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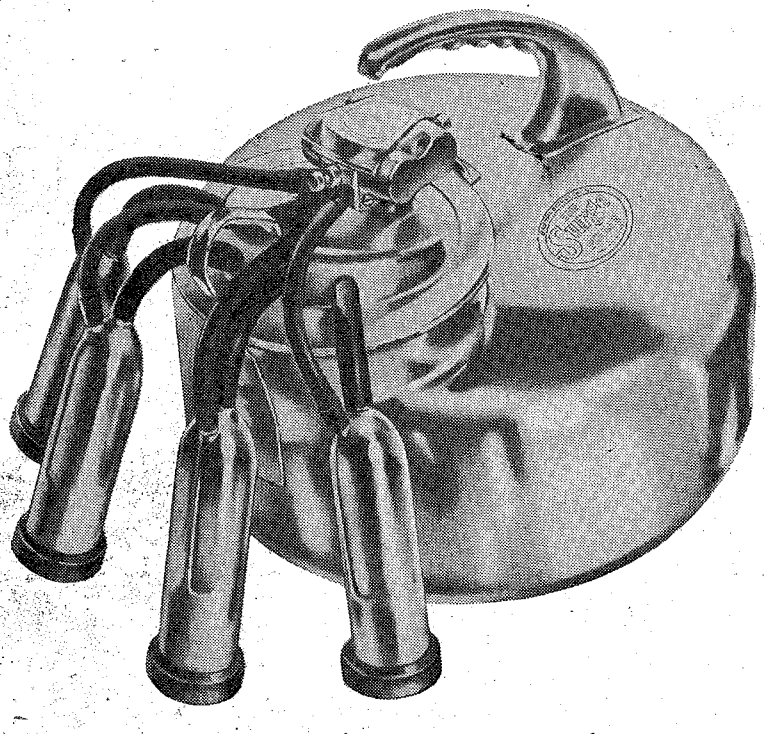
Journal of

MILK and FOOD TECHNOLOGY

Official Publication

International Association of Milk and Food Sanitarians, Inc.

SURGE



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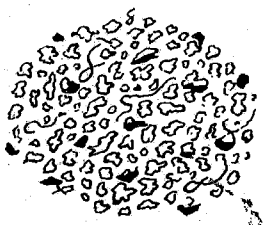

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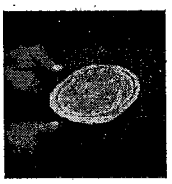

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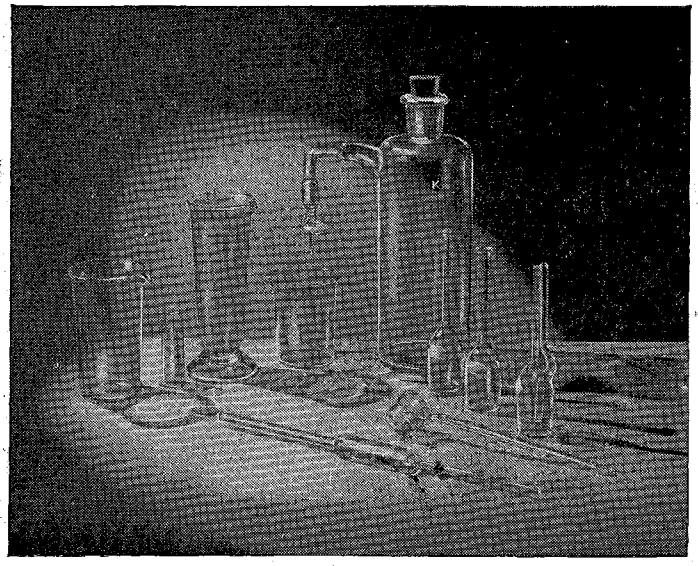

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INCLUDING MILK AND FOOD SANITATION

Official Publication

International Association of Milk and Food Sanitarians, Inc.

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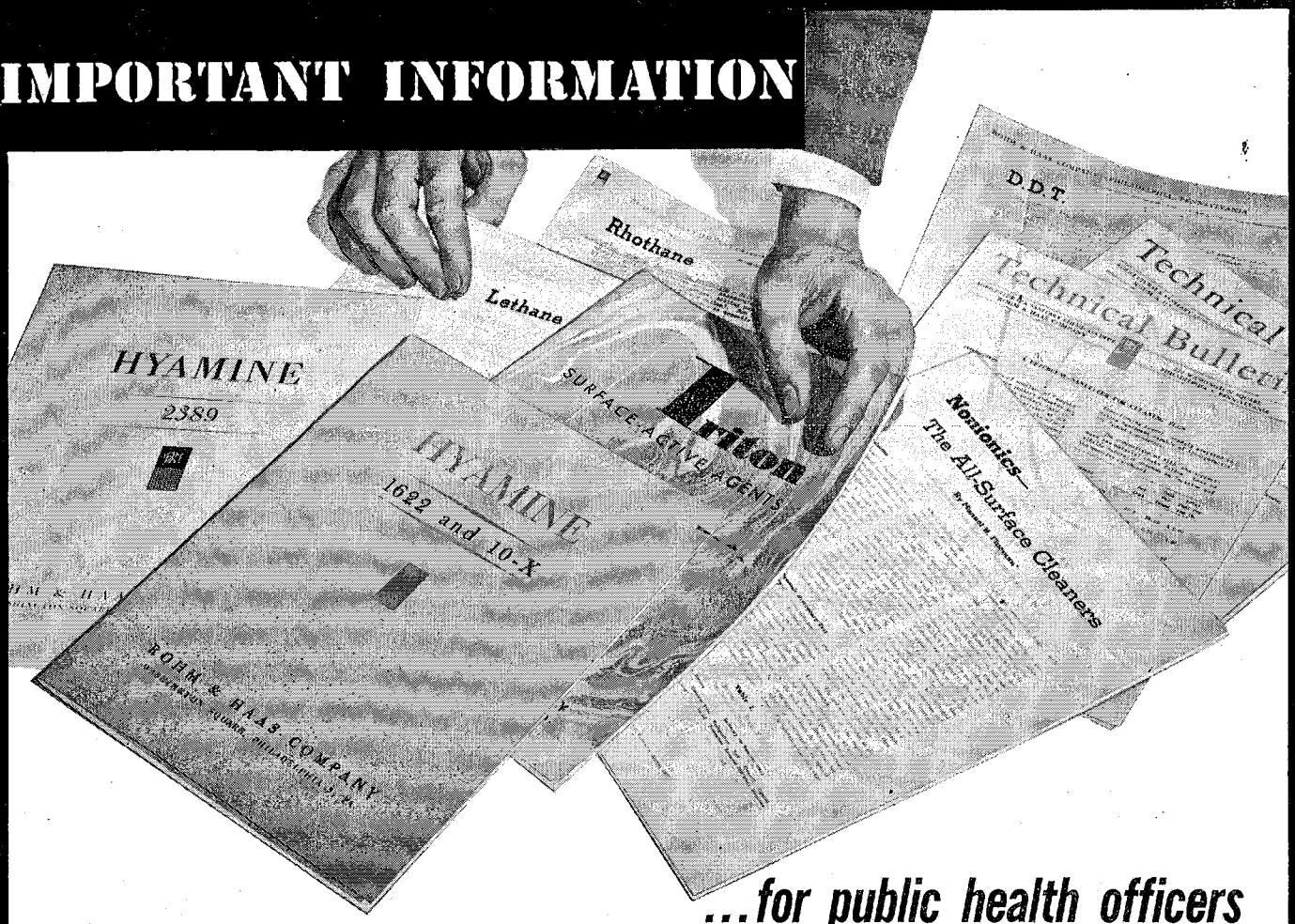
IMPORTANT INFORMATION



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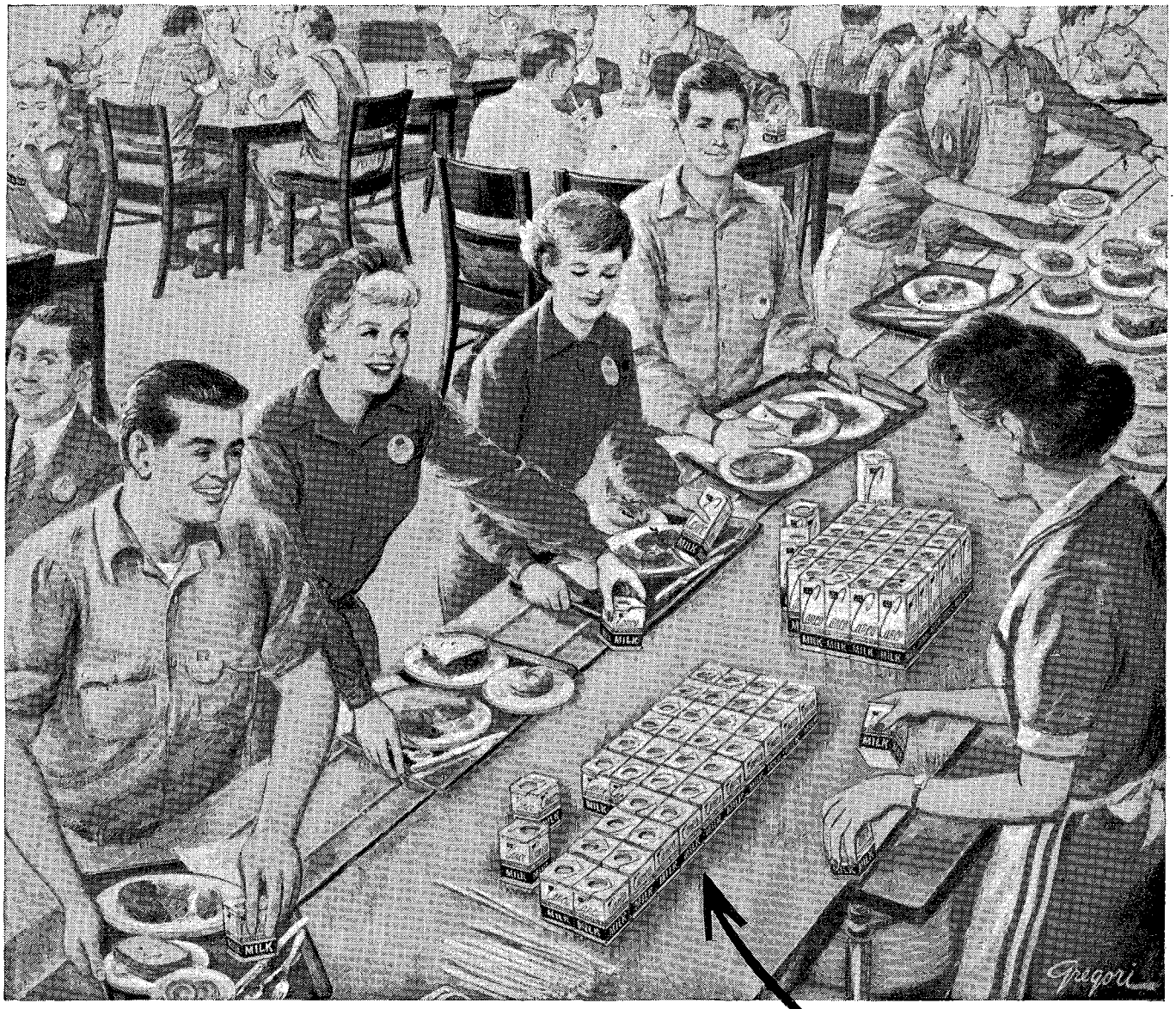

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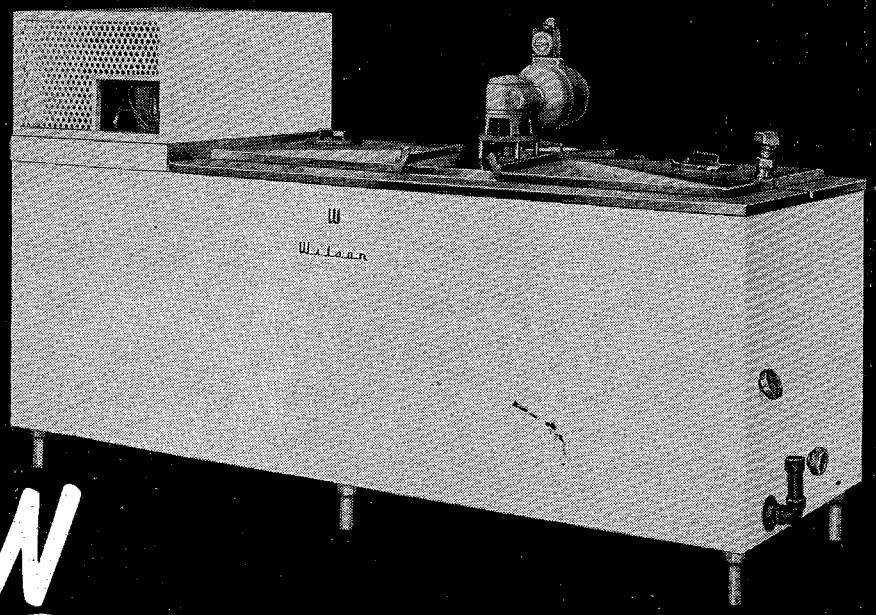

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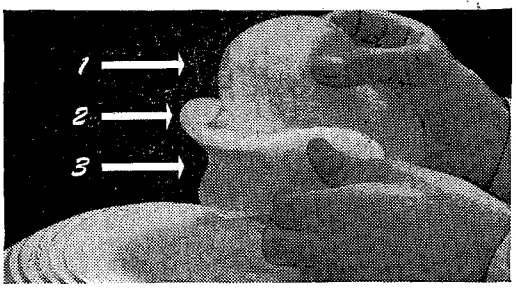

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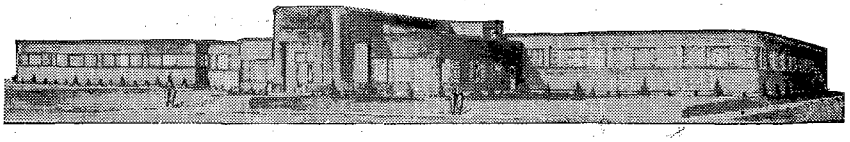
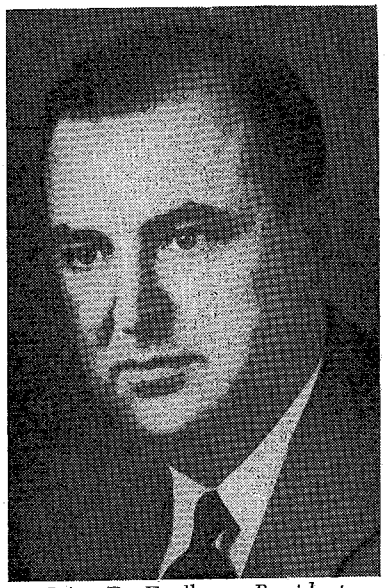


Editorial Notes

BIOGRAPHY SKETCH OF PRESIDENT FAULKNER



John D. Faulkner, *President*
MILK AND FOOD SANITARIANS, INC.
INTERNATION ASSOCIATION OF

John was born in New Bern, North Carolina, in 1911. He attended North Carolina State College, Raleigh, North Carolina, and graduated in 1933 with the degree of B.S. in Mechanical Engineering. He also attended the graduate schools of the University of North Carolina and the University of Michigan, and received his M.S. degree in Public Health Engineering from the University of Michigan.

From 1935 through 1941 John was employed by the North Carolina State Board of Health, and was primarily engaged in milk and food sanitation activities. In 1940 he was appointed Chief of the Milk Sanitation Unit of the N. C. State Board of Health, and served in that capacity until called to active duty with the Army in December 1941. His military service in World War II included 20 months duty in the European Theater of Operations. Upon return to civilian life in 1946 he joined the staff of the Institute of Inter-American Affairs, and was assigned to Brazil, where he held the position of Chief Sanitary Engineer and Assistant Director of the Institute's Health and Sanitation program. In 1949, he was commissioned in the Public Health Service and was assigned to the Milk and Food Branch of the Division of Sanitation as its Assistant Chief. In October 1951, upon the reassignment of Mr. A. W. Fuchs, he became the Chief of the Milk and Food Branch, the position he now holds.

John was elected an officer of the Association in 1950, and has served on the Executive Board for the last four years.

He is married and has three boys, and his home is Bethesda, Maryland.

President's Message

It is customary at the beginning of each new year for organizations to evaluate the progress which they have achieved in meeting their objectives, to reorient their programs where necessary, and to establish plans for the coming year's work. Therefore, I would like to take this opportunity of discussing with you the objectives of the International Association of Milk and Food Sanitarians, the progress we are making in meeting these objectives, and some of our plans for the future.

The objectives of the Association as stated in the Constitution are:

(1) Develop uniform and proper methods of supervision and inspection of dairy farms, milk and milk products plants, and food-handling establishments, including restaurants, warehouses, and transportation equipment;

(2) Develop uniform and proper methods for the examination of milk, milk products, and other foods;

(3) Encourage improvement in sanitary methods of production of milk and related food products;

(4) Encourage the development of equipment and supplies to improve the sanitary handling of dairy and food products;

(5) Assist members in their technical work and development;

(6) Cooperate with other professional groups in advancing the public health through improved milk and food-handling technology; and

(7) Disseminate information concerning sanitary milk and food-handling technology and administration through its official publication and/or by other means.

In addition, two other objectives have been added in recent years by official actions of the Association which, while inherently a part of numbers (3), (4), (5) and (6) specified above, are of such prime importance that they deserve special mention, namely:

(8) Develop plans and devise methods to advance the professional development and professional status of milk and food sanitarians, and to gain recognition for the Sanitarian as a professional worker in public health and environmental sanitation.

(9- Encourage the highest degree of cooperation between regulatory agencies and industry at the local, State and Federal levels, through the development of mutual understanding and recognition of the problems and responsibilities of each group.

What progress has our Association made toward meeting these objectives? As regards objectives numbers (1) through (5), a great deal has been accomplished in recent years through outstanding work by several of our committees. Their findings and recommendations have had considerable influence on programs and standards of regulatory agencies at the local, State and Federal level; have resulted in manufacturers improving the sanitary design and construction of milk and food equipment; have contributed to improvements in laboratory techniques; and, have aided in the technical development of new procedures and processes. A few examples of some of these accomplishments are cited for your information.

The Advisory Committee on Milk Regulations and Ordinances several years ago completed an exhaustive study of sanitary regulations pertaining to market milk and milk products, and made certain recommendations for changing existing regulations. Many of their recommendations were incorporated into the new edition of the *Milk Ordinance and Code* recommended

by the U. S. Public Health Service. In addition, they have influenced the amendment or modification of municipal regulations. The Committee on Applied Laboratory Methods has long engaged in the study of laboratory procedures and techniques, and the recommendations of this Committee were fully considered in the development of the 10th edition of *Standard Methods for the Examination of Dairy Products,* which was recently published by the American Public Health Association.

The Committee on Sanitary Procedure and the Committee on Food Equipment, in their work with the 3A Sanitary Standards Committee for Dairy Equipment, the Baking Industry Sanitation Standards Committee and the National Sanitation Foundation Joint Committee on Food Equipment Standards, have contributed greatly to improvements in the sanitary design and construction of various items of milk, baking, and food-service equipment. Through this joint work, seventeen 3A standards for dairy equipment, four standards for baking equipment and three standards for food-service equipment have been developed, to-date, which are being followed in the manufacture of new equipment. Sanitary standards for many other items of equipment are now in the process of formulation.

In the area of technical development, both the Committee on Sanitary Procedure and the Committee on Dairy Farm Methods have recently made significant contributions. The Committee on Sanitary Procedures participated in the development of the 3A recommended methods for determining the holding time of HTST pasteurizers and for the cleaning-in-place of sanitary pipe lines in milk plants. In 1953, the Committee on Dairy Farm Methods undertook an extensive study of present day experience with methods for the bulk cooling of milk on the dairy farm and its transportation to plant. The Committee's findings are to be published in an early edition of the Journal.

As regards our cooperation with other groups in advancing the public health, I have mentioned our joint endeavors in the development of equipment standards. In addition, our Association is cooperating with the public health and sanitation organizations, the restaurant and beverage industries, the National Sanitation Foundation, the U. S. Public Health Service and others concerned, in the development of a nationwide program of food and beverage sanitation. We are also one of the sponsors of the National Conference on Trichinosis, a member of the Food Law Institute, and have applied for affiliation with the American Association for the Advancement of Science.*

Technical information is disseminated to the membership of IAMFS through our official publication, the *Journal of Milk and Food Technology.* In recent years, sincere efforts have been made to improve the Journal through the inclusion of more articles on food sanitation, prompt publication of material of current interest to the Sanitarian, the inclusion of articles and information directed toward helping the Sanitarian solve his field problems, and by increasing our coverage of news items, including news from our Affiliate Associations.

*Now established.

Professional development and professional recognition, for the Sanitarian are matters in which our Association is greatly concerned. In 1953, the Committee on Professional Development, now the Committee on Education and Professional Development, completed a detailed study of these questions, and submitted recommendations covering definition, qualifications, grades, experience and other criteria for the Sanitarian which have been aimed at enhancing his professional status. We are also proud of the steps taken by our Association to establish the Sanitarians Award, which is presented annually to a local sanitarian whose achievements have contributed greatly to the public health and welfare of his community. First presented in 1951, the Award consists of a Certificate of Citation and one thousand dollars in cash, and is sponsored jointly by the Diversey Corporation, Klenzade Products, Inc., Mathieson Chemical Corporation, Oakite Products, Inc., and the Pennsylvania Salt Manufacturing Company.

With regard to the development of a high degree of cooperation between regulatory agencies and industry, our Association in 1951 voted to amend its constitutional requirements in order to provide full membership status for industry personnel. Industry personnel now serve on committees and are eligible for election as officers of the Association. It is our policy to work jointly with the milk and food industries, wherever possible, in seeking solutions to common problems. Examples of present joint projects of this nature are our work on sanitary standards for milk, baking and food equipment, and our participation in the development of a nationwide program of food and beverage sanitation.

I would also like to make brief mention of our progress since 1951 in improving the business management of our Association and our financial status, and in increasing our membership and the number of Affiliate Associations. In this connection, "Red" Thomasson, our Executive Secretary and Managing Editor of the *Journal of Milk and Food Technology,* has done a magnificant job. In 1951 the Association was faced with bankruptcy. Now we are solvent and have established a small but adequate reserve fund. In 1951 our paid membership totaled approximately 2,500. Today, we have approximately 3,800 members. In 1951, a total of 11 State Associations were affiliated with the IAMFS. Today, we have a total of 25 Affiliate Associations.

What are our plans for 1954? In my opinion the following deserve special mention.

(1) Plans of the Committee on Education and Professional Development to investigate legal means which may be used to aid the Sanitarian attain professional recognition.

(2) Publication of the Journal on a monthly rather than a bi-monthly basis.

(3) Inclusion in the Journal of more articles on food sanitation and more material which will help the local Sanitarian solve his field problems.

(4) Investigation of the possibilities for the establishment of scholarship aids to be awarded by the Association.

(5) Continuation of the one thousand dollar Sanitarians Award.

(6) Development by the Committee on Commun-

icable Diseases Affecting Man of a practical manual on epidemiological procedures for use by the Sanitarian in the investigation of milk-borne and food-borne disease outbreaks.

(7) Studies by the Committee on Frozen Food Sanitation of sanitary problems related to the processing and packaging of specific frozen foods.

(8) Plans for a better-balanced program at the Annual Meeting, which this year is to be held in Atlantic City, N. J., October 21-23.

In addition, all committees of the Association have revised their objectives and developed work plans for 1954. These are published in this issue of the Journal.

Finally, I would like to stress the need for more active participation by individual members to the end that the Association may better serve its membership and more closely reflect their views in its official actions. The Executive Board urges you to take a personal interest in the affairs of the Association and your own State affiliate, to contribute to the technical work of the various committees, and to make your views known on policies and programs that you would like the Association to follow.

JOHN D. FAULKNER
President

NAVY ENVIRONMENTAL SANITATION TECHNICIANS*

CHARLES J. JORDAN, *Ensign, MSC, USN*

The Navy's need for hospital corpsmen who are thoroughly trained in principles of sound environmental sanitation has resulted in the Naval School of Environmental Sanitation at the U. S. Naval Hospital, Oakland, Calif. Established in 1950, the school has graduated 11 classes totaling 181 students as of 21 August, 1953, all of whom are now applying throughout the Navy their knowledge gained during the five-months' course.

Primarily, the environmental sanitation technician is taught the how and why of conducting sanitary inspections, food service personnel training, food inspection, insect and rodent control, venereal disease control, and routine ship and field sanitation. Not only is he liberally exposed to intense classroom and laboratory instruction but, more important, he is trained in the field under the supervision of topnotch military and civilian health authorities. There are no "mock-ups," no "dummy runs." The student takes an active part in solving actual health problems through the cooperation of city, county and state health agencies, private industries, commands of naval establishments, and ships. He not only learns to apply the desired methods and technics of sanitation but is on hand to observe their results.

In addition to these methods and technics, the student is trained in bacteriologic and entomologic diagnostic technics and is taught the principles of statistical reporting. He learns correct interviewing procedures, how to get along with people, and how to sell them an idea or recommendation without creating antagonism. Emerging from the school with a Certificate of Completion, the environmental sanitation technician is well prepared to cope with the sanitary problems of his future ship or station.

The opportunities of the environmental sanitation technician are virtually unlimited. Plans have been discussed by which the EST can earn college credits for successful completion of the course. By passing the two-year college level examination (2CX) and acquiring certain additional college subjects, the road leading to a Bachelor of Science degree in sanitation will be wide open. Five EST's have passed the California State Civil Service Examination successfully and have been designated: "Registered Sanitarian"; all graduates of the school are qualified for membership in the National Association of Sanitarians. Not only can the EST become a credit to himself and the naval service, but can assure himself a worthwhile occupation in civilian life.

New classes in environmental sanitation (increased from 20 to 30 students per class), begin every 2½ months and candidates for them are carefully selected. They must be at least hospital corpsmen, second class, and have at least 23 months' obligated service after completion of the course. The candidate should have a high school education or the equivalent thereof and preferably have some knowledge of bacteriology, malariology, physics, chemistry, or public health. More important than the foregoing qualifications, however, the prospective EST should have the ability to get along with people and above all, have a genuine desire to enter this field of endeavor. Anyone who intends to take the course merely for the sake of adding a technician's specialty to his service record, will do well to reconsider, as he can expect five months of intense study and hard work during the course.

*All interested personnel applying for this course of instruction will find the following references valuable: BuPers Notice 1326 (Prs B212 D-OB-735), dtd. 23 March 1953, and the Catalog of Hospital Corps Schools and Courses, Revised: 1951

FORTY-FIRST ANNUAL MEETING
HOTEL MORTON — ATLANTIC CITY, N.J., OCT. 21-23, 1954

FOOD-BORNE ILLNESS IN THE NAVY—ANALYSIS OF 243 OUTBREAKS*†

JOHN. S. COOK, JR.

Lieutenant (MC) U. S. Navy, U. S. Naval Medical School
National Naval Medical Center, Bethesda, Maryland

A total of 243 outbreaks of possible food-borne illness reported in the Navy during the three-year period 1950-52 is analyzed.

Although the number of outbreaks of streptococcal sore throat is small, the importance of these outbreaks and their sequelae is great.

Outbreaks of diarrheal disease reported to the Navy may be roughly separated into two groups, namely, those which are over within 24 hours and those which last longer, usually much longer.

The second group, affecting predominantly individuals of ships in tropical areas or war zones, is not usually related to a particular meal but assumes a form statistically resembling a propagated epidemic. This group of illnesses — including shigellosis, salmonellosis, and "intestinal flu"—is being intensively studied by the Navy.

INTRODUCTION

Food-borne illness is a serious matter in the Navy. From the military or operational standpoint, outbreaks of food poisoning or dysentery may be crippling to a ship or fleet. There have been reports of ships unable to proceed to sea from a harbor; there was at least one ship which ran aground because of food-borne illness. When an outbreak of possible food-borne illness has occurred, it must be the subject of an investigation. The findings of the investigation are given in a "special epidemiological report," which is required after any outbreak, or unusual incidence, of disease. To give you a better understanding of this Navy problem, I will review the characteristics of these outbreaks of food-borne disease as shown by the reports.

Statistics compiled from reports of outbreaks do not lend themselves to exactly the same sort of treatment as do those from reports of individual cases. An analysis of case reports of diarrheal diseases in the Navy was made by Smiley and Raskin in 1945.[1] They noted trends in case incidence and were able to show such things as the drop in admission rate for typhoid fever following compulsory vaccination in 1911-12. In a speech to this Association at Glenwood Springs, Colorado, 1951, Lieutenant Commander Fred E. Stewart compared the reporting of food-borne illness in epidemiological, or "outbreak," reports with that of individual case reports.[2] This comparison showed that from 1946 to 1950 there was increasingly inclusive coverage by "outbreak" reporting.

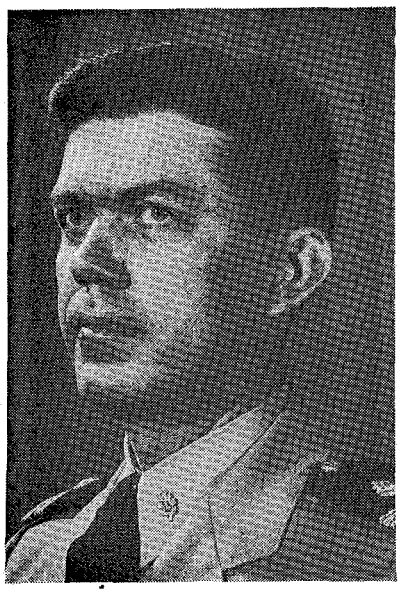
Only outbreak reports are considered in the present study; no attempt is made to include trends which might be shown using case incidence data. An analysis of 243 outbreaks of food-borne illness reported within the Navy for the three-year period 1950-52 is made here somewhat similar to analyses of civilian outbreaks by the U. S. Public Health Service[3,4] and others.[5]

The reports of outbreaks received in the Bureau of Medicine and Surgery of the Navy vary in their completeness. Most of them contain a simple narrative of what happened, the investigation, the findings, and control measures taken. In 1953,[6] directions for these "special epidemiological reports" were revised so that future reports may be suitable for very detailed analysis, including specific attack rates for various sectors of the population at risk. The reports sent in for the three-year period 1950-52 are not so specific but are quite satisfactory for certain kinds of analysis.

Miscellaneous Outbreaks of Food-Borne Disease

The number of outbreaks in the Navy, 1950-52, in four categories of food-borne illness is given below:

Diarrheal disease	236
Food-borne sore throat	7
Poisoning by chemicals in food	0
Poisoning by food substance	0
Total	243



Lieutenant Cook, A. B. (Univ. of N. C.), M. D. (Duke Univ.), plans a career in naval preventive medicine. He served six years in the hospital corps of the Navy during World War II, a clinical laboratory technician and malariologist. He concluded his enlistment by a year as warrant officer with Epidemiology Unit No. 47 at the Philadelphia Naval Hospital. He was elected to membership in Alpha Omega Alpha, honorary medical fraternity, in 1950. After medical school he completed a rotating internship at the U. S. Naval Hospital, Portsmouth, Virginia, and a 10-months course in epidemiology at the U. S. Naval Medical School. He has remained at the Naval Medical School on the epidemiology and tropical medicine staff since May 1952.

The striking thing about this number of outbreaks is not *how many,* but *how few,* outbreaks were reported. During the three-year period being considered, there were an average of over 1500 activities who make this type of report. The fact that we have 243 outbreaks from a total of 4,850 "ship-or-station years" may be stated: The chances are that any particular ship or station in the Navy will report one outbreak of possible food-borne illness every 20 years.

It is evident that diarrheal disease is the main category of food-borne illness. Sore throat is occasionally traced by epidemiological methods back to a particular food eaten at a particular meal, and in these cases it is certainly a food-borne illness. Diarrheal disease is thought of as food-borne

*The opinions or assertions contained herein are the private one of the writer and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

†Presented at the 40th annual meeting of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., East Lansing, Mich., Sept. 1-3, 1953.

unless proved otherwise; streptococcal sore throat is assumed to be spread in other ways than by food unless proved to be food-borne.

In order that absence of outbreaks of chemical food poisoning during 1950-52 might be better evaluated, a search of naval medical literature for the past ten years was made. Of 100 food-poisoning outbreaks analyzed in 1945,[7] one was caused by a chemical, cadmium. Three outbreaks caused by cadmium were the subject of a report in 1941.[8] Cadmium poisoning was reviewed in the *Naval Medical Bulletin* in 1944.[9]

No reports of mushroom or mussel poisoning was found for the past ten years; fish poisoning, as shown in table 1, is not so rare. In 1942 an outbreak occurred on Culebra Island in the Caribbean area.[10] In 1944 there was an outbreak in the Marianas Islands.[11] In 1945 two outbreaks occurred simultaneously on the island of Saipan.[12] All these outbreaks were caused by barracuda or barracuda-like fish. In 1949 a very severe outbreak involving 57 people who had eaten an eel occurred on Saipan.[13] Although no outbreaks were reported in the Navy for 1950-52, an outbreak involving 6 people who had eaten an eel occurred at Kwajalein in March 1953.[14]

TABLE 1—OUTBREAKS OF POISONING BY FISH REPORTED FROM VARIOUS SOURCES

Year	Location	Kind of fish	Number eating	Number Ill
1942	Culebra Island	Barracuda	10	10
1944	Marianas Islands	Barracuda	31	30
1945	Saipan	Barracuda-like Fish	51	51
1949	Saipan	Eel (Gymnothorax)	57	57
1953	Kwajalein	Eel	6	6

Food-borne streptococcal sore throat

As shown in table 2, seven outbreaks of streptococcal sore throat were reported as food-borne for this three-year period, 1 in 1951 and 6 in 1952. A total of 708 were admitted to the sick list; the median outbreak had 52 admissions. The incubation period for three outbreaks was 2 or 3 days. Offending food was listed in only three outbreaks: turkey salad, shrimp salad, and reconstituted powdered milk. Previously (1944) a salad was reported as the vehicle for transmission of streptococcal sore throat.[15] In 1945, reconstituted powdered milk was involved, and the same type Group A streptococcus was isolated from the throat and from an infected cut on the wrist of a man who regularly mixed powdered milk as was isolated from the throats of scarlet fever and sore throat patients..[16] In the turkey salad outbreak, Group A Type 14 streptococcus was isolated from the patients and from the cook. In the shrimp salad outbreak, Group A Type 5 streptococcus was isolated from the patients and from a burn lesion on the cook's arm.

The remaining four outbreak reports gave incomplete data. Since the vehicle, incubation period, and bacterial evidence is lacking, these must be considered as of doubtful food origin. However, the evidence is clear that *some* streptococcal outbreaks are food-borne; in other outbreaks the connection to food may have been present but missed.

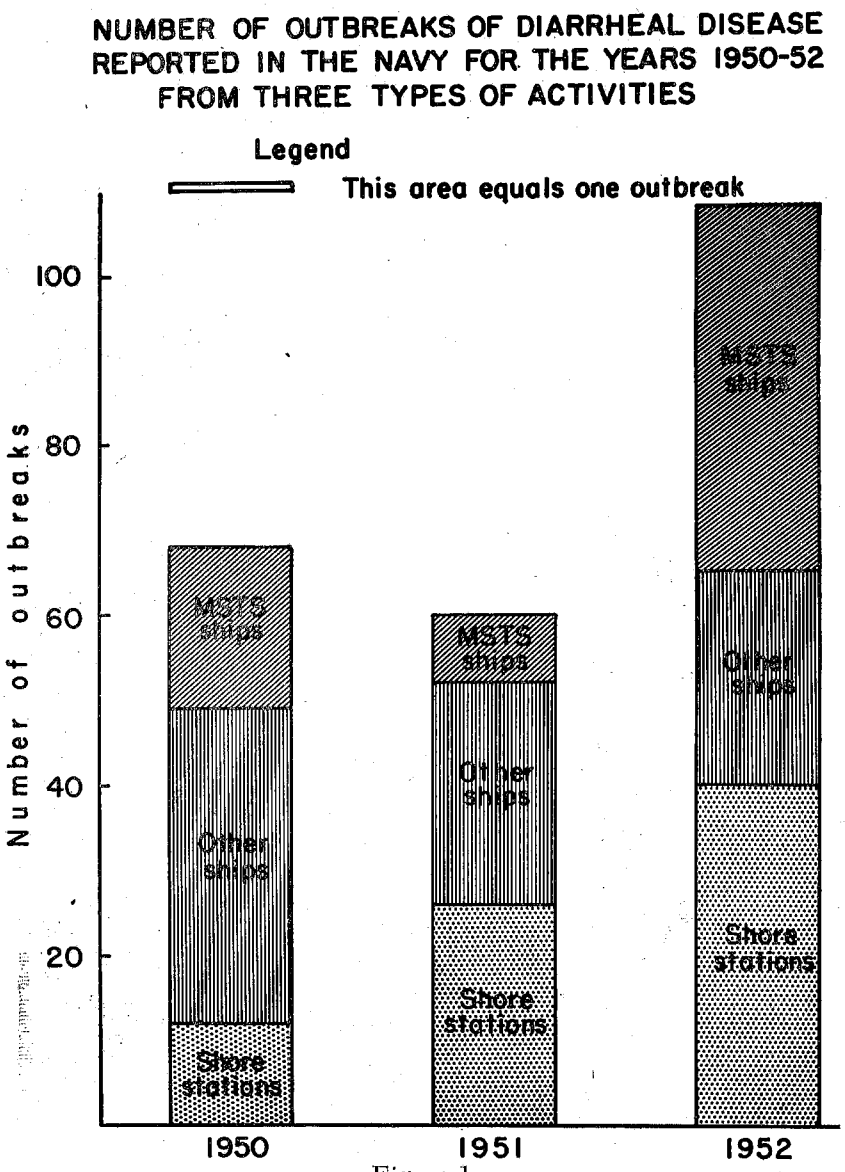


Figure 1

TABLE 2—OUTBREAKS OF FOOD-BORNE STREPTOCOCCAL SORE THROAT U. S. NAVY, 1950-1952

Year	Vehicle	Cases admitted	Streptococcal type	Incubation period
1951	Turkey salad	158	14	More than 24 hrs.
1952	Shrimp salad	52	5	More than 48 hrs.
1952	Reconstituted powdered milk	135		More than 24 hrs.
1952	Unknown	28		
"	"	52		
"	"	20		
"	"	263		

DIARRHEAL DISEASE OUTBREAKS

Organization of study.

The remaining 236 outbreaks were described as food poisoning or infection, gastroenteritis, diarrhea, or dysentery. It is this group of illnesses that forms the main subject matter for this paper. The analysis covers all outbreaks reported to the Bureau of Medicine and Surgery of the Navy and is not limited to outbreaks affecting Navy and Marine Corps personnel. It is not limited to U. S. Military personnel, but includes outbreaks among other United Nations troops aboard U. S. vessels, civilian employees aboard ships or stations, and military personnel exposed ashore—in addition to outbreaks of Navy and Marine Corps personnel aboard ships or stations of the Naval establishment.

A report of an outbreak might consist of (1) a dispatch that an outbreak of gastroenteritis had occurred aboard with 52 cases and 7 admitted to the sick list; (2) a letter report giving elaborate details of the clinical, epidemiological, and bacteriological aspects of the outbreak; (3) a notation in a ship's annual report that an outbreak of diarrhea occurred during August of the past year; or (4) a notation from a preventive medicine activity that during the past month the activity had been called on to investigate an outbreak aboard the USS John Doe. In most instances the report consisted of a combination of several or all of these types of reports.

The following is a list of the data abstracted from each outbreak report and entered on 5x8 McBee punch cards.

1. Name of ship or station.
2. Geographical location.
3. Date first case(s) were seen.
4. Number of cases reporting for treatment.
5. Number of admissions to sick list.
6. Etiological agent.
7. Diagnosis given in describing outbreak.
8. Kind of food or other vehicle involved.
9. Method of preparation of food.
10. Incubation period before onset of first case.
11. Duration of outbreak in days from the onset of the first case until the onset of the last case.

Number 6, etiological agent, includes also whether or not the etiology was definitely established. If the etiological agent was staphylococcus, it would be necessary to culture staphylococcus from the

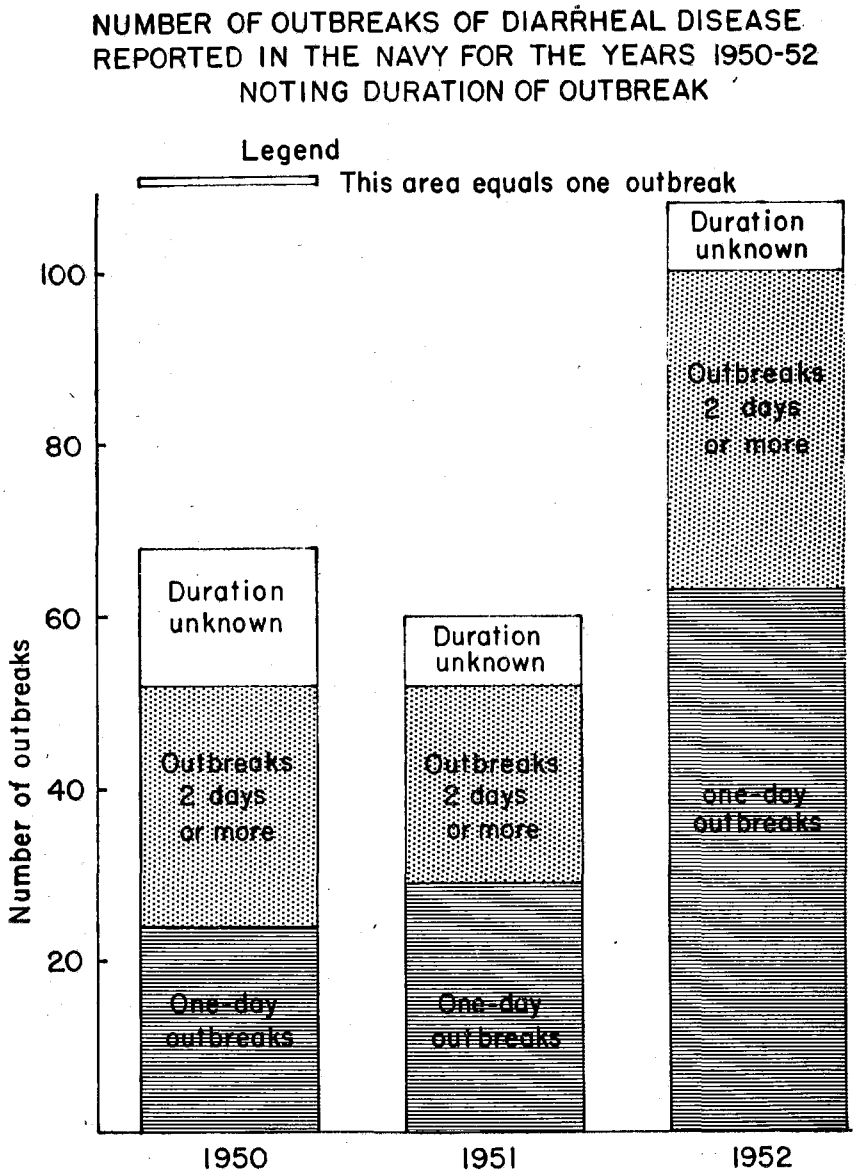


Figure 2

suspected food to state that the etiology was definitely established. If the etiological agent was salmonella or shigella, it would be necessary to culture the bacterium from the patient in order to state that the etiology was definitely established. If the etiological agent was thought to be a virus, it would have been necessary to carry out a fairly elaborate research project to definitely establish the etiology; this was not done, and so no outbreak thought to be due to virus is included among outbreaks with etiology definitely established.

Number 7, diagnosis. Where more than one diagnosis was given, the one appearing first in the report was arbitrarily selected as the diagnosis of the outbreak.

Number 11, duration. This last item proved valuable as an estimate of the type of outbreak, and its use was suggested by the fact that information was available for this tabulation in 204 of 236 outbreaks, whereas the incubation period was known in only 91 of the outbreaks. In epidemics from a common source which has acted over a short interval of time, the duration as calculated (from the onset of the first case until the onset of the last case) is equivalent to the difference between the longest and shortest incubation periods. The propagation of an epidemic from person to person would of course lengthen the "duration" of the epidemic.

TABLE 3—AVERAGE NUMBER OF CASES PER OUTBREAK REPORTED IN THE NAVY BY YEAR OF OCCURENCE

Year	Average cases admitted	Average cases seen
1950	96	23
1951	120	23
1952	106	13

General Analysis.

Although the number of cases reporting for treatment and the number of cases admitted were both studied, no use is made of the data except for general analysis of size of outbreak. The average size of outbreak in each of the three years is shown in table 3. The number admitted is probably the more reliable figure for comparison of the three years, and this average in 1952 is 13 as compared with 23 in each of the two previous years. The decrease in average size of outbreak may be caused by an increased reporting of small outbreaks, but there is insufficient evidence to make an assertion that this is true.

In the remainder of the paper, outbreaks are considered as units and the number of cases per outbreak is ignored. The graph space occupied per outbreak is shown on each figure.

The distribution of the 236 outbreaks of diarrheal disease by year of occurrence is shown in figure 1. Of the 236 outbreaks reported, 68 occurred in 1950, 60 in 1951, and 108 in 1952. There is a definite increase in 1952 over the previous two years in number of outbreaks reported.

In figure 1 the outbreaks are divided into three types of activities reporting outbreaks. The 1952 increase is made up largely of increases in reported outbreaks from shore establishments and ships of the Military Sea Transportation Service. The MSTS ships, operated by civilian crews under Navy jurisdiction, are transports carrying United Nations troops and dependents; the nature of its function makes this group of ships particularly susceptible to outbreaks of diarrheal diseases.

In figure 2 the same outbreaks are divided by duration of outbreak. Those outbreaks in which all cases became ill within 24 hours are grouped as "one-day" outbreaks. In 1952 there is an increase both in one-day outbreaks and in outbreaks lasting 2 days or more. The much greater increase in one-day outbreaks is probably an indication of improved reporting. One-

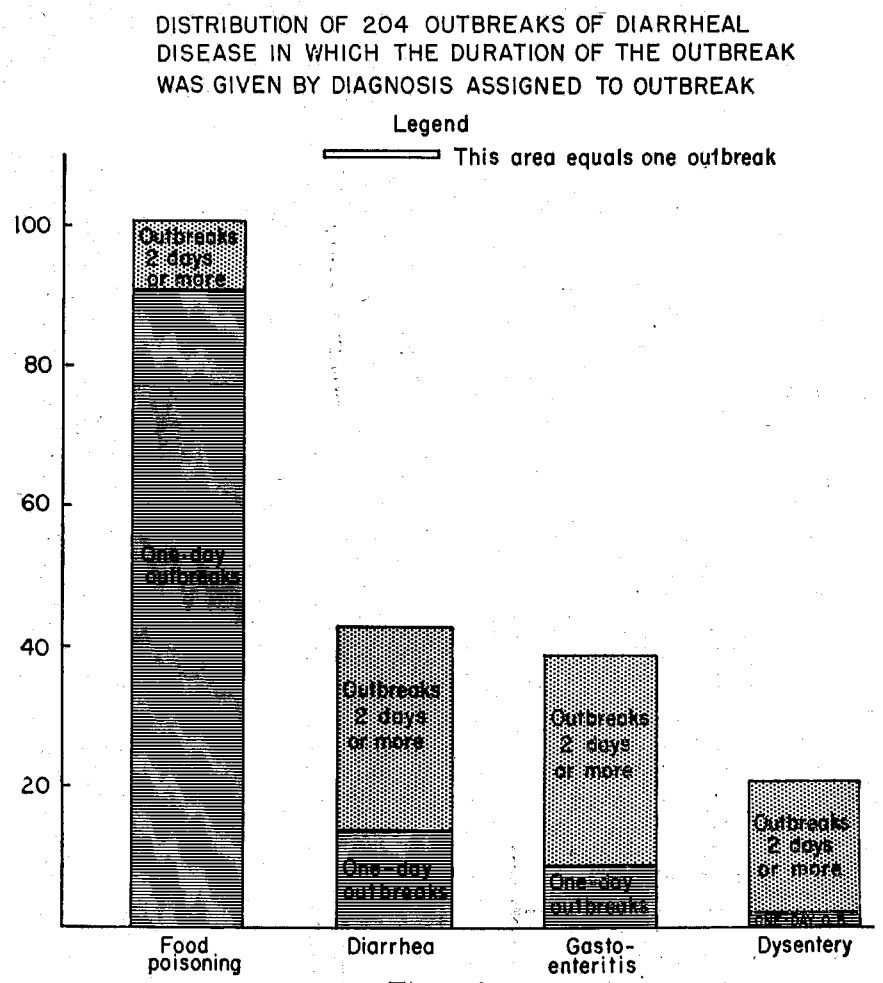


Figure 3

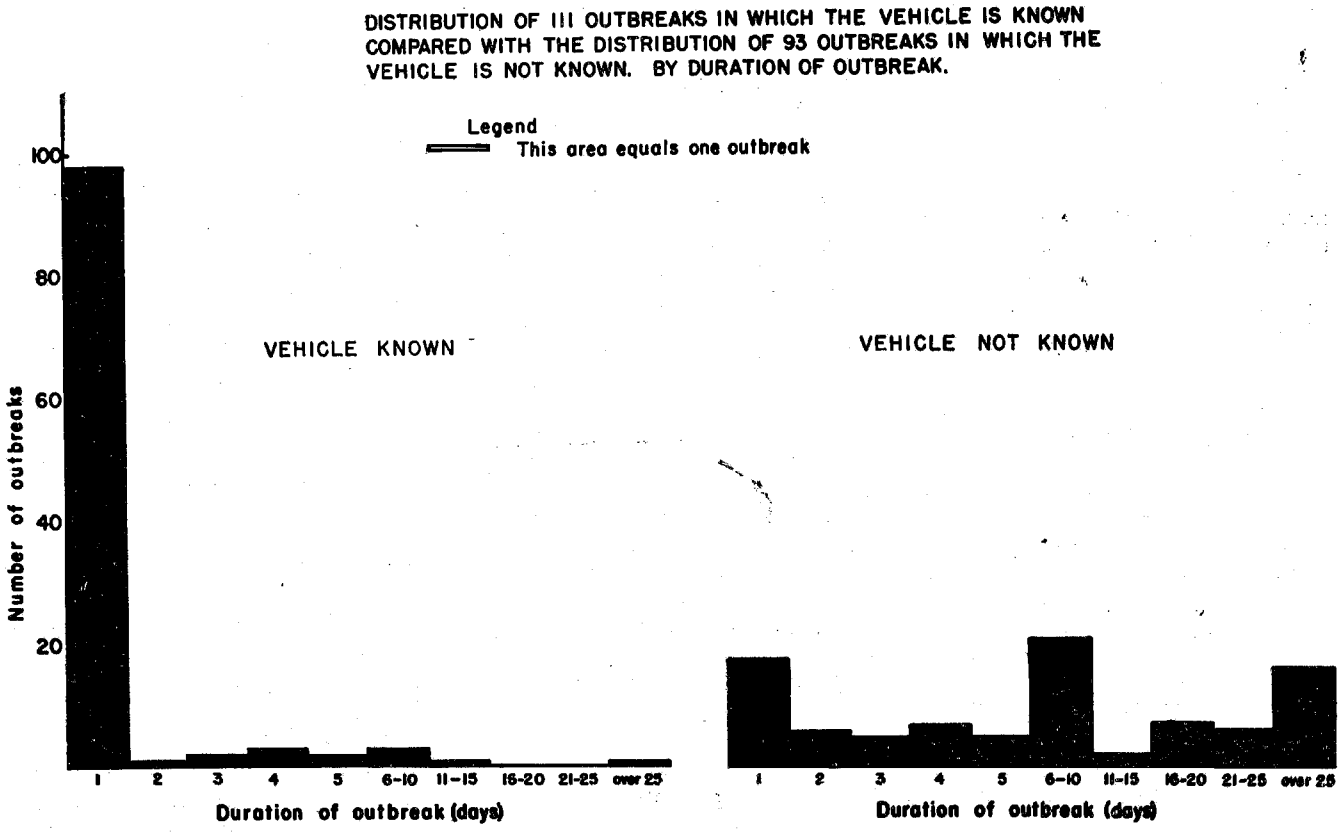


Figure 4

day outbreaks total 116 and those greater than one day total 88. The duration of 32 outbreaks was not given.

Figure 3 shows the distribution of these two types of outbreaks among the diagnoses used in reporting the outbreak. It is striking that 91 of 101 outbreaks called food poisoning, food intoxication, or food infection are of the one-day variety. In 21 outbreaks of dysentery, on the other hand, 19 are of more than one-day duration.

It would be expected that with the outbreaks of shorter duration the vehicle would be known in a greater number of cases. That this is true is shown in figure 4 comparing the duration of outbreaks of 111 in which the vehicle is known (on the left) with the duration of 93 outbreaks in which the vehicle is not known. In 98 of 116 one-day outbreaks the vehicle is known; in 75 of 88 outbreaks lasting more than one day the vehicle is not known.

A further breakdown of 148 outbreaks in which the geographical location is known is given in figure 5. In 46 of 48 outbreaks at shore sections in the continental United States the outbreaks are of the one-day type. In 41 of 52 outbreaks on ships in tropical areas or war zones, the outbreaks are of two or more days duration.

In summary, outbreaks diagnosed food poisoning, those with the vehicle known, and those occurring at shore stations in the continental United States are typically those with a duration of 24 hours or less. Outbreaks diagnosed dysentery, those with the vehicle not known, and those occurring on ships in tropical areas or war zones are typically those with a duration of more than one day.

In the 32 outbreaks in which the duration was not given, the etiology of none of the outbreaks was definitely established and the incubation period was not known. Not much is lost by dismissing these 32 outbreaks from the remainder of the discussion. This will enable us to analyze the bulk of the outbreaks in the two categories which have become apparent—those which lasted *less* or *more* than 24 hours.

One-day outbreaks.

Of 116 one-day outbreaks, the vehicle was known in 99. These 99 outbreaks are shown by vehicle of transmission in figure 6. Water and milk were involved in only 3 outbreaks each. The bulk of transmission was by foods other than milk. First on the list is pork, with ham accounting for 24 of 27 outbreaks. Next, poultry, with turkey responsible for 12 of 18 outbreaks. Other meats (not ground) come next with beef causing 13 of 15 outbreaks. Ground meat caused 11 outbreaks; commercially treated meat such as frankfurters and vienna sausage were vehicles in 5, meat loaf or stuffed pepper were vehicles in 6. Sea-food were vehicles in 5 outbreaks, of which lobster and shrimp account for 2 each. Desserts were responsible in 6 outbreaks, potato and macaroni salad in 5, and miscellaneous foods in 6.

Etiology was definitely established in about one-third, probable in a third, and undetermined in a third. The 34 outbreaks whose eti-

ology was definitely established are shown in figure 7. The 23 outbreaks caused by staphylococcus include 10 ham outbreaks, 5 poultry, 3 beef, 2 ground meat, and 1 each of lemon cream pie, macaroni salad, and left-over baked beans. Salmonella was isolated in one roast turkey outbreak. The two water outbreaks may be considered as one. River water was pumped into a ship's fresh water system through a cross connection and back into the shore fresh water supply. As a result outbreaks of gastroenteritis were reported from both the ship and shore station. The results of rectal cultures from patients follow:

Paracolon (similar to Providence 29911)--2 cultures
Paracolon intermedius ---6 cultures
Coliform intermedius ----4 cultures
Proteus morgani --------2 cultures
Alkaligenes ----------2 cultures

These two outbreaks were tabulated as of paracolon etiology, since no more definite pathogen could be demonstrated. Other "doubtful" pathogens isolated from outbreaks included 2 *Paracolon*, 4 *E. coli*, 1 *Proteus*, and 1 aerobic Gram-positive rod.

TABLE 4—SUMMARY OF SIX OUTBREAKS WITH ETIOLOGY DEFINITELY ESTABLISHED AS SALMONELLA, U. S. NAVY, 1950-1952

Incubation period (Hours)	Duration (Days)	Etiological agent	Vehicle	Cases	Admissions
10	1	*S. enteritidis*	Roast turkey	150	—
30	7	*S...typhimurium*	Meat balls & spaghetti	534	79
50	5	*S...typhimurium*	Thanksgiving turkey	20	20
Unknown	3	*S. montevido*	Unknown	57	47
Unknown	6	*S. montevideo*	Unknown	65	15
Unknown	16	Salmonella species	Unknown	214	214

The incubation period was known in 83 of the 116 one-day outbreaks. Figure 8 shows the distribution of outbreaks by incubation period. Of 83 outbreaks, 49 had an incubation period of less than 7 hours and 80 had an incubation period less than 13 hours. All outbreaks whose etiology was definitely established as staphylococcus had an incubation period less than 7 hours. As the incubation period becomes longer there is less chance of recovering the food, and if the food is not recovered it becomes impossible to "establish" an etiology of staphylococcus by our standards.

Outbreaks lasting more than one day.

Outbreaks lasting more than one day require a different sort of analysis.

The duration in days of all the outbreaks is shown in figure 9. On this scale the graph for the 116 one-day outbreaks would reach about six times as high as the column shown. You will notice that there are about 6 or 8 outbreaks in each category—2-day, 3-day, 4-day, 5-day, and so on—for outbreaks up to 8 days duration. Of 88 outbreaks lasting more than one day, 49 were over within 8 days and 55 were over in 10 days. On the other hand 14 outbreaks lasted 30 days or longer.

Of the 11 outbreaks whose etiology was definitely established as shigella, 9 are outbreaks of 12 or more days duration. Ten of the 11 were on USS ships; one was on an MSTS vessel. Seven were caused by *S. flexneri* 3, one by *S. flexneri* 2, one by *S. flexneri* 2a, and two by Shigella species undetermined. Of the 11 reports, seven described exposure of personnel ashore or to an affected ship, one mentioned food purchased ashore, and one listed contaminated milk as contributing causes of the outbreaks.

Caution is necessary to avoid the interpretation that shigella is the cause only of outbreaks lasting more than 10 days. There is a sampling error involved. An outbreak which lasts more than 10 days is more likely to be thoroughly investigated with all the bacteriological methods in our armamentarium,

DISTRIBUTION OF 148 OUTBREAKS IN WHICH GEOGRAPHICAL LOCATION IS KNOWN BY LOCATION NOTING DURATION OF OUTBREAK.

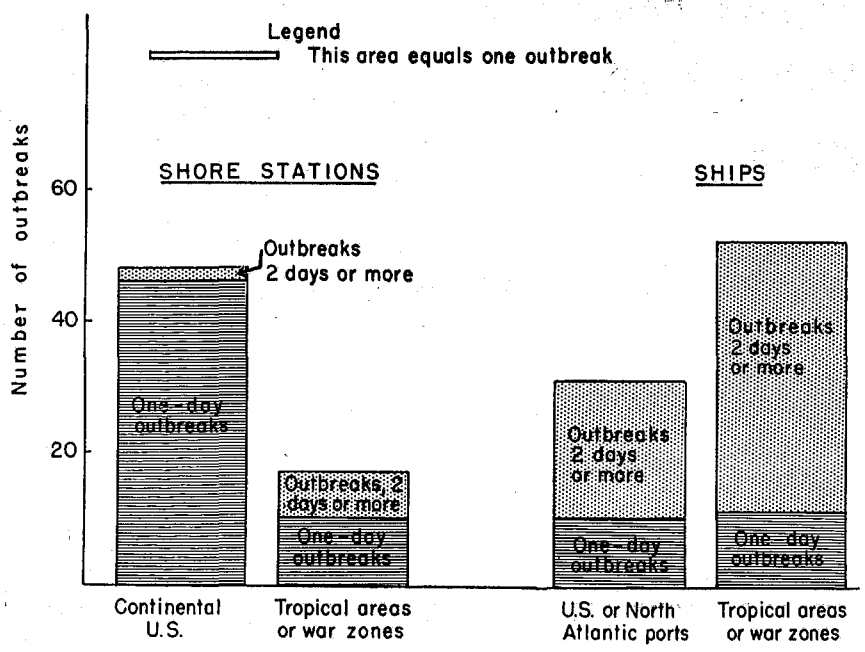


Figure 5

than is an epidemic which is over in a week or less. So it would not be surprising if the same pattern of definitely identified shigellosis were found, even if all the outbreaks were caused by shigella.

Figure 9 also gives the duration of the six outbreaks whose etiology was definitely established as salmonella. You will note that 5 of the 6 outbreaks have a duration of a week or less. The incubation period for three of these is known; the outbreaks lasting 1, 7, and 5 days had incubation periods of 10, 30, and 50 hours respectively, as shown in table 4. The etiology of these three outbreaks was established as S. *enteritidis* in one outbreak and S. *typhimurium* in the other two. Roast turkey was the guilty food in two cases, meat balls and spaghetti in the third.

A two-day outbreak was attributed to *Endamoeba coli* after 5 of 6 stool specimens showed this parasite. No outbreak of amoebic dysentery caused by *Entamoeba histolytica* was reported.

For the large group in which the etiology was not specifically determined, a presumptive etiology was given in 27 outbreaks lasting 2 days or more. In 17 of the 27, clinical and epidemiological features of the disease suggested a virus as the probable cause of the outbreak.

Table 5 gives a summary of the typical differences between the one-day outbreaks and those lasting more than one day.

DISCUSSION AND CONCLUSION

More outbreaks were reported in 1952 than in 1950 or 1951. This is probably due to improved reporting as illustrated by one or both of the following points: (1) The average outbreak was smaller in 1952 than in the two preceding years. (2) A larger portion of 1952 outbreaks were of one-day duration as compared with preceding years. Either fact would provide a satisfactory explanation, since outbreaks of either small size or short duration would be more easily concealed and less likely to be reported when reporting is poor, and an increase in these types of out-

DISTRIBUTION OF OUTBREAKS OF DIARRHEAL DISEASE BY VEHICLE INVOLVED IN 99 ONE-DAY OUTBREAKS IN WHICH THE VEHICLE IS KNOWN.

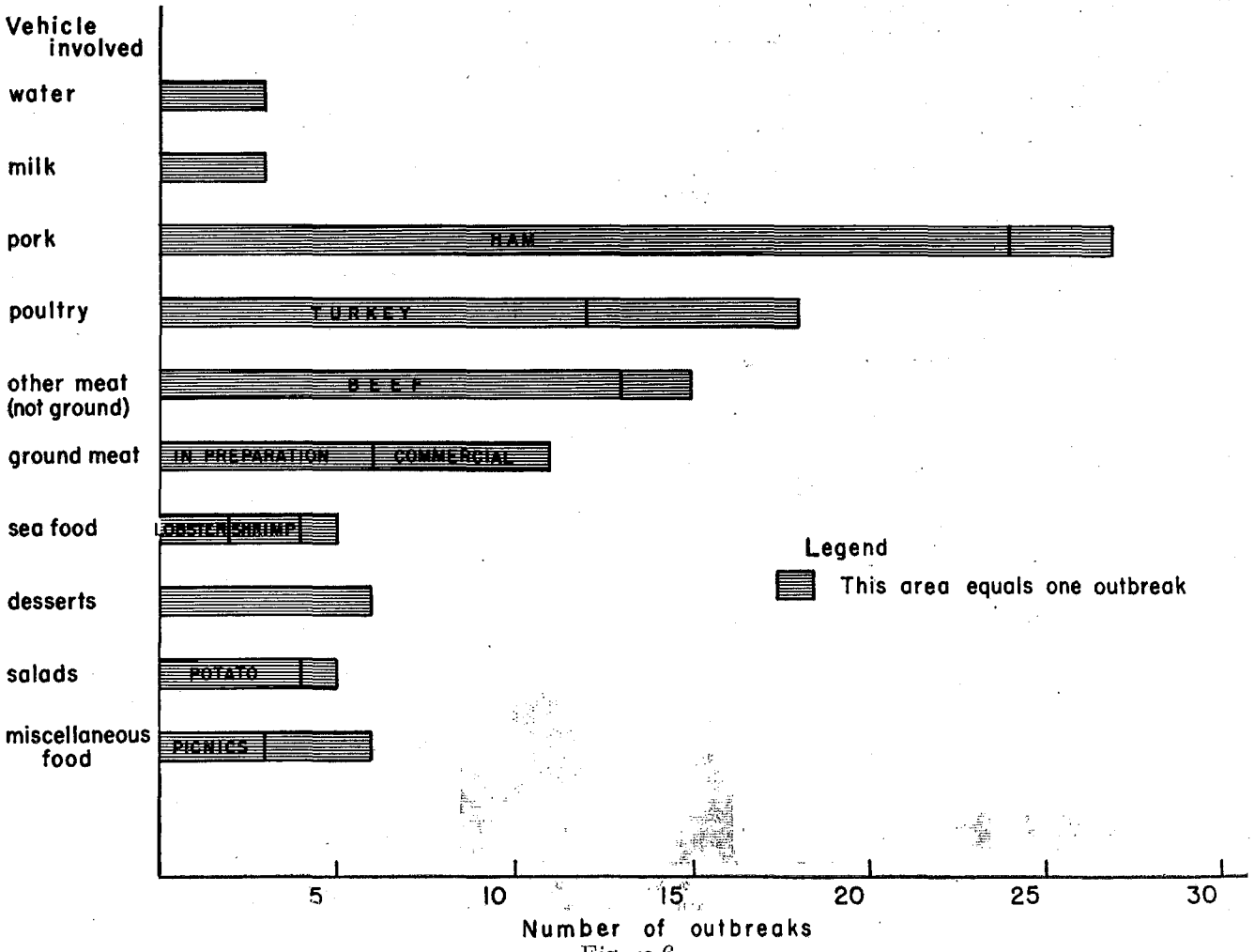


Figure 6

TABLE 5—SUMMARY OF TYPICAL DIFFERENCES BETWEEN TWO TYPES OF OUTBREAKS, U. S. NAVY, 1950-1952

	Outbreaks with duration of one day or less	Operation with Duration of more than one day
Typical diagnosis	Food poisoning	Dysentery
Typical relation to vehicle	Vehicle known	Vehicle not known
Typical location	Shore stations in continental U. S.	Ships in tropical areas or war zones
Typical etiology	Staphylococcus	Shigella

breaks would be expected as reporting improved.

Only 7 outbreaks of food-borne streptococcal sore throat were reported, but these averaged 100 admissions per outbreak. If we estimate the number of cases of rheumatic fever which can be expected to develop from these illnesses at an approximate figure of 3 percent, these 700 cases of sore throat would be followed by 21 cases of rheumatic fever. Each case of rheumatic fever causes considerable disability to the individual, often separation from the service, a pension, and consequent expense to the taxpayer. It is difficult to demonstrate when streptococcic sore throat is food-borne, and by rigid criteria only 2 or 3 of the 7 outbreaks would unquestionably be food-borne. However, since food-borne outbreaks of streptococcal sore throat could easily be missed, figures might be still higher for the cost of this disease.

The diarrheal disease outbreaks may be separated into two groups, those of less and those of more than 24 hours' duration. This separation is one of convenience, and allows us to recognize the large size of the second group in the Navy as compared with civilian outbreak reports. The first group is made up entirely of epidemics arising from a common source, while all epidemics propagated from person to person fall into the second group.

The first group includes all the staphylococcus outbreaks and is very similar to previously reported series of such outbreaks.

The second group of outbreaks, those lasting 2 days or more, were found more commonly aboard ship than at shore activities, with a slight predominance of ships in tropical areas or war zones. One explanation could be that an outbreak of anything is more likely to be recognized aboard a ship, especialy a ship at sea, because the population is a closely-knit unit and it becomes easier to make epidemiological explanations for illnesses. At best this could account for only a part of the difference between ships and shore stations, and we must conclude that there is a real difference in the shipboard outbreaks, probably related to the sanitary conditions in the ports, to something about the harbors, or to something peculiar to shipboard life itself.

Salmonellosis is present in both the first and second groups of outbreaks, with duration of outbreak, ranging from 1 to 16 days. Some are definitely outbreaks arising from a common source, and the food involved is identified; others of longer duration appear to be propagated epidemics, at least to the extent that several meals would have to be implicated to include all the cases.

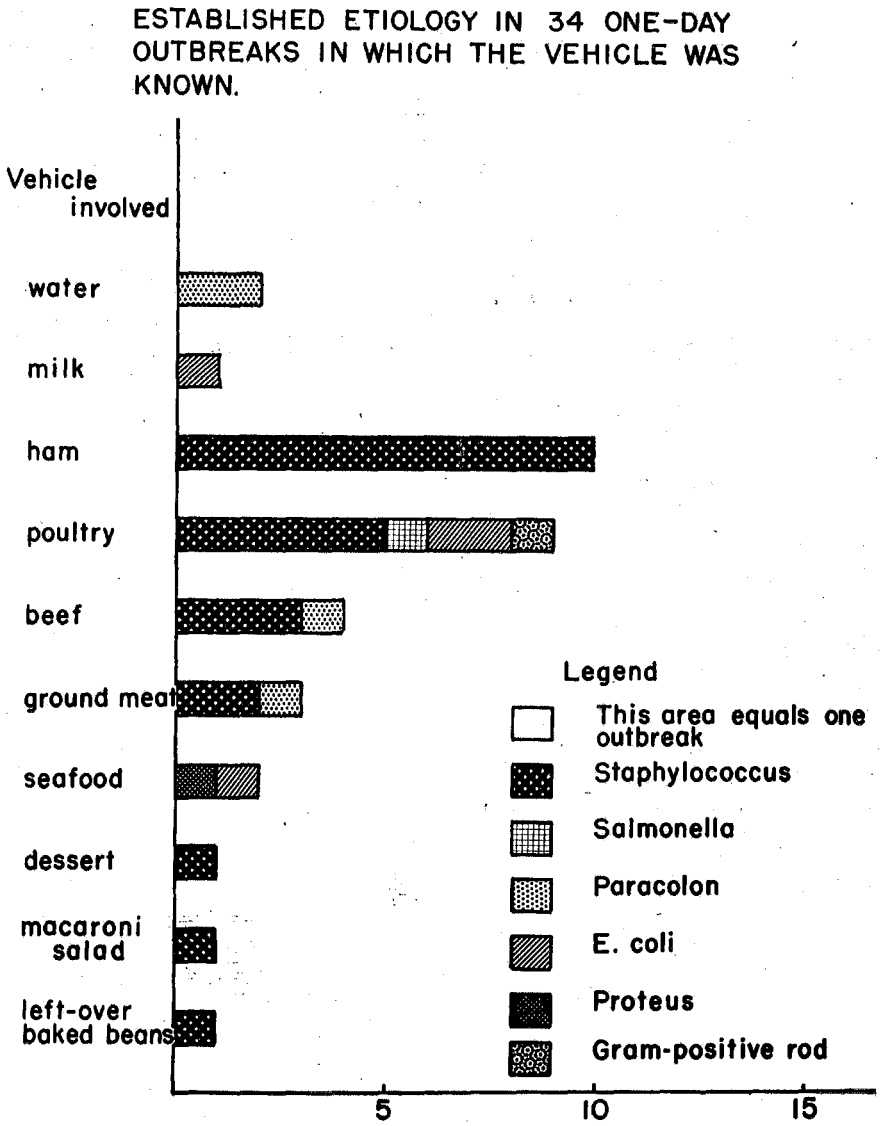


Figure 7

Shigellosis accounts for many of the outbreaks in the second group. The history of epidemics of bacillary dysentery and its effect on naval vessels has been described many times.[17,20] The prevention of these outbreaks of shigellosis might well be called the number one preventive medicine problem of the Navy.

The second group contains a lot of "unknown" outbreaks which are described as of the virus type. These outbreaks, as well as those attributed to paracolons, proteus, and other bacteria not well established as pathogens, deserve further study. This is exactly what is being done in the Navy at present. Although the study is centered around shigellosis and its prevention, viruses and other possible pathogens are not being overlooked. Work is in progress to try to answer the fundamental question as to whether these diseases are food-borne or water-borne, or whether they are not actually transmitted in some other way by person-to-person contact.

ACKNOWLEDGMENTS

The appropriate filing of the outbreak reports was performed by the staff of the Preventive Medicine Division of the Bureau of Medicine and Surgery, Navy Department. Credit for the actual investigation and reporting of individual outbreaks must go to the medical department representatives on the many Navy ships and stations. It is this group of medical department personnel, also, whose supervision of sanitation has resulted in such a small number of outbreaks, one per ship-or-station per 20 years.

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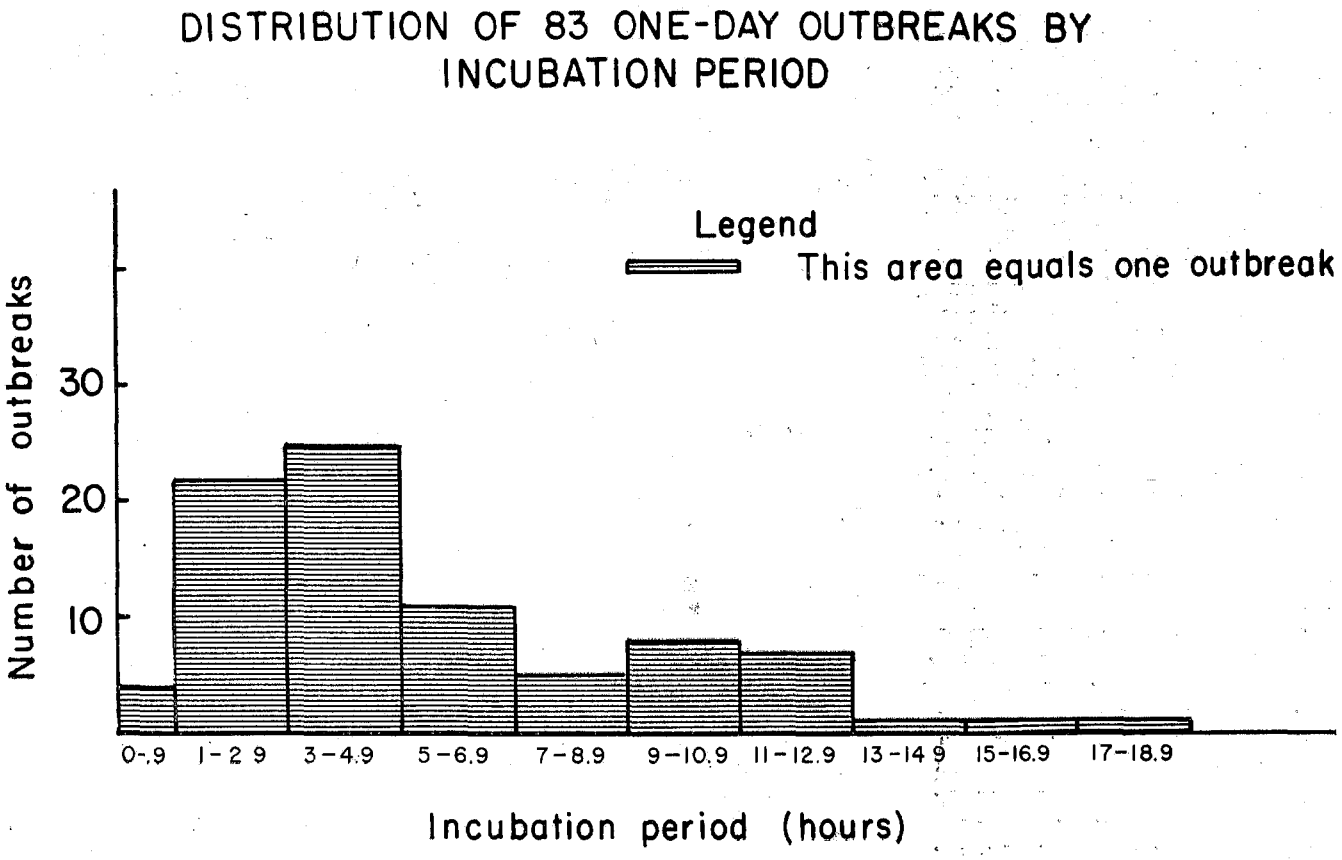

Figure 8

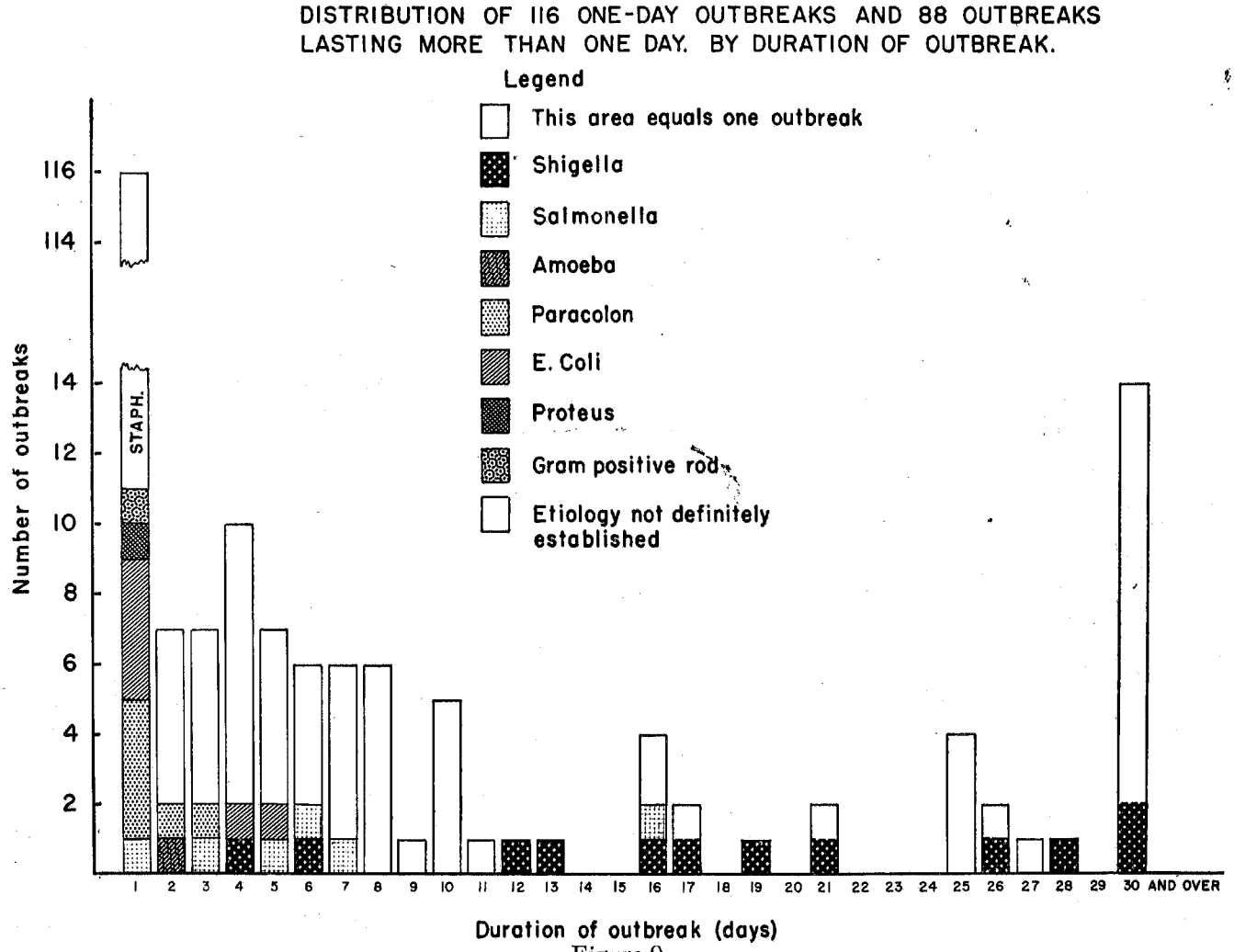

Figure 9

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NEW BRUCELLOSIS CONTROL LAW IN ILLINOIS

On July 1, 1955, all shipments of milk to Illinois markets must come from herds that have been tested for brucellosis. Two plans are available, covering calfhood vaccination or slaughter. After July 1, 1957, new additions to a herd must be tested for brucellosis, and after that date, all milk whether graded or not, must come from herds under one of the two plans. Calfhood vaccination is free for both beef and dairy herds as long as the state funds hold out.

NOTICE

All members are urged to consider nominations for the $1000.00 Sanitarians Award. Please send with supporting evidence as soon as possible to:

H. L. Thomasson, Executive Secretary
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Information on the rules and procedure available from the Executive Secretary or:

Harold J. Barnum, Chairman
Committee on Recognition and Awards, Denver Department of Health and Hospitals, Denver, Colorado.

A STUDY OF THE INFLUENCE OF AGITATION TIME ON THE BABCOCK TEST OF MILK SAMPLES FROM FARM BULK HOLDING TANKS[1,2]

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The influence of mechanical agitation on the mixing of milk in farm bulk milk holding tanks was studied under controlled conditions. Mechanical agitation of the milk for a period of sixty seconds gave sufficient mixing so that the milk could be sampled for the butterfat test. This was true with various volumes of milk and with different creaming times. A limited study conducted with tanks on a bulk milk route indicated that one minute of agitation was sufficient to mix the milk in the tanks for the purpose of fat sampling.

The change from the conventional can method of handling milk to a system of bulk handling of milk on the farm is occurring rapidly within this country. A description of this new method and some of its history have been discussed by several writers.[1,5,6,9,10] Producers and processors are interested in bulk milk handling on the farm and tank truck pick-up of milk.

When milk is transported from dairy farm to dairy plant in the conventional type of milk cans, it is customary to sample the milk for the fat analysis at the dairy plant. As any new type of weigh vat is developed and installed in the receiving rooms of dairy plants, the problem of obtaining a representative sample of a producer's milk for the fat analysis is encountered.[8] This same difficulty also has arisen with the introduction of farm bulk milk tanks, where sampling for fat analysis must be carried out on the farm. The problem of establishing a standard method for obtaining a representative sample of milk for a fat test from a farm bulk milk tank is complicated because of several factors. Some of these are the wide variety of style and design of tanks as well as the variations in methods of agitation and types of milk agitators.

It is quite common to find several different types of bulk milk tanks in use on the same milk route. Also, tanks on the same route may contain unequal amounts of milk. In addition to these factors, the amount of creaming that has occurred in the milk in a tank will depend on the time that has elapsed from completion of cooling of the milk until it is agitated for sampling.

This study was undertaken to observe the effects of short periods of agitation on the mixing of the milk in farm bulk milk holding tanks.

Methods

The studies in Series I and II were made with a 200-gallon and a 150-gallon direct expansion refrigerated farm bulk milk tank at the University of Wisconsin Dairy Farms. Both of these rectangular tanks were equipped with mechanical agitators mounted vertically in the center of the tank. As is common in farm bulk milk tanks, the agitator motors were wired so that when the refrigeration compressor was operating, during the cooling phase, the agitator was in motion. At the completion of cooling, the agitator motors could be switched to manual control so that they could be operated independently of the refrigeration system. The agitator in the 200-gallon tank was designed with two 12" propeller-type blades and operated at 115 rpm. The 150-gallon tank had an agitator with 5 flat blades, 3 blades on the lower level, each 9" long, and two blades on the upper level, each 6½" long. This agitator operated at 36 rpm.

The milk was introduced into the farm holding tank immediately after milking and cooled to 40°F or below. Samples were obtained by using a 50 ml stainless steel long-handle dipper. The bowl of the dipper was inserted just below the surface of the milk in the tank, then drawn slowly upward and the sample placed in a glass sample jar. The samples were held in ice water until analyzed for fat by the Babcock method.[7] Tanks were sampled in the following manner: 5 samples were taken at the end of each period of agitation, one sample from each of the four corners and one from the center of the tank. The fat content of the milk in the tank was determined by analysis of samples taken from the five positions after lengthy agitation and then combined into one sample.

Series I—In this series of observations the milk in both the 150-gallon tank (tank A) and in the 200-gallon tank (tank B) was allowed to remain quiescent for two hours after cooling. This was to permit considerable creaming to take place before any samples were taken. Then five samples were taken before any agitation of the milk. After this sampling the milk in the tank was agitated for 15 seconds, the agitator stopped, and 5 more samples were collected as rapidly as possible. The agitator was then turned on for an additional 15 seconds and another set of samples collected. This procedure was repeated and samples obtained after two more 15 second periods of agitation. This resulted in 5 sets of samples collected after cumulative stirring times of 0, 15, 30, 45 and 60 seconds. Several series of samples were collected in this manner with various amounts of milk in the tanks. In tank A these amounts of milk represented ⅓, ⅔ and the entire capacity of the tank collected over a period of 36 hours by combining three milkings. In tank B they were ¼, ½, ¾ and a full tank of milk collected during 48 hours from four milkings.

The maximum difference between the composite test and the fat test of the milk samples obtained at different periods of stirring with varying amounts of milk in the tanks are shown in table 1.

The results as presented in table

Mr. Liska was graduated from high school in Hillsboro, Wisconsin, as first out of a class of 65. He was graduated from the University of Wisconsin with honors in January, 1953, receiving at that time a B.S. degree in agriculture. He then entered the graduate school of the University of Wisconsin and did research work on the bulk handling of milk on the farm. Currently Mr. Liska is on active duty with the U. S. Army as a Second Lieutenant in the Quartermaster Corps.

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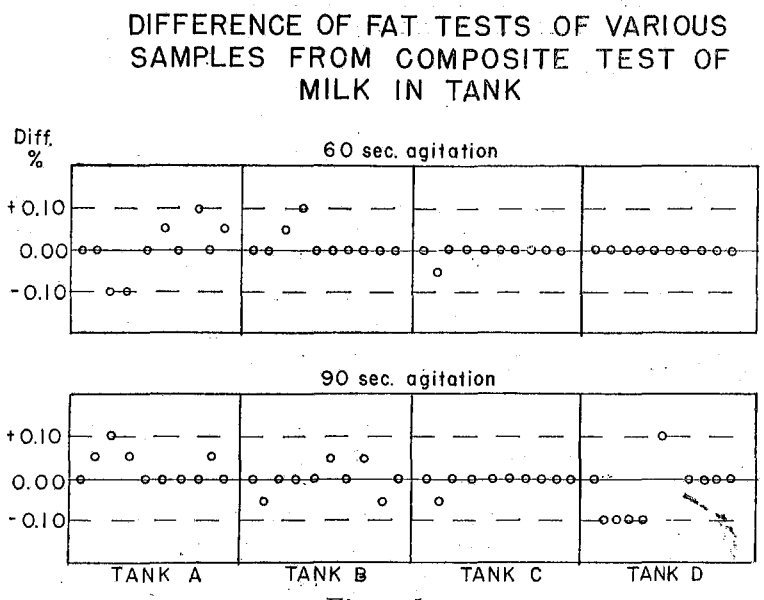

Figure 1

1 indicate the maximum difference between the fat test of any of the samples collected at various stirring times and the composite fat test of the milk in the tank. The sign preceding the number in the table indicates whether the difference resulted from a test greater (+) or less (—) than the composite test.

"If both signs (±) are used, differences from the composite test of the same magnitude were encountered in two or more sampling positions but resulted from fat tests of samples of which one or more were greater than and one or more were less than the composite test of the milk."

As is shown in table 1, the maximum differences between the fat test of the various samples and that of the composite decrease as the agitation time increases. It can be noted, that as the volume of the milk in the tank increases, the agitation time required to mix the milk also increases.

Series II—This series of tests was carried out in the same manner as the first series except a 12 hour creaming time was used to replace the previous two hour quiescent period. The 15 second stirring period was eliminated but cumulative stirring periods of 30, 45 and 60 seconds were used. Results of the tests obtained in this series are presented in table 2 in the same way as previously shown for Series I in table 1.

In general, the results of Series II with 12 hour creaming follow the same pattern as those of Series I with two hour creaming. The maximum variations between the fat test of the samples and the composite test decrease as the time of agitation is increased; also as the volume of milk is increased, more time is required for thorough mixing. The 12 hour creaming time used in this study is an extreme when compared to actual conditions on bulk milk pick-up routes. Under normal field conditions, agitation takes place during the cooling of the milk and occasionally during the holding of the milk. Therefore, a 12 hour quiescent period rarely would be encountered.

Series III—This series consisted of sampling a total of eleven tanks under field conditions on several bulk milk pick-up routes. These tanks were of different types and models and contained varied amounts of milk. These eleven tanks were chosen because they offered the greatest number of variabilities. They ranged in size from 100 to 400 gallons. Six tanks were rectangular shaped, four were essentially square and one tank was circular. Eight of the tanks used direct expansion refrigeration systems, the remainder used refrigerated water as the milk cooling medium. The agitators in all of the tanks with one exception were mounted in a vertical position in the center of the tank. In one tank the agitator was mounted in a slanting position. Agitator speeds ranged from 30 to 120 rpm.

Creaming times varying from one-fourth to 3 hours were encountered in this study. The temperature of the milk in all of the tanks was below 45°F. Stirring times of 60 to 90 seconds were used. Samples were taken from four different positions in the tanks (a, b, c, d) and from the center of the tanks (e) for fat analysis. In addition, a composite sample from each tank was obtained by mixing the milk from samples taken at the five different positions in the tank after five minutes of constant agitation. The test of this composite sample was used as a basis of comparison

TABLE 1—MAXIMUM DIFFERENCE BETWEEN FAT TEST OF DIFFERENT SAMPLING POSITIONS AND COMPOSITE TEST OF THE MILK IN THE TANK (2 HOUR CREAMING)

Tank A	VOLUME OF MILK IN TANK 1/3 Capacity	2/3 Capacity	Filled
Stirring time (seconds)	% fat	% fat	% fat
0	>+4.65	>+4.65	>+4.67
15	+1.55	+3.65	+3.70
30	±0.05	+0.30	+2.55
45	±0.05	±0.05	+1.10
60	±0.05	±0.05	+0.10

Tank B	1/4 Capacity	1/2 Capacity	3/4 Capacity	Filled
Stirring time (seconds)	% fat	% fat	% fat	% fat
0	+3.20	+3.90	>+4.50	>+4.50
15	+0.10	+0.05	+0.10	—0.15
30	+0.10	+0.05	+0.05	—0.15
45	—0.05	+0.05	+0.05	—0.10
60	—0.05	+0.05	+0.05	—0.05

TABLE 2—MAXIMUM DIFFERENCE BETWEEN FAT TEST OF DIFFERENT SAMPLING POSITIONS AND COMPOSITE TEST OF THE MILK IN THE TANK (12 HOUR CREAMING)

Tank A	VOLUME OF MILK IN TANK 1/3 Capacity	2/3 Capacity	Filled
Stirring time (seconds)	% fat	% fat	% fat
0	>+4.60	>+4.80	>+4.80
30	−0.10	+0.50	+0.40
45	0.00	+0.10	+0.30
60	+0.05	+0.10	±0.10
Tank B	**1/4 Capacity**	**1/2 Capacity**	**3/4 Capacity**
Stirring time seconds)	% fat	% fat	%fat
0	>+4.40	>+4.50	>+4.30
30	+0.10	−0.10	−0.25
45	−0.10	±0.10	+0.15
60	+0.05	+0.10	0.00

to illustrate the difference between it and any of the samples taken from the tank after 60 and 90 seconds stirring.

Typical results for this series are shown in figure 1. The four tanks reported here were chosen as representative of the group because they included a range in fat tests, creaming times, and volumes of milk as well as differences in tank design. The results for these four tanks were quite representative of the total eleven tanks sampled. Duplicate analysis of all five samples taken after each period of stirring were compared to the composite sample. The difference of these analyses from the composite have been plotted and shown in figure 1. It may be noted that the greatest difference of any analysis from the composite was not over 0.10 percent and that the variations were about evenly divided above and below the composite test.

DISCUSSION

Past experience has shown that milk must be mixed adequately to obtain representative samples for fat tests. This applies whether sampling is done from weigh vats in receiving rooms of plants or in bulk milk tanks on the dairy farm.

In the establishment of regulations and standards for bulk milk tanks it has been recognized that a definite period for agitation of the milk must be included to assure adequate mixing before sampling.

Regulations for the state of Washington on farm holding tanks state the following, "Adequate agitation means that degree of agitaion which within 3 minutes restores uniformity (not over and not under 0.1 percent, to the fat content throughout the capacity volume."[4] The state of California does not specify the length of time but makes it clear that adequate mixing must be done before sampling by stating, "The tank shall be provided with a proper agitator which will adequately and uniformly mix the milk fat contained in the tank."[3] In the compilation of the tentative 3A Standards for Farm Holding and/or Cooling Tanks the Dairy Industry Committee has included the following: "Agitation shall be provided of sufficient degree to assure homogeneity within five minutes of operation, and so that the fat content taken at different levels in the tank and at extreme distances from source of agitation will not vary more than plus or minus 0.1 percent to the fat content throughout the capacity volume."[2]

In Series I of this study it was noted that after 60 seconds of agitation the milk in both Tanks A and B was sufficiently mixed so that the maximum difference between the Babcock Test of the different samples and the composite test of the milk in the tanks did not exceed 0.10 percent. This was true after the various volumes of milk tested in the tanks had been permitted to remain quiescent for a period of two hours before agitation. In most instances this difference did not exceed 0.05 percent.

When the milk had been allowed to remain quiescent in the two tanks for a period of twelve hours before agitation (Series II), again 60 seconds of agitation appeared to give adequate mixing of the milk.

On the field trial (Series III) it was found that when the eleven tanks under the varying conditions described above were checked, again 60 seconds agitation seemed to be sufficient to give adequate mixing of the milk. This is evidenced by the fact that the difference between the Babcock Tests of various samples and the composite test of the milk was no greater than 0.10 percent.

On the field trials, there was no significant difference between 90 seconds and 60 seconds agitation. The effect of this amount of mixing may or may not be adequate for bacteriological testing.

CONCLUSION

Present standards and recommended standards for farm bulk milk holding tanks consider the milk in the tank to be mixed adequately for butterfat sampling if the tests of samples taken at various locations in the tank do not vary from the composite test of the tank by more than ±0.10 percent.

If a maximum variation of this amount is acceptable (from a practical standpoint it should be), then the milk in the tanks examined under the conditions of this study was adequately mixed for fat sampling after a sixty second period of agitation. The limited observations made in this study indicate that regulations as they are being set up are more than adequate to as-

sure few difficulties from this phase of bulk milk handling on the farm. More extensive tests should be conducted under conditions encountered normally on bulk milk pick-up routes. Similar tests should be conducted to determine the amount of agitation necessary to mix the milk adequately for sampling for bacteriological tests. However, this preliminary work indicates that agitation of milk for 60 seconds or more should give sufficient mixing of the milk for fat sampling providing the tank has been constructed in compliance with the tentative 3A Standards.

ACKNOWLEDGMENT

The authors wish to acknowledge the advice and assistance of C. O. Cramer and S. A. Witzel, Agricultural Engineering Department, University of Wisconsin.

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*From the Preventive Medicine Division, Bureau of Medicine and Surgery, Washington, D. C.

COOPERATION*

JOHN L. HARVEY

Associate Commissioner of Food and Drugs
U. S. Department of Health, Education, and Welfare

Sediment testing procedures have been used by our inspectors and quite generally by plant operators in the industry for checking deliveries of milk or cream for evidences of filth contamination. This may in part reflect more filtering on the farms rather than fundamental improvements in sanitation. Much further improvement, however, is necessary to achieve clean, rather than cleaned milk and cream supplies. The present one-pint sediment testing procedure, as applied to cream, is not completely satisfactory to you or to us. Difficulties in handling some heavy creams in the available sediment testing device are likely to result in omision of the test or erroneous appraisal based upon less than the one pint of cream intended. The pint sample taken from the bottom of the can for the sediment testing may not reveal gross evidences of filth such as flies and other whole insects that may be present in some quantity.

I do not mean to imply that sediment testing is wholly useless or that it has not served and is not serving a good purpose. It is useful and it does constitute one means of securing information concerning the condition of cream as regards filth contamination. But it does not give complete information or tell the whole story. A "negative" or passable test, however, may be misleading because such test may well fail to reveal substantial evidences of filth contamination that are present.

These and other considerations led to the suggestion that the feasibility of whole-can straining be explored. It was recognized that the contents of a can of cream could not be put through the type of filter used in the sediment tester particularly when with some creams it is difficult, if not at times impossible, to put through even one pint. The use of grosser filters or strainers which would not trap fine particles of sand, manure, insect fragments, and other smaller filth elements would be necessary. Such filters and strainers would, however, reveal all of the larger filth elements in the can and might therefore afford a means of appraisal that would supplement, perhaps even replace, the one-pint sediment test. It was hoped that whole-can straining might be effective in demonstrating the problem of filth in a way that would be impressive to producers and encourage their cooperation in attacking the problem.

Our Division of Microbiology has, during this past month, made some tests and appraisals of different types of straining equipment, and the Division expects to complete this series of investigations during the current week. We are not in position yet to make final suggestions or recommendations looking toward any standardization of the type of equipment for whole-can straining procedures. In fact, it is probable that different types of equipment will be indicated in the different cream producing areas.

Nor are we at the moment in position to conclude as to standards to apply in appraising the results of whole-can filtering operations. As you well understand, the law does not authorize and we do not desire to establish "tolerances" for filth. As a practical matter, it will be necessary to establish standards to interpret the results of whole-can filtering in terms of the classification of the cream as acceptable or reject. We need to acquire more data on the character and amounts of nonsoluble elements obtained in the filtering of whole cans of cream.

During the past year we realigned our scheme for classifying cream with respect to decomposition. Industry recognizes 3 grades of cream—designated as 1, 2, and 3. We are adopting this numbering system. While our definitions of classes of cream will not corre-

Continued on Page 21

*Excerpts from address delivered at meeting of American Butter Institute, Chicago, Illinois, October 1, 1953.

MILK and FOOD SANITATION

A COMPARISON OF THE SCRUBBING EFFICIENCY OF FOUR TYPES OF DAIRY EQUIPMENT BRUSHES[1]

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Dairy plant personnel have different opinions as to the best types of brushes to use in cleaning dairy equipment. Many workers prefer stiff-bristled brushes for difficult cleaning jobs and softer brushes for surfaces that have been exposed to cold products only. Most of the brushes used in dairy plants are made from either nylon or bassine* fibres that are embedded in a wood or composition stock. The length of the handle and the size and shape of the brush depend on the personal preference of the operator for the cleaning job to be done. Since there were so many differences of opinions on the relative value of brushes, it was believed that a contribution could be made to some of the cleaning problems if a means were devised for measuring the scrubbing efficiency of the different type brushes.

A review of the literature revealed that very little information is available on the scrubbing efficiency of dairy equipment brushes or methods for their evaluation. Fowler[2] stated that nylon brushes were very effective for dairy plant cleaning and Myrick[4] remarked that the bristles were very serviceable and virtually impervious to water.

If the scrubbing efficiency of brushes is to be evaluated properly, it is necessary to have a machine that will uniformly subject each brush to conditions that are similar to those found on soiled dairy equipment. Also a standard method of preparing a soiled metal surface and of measuring the cleaned or scrubbed area must be developed. Johnson and Roland[3] prepared a milk film on stainless steel tubes by letting the milk flow through them. As the milk was circulated through the tubes, it was heated to 143°F by a hot water (180°F) jacket surrounding each tube. Domingo[1] devised a method for measuring the efficiency of a cleaning process by staining the soil with a fluorescent material. He could observe the effectiveness of the cleaning procedure by exposing the surface to filtered ultraviolet light and noting the amount of fluorescence.

This study is concerned with (1) the development of a machine for uniform manipulation of the brushes, (2) the preparation of a standard milk-soil, and (3) a procedure for measuring the cleaned area for the purpose of evaluating the scrubbing efficiency of the different type dairy brushes.

EXPERIMENTAL

Development of a Brush Scrubbing Machine

The brush-scrubbing machine that was developed is shown in figure 1. An electric motor was the source of power. The speed of the motor was reduced by means of gears until the large wheel of the machine revolved at 52 rpm. The length of the stroke was 22 inches. The soiled container was fastened in a stationary position. The container had three sides that could be coated with milksoil during each preparation. This enabled the operator to test either three brushes on one preparation or one brush three times.

Metal weights of four, six, and eight pounds were used to test the individual brushes. If weights heavier than eight pounds were used, the soft bristles flattened out so that only the sides were used for scrubbing. On the other hand, weights less than four pounds resulted in very little scrubbing. The weights were fastened to that portion of the brush directly above the bristles on the short-handled brushes and near the tip of the handle on the long-handled brush.

Preparation of a Milk-Soiled Surface

The equipment shown in figure 2 was used in the preparation of a milk-soiled surface. The outside jacket of the cheese vat was filled with water and then drained immediately. (Temperature of water was approximately 80°F.) This was done in order to obtain a uniform temperature in the cheese vat, so that each batch of milk would receive the same heat treatment. The small vat was then filled with water and heated to 204°F with steam. This temperature was held for five minutes, so as to insure an even temperature of the vat. Reconstituted milk made from non-fat dry milk solids (9 percent total solids) was adjusted to 50°F, poured into the milk can, and then siphoned into the cheese vat in approximately 10½ minutes. The agitator was started, and the milk heated to 150°F by holding the water in the small vat at 204° F. When the milk reached 150°F it was held for ten minutes. This temperature was maintained by lowering the temperature of the water in the small vat by simultaneously siphoning off the hot water and running in cooler water. After the ten-minute holding period, the milk was cooled to 140°F by siphoning off the warmer water and running cooler water into the small vat. When the milk temperature reached 140°F, the small vat containing the water was removed from the milk, placed on its end for three minutes, and then rinsed with two quarts of 120°F water. The soiled surface was then ready for use. An illustration of the milk-soiled surface is shown in figure 3.

In order that the milk-soil produced by the above procedure would be uniform from day to day, one source of non-fat dry milk solids was used. Furthermore when one batch of reconstituted milk had been used a total of four times, it was discarded and a new batch prepared.

Measurement of the Cleaned Area

The senses of sight and touch supported by observations with a Mineralight[2] were used to determine when the surface was clean. If

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[1]Published with the approval of the Director of Research, North Carolina Agricultural Experiment Station, Raleigh, as paper No. 453 of the Journal Series.

*Bassine fibers are coarse, dark-colored and stiff, commonly used in brushes.—Editor.

[2]Mineralight is an apparatus which generates a long wave ultraviolet for detection of milkstone, fats, and other fluorescent surface soils. Manufactured by Klenzade Products, Inc., Beloit, Wisconsin.

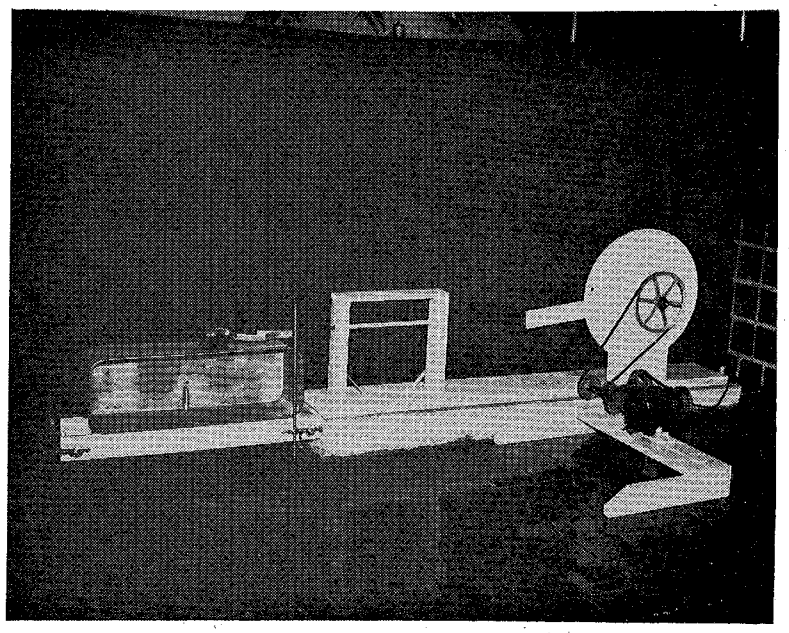

Figure 1. Brush scrubbing machine used in measuring efficiency of brushes.

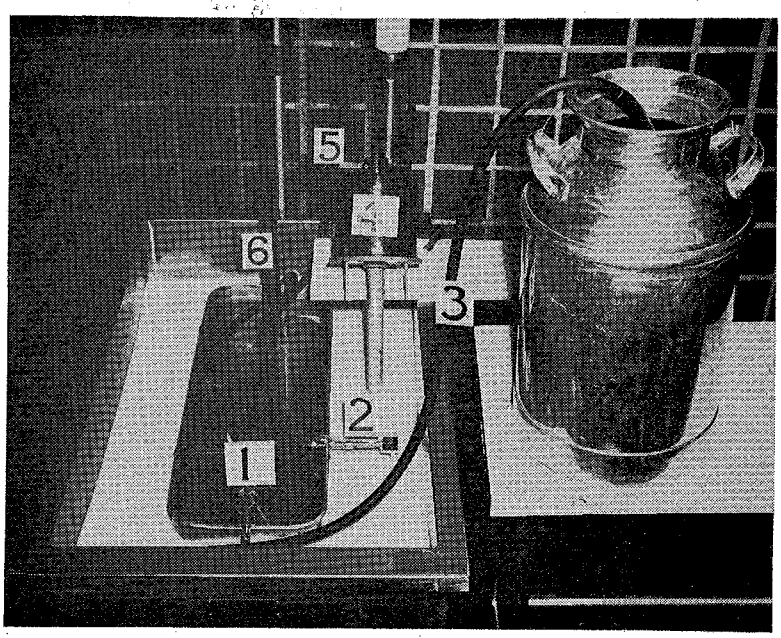

Figure 2. Equipment used in preparation of milk soiled surface. (1) Laboratory thermometer used to determine temperature of water. (2) Laboratory thermometer used to determine temperature of milk. (3) Rubber hose used to siphon milk. (4) Agitator used to circulate milk. (5) Rubber hose used to siphon off water. (6) Steam hose with galvanized pipe inserted used to heat water. (Not numbered are 10-gallon milk can, 50-gallon cheese vat, table and small tinned copper vat.)

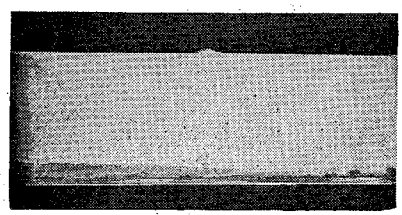

Figure 3. Small vat showing milk-soiled surface.

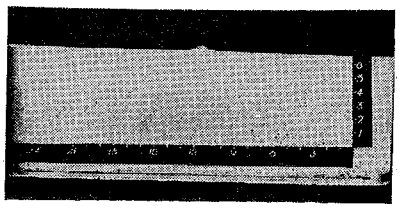

Figure 4. Small vat showing area cleaned by a brush. (Area is 3½ x 20 inches.)

the surface appeared to be clean by observation and feeling, it was rinsed and examined under ultraviolet light. If no fluorescent material remained, the cleaned area was measured and the time recorded. If the area was not clean to sight and touch after each scrubbing period, the scrubbing was continued until it was. Figure 4 shows how the measurement of the area was determined. The area measured in this figure was approximately 3½ inches by 20 inches.

Selection of Brushes

After observing the different types of brushes used in dairy plants, the four types shown in figure 5 were selected. These brushes varied in type of fiber (nylon or bassine), length of fiber, size of brush, and length of handle.

Since different types of brushes hold varying amounts of washing solution, and this may affect their scrubbing efficiency, it was desirable to determine the volume retained by the bristles when each brush was used. Brush No. 1, when submerged in a pail of washing solution, carried across a space of 23 inches and scrubbed for 15 seconds, delivered approximately 140 ml; brush No. 2 delivered 140 ml; brush No. 3 delivered 50 ml; and brush No. 4 delivered 30 ml. This procedure showed that brushes made from bassine fibers had a greater solution-carrying ability than the nylon brushes. This was also true when the comparison was made on the basis of the approximate cubic content of the bristles. However, the short-bristled nylon brush transported almost twice as much solution per cubic inch of brush bristles as the long-bristled nylon brush.

Measurment of the Scrubbing Efficiency

After the types of brushes had been selected, approximately eight of each were secured so that more than one brush of each type could be used in the test. The individual brushes were chosen at random from the supply available.

The weight was attached to the brush and the brush was fastened to the metal rod. Then the soiled surface was positioned. A predetermined amount of cleaning solution (as determined by procedure cited above) was poured on the surface of the vat in the path

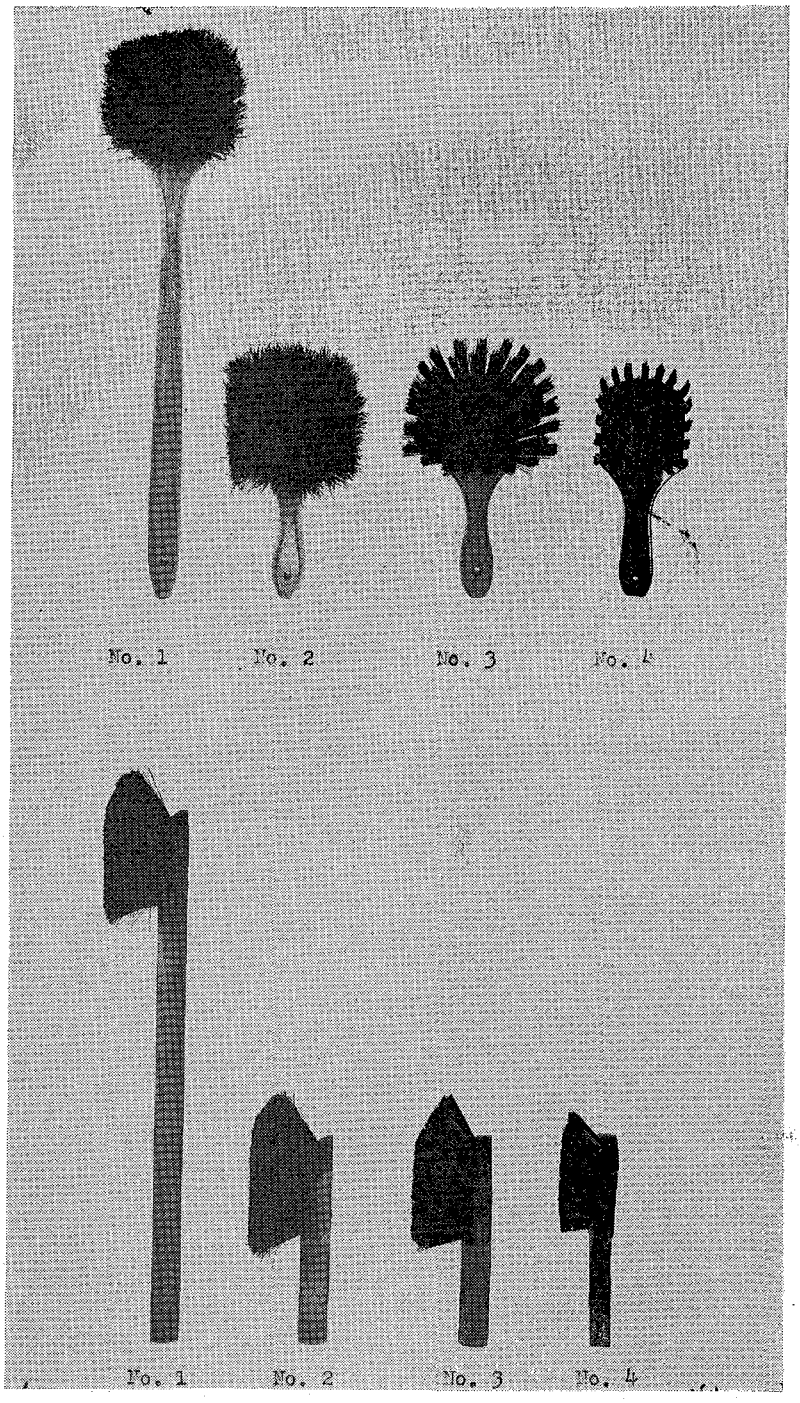

Figure 5. Types of brushes used. No. 1—long-handled bassine fiber. No. 2—short-handled bassine fiber. No. 3—short-handled, long-bristled nylon fiber. No. 4—short-handled, short-bristled nylon fiber.

of the brush as the motor was started. At the end of 30 seconds or 26 strokes, the area was examined. If the surface was clean as determined by sight and touch, it was rinsed with one quart of 115°F water. Further observations were made by sight and by the Mineralight. If the surface was clean, it was measured and the data recorded. If the area was not clean, the process was repeated.

RESULTS AND DISCUSSION

Four types of brushes were tested. A new brush was used for each of the different weights. The trials were repeated eight times on each brush with each weight. The averaged results are shown in table 1.

The amount of weight applied affected the performance of the different brushes. The long-handled bassine brush did not scrub efficiently when four pounds pressure was applied but did satisfactorily when larger weights were used. This was as expected because the leverage involved was such that a much greater weight must be applied at the end of a long handle to get the same pressure on the bristles as on a short-handled brush. In this instance, none of the weights used caused a spreading or flattening of the bristles.

The short-handled bassine brush did best with the 8-pound weight and poorest with the 6-pound weight. The bristles maintained a proper scrubbing position with the 4-pound weight but began to flatten considerably when the 6-pound weight was applied. When the 8-pound weight was used, the bristles were flattened completely and the weight was so heavy that scrubbing was effected only by the sides of the bristles. It is doubtful whether this latter condition would occur in dairy plant cleaning unless the brushes were badly worn or water-soaked.

The long-bristled nylon brush scrubbed best with six pounds pressure. Apparently, four pounds of pressure was not enough and eight pounds was so much that the bristles were flattened.

The short-bristled nylon brush scrubbed satisfactorily with each weight but did best when eight pounds was used. None of the weights caused the bristles to flatten so they remained in their most effective scrubbing position. It is believed that this brush would have a much longer life than the others tested because their bristles were forced out of their proper position and made to scrub from the sides.

The brushes varied in the amount of surface which was in contact with the soiled area. Therefore, it was thought that some comparison should be made of the scrubbing efficiency based on the actual contact surfaces. The results are presented in table 2.

The short-bristled nylon brush proved to be approximately twice as effective in scrubbing efficiency as any of the other brushes when compared on the basis of its size. The other types varied in their relationship to each other depending on the weights used and it would

TABLE 1—A COMPARISON OF THE VAT AREAS CLEANED BY FOUR TYPES OF BRUSHES USING LEAD WEIGHTS WEIGHING 4, 6, AND 8 POUNDS

Type	Area cleaned per minute using a 4-pound weight	Area cleaned per minute using a 6-pound weight	Area cleaned per minute using an 8-pound weight	Averaged areas cleaned per minute by all weights
	sq. in.	sq. in.	sq. in.	sq. in.
1. Bassine (long handled)	32.10	58.02	57.14	49.09
2. Bassine (short handled)	54.49	35.25	87.70	59.15
3. Nylon (long bristle)	50.05	59.34	30.06	46.48
4. Nylon (short bristle)	61.46	58.26	72.85	64.19

TABLE 2—A COMPARISON OF VAT AREAS CLEANED PER SQUARE INCH OF BRUSH AREA APPLIED FOR FOUR TYPES OF BRUSHES USING 4-, 6-, AND 8-POUND LEAD WEIGHTS

Type	Brush area	4-pound weight	6-pound weight	8-pound weight	Average
	sq. in.	sq. in.	sq. in.	sq. in.	sq. in.
1. Bassine (long handled)	23.75	1.35	2.44	2.41	2.07
2. Bassine (short handled)	23.63	2.31	1.49	3.71	2.50
3. Nylon (long bristle)	24.94	2.01	2.38	1.21	1.86
4. Nylon (short bristled)	14.88	4.13	3.92	4.90	4.31

be desirable to use information about the specific cleaning job, as a basis for determining which brush to select.

SUMMARY

1. A method was developed for measuring the scrubbing efficiency of dairy equipment brushes.

2. The bassine-bristled brushes carried about twice as much cleaning solution as the nylon-bristled brushes.

3. The amount of pressure exerted on the different type brushes affected their scrubbing efficiency.

4. The short-bristled nylon brush cleaned the largest area per square inch of brush area when comparisons were made on a heavily-soiled surface.

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COOPERATION

Continued from Page 7

spond to the present industry grading system, actually the two systems will not be far apart basically. We are hopeful that our adopting the 1-2-3 numbering system will facilitate industry's adoption of our classification plan. Briefly, our system places in Class 1 passable cream such as sweet cream or "clean sour cream"—i.e., free from objectionable odors or flavors; Class 2 covers "borderline" cream and Class 3 includes cream which is decomposed. Class 3 cream is regarded as unfit and as cream that should be rejected for food use.

We have been very conservative in our classification of decomposed cream. We believe that much of the so-called "borderline" cream might be classed as "decomposed." The difficulties inherent in applying organoleptic procedures where variations in individual judgment inevitably occur require a conservative classification as a basic for law-enforcement activities. Industry graders, however, should apply more critical judgment if they are really going to protect their companies from accepting and using questionable cream. I believe that the health of the industry may well be jeopardized if conditions that result in the production and delivery of large quantities of cream falling in this "borderline" category are permitted to continue. I know that the butter industry is faced with many complex problems. I do not pretend to have answers to very many, if any, of these problems. But whatever else must be done, I feel sure that the industry cannot attain a sound economic status and secure consumer confidence leading to an expanding market for its production without attaining substantial improvement in the quality of its product.

I think we all agree that quality butter cannot be made from rotten cream, and I feel quite sure that quality butter cannot be made from cream that is almost rotten.

I think that insufficient attention has been given to detecting and eliminating from manufacturing use milk or cream obtained from diseased animals. Market milk supplies in most localities are subject to regulation by local health authorities who for the most part exercise supervision adequate to insure the safety of this important food item. Widespread losses in dairy cattle due to infectious diseases such as mastitis and Bang's disease leave no doubt that quantities of milk from diseased animals have at times found their way into manufactured dairy products. There are many difficulties in detection, identification and control, but the difficulties involved do not justify ignoring the problem.

THE PASTEURIZATION OF MOZZARELLA CHEESE*

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This article describes mozzarella cheese, its method of manufacture and the difficulties that confront the Department of Health of the City of New York in causing industry to comply with regulations of the Sanitary Code requiring mozzarella cheese to be made from pasteurized milk.

Mozzarella cheese is a variety of cheese formerly limited in distribution to the Italian segment of our population. It was used mainly for cooking. However, some of it is consumed in an uncooked state. This cheese has recently attained such a popularity that its acceptance is extending to other population groups. The leading producers of mozzarella cheese estimate that there are about 30 firms of significant size producing this cheese in New York City. There are more than 150 distributors, and from 40,000 to 50,000 pounds of mozzarella cheese are manufactured daily.

In New York State in 1949 about 30 percent of Italian cheese curd was made from raw milk, most of which was used for mozzarella cheese. Italian cheese such as Ricotta during that year was made in the main from pasteurized milk.

Description

Our problem in 1948 related to mozzarella cheese, the curd of which is made generally from partially skimmed milk of a grade used for manufacturing purposes containing 1, 2, or 3 percent milkfat. This milk is heated to about 86°F and set with rennet usually for about 30 minutes. The curd is cut and stirred. It is separated from the whey when the latter flows freely. The curd is packed in a large cloth, cooled, and later shipped, packed in ice to plants in this city.

In the city manufacturing plant the curd is stored until regarded as workable or ripe. Small samples of each lot are tested daily for ripeness. This is accomplished by hand working the cheese in hot water of about 130°F until it becomes stringy. When samples work easily the batch is regarded as ripe enough for working.

Working consists of placing about 30 lbs. of curd in a large basin. Hot water of about 180°F is poured into the basin. The mass of curd is broken up with a wooden paddle and submerged in the hot water. This water is then poured off and more hot water is poured over the mass. Working with the paddle continues until the somewhat granular texture of the curd becomes smooth and stringy. The curd then is kneaded by hand into a pear-shaped mass or molded into other shaped pieces weighing about a pound. This work is done rapidly to avoid the loss of butterfat while the curd is in contact with the hot water. The molded cheese is cooled in a brine solution and kept under refrigeration until sold. This hot water process has in very few instances been sufficent as a form of heat treatment to assure pasteurization and to inactivate the phosphatase enzyme.

Public Health Problem

Food and milk regulatory work is replete with a record of the successful development of procedures, methods, and equipment which have prevented disease and improved nutrition. Until recently, the public health significance of milk technology was not recognized as important in the field of cheese manufacture. Cheese manufacture through the ages has resulted in the formulation of processes and periods of aging which yielded a relatively safe product. However, during World War II in 1943-1944, shortcuts in normal processing were practiced with the result that certain safeguards provided by adequate aging were relaxed, and a number of typhoid outbreaks were reported.

Following the four outbreaks of typhoid in the United States[1], [2] and Canada[3], [4] from the consumption of green cheddar sheese, the Departments of Health of the State and City of New York provided in their sanitary codes that cheddar and similar types of cheese be made of pasteurized milk or be heat treated equivalent to pasteurization or be aged for a period of 60 days at a temperature not lower than 35°F. The Board of Health of the City of New York extended these provisions to embrace all soft cheese including mozzarella.

The studies of some workers seem to indicate this aging period is too liberal. There is ample evidence in the literature of dairy science and public health to show that *Brucella abortus* is viable and may be recovered after six months in cheese made from cow milk positive for *Brucella abortus*.[5]

Federal standards and definitions for cheddar cheese, washed curd, and colby cheese which became effective April 9, 1941, makes the use of pasteurized milk permis-

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sive. However, the standards and definitions for cream cheese, cottage cheese, and Neufchatel cheese which became effective March 23, 1945, prescribe that these cheeses be made from pasteurized milk.

During and immediately following the years of World War II pasteurizing equipment was not readily available, and an exemption from the immediate enforcement of these provisions was granted until equipment became available.

Cheddar cheese presented many difficult technological problems both in the use of pasteurized milk and the means of identifying properly aged cheese. These difficulties were overcome by collaboration and study by industry groups with regulatory agents and experts.

Ricotta cheese which is an Italian variety of cottage cheese was next required to conform to pasteurization regulations. Soon the segment of the cheese industry which manufactures ricotta cheese also saw the advantages in quality improvement by using milk which is pasteurized to destroy gas forming and other spoilage bacteria. Therefore, in 1948, mozzarella cheese remained the only un—aged soft cheese which was made from unpasteurized milk. Until then pressure on the industry to conform to the pasteurization requirement was not great because so little comparatively of this product was sold and then only a small part of the output was consumed without cooking.

THE STUDY

In December 1948 a survey was made among some 30 wholesale mozzarella cheese manufacturers. All the samples of this product proved violative of the pasteurization requirement. A meeting was held with the principal producers on February 2, 1949, at the Department of Health of New York City to point out that the curd for this cheese should be made of pasteurized milk or that the cheese be subjected to a heat treatment equivalent to pasteurization. Spokesmen for the industry maintained that pasteurization destroys the characteristics of the cheese. The makers of mozzarella cheese also contended that in the working of the curd extremely hot water is used which is a heat treatment equivalent of pasteurization. Members of our Department felt that mozzarella cheese could be made from milk pasteurized in the conventional manner. The industry was advised to experiment and develop a suitable method of pasteurization. It was also suggested among other things that small amounts of calcium chloride be added to the milk before pasteurization. One producer who participated in this latter experiment claimed poor results. This experiment was observed by a member of our country milk staff, who confirmed this finding.

On May 11, 1949, a case of undulant fever was reported in New York City. Epidemiological investigation revealed no history of consumption of raw milk, contact with animal hides, or recent meals out of the city. It was disclosed that mozzarella cheese was eaten frequently by the patient. Following this the Department of Health decided to press for compliance with pasteurizing requirements in the manufacture of mozzarella. The industry claimed their use of hot water for processing the curd was the equivalent of pasteurization. This was not substantiated by the results of the following study.

TABLE I

Sample	Phosphatase activity	pH	Filth detected	Standard plate count Colonies per gram
1 a	500 units	5.6	none	1,000,000,000
b	500 "	5.7	"	270,000,000
2 a	500 "	5.9	"	600,000,000
b	500 "	5.6	"	205,000,000
3 a	500 "	5.6	"	1,180,000,000
b	20 "	5.7	"	180,000,000
4 a	500 "	5.6	"	180,000,000
b	50 "	5.8	"	110,000,000
5 a	500 "	5.9	"	2,420,000,000
b	50 "	5.8	"	38,000,000
6 a	500 "	5.8	"	540,000,000
b	250 "	5.6	"	640,000,000

a—represents raw curd
b—represents mozzarella cheese

The Department urged upon the New York State Department of Agriculture and Markets in a communication "that a concentrated attack upon the problem must be made if a proper solution is to be found.—The project is an important one not only from the standpoint of public health but it is highly important to mozzarella cheese manufacturers and to dairymen whose milk goes into the production of this type of cheese, since a failure to solve the matter adequately is likely to result in a prohibition against the manufacture and sale of the cheese."

A new industry conference was held on October 18, 1949. The industry then submitted it was willing to heat milk by flashing to about 130°F. This they maintained would destroy pathogens.

Following this the Department of Health declared to the industry that its policy would be nothing short of the pasteurization requirements, for two reasons: (1) that previous experimental work on cheddar and other cheese supported the soundness of pasteurization; and (2) that an adequate control test such as the phosphatase test was not available to detect failure to use other methods of heat treatment, such as flash heating. The conference concluded with an order that all mozzarella cheese sold in the City of New York must be pasteurized after February 1, 1950, in accordance with the requirement. This date would allow plants ample time to install pasteurizing equipment.

The industry sought the aid of Dr. J. C. Marquardt, Assistant Director Milk Control, N. Y. State Department of Agriculture and Markets and then Professor H. T. Gilman at Cornell University.

Dr. Marquardt succeeded in establishing a pilot plant where he observed the pasteurization of the milk used to manufacture mozzarella curd. This curd was then made into mozzarella cheese. It was noted then that numerous difficulties presented themselves requiring a change in manufacturing technique. But it was observed that a better flavored product resulted when pasteurized milk was

used. On December 5, 1949, we were advised by one producer that he was ready to market a pasteurized product. Dr. Marquardt on January 18, 1950, reported the making of good mozarella from pasteurized milk and that he was ready to work with other companies. On February 10, 1950, Dr. Marquardt reported continued satisfactory results and that the cheese flavor was improved. Pasteurization was at 161°F for 20 seconds.

The country milk inspectors of the Department of Health were asked to survey country plants producing mozzarella curd. The reports revealed that most of the plants were poor in sanitary development and lacked suitable controls for proper milk heating. Reports were received from various sources including plant personnel alleging that only the dirtiest milk produces curd with the most desirable stringiness, characteristic of mozzarella cheese.

The industry seemed to be floundering from lack of organization among the various producers, and lack of research facilities. The threat of extinction by the Department of Health order prompted the principal producers to seek more time from this Department.

Notwithstanding the fact that a producer now was able to manufacture a legal mozzarella cheese, the other producers still sought an extension of time from the Department. Another meeting was arranged for April 19, 1950. At this time notice was served on the industry that the use of pasteurized milk for mozzarella curd was possible. The regulation was to be enforced.

Soon other producers were shipping mozzarella curd made of pasteurized milk. The smaller local manufacturers had trouble working it. As a result they changed their source of supply to the unpasteurized curd producers.

On July 10, 1950, it was learned that a new mozzarella cheese starter known as DK starter was developed by Professors A. C. Dahlberg and Frank V. Kosikowsky of Cornell University which produced mozzarella curd with the proper properties from pasteurized milk. This starter containing S. *faecales* organism of known characteristis[6] permitted pasteurized milk curd to ripen as well as raw milk curd. The flavor and yield were good and the Pizza pies made with this pasteurized cheese were judged excellent. The industry was immediately apprised of this situation.

A period followed in which those who made curd from unpasteurized milk began to take advantage of those who sold acceptable curd and a break-down suddenly appeared. Those who had pasteurized curd complained of loss of customers and notified the Department of Health of their intention to discontinue to pasteurize unless the others do.

ENFORCEMENT

In order to launch our enforcement program we required a means by which to test for proper pasteurization in the field. Our chemical laboratory on March 11, 1950, reported they had developed a field phosphatase test for this product. A staff of inspectors was trained to use this test and a survey of all wholesale mozzarella cheese manufacturers was made. Any lot of cheese produced which was phosphatase positive by field test resulted in an embargo of the curd and cheese. Following laboratory confirmation of a positive phosphatase the owner of the curd and cheese was given the alternative of pasteurizing, or aging a most perishable cheese for 60 days at 35°F. Needless to say, such cheese and curd were voluntarily destroyed.

Complaints continued to pour in that the pasteurization requirement would ruin a substantial business. The industry maintained the new curd had to be worked differently and that the dealers were refusing to accept this condition. Following this, reports were received of spoilage of curd which failed to ripen properly, but embargoes continued and then a few prosecutions were instituted. Court action against one of the larger producers was instituted September 7, 1950.

RESULTS

On October 9, 1950, the principal producers met with members of our Department and agreed to pasteurize mozzarella cheese.

Members of the country staff advised cheese plant operators concerning the installation of pasteurizing equipment (usually short time), and saw to it that the apparatus was properly adjusted and capable of doing a satisfactory job of pasteurizing.

During 1950, up to October 10, only 26 of 121 samples had been phosphatase negative. The situation changed suddenly thereafter. All wholesale manufacturers were sampled in 1951. There were 5 samples positive for phosphatase of 127 samples taken. The Department of Health by this evidence had made a substantial advance to obtain compliance.

Beginning August 11, 1950, a survey of all retail manufacturers of mozzarella cheese was concurrently carried out. Numerous phosphatase positive samples were obtained. Each dealer was called in and warned against a recurrence of the use of unpasteurized curd, and a follow-up was made at the establishment of the wholesale supplier of the curd.

A resampling project in 1951 revealed that this phase of the problem was also successfully completed. (4 positive for phosphatase of 95 samples taken.)

A program of enforcement of labeling provisions followed. The mozzarella cheese was required by regulation to be pasteurized and so labeled. This phase was successfully concluded early in 1951.

The country plants which were earlier reported insanitary were ordered to correct plant conditions. Failure to conform to this order would result in embargo of the curd on arrival in the city. No difficulty was experienced. These plants are much improved as a result of this project.

CONCLUSION

A project of great proportions was undertaken when it was decided that mozzarella cheese should be made of pasteurized milk or should be heated so that the product would be subjected to a treatment equivalent to pasteurization. This was especially difficult since a change in the technology of the manufacture of cheese was necessary in an old industry which is steeped in tradition. We were advised at the time by the industry that the requirement could not be carried out and that good mozzarella cheese could not be made from pasteurized milk.

The concensus of the industry now, although grudgingly admit-

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A PLAN OF OFFICIALLY SUPERVISED INDUSTRY DAIRY FARM INSPECTION*

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The author suggests a different approach to the dairy farm inspection problem. The merits of the conventional method used by many State and Municipal departments of health are weighed. An effort is made to define the responsibilities of the official control agency and to correlate these with the responsibilities of the milk distributor operating under the licensing privilege granted by the Department of Health. It is recommended that the direct supervision of the supply be left to the Health Department responsible for the milk supply where the major portion of the milk is consumed. The author holds that the most effective results in the enforcement of dairy farm requirements will be attained when departments of health transfer the major portion of the inspection burden to the milk industry itself. The major health consideration in the metropolitan area, that of preventing milk borne disease, can best be accomplished by intensifying efforts extended in the supervision of the pasteurizing process itself and in the application of safeguards necessary to prevent subsequent contamination.

The last decade has witnessed a constant improvement in the methods and practices employed in supervising and conducting inspections of dairy farms producing milk for pasteurization. As dairy farm after dairy farm was electrified and supplied with motor vehicles for work and pleasure, the lantern, the kitchen range, the thunder mug, and old dobbin went into the discard. They were replaced by the farm tractor, the milking machine, the mechanical cooler, running water, and a bath room in the house. Improvements in transportation, highways, and rural education brought all kinds of electric and gas-driven appliances to the farm. In less than a generation the environment of most of our better dairy farms had undergone a tremendous change.

There has followed, in a much shorter span of time, marked improvement in the health and vigor of our dairy cattle through the elimination of tuberculosis and other diseases and the inauguration of effective disease control measures, wherever necessary.

Higher production per cow and more assurance of stabilization of milk prices through marketing orders have had the effect of fostering an increased interest in dairy farming as a livelihood and have stimulated a demand upon the part of the dairy farmer for up to date knowledge concerning better methods to be used in milk production.

INSPECTION NECESSARY

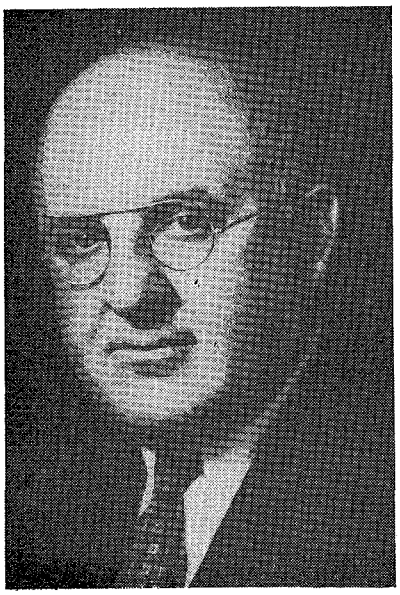
In the industry today there is a clear understanding of the value of periodic contacts between the milk buyer and the milk producer. Everywhere there is a rapidly growing realization that the greatest improvement in quality of milk and cream for the immediate future will be attained by assisting and teaching the producer and by actually demonstrating to producer groups sound, as well as sanitary, methods of milk production.

The job of assisting the milk producer, of teaching, guiding, planning, and demonstrating better methods of producing, economically, increasing volumes of high quality milk under good sanitary conditions is the job of the industry milk sanitarian. He must be charged with and expected to assume all of the responsibilities, both industry and health, and be held accountable for producer compliance with all of the sanitary requirements applicable to safety and quality of milk prior to pasteurization.

Obviously the sanitarian assigned to supervise the production of milk, by the various patrons comprising a supply, must be a person of good character, trained by school and experience to carry on dairy farm inspection and supervision in a capable and efficient manner. His qualification and character are of the essence.

No official recognition of industry milk sanitation inspection reports should be granted unless Certification of the sanitarian's qualifications have been received from the health department exercising jurisdiction. Health departments in receiving milk sheds should under all circumstances reserve the right to suspend such Certificates for cause.

It is unimportant whether the sanitarian be employed by the milk buyer or the health department. To promote efficiency, to effect economy, and to avoid duplication and misunderstanding, the sanitarian must be prepared and willing to work for and to represent both. He must expect supervision and guidance from the buyer as well as from the health departments in the milk sheds where the milk is consumed.



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Whether health department or industry employed, the work of the milk sanitarian, charged with the responsibility of making the routine producer contacts upon a given supply, must be constantly supervised by the health officer in whose jurisdiction the major portion of the supply is consumed regularly throughout the year.

CHANGING CONDITIONS

Our view of farm inspection today is no longer obscured by the fog and uncertainty of what lies ahead. The hazards lurking in unpasteurized milk are well recognized. We have had time to evaluate the safety conferred upon our milk supplies by proper pasteurization. The phosphatase test furnishes us further assurance as to safety of the milk supply. We have a clearer conception of our goal and what must be done to attain it. The essential requirements to be met in producing a clean and wholesome milk supply are becoming well understood. With this understanding has come a greater degree of uniformity in enforcement procedures.

The early concept of milk inspection contemplated routine visitations, by health department personnel, of all dairy farms and milk processing plants. This concept came about at a time when much of the milk supply of the country was delivered direct by rail to the large centers of population and consumed raw. Health departments came to recognize a potential health menace in the milk supply from every dairy farm.

In an endeavor to prevent milk-borne disease it was considered necessary for the health department to assume full responsibility of examining into the sanitary conditions surrounding the production of milk at every farm.

During the years that have followed, many changes in handling and transportation of milk have occurred. Investigations in the field of science have furnished much information with respect to the effect of environment and concerning the etiology of milk-borne disease and the transmission of certain infections from animal to man.

The almost universal practice of pasteurizing milk, together with the improvements in methods of pasteurization, have been responsible for the marked reduction in milk-borne epidemic disease throughout the country. Today milk and dairy products are comparatively insignificant sources of illness, when compared with some of our other foods.

Much of the credit for improving the quality of our public milk supplies belongs to the milk distributor. The dairy industry has been a potent factor and a staunch ally of the health officer in the battle to make milk safe. The tremendous reduction in the incidence of milk-borne disease and in the elimination of thousands of deaths in infants attributed to summer complaint, is evidence that the fight has been won.

The effect of sanitary milk production practices in bringing about improvement in milk quality and the need for more effective methods of pasteurizing milk were recognized more than a quarter of a century ago. During this period many new milk ordinances and milk sanitation laws were placed on the statute books. Cleanliness and protection of milk during and after production were emphasized and pasteurization of a maximum volume of our milk supply encouraged, under the direct supervision of the health authorities. Even at that time many health authorities recognized that safety in pasteurized milk could be attained by constant supervision of the pasteurization process to assure that the required treatment was being applied and that subsequent contamination was prevented. The greatest benefit of dairy inspection in the advancement of public health was attained by steadfastly adhering to these principles.

The major function of a board of health of any community is to keep unsafe milk out of the stores and off the door step of the consumer. Health authorities need not concern themselves with the relative merits of two obviously safe and accepted grades of pasteurized milk; such matters belong principally to the field of economics.

For safety of its milk supplies, the community should concern itself with the hazards existing in raw milk, if unpasteurized milk is available and permitted to be sold for human consumption. What is needed is a law barring the sale of unpasteurized milk. The community should be more concerned with the ice cream supply, to assure effective pasteurization of the ice cream mix prior to freezing and with the practices followed in preparing and handling uncured soft cheese, preparing milk drinks, and other special products.

Along with the clearer conception of the problem and the more recent developments in milk sanitation, it seems quite unnecessary, in order to preserve safety of the public milk supplies, for the health officer to continue to shoulder the *greater part* of the burden and expense involved in supervising country milk supplies, later to be pasteurized in the city under the health officer's immediate supervision.

RESPONSIBILITY OF INDUSTRY

A plan to be preferred would be to pass on to industry that portion of the milk inspection burden most costly and difficult for the city or state health officer to administer. The health officer has every right to demand that the licensed milk distributor assume full responsibility for the development of a high quality milk supply. Likewise, he has a right to demand that the buyer assume full responsibility for obtaining a milk supply from dairy farms conforming to local sanitary standards and requirements. In administering requirements governing dairy farm sanitation, it is not the responsibility of the health officer to do the spade work or assume the burden of securing compliance upon the part of the producer. The health officer's responsibility is merely to apply the official supervision and to evaluate the degree of industry effort in terms of compliance effected.

Since the health hazards involved in milk, to be pasteurized before sale, are well understood, and considered not nearly as grave as those resulting, either from the consumption of unpasteurized raw milk or failure to exercise effective supervision of the pasteurizing process itself, it would seem right and proper to inaugurate such a procedure. Where this procedure is followed, the effect has been to give industry a share in the responsibility and to stimulate industry interest in the common problem.

It is obvious that competition in the milk business compels constant improvement in milk quality. Competing milk companies cannot maintain their customers, and add new ones, where quality defects, readily detectable to the consumer, exist. The consumer will quickly discriminate against milk with oxidized flavors, milk with detectable stable odor, or with feed flavors, and demand a product properly cooled and cared for, rich in milk sugar and free from objectionable conditions.

The enterprising milk distributor has come to recognize these facts well. Because of this he is quite anxious and willing to take on a responsibility of examining into the sanitary conditions and the quality of milk produced on the dairy farms supplying his plant. It is therefore a happy arrangement, both for the health officer and for the milk distributor, which requires the dairy farm supplying milk to the milk distributor to submit to an inspection at least semi-annually, by a qualified milk sanitarian who has been licensed or certified by the health officer and who has been employed at industry expense. How else could a milk distributor, licensed by the state, assure himself that sanitary conditions on the dairy farms conform to the minimum requirements of law? What other procedure could be adopted which might be more effective, more economical, or simple to administer and still give promise of effecting compliance with the law?

For a number of years it had been the practice of some state and local health departments in this country to employ sufficient personnel actually to visit, at least twice a year, and inspect each dairy farm producing milk for pasteurization. In large centers of population this procedure is quite costly and may seriously deplete health department appropriations which might be used otherwise to much better advantage.

The cities and states of densely populated regions along the Atlantic searboard, where a high percentage of our country milk supply is consumed, are rapidly permitting this practice to go into the discard. This is because, through many years of experience and study of milk problems, health authorities are convinced that both safety and quality can readily be attained without the expenditures of the tremendous effort and public funds heretofore utilized to accomplish this objective. Health authorities have learned what is essenial to assure safety. The *pasteurizer,* plus the application of the *phosphatase test* are the important instruments here. They have learned what is necessary to assure quality: a cooperative compulsory self inspection of dairy farms utilizing qualified industry inspectors, controlled and closely supervised by a small team of capable and energetic dairy specialists, employed full time by the health departments.

A number of states and cities still follow the practice of making routine visits of all dairy farms semi-annually, in many cases duplicating visits made by certified or licensed health department industry-employed inspectors. At least one state, Wisconsin, has refused to rate the sanitary quality of one of its most reputable supplies. Notwithstanding the fact that this supply is under the constant resident supervision of the health department in whose jurisdiction the milk is consumed, the producing state insists that the supply, to be eligible for rating, duplicate farm inspections made by the health department representing the people regularly consuming the milk. In order to secure the publication of an official milk sanitation rating necessary to participate in the advantages provided by an Interstate Reciprocal Milk Shipment Agreement, the state health department of the producing state insists that the applicant for the Rating employ the services of the State Department of Agriculture or a municipal health department of the state where the milk is produced for the purpose of subjecting each individual dairy farm to an additional semi-annual inspection, thus duplicating the inspection made under the supervision of the health authorities in the states regularly consuming the milk supply. Situations such as these impose unnecessary and useless burdens upon our milk supplies and seriously interfere with supervision established jointly by milk plants and the health department responsible to the people consuming a major portion of the supply.

It is gratifying to note that the recently revised draft of the *Public Health Service Recommended Milk Ordinance and Code* recognizes the effectiveness of official supervision of industry dairy farm inspection and provides for its acceptance, if effective official supervision has been established, on an equal basis with the routine semi-annual inspection of each individual dairy farm by the health officer. Unfortunately some of the states importing milk have temporarily refused to accept this recommendation, and continue to insist upon the health officer visiting each individual dairy semi-annually. This procedure necessitates duplication of effort and needless expense. It can be expected that this practice will in the future yield to the more modern and effective plan of self inspection by industry, under continuous and active supervision of full time health department personnel.

A plan, designed to effect the necessary control and inspection service of milk for pasteurization, contemplates from the start, that securing compliance with milk sanitary laws and regulations promulgated by the health department is an obligation which must be assumed by the milk dealer who applies for and receives a health department license to sell milk for human consumption in the immediate area, or normal milk shed, over which the health officer exercises jurisdiction.

Before the initial license may be granted, the health officer exercising jurisdiction in the milk shed where the bulk of the supply is consumed must visit all dairy farms producing the supply in order to ascertain whether the same qualify for the permit applied for, and to issue initial instructions to the management and field department representatives concerning any state or local requirements in force in the area where the bulk of the milk is to be consumed.

Once this phase of the work is completed, the job of maintaining conditions in conformity with existing requirements and affecting improvements, is assigned to the management of the supply producing the milk.

New patrons may be added to the supply only after a satisfactory dairy farm sanitation report has been completed by the industry field man and the dairy farm subjected to a final inspection by the health department supervisor.

As assurance that the field department personnel employed by the local plant management is carrying out its duties in a satisfactory manner, the health officer responsible for the supply must assign a trained sanitarian from his department to apply constant supervision of the industry field personnel. The health department supervisor spot checks the dairy farms comprising the several supplies assigned to him, maintains constant contact with the industry quality control laboratory, and assists in the training of isdustry field men and in the direction of their work. A constant check of quality records, veterinary supervision, and farm inspection reports turned in from day to day is maintained. Special projects helpful in securing quality improvements or to secure compliance with requirements of other markets are inaugurated as necessity demands. The health department supervisor keeps records of milk receipts and shipments, inspects milk as received, and maintains inspection of plant operations and milk processing.

QUALIFICATIONS OF FIELDMAN

The fieldman assigned to contact the milk producer is no longer permitted to function as the milk solicitor, the part time plant employee, or the feed or equipment salesman. He must be an inspector, a practical sanitarian, a teacher and a salesman of ideas. The fieldman must have an understanding of the producers' problems, herd health and management, industry and haulers' responsibilities, milk pricing, and above all the value of quality and integrity of dairy products with full realization that the consumer is selective and critical.

The fieldman must be able properly to score a dairy, to interpret conditions found at time of visit upon an inspection report, with full understanding that such scores are not always perfect or even acceptable, but that with proper explanation and with multiple calls, constant improvement may be attained.

He must have a working knowledge in the use of a microscope, and be well informed in methods of sanitation, to be of apt assistance to the producer. The fieldman must understand and be able to explain and demonstrate the necessity of clean practices in milking preparations, milking, utensil handling, and utensil cleaning. He should be able to advise producers in herd health and management, to a degree sufficient to develop a clear understanding upon the part of the producer that economically he is the greatest gainer through increased production and prolonged animal usefulness.

The number of health department employed supervisors required will depend upon the geographic location of the plants in the milk shed, number of dairy farms and plants, and the extent of the area to be supervised. The volume of milk or dairy products, the sanitary condition of the supply, and the regularity with which a given plant ships to a particular milk shed are all important factors to consider when deciding upon the intensity of supervision to be applied by any particular health department. It would avail little to eliminate duplications of inspections of farms by industry personnel and various health departments and in its place establish a burdensome, full time duplication of supervisory effort upon the same supplies by several different health departments. To avoid this the plan to pursue is to encourage the health department, which exercises jurisdiction over the milk shed where the milk is regularly received and consumed throughout the year, to establish the supervision.

STATE INSPECTION FOR EXPORT

The health officer responsible for the quality and safety of a milk supply which he might find necessary to admit during temporary periods of seasonal shortage from distant plants, far beyond his normal milk shed, has a duty to investigate such supplies before admitting them.

To aid in this undertaking the Public Health Service, in cooperation with state health departments of some of our surplus milk producing states, publishes sanitary ratings computed by state health officers of the shipping state. The information is something that the health officer of the receiving state is now able to use to assist him when admitting, temporarily, unknown supplies from distant points during periods of acute milk shortage within the normal milk shed.

Information of this type should not be permitted to substitute or replace the results and information obtained from supervision as applied in the local milk shed. In this connection the health officer should be mindful of the fact that the sanitary ratings published by the Public Health Service are not Public Health Service computed ratings. In most cases the published ratings have been computed by a state health official. The official is usually an agent of the state exporting the milk. In a number of cases only a very small portion of the rated supply may be consumed normally by the people of the state which computes the rating. Since an acceptable rating is essential to qualify a supply for export under the Interstate Reciprocal Agreement a state official who degrades a supply, not ordinarily consumed in his own state, may expose himself to reprisal locally.

By delegating to the state health officer of the producing state, exclusive authority to compute ratings on milk supplies originating in his state a monopoly is established. The state health officer may elect which supply in his state he cares to rate and which supply he cares to remain unrated. He may make his own requirements concerning the kind of preparations and supervision to be established upon the supply before the rating is undertaken. The state health officer of the producing state may have much to gain at home by announcing favorable ratings on supplies originating in his state, but exported to other states for fluid consumption. Conversly, he might have much to lose at home and little to gain from the consuming state if he announced unfavorable ratings on supplies operated by his fellow citizens anxious to enjoy favorable markets available in neighboring states.

RESPONSIBILITY IN INSPECTION

This situation suggests the advisability of depending for supervision and enforcement upon the health officer exercising jurisdic-

tion in the milk shed where the major portion of the milk is consumed rather than upon the Department of Agriculture of the producing state or upon a department of health of a municipality of a producing state consuming little or none of the supply. In the event that the health officer of a municipality in whose jurisdiction the major portion of the supply is consumed, defaults in the matter of exercising satisfactory supervision over a supply, acceptance for emergency use, during periods of acute milk shortage, may be conditioned upon supervision by the health department of the state consuming the bulk of the milk supply. Occasionally the health officer, faced with a request to accept milk importations from unknown sources, is unable to obtain evidence of constant and satisfactory supervision over the supply in question by the health officer in whose jurisdiction the major portion of the milk supply is consumed. Under such circumstances the health officer of the area affected by the shortage has no alternative open to him other than to rely upon the inspection and supervision instituted by the Department of Agriculture or by the local health department of the shipping state.

In a number of areas throughout the United States seasonal shortages in milk supplies are not uncommon and the importation of a given supply of milk is frequently repeated from year to year. The health officer receiving a portion of such supplies temporarily, should extend his investigations and cause the importer to furnish additional data concerning this supply. If occasion permits, the health department representative of the milk shed receiving the product temporarily, should visit the supply for the purpose of satisfying himself that ample supervision is being maintained and that there is conformity with sanitary requirements, at least equal to those attained in the milk shed to which shipments are from time to time made. If satisfactory, the supply should be continued and re-visited possibly on an annual basis; if unsatisfactory, the person operating or exporting should be called to account. If importations should be increased to the point where the major portion of the supply would be shipped to the milk shed throughout the year, the responsibility for the local supervision should be assumed by the health authorities exercising jurisdiction in the milk shed where the milk is to be consumed. The supply from time to time might be shipped to milk sheds under other health department jurisdiction. The health officer who permits such shipments should be prepared to accept the supervision formerly established by health authorities of the milk shed where the bulk of the supply is consumed.

In the interest of fostering a greater respect for milk inspection upon the part of the industry and dairymen as well as to effect economy and avoid misunderstanding, the recent practice of a state health department of a shipping state to insist upon a duplicate inspection of supplies going into interstate commerce and to refuse to recognize the inspection and supervision established by the health authorities of the milk shed where the bulk of the supply is normally consumed, should be discontinued.

In the event health authorities of the milk shed receiving the milk do not undertake to supervise the supply, supervision may be established by the health authorities of the producing state. In either event the plant receiving the milk should be required to provide the personnel and assume the responsibility for compliance with the sanitary requirements upon the part of the producer.

All supplies for emergency use moving in interstate commerce, regardless of who supervises them, should be rated annually on an individual basis, by properly qualified and certified rating officials. It would seem that greatest dependence should be placed in ratings computed by qualified and authorized representatives of the Public Health Service. Ratings of out of state milk supplies computed by qualified and authorized representatives of a state or municipal health department responsible for the safety of milk supplies in the state or municipality where the major portion of the milk supply under consideration is consumed, should likewise be considered equally dependable. Not infrequently, in surplus milk producing states, the management of milk supplies, having no regular fluid milk markets at home or elsewhere, inaugurates a voluntary milk inspection program in cooperation with the state department of agriculture. Later the state department of health of the producing state is requested to rate the supply in order to facilitate the interstate shipment of milk to favorable out-of-state markets during periods of acute milk shortage. Since such supplies are not recognized as a part of the milk shed supplying milk to any city exercising constant official supervision, the advisability of a closer check upon the supply becomes apparent. If available, supplies which regularly move to a definite milk shed under constant health department supervision are to be desired as temporary emergency supplies.

Duplication of detailed inspection procedures to ascertain acceptability of a supply for emergency or seasonal use should never be necessary. As has been said, there are many ways to expend public funds for the advancement of public health. In the field of milk sanitation let us see to it that both our efforts and our expenditures are directed in the channels where they will pay the greatest dividends.

NATIONAL CONFERENCE ON TRICHINOSIS

The 2nd National Conference on Trichinosis will be held in the auditorium of the American Medical Association, 533 North Dearborn Street, Chicago, on Monday, March 1, 1954.

The purposes of this conference are to discuss methods of education, problems of human and animal health, and research in relation to control of this disease.

For further information write to S. E. Gould, M. D., Chairman, Continuing Committee on Trichinosis, Wayne County General Hospital, Eloise, Michigan.

SANITARY ASPECTS OF FEEDING IN LOGGING CAMPS IN OUTLYING DISTRICTS

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Caloric expenditure of Canadian northland loggers is approximately 5800 calories per day, the 1952 nutritional survey on over 10 million meals showing a variation from 5624 to 9120. Difficulties encountered in warehousing non-perishable goods, fruits, vegetables, and meat for periods up to six months at railhead, base depot, and pulp cutting camps are discussed. Sanitary aspects of feeding in cookhouses far removed from civilization are considered.

There is no doubt that several are wondering why a topic such as feeding bush workers was chosen as a paper. Several factors which are important to both our countries were considered before finalizing on the subject of mass feeding in outlying districts. These were:

(1) Present data indicate figures of production and consumption of all grades of pulp and paper in the non-communist world at approximately 37 million tons per year. Of this quantity, your country produced nearly 16½ million tons of pulp and Canada a little over 9 millions, the balance being made up of about 7 million tons from the Scandinavian countries and 4½ million from all other countries in the world. At the present time we on this continent make up a total of about 15 percent of the free world and yet we consume 70 percent of the total pulp used in that area. In other words, consumption per capita is in the neighborhood of 300 pounds on this continent compared to 65 pounds in the non-communist countries of Europe. What is the import of these figures to your Association? Simply this—the average cut per man per day is about ¾ to 1 cord on the overall employment basis; therefore, this industry constitutes the largest civilian mass feeding on this continent but goes unheralded because it is hidden from view in outlying areas.

(2) With the cold war raging at the present tempo and with the possibility that a greater proportion of the next conflict will be fought under cold climatic conditions (which range as low as 55°F or -60°F with weeks at a stretch where the temperature does not rise to above -20° F), it behooves us to study the problem of feeding under these conditions with an eye to survival.

(3) The export of Canada's pulp and paper exceeds a billion dollars a year, much of which is exported to the United States. Thus from an economic standpoint any improvements which can be made through feeding which will increase production and decrease cost is an important item in the economy of your country.

PROBLEMS OF SUPPLY

To fully appreciate the problem of feeding in outlying districts, one must have some knowledge of the difficulties encountered in the Northland. Some of the timber limits have railroads passing by base supply depots which makes them accessible all year round for receiving food supplies. However, many operations on the north shore of the St. Lawrence are only supplied by boat, and their harbors are frozen in for five or six months of the year. Total supplies for crews of 5,000 to 6,000 men have to be shipped in before freeze up—which usually takes place in early October. Large warehousing facilities have to be provided at rail or boat-head; from here supplies are transported forty to sixty miles to base depots where bulk is broken down for the individual cutting camps, which may be another thirty to fifty miles back in the bush. Main roads are pushed through and made passable, but are such that refrigerated truck bodies become unserviceable in a few months. Many camps during the cutting season can be reached only by snowmobiles, bombadiers, or half tracks.

The problem of feeding is further aggravated by the fact that the average caloric expenditure of a woods worker is in the neighborhood of 5800 calories under cold climatic conditions (or nearly 2½ times as much as you and I consume per day and about 50 percent more than troop rations under normal conditions.) The subject is one of great magnitude when it is considered that analysis of diets on the "as purchased" basis for 28 companies covering over 10 million meals served during the 1951-52 season, showed a variation from 5624 calories to 9120 calories with an average of 6900 calories consumed per man per day. The average net weight of food transported per man day is around 6½ pounds, and of this quantity about half is classified as perishable (not including fresh milk or bread); consequently, if adequate facilities are not provided losses occur.

Professor D. L. Gibson was born in Winnipeg, Canada, 1914. He studied at the University of Manitoba 1935 (B.S.A.), University of Minnesota 1937 (M.Sc.), 1939 (Ph.D.) in Dairy Bacteriology and Biochemistry. He was employed seasonally by the Dairy Branch, Manitoba Government, 1931-36, and was chemist, City Dairy Co., Toronto, Canada, 1937-38, and chairman, research and production for fluid milk and ice cream, The Borden Co. Ltd. (Canadian Division) 1940-43. He served as staff officer in the Quartermaster-General Branch Canadian Army as advisor on food and nutrition, assisted in developing Canadian Army Monopack Ration (Arctic) 1943-46, and joined the staff of the University of Saskatchewan in 1946. His present position is Head, Department of Dairy Science and Agricultural Bacteriology, Saskatoon, Saskatchewan.

*Presented at the 39th annual meeting of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITATIONS, INC., Minneapolis, Minn., Sept. 18-20, 1952.

PROBLEMS OF STORAGE

In discussing the sanitary aspect one must begin at railhead with the initial inspection and warehousing. During the original survey in 1946, a system was outlined for the optimum storage temperature, probable storage life and recommended turnover of all food commodities in lumber camps. In discussing the sanitary aspects of railhead warehousing, this is broken down for clarity to non-perishables, vegetables and meat.

(a) Non perishables do not create a problem, providing the packaging is adequate. Here, however, sanitation enters the picture because without proper packaging to protect the product from moisture, oxygen, dirt, and other sources of contamination, deterioration takes place, and products which are moldy, infected with weevils, or rodents are unfit for human consumption. Because of the high incidence of mice and rats it is necessary to store such items as sugar, beans, oatmeal, flour, etc. in rodent-proof enclosures. Warfarin, 1080 red squill, and even ferrets are used to keep the rats and mice in check.

(b) Storage of vegetables creates a major problem because temperatures and humidities of vegetables are wide and varied (carrots temperature 32°F, humidity 95 to 98 percent; potatoes 38-40°F, humidity 85-90 percent. More research appears to be necessary to provide a roothouse which will adequately handle all vegetables. The methyl ester of naphthaleneacetic acid as an anti-sprout chemical has reduced loss of potatoes but cannot be used until late February or March due to the marked reduction in respiration which would allow freezing to take place if used during the coldest part of winter. Further, a concerted effort will have to be made to reduce fungus growth in the interior of these storages. The temperatures of 36 to 42°F and the humidities ranging from 80 to 95 percent make an excellent habitat for mold and yeast, and any soft rot or bruised vegetables quickly become infected due to the fact that many of the fungi in roothouses are parasitic to vegetables.

(c) Meat storages are easily maintained by artificial refrigeration. Some companies still store carloads of meat in metal sheds but the shrink and so-called freezer burn from exposures to extreme temperature ranges runs as high as 15 percent. Many organizations have instituted central butchershops where steaks, roasts, chops, sausages, smoked meats, and lard are prepared. These are properly controlled from a sanitation standpoint, but the butcher boxes for transportation prove to be a serious difficulty. The molded plastic box with glass wool insulation which carries from 75 to 90 pounds of meat is not nearly rugged enough, cracks soon develop, and the problem of maintaining these boxes in a sanitary condition is almost impossible. The consensus of opinion among operators appears to be that a hardwood box with a removable metal liner is the only one which can withstand the rough handling in the bush. An interesting feature from a keeping quality standpoint is that this box will maintain meat in a frozen condition for 72 hours, which is important in the spring where deliveries to camps often take two days.

Storage at base depots where bulk is broken parallels that of railhead and the same difficulties are encountered.

PROBLEMS OF SANITATION

The heart of sanitation is of course in the cookhouse and here many problems arise because camps range from one season affairs to semi-permanent establishments built for twenty years operation. This section will be broken down into (a) health and training of cooks, (b) sickness control, (c) reliquefying milk, (d) quality control of food in camps, (e) tableware and dishwashing, (f) heating facilities, and (g) fly control.

(a) Just after the last war a close medical examination was made of cooks. Since that time strict health regulations have been enforced with respect to freedom from communicable disease. This has done much to increase the health standard and also the sanitary condition of the cookery. Cook training programmes of the long range character are proving a valuable asset. Because of the businesslike manner in which the courses have been conducted, one company has been able to ascertain that the cost of operation amounts to 10 percent of the saving made, and further the sanitary condition of camps where properly trained cooks were operating was invariably better than non-company trained cooks.

(b) One of the excellent methods of reducing the incidence of epidemics is the method of checking on sickness and non-industrial accidents in camps. There is a simple regulation that obliges the camp physician to report in writing to the Minister of Health for the province not less than once a month all such illnesses. Thus any increase of non-industrial accidents or illnesses can be immediately pinpointed.

(c) Because camps are so far removed from civilization it is necessary to reliquefy dry milk solids and use evaporated milk. The sanitary methods employed for the reliquefaction of dry milk require constant supervision, because the milk for breakfast and luncheon is prepared the previous evening. However, during the complete survey no reliquefied milk was found to be off in flavor. More work is required to produce a milk which has a much higher dispersibility factor than is presently available. This will reduce the contamination hazard as well as increase the intake of calcium and riboflavin which are the only dietary deficiencies occurring in the diet of the woods worker. The water for the milk is procured from rivers or lakes at least 150 feet removed from the campsite and not polluted by drainage from the stables or other outbuildings, based on examination by a Provincial Health Inspector.

(d) One of the most direct and easily accomplished methods of controlling the quality of raw food in camps is to maintain the supply of perishable food at a minimum. Potatoes and fresh vegetables are brought in to camps weekly and meat supplies twice a week in the winter and every other day in the summer. Many operations service camps on even staple items once a week, the rule being not more than seven days supply of any commodity on hand at any one time. The sanitary conditions of these cookhouses is excellent.

(e) All utensils used in preparation, service or storage of food and eating and drinking utensils are

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Association News

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Sec.-Treas., T. A. Evans, State Dept of Health
Executive Board
Past Pres. Fred Hansen ..... Sioux Falls
Elected Member, Fred Jolly .. Rapid City

VIRGINIA ASSOCIATION OF MILK AND FOOD SANITARIANS

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1st Vice-Pres J. F. Tolley .....Abingdon
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..... Woodstock
Sec.-Treas., A. A. Pais
Sec.-Treas., A. A. Pais, State Health Dept.
Auditors:
L. E. Brubaker ..... Chester
E. Lee Everett ..... Suffolk

WASHINGTON STATE MILK SANITARIANS ASSOCIATION

Pres., M. L. Strommer ..... Olympia
Vice-Pres., Robin C. Wilson ..... Seattle
Sec.-Treas., George Andrews, 1626 Smith Tower, Seattle 4, Wash.

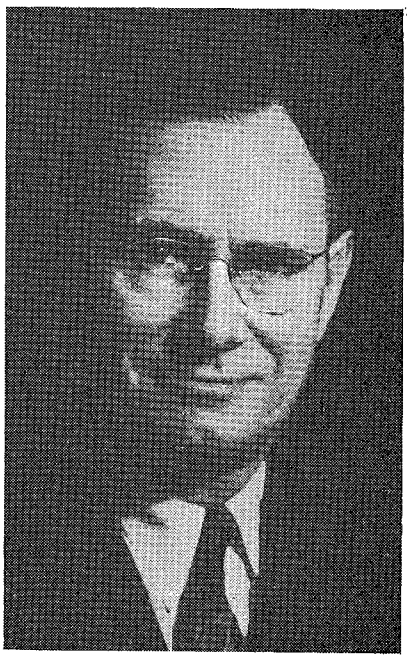
WISCONSIN MILK SANITARIANS ASSOCIATION

Pres., Jack Keenan ..... Madison
Vice-Pres. (and Pres.-Elect) Harold E. Calbert ..... Madison
Sec.-Treas., L. Wayne Brown .... Madison (421 Chemistry Bldg., Madison 6)
Past Pres., Chester L. Anderson
..... Oconomowoc
Directors:
Phillip C. Newman ..... Beaver Dam
Burdette L. Fisher ..... Kiel

NEW AFFILIATES

PENNSYLVANIA DAIRY SANITARIANS ASSOCIATION

Pres., Henry Albert ..... Johnstown
Vice-Pres., Clarence Moss .... Philadelphia
Sec., William Boyd ..... Box 289 Lewistown, Pa.
Treas. Clark Herbster ..... Selinsgrove
(Note) (The Approved Inspectors Association of Southeast Pa., and the Dairy Sanitarians Association of North Central Pa. has amalgamated with the new Pennsylvania Dairy Sanitarians Association.)



Harold S. Fielder

DAIRY PLANT FIELDMEN'S CONFERENCE

Building T-16, University of Wisconsin, Madison
Thursday Afternoon, February 4, 1954
H. C. JACKSON, *Chairman*

Main Theme: *"What's New In The Dairy and Food Industries"*

1:30—General Food Industries
K. G. Weckel
2:00—Dairy Sanitation
H. E. Calbert
2:30—Cheese Industry
W. V. Price
3:00—Market Milk and Ice Cream
W. C. Winder
3:30—Concentrated Milk Products
A. M. Swanson
4:00—Butter Industry
Manufacturing—L. C. Thomsen
Butter Grading Program—H. J. Weavers
Questions and Answers

Friday, February 5
E. A. ERNSTROM, *Chairman*

9:00—What's New in Dairy Cattle Disease Work
David T. Berman and E. V. Morse
9:45—The Brucellosis Control Program Up to Date
Arden A. Erdmann
10:00—What's New in Dairy Cattle Breeding, Feeding and Management
E. E. Heizer and R. P. Niedermeier
11:00—The Dairy Promotion Program
American Dairy Association
Gordon Reuhl
Wisconsin Department of Agrictulture
Don Wilkinson
County Promotion Programs
George F. Baumeister
Question and Answers

His many friends in the Dairy and Food Processing Industries will regret exceedingly to learn of the death of Harold S. Fielder, Director of the New Products Planning Group of Cherry-Burrell, Chicago, on December 16, 1953.

With the exception of World War I years, Harold Fielder has been active in the Dairy Equipment and Supply field, starting in 1913 with the A. H. Barber Creamery Supply Co. which, in 1928, became a part of the Cherry-Burrell Corporation.

He has served as Chairman of the Technical Committee of the Dairy Industry Supply Association since 1946 and in that capacity has been an active leader in the important 3A Standards work of the Sanitary Standards Sub-Committee of the Dairy Industry Committee.

He also was the first chairman of the National Association of Dairy Equipment Manufacturers' Technical Committee and a member of the American Society of Mechanical Engineers.

Trained as an engineer at the University of Illinois, he was active and contributed greatly over the long period of years of his experience in the development of much of our modern equipment, particularly the controls and sanitary design improvements which have safeguarded public health.

During his career with Cherry-Burrell, he served as Manager of Sales Engineering, Assistant General Sales Manager, Assistant Director of Engineering and Manufacturing, General Manager of Development Engineering, and, for the last two years, as Director of the New Products Planning Group (in the field of research and diversification).

His capabilities and friendly nature will be greatly missed.

COMMITTEES OF THE INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., FOR 1954

Presented below are the Committees of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC. for 1954, together with the objectives and current work plan of each committee. Members of the Association are urged to study the work plans of each committee, and to submit their views on any of the subjects being studied to the chairman of the committee concerned.

ADVISORY COMMITTEE ON MILK REGULATIONS AND ORDINANCES

Objectives and Work Plan

To review and study the provision of sanitary ordinances and regulations pertaining to milk, milk products, and frozen desserts, to evaluate data on research findings relative to the sanitary and public health significance of specific requirements of ordinances and regulations, and to prepare for submission to the members of the Association recommendations for changes in existing ordinances and regulations.

In 1954, the Committee plans to review the *Milk Ordinance and Code — 1953 Recommendations of the Public Health Service,* and to prepare recommendations for consideration by the Public Health Service when the Ordinance and Code is next revised. The Committee also plans to present to the next annual meeting of the Association a review of sanitary regulations governing milk and ice cream for manufacturing purposes.

Membership

C. J. Babcock, *Chairman*
U. S. Department of Agriculture
Washington 25, D. C.

John Andrews
917 West South Street
Raleigh, North Carolina

David H. Evans
Division of Food and Drugs
Texas State Health Department
Austin 14, Texas

C. V. Christiansen
Bowman Dairy
140 West Ontario Street
Chicago 10, Illinois

C. A. Ghiggoile
California State Department of Agriculture
Sacramento, California

Dr. N. O. Gunderson
City Health Department
Rockford, Illinois

Dr. William Hoskisson
Director of Quality Control
Arden Sun Freeze Dairy
Salt Lake City, Utah

W. R. McLean
U. S. Public Health Service
Regional Office VI
50 Seventh Street, N.E.
Atlanta, 5, Georgia

Steven J.Wolf
Pevely Dairy
St. Louis, Missouri

COMMITTEE ON APPLIED LABORATORY METHODS

Objectives and Work Plan

To study new laboratory procedures and bacteriological problems of current interest to milk and food control authorities, to evaluate both published and unpublished data, and to present conclusions which will be helpful to the sanitarian in the conduct of his work.

Topics under consideration for study in 1954 include studies of psychrophilic bacteria in milk and their significance, the control of raw milk through laboratory pasteurized counts, and study of coliform standards for pasteurized milk products.

Membership

Dr. C. K. Johns, *Chairman*
Division of Bacteriology and Dairy Research
Canadian National Department of Agriculture
Ottawa, Canada

Dr. F. W. Barber
National Dairy Research Laboratories
Oakdale, L. I., New York

Dr. Ralph N. Costilow
Department of Bacteriology
Michigan State College
East Lansing, Michigan

Dr. Earl F. McFarren
Environmental Health Center
U. S. Public Health Service
1014 Broadway
Cincinnati, Ohio

Dr. W. K. Moseley
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Indianapolis, Indiana

Dr. W. S. Mueller
Department of Dairying
University of Massachusetts
Amherst, Massachusetts

Dr. Joseph C. Olson, Jr.
Division of Dairy Husbandry
Department of Agriculture
St. Paul 1, Minnesota

Dr. H. B. Richie
Swift and Company
Union Stock Yards
Chicago 9, Illinois

Dr. George W. Shadwick
Beatrice Food Company
1526 S. State Street
Chicago, Illinois

Dr. H. W. Weiser
Department of Bacteriology
Ohio State University
Columbia 10, Ohio

R. B. Parker
Department of Bacteriology
Oregon State College
Corvallis, Oregon

COMMITTEE ON COMMUNICABLE DISEASE AFFECTING MAN

Objectives and Work Plan

To study problems related to those diseases communicable to man through the consumption of foods, including milk and milk products, meat, poultry, and shellfish, and to recommend specific measures that can be taken by the sanitarian to control such diseases.

The Committee is now engaged in the development of a manual on epidemiological procedures for use by sanitarians in the investigation of milk-borne and food-borne disease outbreaks. The first draft of this manual will be completed in 1954.

Membership

Dr. R. J. Helvig, *Chairman*
Milk and Food Branch
U. S. Public Health Service
Washington 25, D. C.

Dr. H. L. Bryson
Vancouver Health Department
Vancouver, British Columbia
Canada

Dr. Raymond Fagan
Kansas City Field Station
Communicable Disease Center
U. S. Public Health Service
3900 Eaton Street
Kansas City, Kansas

John H. Fritz
Chief Food Sanitarian
Kansas City Health Department
Kansas City, Missouri

Dr. Stanley L. Hendricks
Iowa Department of Health
Des Moines, Iowa

Dr. E. R. Price
Missouri State Health Department
Jefferson City, Missouri

Dr. H. H. Rothe
State Department of Agriculture
P. O. Box 163
Gainesville, Florida

COMMITTEE ON DAIRY FARM METHODS

Objectives and Work Plan

To study dairy farm methods and procedures, to determine the sanitary problems involved, and to make recommendations for the solution of such sanitary problems, and for the improvement of dairy farm methods which have a relationship to the sanitary quality of milk.

Methods and procedures which are to be considered by the Committee in 1954 include methods of cleaning and sanitizing farm cooling and/or storage tanks, operation of pipeline milker installations in both milking parlor units and stanchion barns, in-place cleaning methods and bactericidal treatment of pipelines, and the construction of milking parlor units.

Membership

Chester F. Bletch, *Chairman*
Maryland and Virginia Milk Producers Association, Inc.
1756 K Street, N. W.
Washington 6, D. C.

Paul Corash
Department of Health
125 Worth Street
New York 13, New York

Joseph J. Donovan
Brookline Health Department
Brookline, Massachusetts

James M. Doughty, Jr.
State Department of Public Health
Santa Fe, New Mexico

L. C. Flake
Evaporated Milk Association
[illegible] North LaSalle Street
Chicago 1, Illinois

Dr. Richard S. Guthrie
DeLaval Separator Company
[illegible] North Fourth Street
DeKalb, Illinois

C. F. Hanger
Dairy and Food Division
State Office Building
Richmond 19, Virginia

Milton Held
U. S. Public Health Service
Regional Office VII
2200 Federal Office Building
Kansas City 6, Missouri

Dr. Robert Metzger
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100 Park Avenue
New York, New York

Russell R. Palmer
Detroit Department of Health
Detroit 26, Michigan

C. W. Pegram
State Department of Agriculture
Raleigh, North Carolina

L. O. Tucker
State Department of Health
Smith Tower
Seattle 4, Washington

COMMITTEE ON EDUCATION AND PROFESSIONAL DEVELOPMENT

Objectives and Work Plan

First, to develop plans and to devise methods whereby the Sanitarian can more fully gain recognition as a professional worker in public health and in the field of environmental sanitation; and secondly, to recommend standards of education, training, and experience designed to establish desirable professional qualifications to the end that the title Sanitarian will denote adequate preparation for professional work and attainment.

In the interest of carrying out the above mentioned objectives, the Committee plans in 1954 to investigate, study, and to prepare recommendations concerning such factors as:

(1) Education and training needs, including possibilities of scholarship aids to students and men in the field who wish to pursue courses in sanitary science and related work or to continue their education through special courses and field training;

(2) Placement of the Sanitarian, on the basis of merit, in positions best suited to his capabilities; and

(3) The careful investigation of legal means which may be used to aid the Sanitarian in the attainment of professional recognition together with the development of model legislation aimed to further this possibility.

Membership

Harold S. Adams, *Chairman*
Indiana University Medical Center
1040-1232 W. Michigan Street
Indianapolis 7, Indiana

W. Howard Brown
940 Main Street
Jacksonville, Florida

J. H. Burkett
City Health Department
Sioux City, Iowa

C. F. Hanger
Dairy and Food Division
State Office Building
Richmond 19, Virginia

Dave Jones
431 Berkshire Drive
Everett, Washington

Dr. Harry Lindquist
Flint Laboratory
University of Massachusetts
Amherst, Massachusetts

D. B. Morton
State Department of Health
2129 S. 4th Street
Springfield, Illinois

Harper Orth
Public Health Department
Shawnee, Oklahoma

Dr. E. J. Rigby
City Health Department
Winnipeg, Manitoba
Canada

Harold B. Robinson
Milk and Food Branch
U. S. Public Health Service
Washington 25, D. C.

George White
Evansville-Vanderburg Health Department
Evansville, Indiana

COMMITTEE ON FOOD EQUIPMENT

Objectives and Work Plan

To participate with other health organizations and industry in the formulation of sanitary standards for food equipment. Specifically, the functions of this Committee include: (1) cooperation with other health agencies and industry, under the auspices of the National Sanitation Foundation, in the joint development of NSF Standards for Food Service Equipment; (2) to provide consultative assistance to the Baking Industry Sanitation Standards Committee in the devel-

opment of standards for items of baking equipment; (3) when directed by the Executive Board, to cooperate with other health groups and industry in the development of sanitary standards for food equipment; and (4) to present to the membership at the annual meeting those standards which the Committee recommends be endorsed or approved by the Association.

Items of equipment now under consideration by the Committee include NSF standards for commercial cooking equipment and hot water heating equipment, and BISSC standards for bread moulders, ingredient containers, baking pans, dividers, rounders, and bun machines.

Membership

John H. Fritz, *Chairman*
Kansas City Health Department
Kansas City, Missouri

Lewis Dodson
1609 Van Buren
Amarillo, Texas

F. H. Downs, Jr.
Headquarters 4th Army
Ft. Sam Houston, Texas

D. E. Hartley
State Board of Health
1330 W. Michigan Street
Indianapolis, Indiana

J. H. Millar
State Department of Health
Charleston, West Virginia

Gordon W. Molyneux
Milk and Restaurant Sanitation Section
New York State Department of Health
Albany 6, New York

Darold W. Taylor
U. S. Public Health Service
Regional Office III
Washington 25, D. C.

Jerome Trichter
New York City Health Department
125 Worth Street
New York, New York

Charence W. Weber *Vice-Chairman*
New York State Department of Health
18 Dove Street
Albany 6, New York

John McCutchen
Missouri State Health Department
Jefferson City, Mo.

COMMITTEE ON FROZEN FOOD SANITATION

Objectives and Work Plan

To study conditions and practices within the frozen food industry, to determine the sanitary problems involved which might contribute to a public health hazard, and to make recommendations for the solution of such problems.

In 1954, the Committee proposes to continue its study of sanitary problems in the frozen food industry and, in addition, to work jointly with the Advisory Committee on Milk Regulations and Ordinances in a study of the needs for adequate regulations for the control of roadside stands dispensing frozen desserts.

Membership

Dr. V. C. Stebnitz, *Chairman*
Chicago Dairy and Food Laboratories
6930 N. Clark Street
Chicago 26, Illinois

Frank E. Fisher
Food and Drug Division
Indiana State Board of Health
1330 West Michigan Street
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Archie B. Freeman
U. S. Public Health Service
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G. A. Ghiggoile
California State Department of Agriculture
Sacramento 14, California

S. R. Howe
Dairy Products Inspection Service
Department of Agriculture
Ottawa, Ontario
Canada

James A. King
Communicable Disease Center
U. S. Public Health Service
Atlanta, Georgia

George F. Kirchoff
Bureau of Food and Dairy Inspection
Jefferson County Department of Health
1912 Eighth Avenue, South
Birmingham, Alabama

Joseph C. McCaffrey
1800 W. Fillmore Street
Chicago 12, Illinois

S. E. Smith
Birdseye Snider Division
General Foods Corporation
Albion, New York

COMMITTEE ON MEMBERSHIP

Objectives and Work Plan

To make every effort to increase the membership of the organization by bringing to the attention of all qualified persons the advantages of belonging to the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., and to interest state milk and food sanitarians' organizations in the advantages of affiliation with the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC.

The Committee plans to work closely with the Executive Secretary in carrying out its objectives.

Membership

Hugh T. Templeton, *Chairman*
Technical Director
Fairmont Foods Co.
Omaha, Nebraska

Dr. L. Wayne Brown
Dairy and Food Control Laboratory
State Department of Agriculture
Madison 2, Wisconsin

Dr. H. E. Calbert
Department of Dairy Food Industries
University of Wisconsin
Madison 6, Wisconsin

Dr. L. K. Crowe
Department of Dairy Husbandry
University of Nebraska
Lincoln, Nebraska

E. R. Eichner
State Departmentof Agriculture
Mission and Embarcadero Streets
San Francisco 5, California

Emil Mikolajcik
Professor of Animal Husbandry
University of Puerto Rico
Mayaguez, Puerto Rico

James M. Nakahara
Department of Health
Territory of Hawaii
Hilo, Hawaii

Ivan Van Nortwick
Division of Food and Drugs
Kansas Board of Health
Topeka, Kansas

Alexander A. Pais
Virginia State Health Department
Richmond, Virginia

Kenneth L. Pool
North Central District Health Unit
Lewiston, Idaho

P. E. Riley
Illinois Department of Public Health
1800 West Fillmore Street
Chicago 12, Illinois

L. O. Tucker
State Department of Health
Smith Tower
Seattle 4, Washington

Howard H. Wilkowske
Department of Dairy Science
College of Agriculture
University of Florida
Gainesville, Florida

COMMITTEE ON RECOGNITION AND AWARDS

Objectives and Work Plan

This Committee is charged with the responsibility of implementing those objectives of the Association concerned with (1) recognition of individual milk and food sanitarians whose achievements have contributed greatly to the public health and welfare of their communities, and (2) recognition of those members of the Association who have through distinguished service contributed greatly to the professional advancement, growth and reputation of the INTERNATIONAL ASSOCIATION OF MILK AND SANITARIANS, INC.

The Committee receives and reviews nominations for the annual Sanitarian's Award, and has full responsibility for the selection of the recipient. The Committee also receives and reviews recommendations on candidates for the annual Citation Awards, and counsels with the Executive Board relative to the selection of the recipients. It is also responsible for handling all matters pertaining to the presentation of awards, publicity, and other related items.

Membership

Harold J. Barnum, *Chairman*
Denver Department of Health and Hospitals
West 6th Avenue and Cherokee Street
Denver 4, Colorado

James Robert Foster
10312 Irwin Avenue
Inglewood, California

Wilbur Kempa
City Health Department
Saskatchewan, Canada

P. Edward Riley
Illinois Department of Public Health
1800 West Fillmore Street
Chicago 12, Illinois

Dr. John J. Sheuring
Dairy Department
University of Georgia
Athens, Georgia

COMMITTEE ON RESOLUTIONS

Objectives and Work Plan

To present for consideration at the annual business meeting matters on Association policy and matters wherein the Association can make known its official position with respect to proposals affecting (1) the work of professional sanitarians, and (2) the health of the people of the nation.

In 1954, the Committee proposes to review proposals submitted by the membership, and to consider matters whereby the Association can increase its professional participation in public health efforts in which the Association is interested or concerned.

Membership

Dr. K. G. Weckel, *Chairman*
Department of Dairy and Food Industries
College of Agriculture
University of Wisconsin
Madison 6, Wisconsin

Harold J. Barnum
Denver Department of Health and Hospitals
West 6th Ave. and Cherokee St.
Denver 4, Colorado

Owen Owens
Rochester Dairy Cooperative
Rochester, Minnesota

COMMITTEE ON SANITARY PROCEDURE

Objectives and Work Plan

To participate jointly with the Sanitary Standards Sucommittee of the Dairy Industry Committee and the Milk and Food Branch of the U. S. Public Health Service in the formulation of 3A Sanitary Standards for Dairy Equipment. Specifically the functions of this Committee are (1) to receive, consider, and comment on proposed sanitation standards for dairy equipment submitted by the Sanitary Standards Subcommittee of the Dairy Industry Committee, (2) to bring to the attention of the Sanitary Standards Subcommittee items of dairy industry equipment and methods for which formulation of sanitary standards appear desirable, and (3) to cooperate with the Dairy Industry Committee, the U. S. Public Health Service, and health officials, in attaining universal acceptance of the sanitary standards upon which mutual agreement has been reached.

Items of equipment for which 3A sanitary standards are being formulated in 1954 include: milking machines, CIP pipelines on dairy farms, inlet and outlet leak protector plug valves, can washers, batch pasteurizers, milk and milk products evaporators, and bulk milk dispensers.

Membership

C. A. Abele, *Chairman*
2617 Hartzell Street
Evanston, Illinois

H. E. Bremer
Dairy Division
Department of Agriculture
Montpelier, Vermont

E. B. Buchanan
23728 Cliff Drive
Bay Village, Ohio

Paul Corash
New York City Department of Health
125 Worth Street
New York 13, New York

Dr. Milton R. Fisher
5536 Murdock Street
St. Louis 9, Missouri

H. Clifford Goslee
Office of State Dairy and Food Commissioner
256 Palm Street
Hartford, Connecticut

Mark D. Howlett, Jr.
Department of Health
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Leslie E. Jenne
State Department of Agriculture
Olympia, Washington

C. K. Luchterhand
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Madison 5, Wisconsin

James A. Meany
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Chicago 20, Illinois

I. E. Parkin
Pennsylvania State College
State College, Pennsylvania

Ivan Van Nortwick
State Board of Health
Topeka, Kansas

Harold Wainess
228 N. LaSalle Street
Chicago 1, Illinois

C. W. Weber
State Department of Health
18 Dover Street
Albany, New York

MOZZARELLA CHEESE

(Continued from Page 24)

ted, is that pasteurized milk makes better mozzarella cheese. The flavor is better and what is more important, the quality can be maintained more uniformly. Thus the consumer is protected and the producer is satisfied. This is also satisfying as a public health accomplishment to those who participated in bringing it about.

We acknowledge with thanks the help of Mr. Elias Kushel, Chief of the Retail Division, and Mr. Andrew Pensa, Chief Chemist, and their staffs. We acknowledge also the help of Dr. J. C. Marquardt, N. Y. State Department of Agriculture and Markets, Professor H. L. Gilman and Professor Frank Kosikowsky, Cornell University.

REFERENCES

1. Typhoid Epidemic in Indiana Due to Eating Green Cheese Made From Unpasturized Milk, *Public Health Reports*, 59-16.

2. Meyer, K. F. Cheese-borne Epidemics, *Calif. and Western Medicine*, 61, 137-139 (1944).

3. Gauthier, Jacques; and Foley, A. R., Cheese-borne Epidemic of Typhoid Fever, *Canadian J. Pub. Health*, 34, 543-556 (1943).

4. Menzies, D. R. Outbreak in Alberta Traceable to Infected Cheddar Cheese. *Ibid.* 35, 431-432 (1934).

5. Gilman, H. L., Dahlberg, A. C., and Marquardt, J. C. The Occurrence and Survival of *Brucella abortus* in Cheddar and Limburger Cheese. *J. Dairy Sc.*, 29, 71-85 (1946).

6. Correspondence with Prof. Frank V. Kosikowsky, Cornell University.

FEEDING IN LOGGING CAMPS

(Continued from Page 31)

washed in the main by three compartment sinks—pre-soak, washing in detergent, and sanitizing in water not less than 170°F for 2 minutes. This procedure produces low bacterial count dishes for both china and plastic. The use of plastic is increasing as far as plates, soup bowls, and bread and butters are concerned. Preference by practical personnel for plastic is due to ease of washing, light weight, and good drying qualities. Plastic dishes taken from 170°F water dry rapidly and tables can be reset immediately. Plastic cups are not in common use due to staining and difficulty of cleaning, harsh abrasives soon penetrate the plastic surface, and the resultant cups are difficult to sanitize. However, due to durability and light weight, plastic has almost completely replaced vitreous china on river drives.

(f) The type of heating has a definite bearing on the sanitation of the kitchen. It may be surprising to learn that camps far removed from railroads and in the heart of the woodlands can still cook cheaper with propane gas than wood. The use of propane is increasing and as a result the general cleanliness of the kitchen has improved; no longer do cooks have to handle dirty wood and then return to baking duties where propane is installed.

(g) No discussion on camp cookery would be complete without a word on fly control. Flies are kept to a minimum during the summer by spraying the dining hall and kitchen twice during the summer. Because these camps are located so far from towns or cities there have been no difficulties from DDT resistant strains of flies. Where campsite areas are sprayed it is seldom that a fly even gains access to a kitchen. Fly control is further aided by the strict regulation of garbage removal after each meal and storing in covered receptacles until buried.

In summing it up—the personnel required to oversee the feeding of men in logging camps are well qualified sanitation officers with a background and knowledge of the processing, storage, transportation, and preparation of food.

REPORT OF THE COMMITTEE ON FOOD EQUIPMENT*

Another year has passed and although your Committee on Food Equipment has made some progress which we hope will benefit sanitarians and assist the industry to supply the public with better quality food, we did not accomplish as much as we had desired. Under existing conditions, it was not possible to hold a single committee meeting during the year. We believe that far more rapid progress could be made if some means could be worked out to defray the expenses of the members to attend several meetings annually. Many governmental agencies have curtailed travel expenses for non-official activities. The food industries have awakened to the need for improvement in sanitation and are on the march to satisfy this need. They are looking to sanitarians and particularly our Association for assistance and guidance.

COOPERATION WITH THE NATIONAL SANITATION FOUNDATION

We appreciate the opportunity to continue to cooperate with the National Sanitation Foundation through its Joint Committee on Food Equipment Standards.

Standard No. 1—Soda Fountain and Luncheonette Equipment, which was released in July, 1952, has been given wide distribution and has had an appreciative general acceptance.

Standard No. 2—Food Service Equipment, was approved prior to our last Annual Conference but was not released until October 1952. The Foundation, through the Executive Director of its Testing Laboratory, has provided the means and personnel for examining and testing equipment to ascertain whether it complies with the standard and whether or not it is eligible to carry the copyrighted "N.S.F." seal. Soda fountain, luncheonette, and food service equipment is now on the market bearing the Foundation seal of compliance with the standard. There have been instances where the Director of the Testing Laboratory has referred back to the Joint Committee items of the standard for clarification and interpretation.

We realize that these standards are not perfect and will have to be changed and improved as knowledge and experience is gained by the sanitarians and by the designers and fabricators of the equipment. Your Committee and the National Sanitation Foundation will welcome your suggestions for improving the standards. If you believe that any equipment or a specific feature thereof, bearing the seal of accept-

*Presented at the 40th Annual Meeting INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., East Lansing, Michigan, Sept. 1, 1953.

ance, does not satisfy the specifications of the standard, please notify your Committee (or the Foundation.) Improvements in the standards or the equipment can only be made as your knowledge and experience are called to our attention, and we, in turn, call it to the attention of the manufacturers. That is your responsibility and your opportunity to further this program.

After long and diligent efforts, Standard No. 3, Spray-Type Dishwashing Machines, was approved and published in May 1953. So far as we know, the Foundation has not as yet granted permission to use the seal of acceptance on this type of dishwashing machine. There were many changes and improvements made in dishwashing machines as this standard was being developed. We wish to caution that a dishwashing machine bearing the seal is no guarantee that the dishes will always be properly washed. The machine must be built so it can function properly but unless it is operated properly, the results will not be satisfactory. This standard should serve as an excellent guide to proper or improper operation.

In previous annual reports we stated that standards are worth no more than the paper they are written on unless they are put to practical and general use. There are two steps in securing general acceptance of these standards. First, they must reach the hands of persons interested and affected. The Foundation has given broad and extensive distribution of the standards but they may not be accessible to all interested parties. We have obtained permission from the Foundation, and are therefore recommending that they be published in our *Journal of Milk and Food Technology*. If this is not feasible or practical it is our hope that a copy of each standard be made available to all of our members by some other means.

However, before taking the first step, this Association should consider the second step. Up to this time the three standards released by the Foundation have been approved by this Committee only and not by our Association. We believe that these standards have been developed with the best knowledge available at this time and that they are sound and practical, and we, therefore, recommend that they be endorsed or approved by the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS. It is our understanding that an acceptance of this report by the voting members of this Association will constitute an endorsement of the National Sanitation Foundation's standards:

No. 1—Soda Fountain and Luncheonette Equipment

No. 2—Food Service Equipment

No. 3—Spray-Type Dishwashing Machines

The Joint Committee of the National Sanitation Foundation of which this Committee is a member, have under development or consideration the following items:

LIST OF ITEMS SUGGESTED FOR STANDARDIZATION
July 30, 1953

Commercial cooking equipment
Hot water heaters
Bulk milk dispensers
Coffee cream dispensers
Whipped cream dispensers
Wire dish racks
Home laundry machines
Hospital equipment
Steam kettles
Mixers
Grinders
Slicers
Dispensers for single service utensils and containers
Refrigeration
Aersol vaporizers
Butcher's blocks
Coffee dispensers (automatic)
Coffee urns
Fudge warmers
Glass washing brushes
Glass sterilizers

BAKING INDUSTRY SANITATION STANDARDS COMMITTEE

We have continued to cooperate with the Baking Industry Sanitation Standards Committee but only in the role of an invited consultant. During the year this baking committee has extended a similar invitation to the National Association of Sanitarians. The chairman represented your Committee at the two meetings held during the year, both at Chicago, in October 1952 and February 1953. The next Baking Industry Sanitation Standards Committee meeting is scheduled to be held in Chicago on October 23, 24, 1953.

This baking committee is very desirous of improving the sanitary design of baking equipment and are very industrious as you can see from the list of items under consid-

Status of BISSC Standards

As of July 15, 1953.

Standards	*Status*
* 1. Flour handling equipment	Published June 1, 1952
* 2. Dough troughs	Published August 1, 1952
* 3. Mechanical proofers	Published August 1, 1952
* 4. Pan, rack, and utensil washers & industrial sinks	Published January 1, 1953
* 5. Cake depositors, fillers and icing machines	Approved for publication
6. Bread and cake ovens	Task chairman appointed
7. Bread moulders	In task committee
8. Conveyors	For final review
9. Dividers and rounders	In task committee
10. Doughnut equipment	Task Chairman appointed
11. Enrobers and icing machines	Task Chairman appointed
12. Ingredient containers	In task committee
13. Ingredient water coolers	In task committee
14. Mixers—horizontal	For final review
15. Mixers—spindle	Task committee being constituted
16. Mixers—vertical	For final review
17. Pan Greasers	
18. Pans	In task committee
19. Pie making equipment	
20. Proof boxes, fermentation rooms and coolers	In task committee
21. Racks, pan trucks, skids, pallets and dollies	Task chairman appointed
22. Scales	
23. Wrappers and slicers	

eration.

There are many other food industries in which there is plenty of opportunity to improve the sanitary features of the equipment being used. These industries should welcome our assistance and cooperation but we have been so busy with the problems at hand that we have not had ample opportunity to make the necessary contacts. In planning for the future, consideration should be given to creating a number of subcommittees, each devoted to a single food industry, or a separate committee should be appointed by the president for each industry.

The opportunity to improve the quality of all food through improved sanitary design of equipment is present. We have within our ranks the knowledge and ability to promote this worthwhile undertaking. We need the volunteers and the finances to carry it forward.

C. W. Weber, *Chairman*

E. B. Carroll—approved by letter 8-29-53

Lewis Dodson

Lt. Colonel F. H. Downs, Jr.

F. H. Fiske

D. E. Hartley—Approved in person 9-1-53

W. R. McLean

J. H. Millar—Approved by letter 8-29-53

Darold W. Taylor

Jerome Trichter

*These standards have not been approved or endorsed by the Food Equipment Committee of this Association.

PENNSALT CHEMICALS CONSOLIDATES PERSONNEL AND PUBLIC RELATIONS ACTIVITIES

George B. Beitzel, President of the Pennsylvania Salt Manufacturing Company, today announced the consolidation of its personel and public relations activities under the direction of Fred C. Abbott, Manager of Personnel and Labor Relations since 1947. The redesignated office will be known as the office of Industrial Relations. Mr. Abbott, a chemical engineer, was graduated from the University of Arkansas and came to Pennsalt in 1943. He attended the advanced management course of Harvard Graduate School of Business Administration in 1950. His staff will serve nine plants and numerous sales offices of the parent company and its three subsidiaries.

Concurrently Dr. W. Austin Bishop, Director of Training and Employee Publications, was named Manager of Public Relations. He will succeed Cleveland Lane who recently resigned to accept a similar position with the Manufacturing Chemists' Association, Washington, D. C.

Dr. Bishop joined the 103-year old manufacturers of industrial, agricultural and special chemicals in 1950 following a three-year public relations assignment in Department of Army Headquarters, Washington. He is a graduate of Franklin & Marshall College and did postgraduate work at New York University. From 1936-1942 he was a member of the faculty and athletic staff of the University of Pennsylvania, and after World War II returned to his alma mater as Director of Athletics. Active still in military affairs, Dr. Bishop holds a reserve commission in the grade of Colonel and is a member of the Philadelphia USAR School.

Dear IAMFS Member:

5 Minutes, Please?

1 Minute to think of the names of a few people who should be members of IAMFS.

3 Minutes to jot down their names and addresses.

1 Minute to mail.

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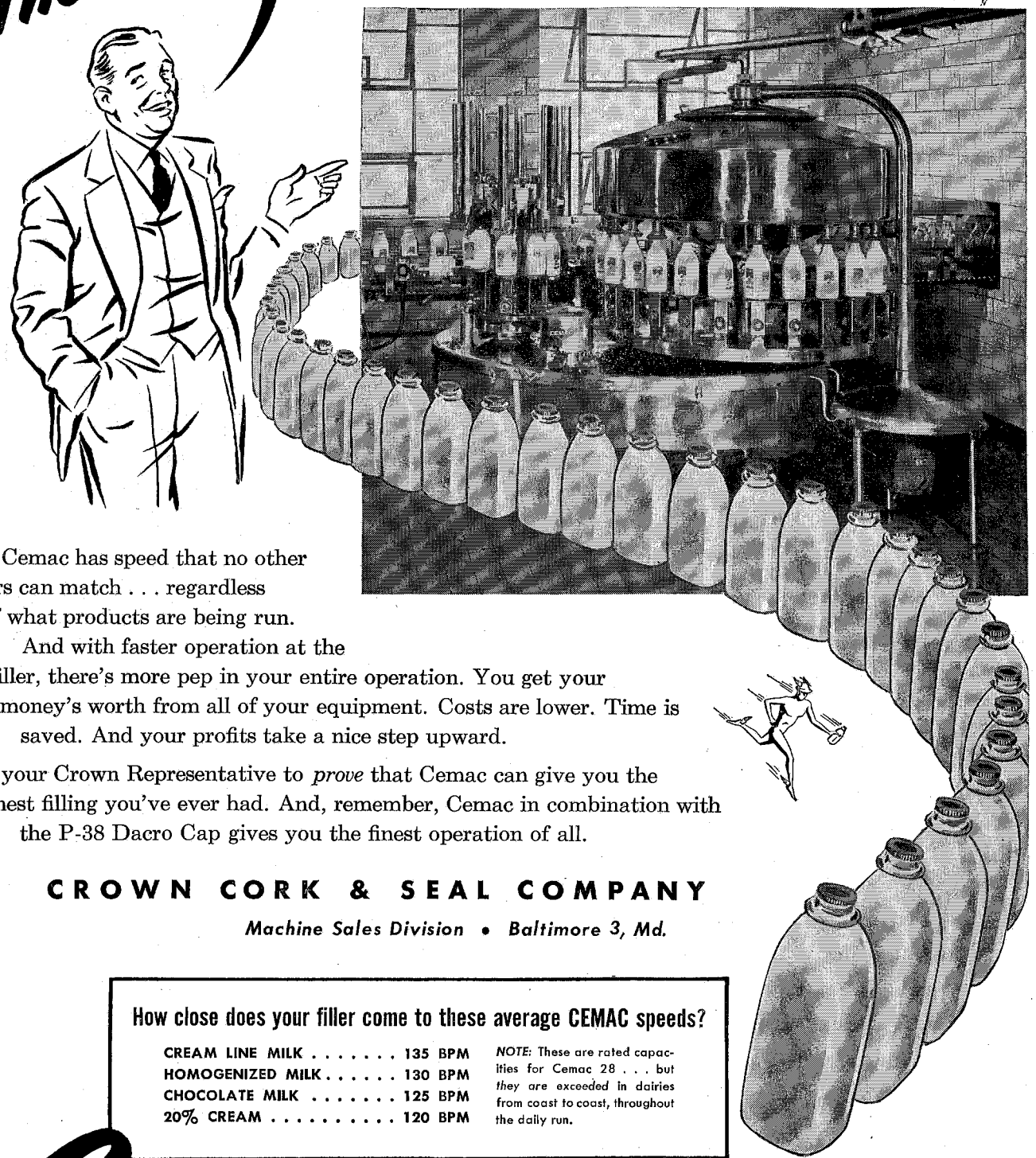

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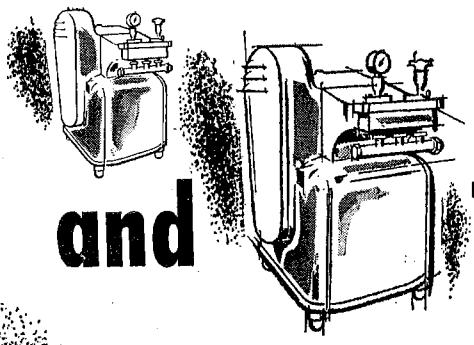

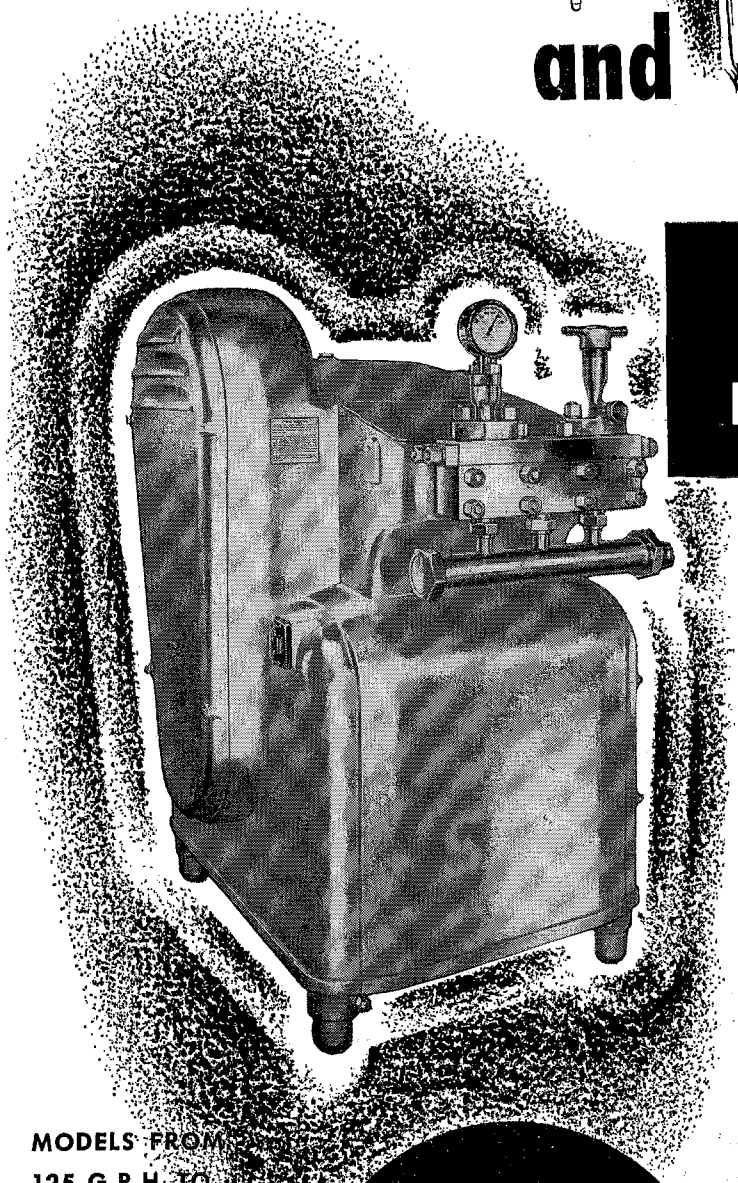

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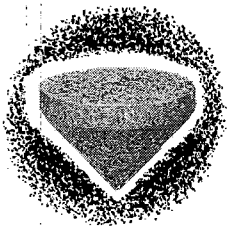

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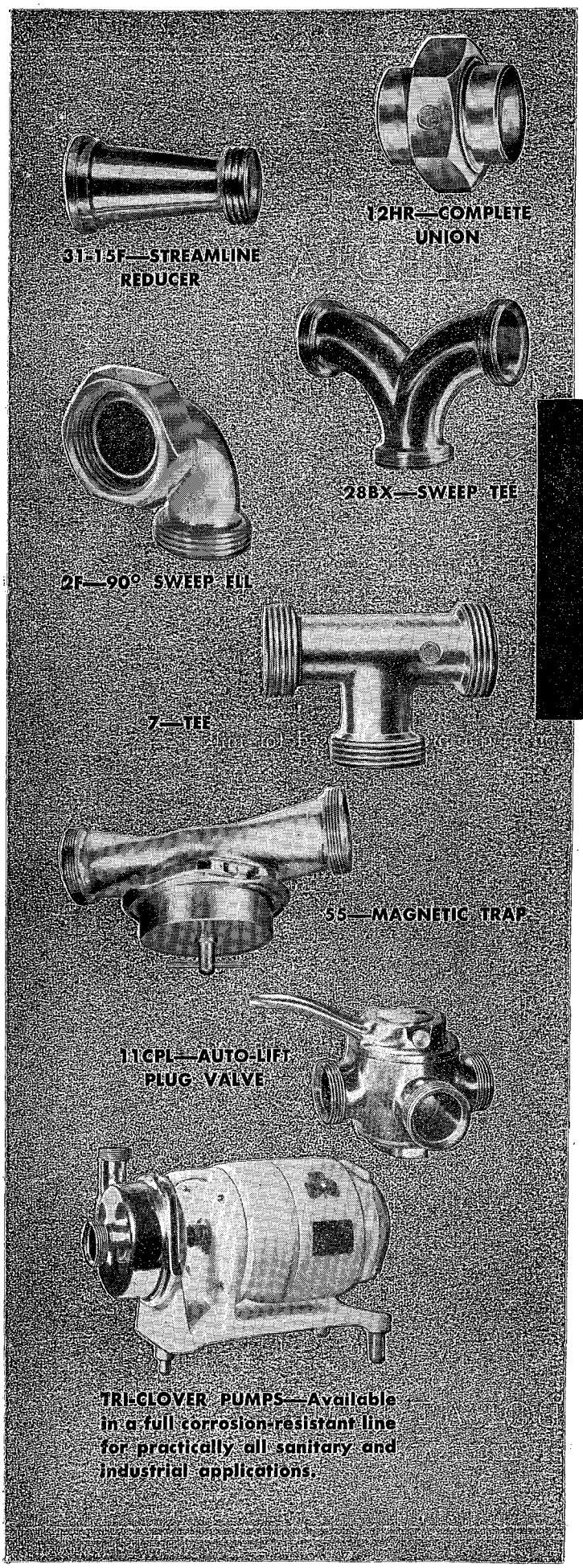

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