foods, which demonstrate the values obtainable under acceptable commercial conditions. This is not always readily accomplished even within a single country and is much more difficult when broad geographic areas are involved. It is the hope of the Committee that all groups—industry and public health officials—will supply the data for this task. Both groups have a vital interest in the establishment of meaningful and realistic international limits and it is only through joint effort that these can be obtained.

Space does not permit a full discussion of the Committee's deliberations concerning specific pathogens or the various indicator organisms. The discussions leading to agreement on the statements to be contained in the report have resulted in mutual respect and understanding among the members of the countries represented. It is hoped that this feeling will be extended, through the report, to others.

Methodology.

In considerable measure much the same understanding has been generated in the area of methodology. Where comparative tests have been made, on an international scale, of some of the methods set forth by AOAC or AFDOUS, whole-hearted acceptance has generally resulted. However, the Committee found that, in many instances, sufficient comparative data does not presently exist on which selection of any one method could be made. In these instances multiple methods have been selected on the basis of satisfaction obtained by many laboratories or on comparisons made at regional or local levels.

In order to stimulate additional comparative testing of different methods at the international level, the Committee has obtained the services of a professional coordinator who plans to set up protocol for such tests and to obtain and distribute samples. It is anticipated that initial efforts will be concentrated on methods for the isolation of *Salmonella* and for other specific pathogens.

Throughout its deliberations the Committee has recognized many areas where research was needed in order to devise more reliable methods or to establish microbiological criteria for foods in international commerce. These needs will be included in the report without any attempt to establish order of priority or to cover all areas in depth, in the hopes that necessary investigations will be stimulated.

OTHER GROUPS

These comments have dealt at length with the activities of a single international Committee. There are many others, which are either international in scope or which represent broad geographic areas, that should be recognized. In most instances these groups are represented on the IAMS Committee and in all instances their activities and especially any methods they may have adopted were considered.

Among these groups were: the Microbiological Committee for the Benelux Countries, the Scandinavian Committee for Standardization of Foods, the International Standards Organization, Food Hygiene Committee of the Codex Alimentarius Commission, the International Institute of Refrigeration, the Association of Official Analytical Chemists, specific subcommittees of the American Public Health Association, Association of Food and Drug Officials of the United States, British Food Manufacturing Industries Research Association, and specific industrial Committees in the United States, Canada, and the United Kingdom. Many of these are primarly interested in methods but others such as those associated with the Codex Alimentarius Commission are also broadly concerned with microbiological standards. It is hoped of the IAMS Committee that it can serve in an advisory capacity to these others with like interests.

This report has covered only the high points but it will hopefully demonstrate that microbiological limits are truly receiving international consideration.

3-A SANITARY STANDARDS OVER THE YEARS[1]

ROBERTS EVERETT

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Dairy and Food Industries Supply Association, Inc.

Washington, D. C.

In the 1920's International Association of Milk Dealers (IAMD) and individual fittings manufacturers were negotiating a standarization of sanitary fittings. The Association of Ice Cream Supply Men's members included these manufacturers. Consequently, that Association became a channel of communication and of evolution relating to the standards. That Association, nearly 50 years later is Dairy and Food Industries Supply Association, Inc.

Also, the National Association of Ice Cream Manufacturers, National Creamery Association, American Butter Institute, Evaporated Milk Association, American Dry Milk Institute, National Cheese Institute or their respective predecessors all became aware of the fittings standardization and, whether this was officially recognized or not, by their very functions these associations were equally in a position to be drawn into what would become a slowly widening orbit of dairy processing equipment sanitary standardization.

Let's consider the other side of a potential triangle: I have touched already on the processor and fabricator. The International Association of Dairy and Milk Inspectors also existed in the 1920's. Toward the end of that decade it established a committee on Dairy and Milk Plant Equipment. According to C. A. Abele, whom we all know so well, a 1933 report of a Committee on Sanitary Procedure of the Association asserted that much dairy equipment failed at that time to meet health and sanitary standards. The report continued "that much could be gained if some organized group of control officials, preferably a committee of this organization, could confer with manufacturers and gradually develop standards which would generally be accepted." You can perceive that the foreshadowings of the triangle could be seen.

What was the general situation, then, 45 years ago or so, or even 35 years ago or so, with respect to the dairy farm and dairy processing fields' recognition of the importance of equipment sanitation, and of sanitation itself, as a desired farm and industrial condition?

If one has studied the history of dairying and dairy industrialization he becomes aware of a perceptible hangover in this broad field from 19th century practices. Bitter antagonisms between farmer and processor developed in the last half of the last century.

It was alleged that processors by one device or another prevented the attempted organizing of some early Eastern dairy farmer co-operatives. It was often believed that regularly, by one souvenir or another, the processors in the main managed to deprive the farmer of a proper return. Dairying generally, and milk distribution, too, had low repute. Consumers believed, and with much justification, that milk was regularly watered on the farm and that many processors diluted or contaminated their products. The tremendous shame of the city "milk farms" was not wholly forgotten. These were stables adjoining breweries in which dairy cows were literally imprisoned and fed on brewery mash, standing in muck until their hooves literally decayed; crusaders did not let the memories of all this fade. The opposition of both farmer and processor to the introduction of pasteurization damaged to varying degree the public attitude toward all dairymen, be they rural or urban, for twenty years or more. All these factors stamped themselves upon practice and event even until the end of World War I. Even in the 1920's few dairy plants would be regarded as truly sanitary —probably none whatever—by today's standards.

The regulatory world in the 1920's was characterized by conflicting jurisdictional requirements. It was common practice for many sanitarians, because of the local nature of their work and the individual authority they were given, to apply sanitary requirements for the equipment in the plants which they supervised, that varied materially from one area to another. Nearly every state had a different code; and the U. S. Public Health Service had its separate outlook and procedures. Sanitarians generally felt a strong urge to win high professional kudos in a world in which they had not earlier had great authority.

As communities became more conscious of the importance of safe milk, many of the sanitarians applied highly individualistic standards to the equipment in the plants they supervised. Some locally enforced standards included actual specifications for equip-

[1]Presented before the 3-A Sanitary Standards Committee Meeting, Miami Beach, Florida, April 6, 1967.

ment construction. Many misunderstandings and disagreements among sanitarians, manufacturers, and users developed. Much of this was due, besides other factors, to a lack of a common language which could be used by the three groups to indicate exactly what was wanted or needed for adequate public health protection or for workmanlike and practical equipment building. All this resulted in many pieces of equipment having to be custom made, not for basic technologic or economic causes, but because of not always justifiable requirements peculiar to one or a few health jurisdictions. Many times it was necessary for the manufacturer to send mechanics into the field to make structural changes in equipment after it had been delivered to a user, although identical equipment was everywhere else approved without change.

All of these causes brought substantial increases in costs—costs to the user; costs to the manufacturer; overall enforcement costs due to constant "confusion in the craft". These circumstances raised the cost to the consumer of milk and dairy products. There was a clearer and clearer need for the development of generally recognized sanitary standards for dairy equipment.

It was sometime in the 30's, I believe between 1935 and 1938, that the term "3-A Sanitary Standards" for dairy processing equipment came into use. I clearly recall that some meeting of DFISA member company equipment design engineers occured high in a midtown New York City skyscraper, following a session downtown with New York City Health Department officers, and someone suggested that the whole movement toward dairy industrial sanitation improvement be formally identified by the term "3-A" —since representatives of three groups had given birth to the movement and had carried it forward until that time. The three bodies were: for the fabricator, the Dairy and Ice Cream Machinery and Supplies Association (now Dairy and Food Industries Supply Association); for the users, at first, The International Association of Milk Dealers (now Milk Industry Foundation) and later, by degrees, the other chief dairy processing associations; and for the regulatory field, at first outstanding city, regional and state health officers, acting as individuals and later, the International Association of Milk Sanitarians (now the International Association of Milk, Food and Environmental Sanitarians) and the U. S. Public Health Service, now represented through the Milk and Food Branch of Environmental Health.

I can name for you the leaders on the manufacturers' side in the conference of that period on equipment sanitary standards—the conferences newly christened as "3-A". They were Harold Fielder and Charles Dalzell of Cherry-Burrell, the former from Chicago and the latter from Little Falls; George Putnam, of Creamery Package, Chicago; Ray E. Olson, of the Taylor Instrument Companies, Rochester; Dr. Alling, of Rice and Adams, Buffalo. Pfaudler, I remember, was also represented, and there were many other workers, as the activity slowly expanded. For quite a period, I, who could contribute nothing of engineering or manufacturing or bacteriological value, acted as unofficial recording secretary, and I assure you that my education was painfully and constantly extended.

Following the second World War, the Dairy Industry Committee assumed the user spokesmanship which it exercises today. Now, too, the dairy farm field is represented in the standards formulation process, through the National Milk Producers Federation, another step forward. Today, we are all keenly aware that "3-A" has become an indigenous term in the dairy industrial world, and its aims and procedures are being looked upon as patterns in other segments of the very broad total food industrial field.

You gentlemen here today, and your associates who are not present at this particular meeting, follow in the paths of many dedicated earlier conferees, who proved themselves industrial statesmen, step by step bringing understanding and constructive compromise and general soundness into a situation fraught with suspicion, with miscalculation and with waste. I know how seriously you are to be commended for the good work which you carry on.

THE FATE OF SALMONELLAE IN THE MANUFACTURE OF COTTAGE CHEESE

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Summary

The effects of cooking temperatures ranging from 110 to 130 F on the fate of salmonellae during the manufacture of Cottage cheese were determined. Seven test species noted for heat resistance and occurrence in dairy products were used to inoculate cheese milk. Salmonellae determinations were made on the milk, whey, curd and cheese at varying stages of manufacture. Salmonellae survived at 110 and 115 F in all trials, and at 120 F in 1 of 5 trials. None survived at 125 F. Creamed Cottage cheese was inoculated with salmonellae, stored at 40 F and analyzed periodically. No marked decrease in numbers was observed during storage.

The increasing awareness of salmonellae contamination in notfat dry milk (NDM) and in certain NDM-containing foods has caused considerable concern to public health officials, consumers, and the dairy industry. In early 1966, 11 serotypes of salmonellae were isolated from NDM that had been manufactured in 20 drying plants located in 9 high milk-producing states *(3)*. However, none were found in 137 samples of NDM representing 26 brands. More recently, salmonellae have been found in a relatively small yet alarming percentage of NDM samples examined in federal and state surveillance programs.

Frequently, NDM is added directly to pasteurized skimmilk in the manufacture of Cottage cheese. In case the fortified milk is not pasteurized, there is a risk of salmonellae contamination. Furthermore, there is a chance that salmonellae may enter the milk from contaminated air or from human carriers as evidenced by an outbreak of salmonellosis traced to Cottage cheese infected by the maker *(1)*. Although Lyons and Mallmann have shown that salmonellae inoculated into packaged Cottage cheese survived long enough to present a health hazard *(2)*, no known information is available concerning their fate during the manufacture of Cottage cheese. Such information is urgently needed to properly evaluate the safety or potential danger of present manufacturing practices.

This report presents the results of a study to determine whether salmonellae survive during the manufacture and storage of Cottage cheese. Emphasis was on the cooking temperature.

Experimental

Seven test species of *Salmonella* were selected on the basis of their reported heat resistance and frequency of occurrence in dairy products. They were *Salmonella senftenberg* 775W, *Salmonella blockley* 2004, *Salmonella typhi-murium* TMI, *Salmonella new-brunswick* 1608, *Salmonella montevideo*, *Salmonella oranienburg* 200E, and *Salmonella worthington* 4661. From 2 to 4 species of 18-hr cultures grown in trypticase soy broth were added to the cheese milk approximately 1 hour prior to manufacture. The inoculum ranged from 200 to 500 thousand per ml of milk. Sixteen lots of Cottage cheese were made in 4 miniature steam-jacketed cheese vats, each having a capacity of 50 lb of milk. Four cooking temperatures ranging from 110-130 F were used to test each of 4 different combinations of salmonellae. In all tests, the large curd rennet-type, short-set Cottage cheese method was used. Large curd (1/2 inch) and a relatively short cooking period (1 to 1 1/2 hr) were selected because of a greater probability of survival. Fresh skimmilk was fortified to 10.5 to 11% solids with NDM, pasteurized, and cooled to 90 F before innoculation with the test organisms. An active, mixed-strain lactic starter was added at the rate of 5% and rennet was added at the rate of 1 ml/1000 lb of milk. The curd was cut when the titratable acidity of the cheese whey reached 0.53%. Cooking was initiated 15 minutes after cutting. The time required to reach the cooking temperature was 60 minutes. The curds and whey were held at their respective cooking temperatures for 20 minutes prior to draining. No attempt was made to obtain the same degree of curd firmness at different temperatures.

Analyses for salmonellae were made on: the cheese milk just prior to adding starter, the coagulated uncut curd after ripening (4-6 hr), the whey just before cooking, the whey just before draining, and the curd after washing and cooling.

Three procedures were employed to detect and enumerate salmonellae:

1. Direct plating on trypticase soy agar.
2. Direct streaking (0.1 ml aliquots of each dilution) on brilliant green agar.
3. Most probable number (MPN).

MPN was determined by selenite F broth enrichment, followed by streaking onto brilliant green agar and confirming typical colonies on triple sugar iron agar, lysine iron agar and

[1]Deceased July 9, 1967.

TABLE 1. SURVIVAL OF SALMONELLA DURING COTTAGE CHEESE MANUFACTURE

Cooking temperature	Numbers of salmonellae			
	Trial 1		Trial 2	
	Direct no./ml-g	MPN no./100 ml-g	Direct no./ml-g	MPN no./100 ml-g
Vat 1 - 110 F				
Cheese milk	$35x10^4$	—	$40x10^4$	—
Milk-coag. (before cut)	$43x10^4$	—	$86x10^2$	—
Whey-before cook	$31x10^3$	—	$25x10^2$	—
Whey-before drain	$16x10^2$	$35x10^3$	$7x10^1$	$35x10^1$
Curd-uncreamed	$18x10^1$	$32x10^3$	0	$19x10^1$
Vat 2 - 115 F				
Cheese milk	$39x10^4$	—	$20x10^4$	—
Milk-coag. (before cut)	$48x10^4$	—	$51x10^3$	—
Whey-before cook	$56x10^2$	—	$16x10^2$	—
Whey-before drain	$17x10^1$	$16x10^3$	6	$54x10^1$
Curd-uncreamed	0	$78x10^1$	0	$24x10^1$
Vat 3 - 120 F				
Cheese milk	$46x10^4$	—	$34x10^4$	—
Milk-coag. (before cut)	$54x10^4$	—	$35x10^3$	—
Whey-before cook	$42x10^3$	—	$26x10^2$	—
Whey-before drain	0	9.3	0	$24x10^1$
Curd-uncreamed	0	0	0	8
Vat 4 - 125 F				
Cheese milk	$52x10^4$	—	$30x10^4$	—
Milk-coag. (before cut)	$60x10^4$	—	$81x10^3$	—
Whey-before cook	$52x10^3$	—	$33x10^2$	—
Whey-before drain	0	0	0	0
Curd-uncreamed	0	0	0	0

motility medium. The MPN enrichment procedure was necessary when small numbers of salmonellae were present.

The MPN in milk and whey was determined by inoculating 5 tubes of selenite F broth for each dilution. After incubation for 18 hours at 37 C, a loopful of broth was streaked on brilliant green agar and typical colonies were picked and confirmed after 18 hours' incubation at 37 C. The MPN in curd and creamed Cottage cheese was determined as follows: Sterile distilled water was added to 50 g of curd or cheese, made to a final volume of 100 ml and blended in a Waring blendor.[2] Ten-, 1-, and 0.1-ml aliquots were added respectively to 90, 9, and 10-ml portions of selenite broth. Incubation, streaking, and confirmation of salmonellae were as described above.

The Effects of Creaming Mixture and Storage.

The effects of 3 Cottage cheese creaming mixtures on the survival of salmonellae in Cottage cheese at 40 F storage were studied. One lot (A) of uncreamed commercial Cottage curd was creamed with a normal sweet cream dressing, a second lot (B) with a dressing containing *Leuconostoc* spp. and a third lot (C) with a lactic-cultured cream dressing. Mixtures containing equal amounts of 3 different species of salmonellae were added to each cheese and the inoculum was mixed into the cheese in a Waring blendor. The cheeses were analyzed for their salmonellae content at zero, 3, 6, and 12 days storage.

[2]Reference to certain products or companies does not imply endorsement by the Department over others not mentioned.

RESULTS AND DISCUSSION

Differences among species did not appear to be a major factor in the survival of salmonellae during Cottage cheese making. Heat resistant strains, *S. senftenberg* and *S. blockley*, showed no evidence of being more resistant to the cooking temperatures. Sixteen lots of Cottage cheese were tested; typical data from 8 of these are shown in Table 1. None of the salmonellae survived a cooking temperature of 125 F and, in 4 of the 5 trials, 120 F was sufficient for complete killing. Only a few (8/100 g) survived in 1 of the trials at 120 F; the isolates were identified as *S. typhi-murium*. Salmonellae survived in all lots at both 110 and 115 F. These results indicate that a cooking temperature above 120 F is necessary to insure complete killing. Private communication with industry representatives indicates that most manufacturers employ cooking temperatures of 120 F or higher.

The authors believe that most Cottage cheese manufacturing procedures will kill any salmonellae which may be present in the cheese milk or in NDM used for fortification. However, if a cooking temperature of less than 125 F is used, it is recommended that the cheese milk be pasteurized after fortification with NDM. The importance of this recommendation is supported by data in Table 2 which show that salmonellae present in the curd outlive the shelf life of the cheese. Salmonellae inoculated into commercial cheese showed only a slight decline during storage (Table 2). An exception may be in Sample C which contained the lactic dressing. Its pH was 4.85, compared to 5.2 for samples A and B. This probably accounts for the lower counts after storage.

TABLE 2. SURVIVAL OF SALMONELLA IN COTTAGE CHEESE DURING STORAGE

Sample	Bacterial count (no./gm)	
	Nutrient agar	Brilliant green agar
A — Before inoc.	$7x10^3$	0
After inoc.	$54x10^5$	$51x10^5$
3 days	$122x10^4$	$52x10^5$
12 days	$89x10^4$	$99x10^4$
B — Before inoc.	$9x10^5$	0
After inoc.	$24x10^5$	$20x10^5$
3 days	$102x10^4$	$68x10^5$
12 days	$85x10^4$	$47x10^4$
C — Before inoc.	$18x10^6$	0
After inoc.	$26x10^6$	$20x10^5$
3 days	$36x10^5$	$34x10^3$
12 days	$12x10^4$	$13x10^3$

A = Sweet cream dressing.
B = Leuconostoc dressing.
C = Mixed lactic dressing.

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ASSOCIATION AFFAIRS

HARRY L DELOZIER - 1902-1967

Harry L. DeLozier, after an extended illness, died on September 4, 1967. "De", as he was known by his friends from coast to coast, leaves, in memorium, a heritage to the milk industry of nearly 40 years of leadership in control administration.

"De" started his career as a milk inspector for the City of Louisville in 1928. Ten years later he was appointed Director of the Milk Division of the City of Louisville Health Department.

In 1942, the Louisville Health Department and the Jefferson County Health Department were joined into a single unit and Mr. DeLozier assumed direction of the Milk Division of the combined City-County Health unit. He held this post until his death.

During World War II, "De" assumed the task of Director of the total environmental program of the newly created Health Department as well as the Milk Division.

The City of Louisville entered into the Grade A milk control program early in its inception, adopting the PHS recommended ordinance and code in 1931. Through diligent educational means "De" was able, by 1942, to boast that 100% of the city's milk supply was pasteurized and the program carried a survey rating of 95% with an enforcement rating of 99%.

The first bulk tanks appeared in the Louisville milk shed in 1954 and by 1956 70% of the 1700 odd shippers employed this means of storage. This was probably one of the largest and fastest transitions, in terms of numbers of shippers and time lapse, in the country; yet, the administration and programming was such that the transition was made without major incident.

Brucellosis control found a champion in Harry DeLozier. In order to comply with the 1953 code provisions "De" brought together Federal, state and local officials and interested parties, including the farmer, and through a series of meetings in southern Indiana and Kentucky, gained their agreement and cooperation. By continuous effort, July 1, 1957 saw all producers in the milk shed following Plan A and 37 counties in Kentucky certified as brucellosis free.

Over the years "De" has provided industry-wide leadership in mastitis control. He has contributed to both national and state deliberations and added much to the continued stature of this program.

Louisville, being a borderline City, has made interstate shipment cooperation a must. In this field, as in none other, "De" excelled. Since the inception of the interstate certification program he was one of its strongest supporters and it is partially due to his fine personal relationship with other regulatory agents that the Louisville milk shed has been able to grow and find market acceptance of surplus supplies in other areas.

"De" was a founding member of the Kentucky Association of Milk and Food Sanitarians. He was instrumental in both its founding and its continued success. He was also a long time participating member of the International Association.

GOOD ATTENDANCE AT NEW YORK STATE ASSOCIATION MEETING

Wilbur W. Farnsworth (left) new President and John Raht retiring President of NYSAFS.

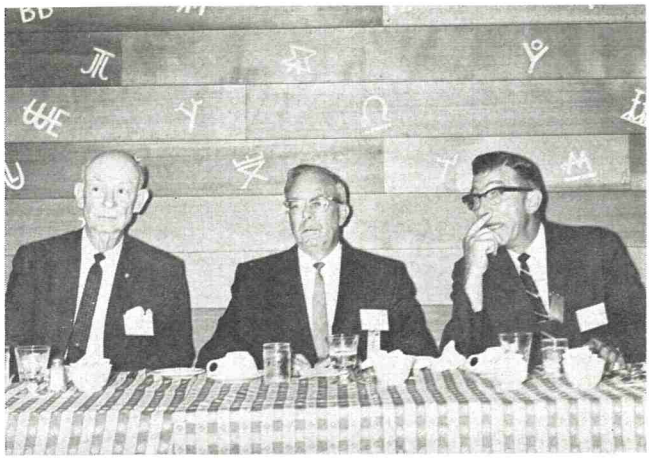
Nearly 600 Milk and Food Sanitarians attended the 44th Annual Conference of the New York State Association of Milk and Food Sanitarians at Buffalo September 18-20, 1967.

This is the 15th year that this group has planned jointly with the Cornell University Food Science Department to sponsor a three day conference. Among the major categories of interest were talks and discussions concerning laboratory personnel, food processing, inspection, field work, and milk processing.

Highlights of the program were: A presentation by Dr. Kenneth Turk, "Feeding the Hungry World." Dr. Turk is director of International Agricultural Development, Cornell University. George Pash, Manager of Customer-Employee Relations for New York State Electric and Gas Corporation gave a stimulating and humorous discussion on the psychology of adjustment, titled "You Don't Have To Go Crazy." The annual banquet was held on Tuesday evening. This banquet consisted of installation of new officers. The new president is Wilbur M. Farnsworth, Chairman of the Agriculture Division at S.U.N.Y., Delhi. A new member of the executive committee is Joseph Tiernan, who is Supervising Senior Sanitarian, Westchester County Department of Health.

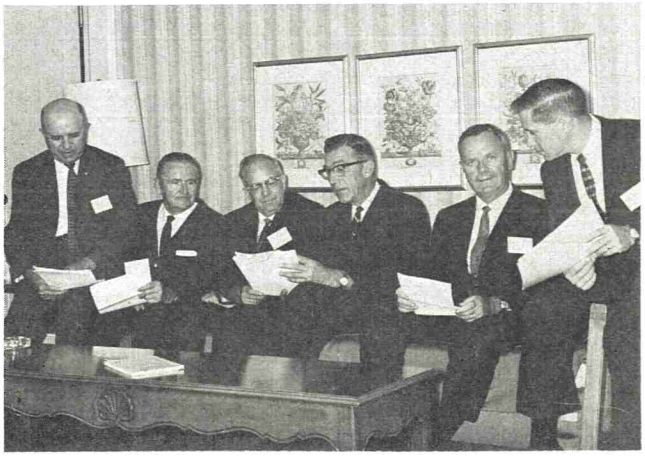
Two annual awards were presented as follows: The Paul B. Brooks Award was presented to Francis Brennan by Walter Grunge. Francis has been active for the past few years as president of the Council of Affiliates of the Association and was elected to the executive committee last year. He is employed by the New York City Health Department and lives in Hubbardsville, New York.

The Emmet R. Gauhn Award was presented by Jim White to Donald Race of Dairyman's League in Syracuse. Don Race was active editor of the *News letter* for several years and was president of the Association in 1964-65.



(Left to right) H. L. Thomasson, Exec.-Sec'y. of IAMFES, Robert Holland and John Raht at NYSAMFS Past Presidents luncheon.

The next convention will be held in Albany on September 9-11, 1968.



Executive Committee NYSAMFS, left to right, Howard Marlott, Francis Brennan, Robert Holland, John Raht, Francis Brady, Dave Bandler.

3-A SUPPLEMENT FOR DIAPHRAGM VALVES DESIGNED

The scope of the 3-A Sanitary Standards for Fittings has been broadened by a new supplement providing for sanitary diaphragm-type valves. Signed by the 3-A Sanitary Standards Committees September 14, 1967, the document becomes effective on that date in 1968.

The new supplement will appear in the June 1968 Journal of Milk and Food Technology and reprints subsequently will be available from the Journal.

NOTICE TO MEMBERSHIP

In accordance with our Constitution and By-laws which requires our 2nd Vice President and Secretary-Treasurer to be elected by mail ballot you are hereby notified that President Paul R. Elliker, at the annual meeting in Miami Beach, Florida appointed A. E. Parker, Division of Milk Sanitation, Bureau of Health, Portland, Oregon as Chairman of the Nominating Committee.

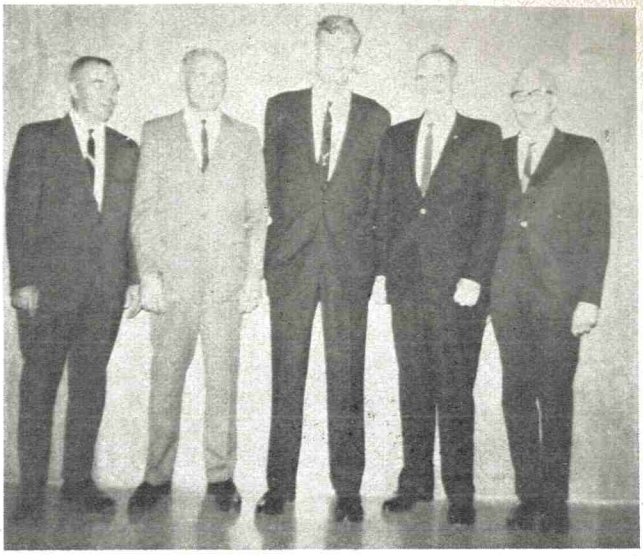
Nominations for the offices of 2nd Vice-President and Secretary-Treasurer are now open and any member wishing to make a nomination should send a picture and biographical sketch of his nominee to Mr. Parker not later than March 1, 1968.

Karl K. Jones, Secretary-Treasurer, International Association of Milk, Food and Environmental Sanitarians, Inc.

WASHINGTON AFFILIATE HOLDS SUCCESSFUL ANNUAL MEETING

Dr. John L. Barnhart of the University of Idaho was the featured speaker at the Washington State Affiliate annual meeting, held at Seattle on September 29, 1967. Dr. Barnhart has been with the Space Program since its original inception with the Air Force and holds the rank of Colonel in the Air Force Reserve. He is Advisor on Research and Development with the Food For Space program, among other responsibilities, in addition to being associate professor of Dairy Science at the University of Idaho.

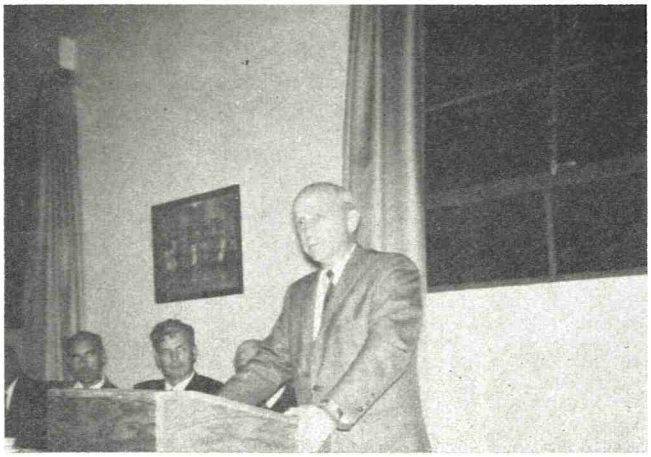
Dr. Barnhart spoke on "Freeze Drying of Dairy Products and Other Foods" and provided samples for the group in the afternoon session, assisted by Karl Nelson, graduate student at the University of Idaho.



The Executive Board of the Washington Milk Sanitarians Association at the annual state meeting in Seattle. Left to right: Roy Olson-Past President, Spokane; Art Surby-N. E. Section Chairman, Spokane; Dr. F. W. Crews-President Elect, Olympia; Ben Luce-Secretary-Treasurer, Olympia; A. W. Sturm-President, Seattle. Members not present for the picture: Rodney Olson-N.W. Section Chairman and Ralph Madery-S.E. Section Chairman.

At the annual banquet Dr. Barnhart spoke on the subject "Life Supporting System Requirements for Space Travel and Habitation". Both of these talks were most interesting and informative, contributing greatly to a very successful annual meeting.

The following officers were elected for the coming year: President, A. W. Sturm; Secretary-Treasurer, Ben Luce; President Elect, Dr. F. W. Crews; and Auditors, Syd Suckling and Alan Barr.



Dr. John L. Barnhart, University of Idaho, speaking at the Annual Washington Milk Sanitarians Association banquet at Seattle on the subject "Life Supporting System Requirements For Space Travel and Habitation".

KEITH LEWIS IS APPOINTED PHS CHIEF OF FOOD PROTECTION

Keith H. Lewis has been assigned the new job of Chief of Food Protection in the Public Health Service's National Center for Urban and Industrial Health in Cincinnati. Jerome H. Svore, Director of the Center, said the appointment means the Public Health Service plans to place an increased emphasis on the prevention and control of foodborne illnesses. About one million Americans suffer from food poisoning every year.

Dr. Lewis, a microbiologist, has served as Chief of the Public Health Service's Milk and Food Research Program in Cincinnati since 1954. In 1964, he was given the additional responsibilities of Assistant Chief for Research and Training. Before joining the Public Health Service he was Chief of the Bac-

teriology Branch and Assistant Director of the Army Biological Laboratories at Fort Detrick, Maryland.

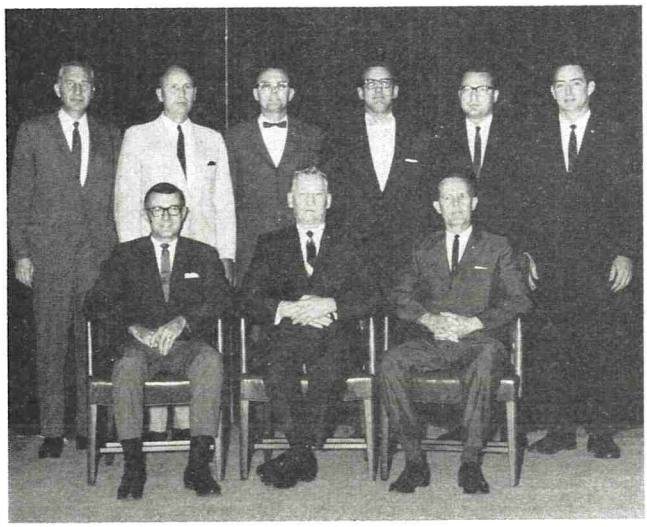
In his new job, he will serve as assistant to Robert E. Novick, Chief of the National Center's Environmental Sanitation Program. "The problems of food contamination have become increasingly important to every one of us," said Mr. Novick. "There has been a decided increase in the reported isolation of salmonellae from foods such as dried milk, poultry, egg products, and candy. Food processors are more concerned with this problem than they have ever been. Exposure of the general public to potentially hazardous substances, such as pesticides and heavy metals, occurs to a greater extent through food than in any other way.

"But we are concerned here with more than food poisonings. In many countries of the world—and to some degree even in the United States—the day of limited supplies of food, even food shortages, is not far off. In order to conserve this food, we need to find new ways to reduce the huge food losses due to contamination and spoilage that take place before it ever reaches the consumer."

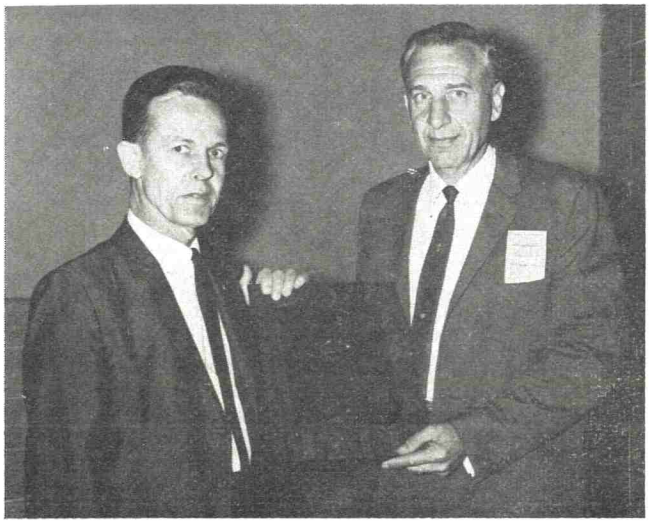
Dr. Lewis is a diplomate of the American Board of Microbiology and a Fellow of the American Academy of Microbiology, as well as the American Public Health Association for the Advancement of Science. He is a member of the Institute of Food Technologists, and has served on its Panel of Scientific Lecturers. He also has long been a member of IAMFES and has appeared on a number of its annual programs.

The work of Dr. Lewis and his research associates has been published in several hundred publications in the fields of microbiology, biochemistry, and engineering. As Chief of Food Protection, he now has responsibility not only for research and development, but application of the findings to assist governmental agencies and industry in improving consumer protection against the hazards of food-borne illnesses. Dr. Lewis is a native of Wisconsin, and a graduate of the University of Wisconsin. He received his M.S. degree from the University of Maine in 1934 and his Ph.D. from Yale in 1939.

SEVENTEENTH ANNUAL CONFERENCE INDIANA ASSOCIATION SANITARIANS



The Seventeenth Annual Conference of the Indiana Association of Sanitarians, Inc., elected the following Registered Professional Sanitarians as officers for the year 1967-68: (1st row, left to right) James E. Goodpasture, President Elect; J. W. Nix, President; Karl K. Jones, Junior Past President; (2nd row, left to right) Louis C. Lukemeyer, Senior Past President; Lowell R. Kingsolver, Auditor; K. J. Baker, Treasurer; J. Lloyd Grannan, Chairman of the N.A.S. Section; John D. Boruff, Secretary; and Robert L. Jump, 2nd Vice President. Not shown are: Joseph W. McIntosh, 1st Vice President; Bernarr Biddle, Auditor; Jack Abney, Chairman, I.A.M.F.E.S. Section; Richard Lopez, City Health Department, Muncie, Vice Chairman, I.A.M.F.E.S. Section; and Paul R. McBride, Vice Chairman, N.A.S. Section.



At the Seventeenth Annual Conference of the Indiana Association of Sanitarians, Inc., Karl K. Jones, Junior Past President (left) is shown presenting the Past President's Award to Louis C. Lukemeyer, 1965-66 President.

CHARLES SENN MOVES TO UCLA

After 25 years as Environmental Health Director of the Los Angeles City Health Department and Environmental Sanitation Consultant of the County Health Department, Mr. Charles L. Senn has accepted a full-time faculty appointment in the School of Public Health at U C L A, where he has served,

part time, for twenty years. He will give the basic environmental health course to the school's 300 graduate students, conduct graduate seminars, serve on doctoral committees and otherwise function in a role comparable to Full Professor.

He is continuing international health activities, having made his 11th European trip in November as consultant at a meeting on regional planning. He is expanding his private consulting activities, now being consultant to a "space agency" in a Water Pollution Control Administration project and is working with several other space agencies in projects involving environmental health projects in solid wastes and water treatment. Activity on national committees such as his chairmanship of the American Public Health Association Program Area Committee on Housing and Health is expected to expand through work with faculty colleagues who are authorities in various related fields.

REPORT OF THE COMMITTEE ON COMMUNICABLE DISEASES AFFECTING MAN—1967

The activities of this Committee have been very light since the second edition of the brochure entitled "Procedure for the Investigation of Food-Borne Outbreaks" which became available this year.

The Chairman was advised that there appeared to be an error on Page 24 of the Manual since *Clostridium perfringens* can nearly always be found in feces. The entire Committee agreed to the deletion of the following: "Exclude from food handling known carriers." The Chairman suggested to the Executive Secretary that these words be blocked out of the copies of the manuals on hand and recommended deletion when the brochure is reprinted.

This correction has been made by our Executive Secretary.

COMMITTEE MEMBERS

E. R. Price, *Chairman*,
Missouri Division of Health
Jefferson City, Mo.

John Andrews,
State Board of Health,
Raleigh, N. C.

Stanley L. Hendricks,
State Department of Health,
Des Moines, Ia.

Charles A. Hunter,
Hillcrest Medical Center,
Tulsa, Okla.

P. N. Travis,
Jefferson County
Health Department,
Birmingham, Ala.

Robert K. Anderson,
University of Minnesota,
St. Paul, Minn.

John H. Fritz,
Milk and Food Branch,
National Center for Urban & Industrial Health,
Cincinnati, Ohio.

INTERIM REPORT OF COMMITTEE ON APPLIED LABORATORY METHODS—1967

The activities of the Subcommittee on Laboratory Methods for the Examination of Milk and Milk Products have been somewhat limited during the past year in anticipation of publication of the 12th edition of Standard Methods for the Examination of Dairy Products (SMEDP). Publication is now expected in September 1967. Although many laboratories that routinely perform bacteriological examination of milk and milk products are now using 32 C incubation, others are still using 35 C incubation, awaiting the change in temperature requirements in SMEDP.

Because of increasing changes in laboratory technology, definite consideration has to be given to coordinating the necessary process activities in preparation for the 13th edition of SMEDP. Prior editions were published approximately every 5 years; undue complications caused a 7-year delay in the publication of the 12th edition, although much of the material contained therein was finalized almost 3 years ago. The 12th edition and previous revisions of SMEDP are the results primarily of a concentrated effort by a relatively large volunteer group of interested persons and no organized, continuing activity exists for the development and evaluation of methods. This has resulted, at least in the opinion of some laboratory personnel, in publication of an occasional "standard" method that was neither good nor standard.

Because past editions of SMEDP have not considered the results of collaborative studies of new methods, preparation of future editions is now being sought by an autonomous Council on Standard Methods for the Examination of Dairy Products. The projected duties and goals of this Council are sound and should result in the adoption and publication of methods that have been established following conclusive collaborative studies and subjection to a majority vote by the Council to determine whether the methods in question are suitable as standard methods. The Chairman of this Committee recommends that the International Association of Milk, Food, and Environmental Sanitarians (IAMFES) go on record as actively supporting the activities and objectives of the Council on Standard Methods for the Examination of Dairy Products.

The Committee Chairman and Dr. Levowitz, a member of the Subcommittee on Laboratory Methods for the Examination of Milk and Milk Products, have been active during the past year in laboratory activities relating to the National Mastitis Council (NMC) Research Committee. The Research Committee of the NMC appointed Dr. Brazis as Chairman of a *Subcommittee on Screening Tests* for the detection of abnormal milk. Continued activity by all members of this Subcommittee of the NMC, who are aware of the importance of mastitis indicator tests, has resulted in a modification of the Direct Microscopic Leukocyte Count, which will be published at some future time as the Direct Microscopic Somatic Cell Count (DMSCC). Other studies are planned, in which all indicator tests will be used to establish criteria as to precision, accuracy, and bias when bulk raw-milk samples are examined. It is anticipated that the 12th edition of SMEDP will list instructions for most of these tests. A planned workshop, including the assistance of expert proponents of each indicator test, will be sponsored and financed by the NMC to assess all indicator test methods. The results of this workshop should provide interpretative

data and information for administratively fulfilling requirements of the National Conference of Interstate Milk Shipments as to abnormal milk laboratory certification programs. It is recognized that to achieve uniformity of results with indicator tests in all State programs, the Public Health Service should specifically designate one or two indicator tests as official acceptable procedures.

Although the Subcommittee on Laboratory Methods for the Examination of Water and Other Environmental Samples has not been very active, discussions of objectives of this subcommittee have resulted in the recognition of a need for preliminary studies; these will soon be started on multiple tube tests for the detection of coliforms. Because of the limited number of persons on this subcommittee, members of the IAMFES who want to assist their association should apply to the Chairman for membership on this subcommittee.

The activities of the Subcommittee on Laboratory Methods for the Examination of Foods have been stymied during the past year because of failure of international and national agencies and associations to agree on methodology for the laboratory examination of foods. This subcommittee was formed to assist in collaborative studies concerning established, defined, and accepted methods for the examination of various foods. Until such agreement is reached by responsible authorities, it is anticipated that the activities of this subcommittee will be limited.

COMMITTEE MEMBERS

Dr. A. Richard Brazis, *Chairman*
Committee on Applied Laboratory Methods

Subcommittee on Laboratory Methods for the Examination of Milk and Milk Products:

Dr. A. Richard Brazis, *Chairman*

Mr. W. L. Arledge	Dr. David Levowitz
Dr. E. W. Cook	Dr. F. E. Nelson
Mr. C. B. Donnelly	Dr. H. E. Randolph
Dr. J. J. Jezeski	Mr. D. I. Thompson

Subcommittee on Laboratory Methods for the Examination of Water and Other Environmental Samples:

Mr. D. Q. Anderson, *Acting Chairman*

Dr. M. S. Favero	Mr. Arnold Salinger
Dr. R. L. Morris	

Subcommittee on Laboratory Methods for the Examination of Foods:

Dr. H. E. Hall, *Chairman*

Dr. Robert Angelotti	Mr. J. C. McCaffrey
Dr. L. G. Harmon	Dr. E. H. Marth

NEWS AND EVENTS

USPHS CERTIFIES SYRACUSE UNIVERSITY'S FOOD PROTECTION LABORATORY

The Food Protection Laboratory at Syracuse University Research Corporation received a boost from the New York State Department of Health in the form of official certification by the State and the U. S. Public Health Service for the examination of single-service food containers and the paper stock from which the containers were formed, Dr. Ralph T. Russell, Analytical Services Laboratory manager, has announced. The laboratory is one of the first of its kind to be officially certified by the Public Health Service.

"The purpose of certification," Russell said, "is to assure that testing laboratories meet the requirements set by the Public Health Service in the Guide for Sanitation Standards for the Fabrication of Single-Service Containers for Milk and Milk Products. The need for certification is to equalize the standards of the laboratories, resulting in uniformity of testing throughout the country."

The Food Protection Program, initiated in 1946 in the Department of Plant Sciences at Syracuse University, was established to serve the requirements of the manufacturers of paper containers for wet and moist food. As the program grew, it became impractical for the University to continue to operate the program in an academic department, and it was made a part of the Syracuse University Research Corporation.

The first phase of the three-point program is microbiological testing of samples to see that they are sanitary; second is periodic inspections of each fabrication plant; and the third takes into consideration the toxicological aspects of the containers. Steps that have been taken to implement the success of the program include the establishment of a Public Health Advisory Council comprised of federal, state and local health officials. The Council is concerned with those facets of the scientific and administrative problems which are relevant in their judicial districts.

As an aid in the program, a Manual of Sanitation Standards for Certain Products of Paper, Paperboard of Molded Pulp was published to guide manufacturers in determining fabrication sanitation standards. Since most of the program involved the microbiological examination of the containers, a manual of methods was also published. This guidebook entitled Manual of Recommended Laboratory Methods for Sampling

and Microbiological Testing of Single-Service Food Packages and Their Components revised existing techniques more extensively to make them adaptable not only to single-service paper products but to those types of products made from plastic, metal and combinations of these materials. The Manual is recognized by the Public Health Service and is included as a reference in the Guide for Sanitation Standards mentioned above.

Training courses, sponsored by a grant from the Public Health Service, are being conducted to introduce the Service's Guidelines and to assist the Service in training of public health sanitarians in methods of sampling and inspection of single-service fabricating plants. The three-day sessions scheduled this year under the direction of Dr. Russell will cover the fabrication of all types of single-service containers. The first course was held in Minneapolis, Minnesota, November 13 to 15 and will be followed by three similar sessions located in key areas across the country.

The Food Protection Laboratory and the Analytical Laboratory, are a part of SURC's Life Sciences Division.

SHORT COURSES SCHEDULED AT PENN STATE UNIVERSITY

Modern concepts of cleaning and sanitizing dairy equipment on the farm and in the plant are some of the subjcets of a short course offered December 5 to 7, 1967, by The Pennsylvania State University.

Subjects to be discussed are: Milk Quality, Nature of Soil on Dairy Equipment, Water Problems as Related to Cleaning-Quality and Quantity, Nature of Cleaning Compounds, Microorganism in Milk-Significance and Control, Regulations on Cleaning and Sanitizing-Pennsylvania and United States Department of Agriculture, and Determination of Strength of Washing Solutions and Sanitizers. CIP (cleaning in place) and Determination of Water Hardness Procedures and Equipment will be demonstrated.

The annual Ice Cream Short Course will be held January 8 to 19, 1968. Included in the instruction will be: Industry trends, composition of milk, testing for fat and acidity, composition of ice cream, ingredients, processing the mix, acidity standardization, freezing the mix, hardening ice cream, refrigeration, ice cream flavors, stablizers and emulsifiers, sherbets, ices, ice milk, defects, juding ice cream bacteriology, ice cream mix concentrates, cleaning dairy equipment, soft ice cream, and fancy ice cream.

Approximately 12 hours will be devoted to comprehensive coverage of the principles involved in calculating ice cream mixes. Fourteen hours of laboratory practice will be given in the testing, processing, and freezing of ice cream mix. More than 30 different ice cream formulas will be used in evaluating the effects of variations in fat, serum solids, sweetener, stabilizer, emulsifier, and flavoring on the texture, body, and flavor of frozen desserts. A field trip will be taken to commercial ice cream plants in the central Pennsylvania area.

Further information can be secured from the Director of Short Courses, Room 208 Armsby Building, The Pennsylvania State University, University Park, Pennsylvania 16802.

KENTUCKY DAIRY INDUSTRY CONFERENCE

The world food situation and dairy products will be the theme of the annual Dairy Industries Conference at the University of Kentucky. The conference will be held December 6, 1967 at the Continental Inn in Lexington.

To be included in the conference program will be discussions of the need of food in a hungry world, developing substitute foods for dairy products, economics of substitute foods and changes in attitudes of dairy concerns. A representative of consumers also will advise the group on the consumer's viewpoint of foods in a world of growing food scarcity.

Among those listed to speak are Dr. K. L. Turk, Cornell University, Don Miller, Durkee Foods Company, and Pauline Massie, home economist for Kentucky Utilities Inc.

Those interested in further information should contact Dr. A. W. Rudnick, 131 Dairy Products Building, University of Kentucky, Lexington, Kentucky.

MSU DAIRY ENGINEERING CONFERENCE

Michigan State's 16th Annual National Dairy Engineering Conference will be held February 27 & 28, 1968. The conference will be held at the Kellogg Center for Continuing Education at the Michigan State University campus.

Each year the leading engineers, scientists, and administrators from the dairy and food industry, the processing equipment industry, education and government participate in this conference. For further information, contact D. R. Heldman, Department of Agricultural Engineering, Michigan State University, East Lansing, Michigan 48823.

PHS ANNOUNCES NEW COURSE ON LABORATORY ANALYSIS OF MILK PRODUCTS

A new course entitled "Laboratory Analysis of Milk and Milk Products -II" is to be given at the

National Center for Urban and Industrial Health in Cincinnati, Ohio on February 19-23, 1968.

This course is designed especially for the laboratory supervisor. It consists of lectures and laboratory demonstrations to thoroughly explain and demonstrate proper laboratory techniques and procedures. Special emphasis will be given to the analytical procedures used in checking dairy products for compliance with the 1965 Pasteurized Milk Ordinance.

Course topics include: Techniques of the SPC, coliforms and simplified counting procedures; Certification program of interstate milk shippers; Public health aspects of mastitis; Fundamentals of bacterial growth; Detection of staphylococcal enterotoxin in food; Tests for abnormal milk; Preparation of standards for penicillin assay in milk; Theory and application of phosphatase test and reactivation of phosphatase; Detection of added water in milk; Detection of *Salmonella* in milk powder; Pesticide residues in milk—thin layer chromatography; Detection of extraneous material; Thermal resistance of pathogens; Fat tests on milk; Trends in thermal processing; Viruses in milk; Radionuclides in milk; and Split sample analysis.

For further details write: Environmental Sanitation Training, National Center for Urban and Industrial Health, 222 E. Central Parkway, Cincinnati, Ohio 45202.

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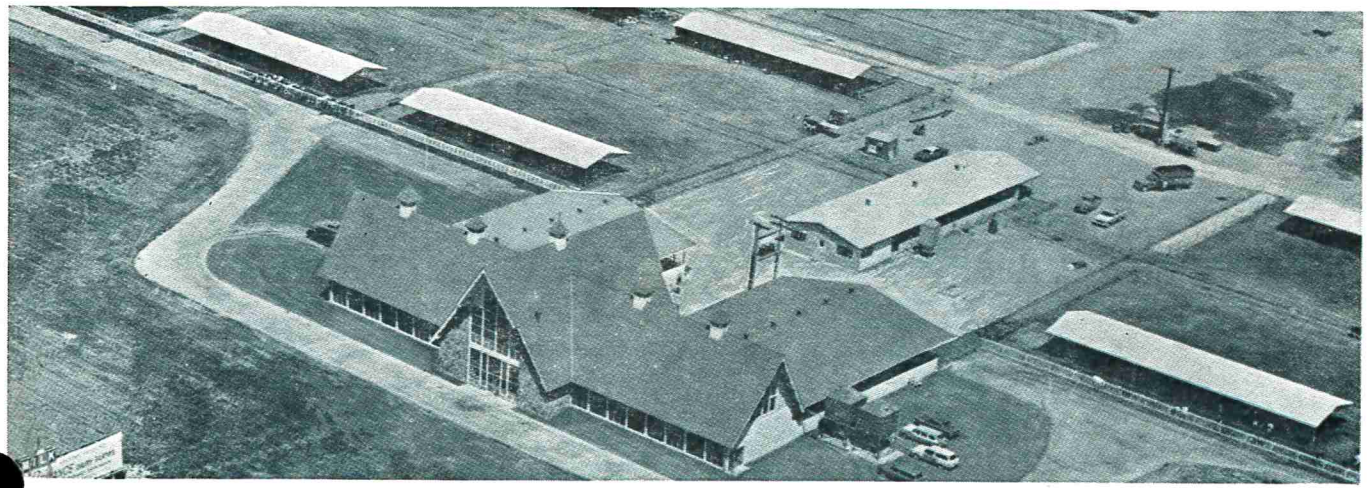

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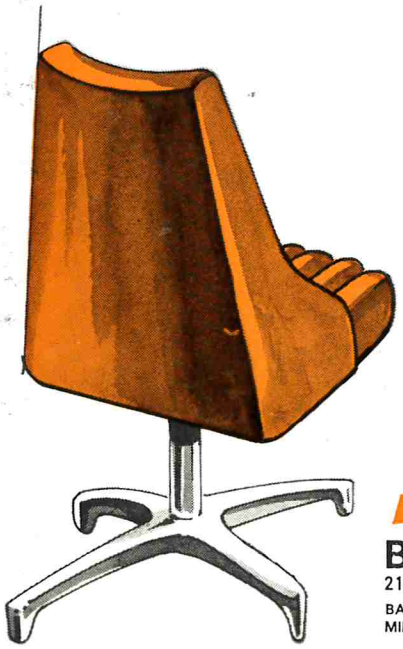

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