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No. 11

*Journal of*

# MILK and FOOD TECHNOLOGY

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*Official Publication*

International Association of Milk and Food Sanitarians, Inc.

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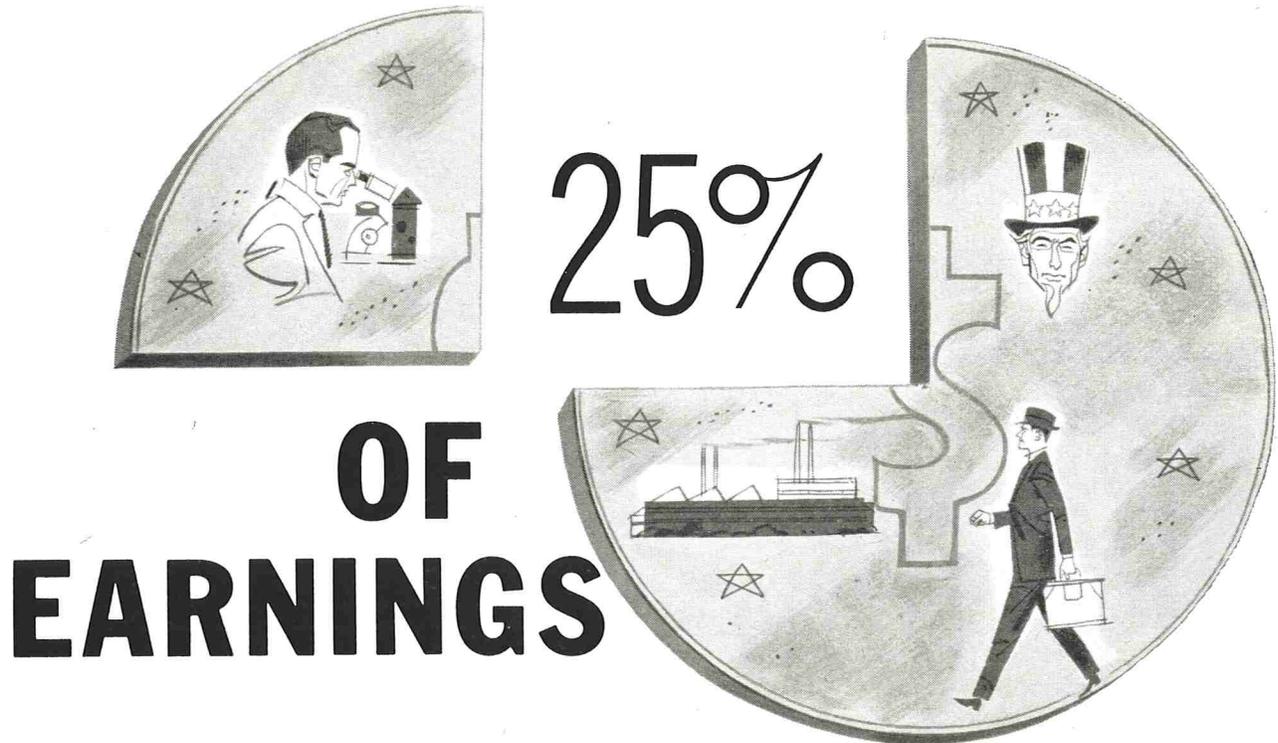
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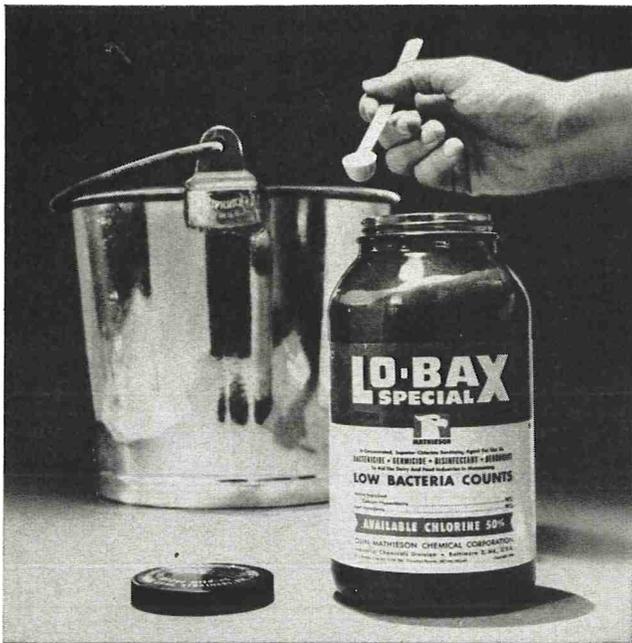
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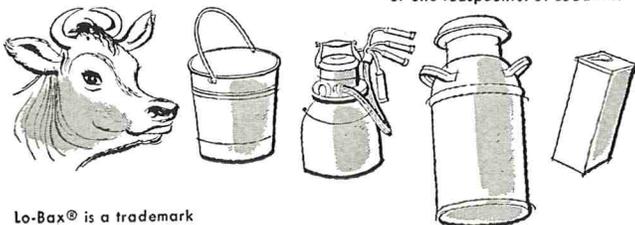
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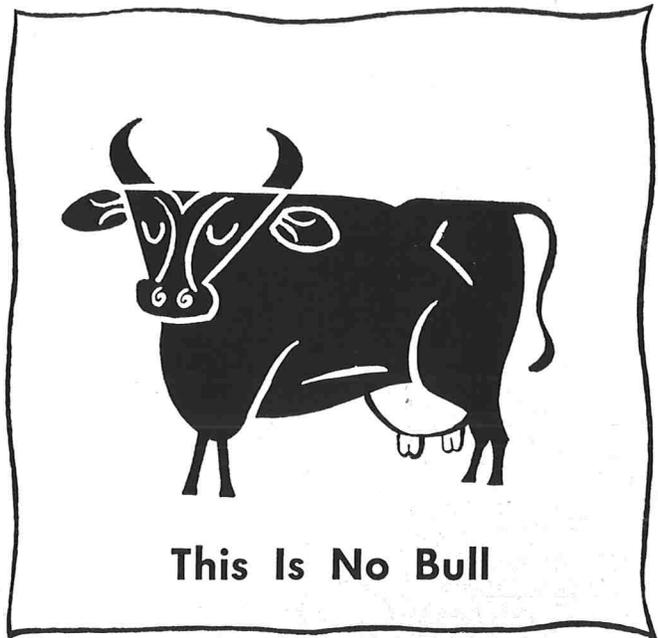
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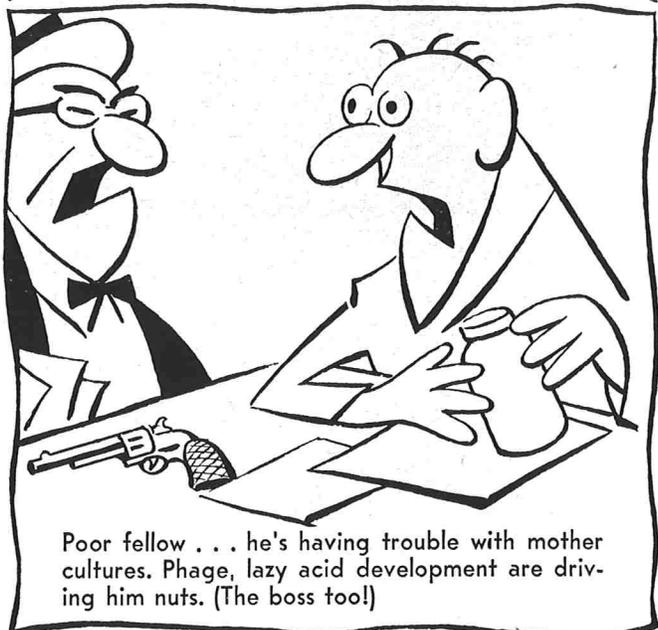


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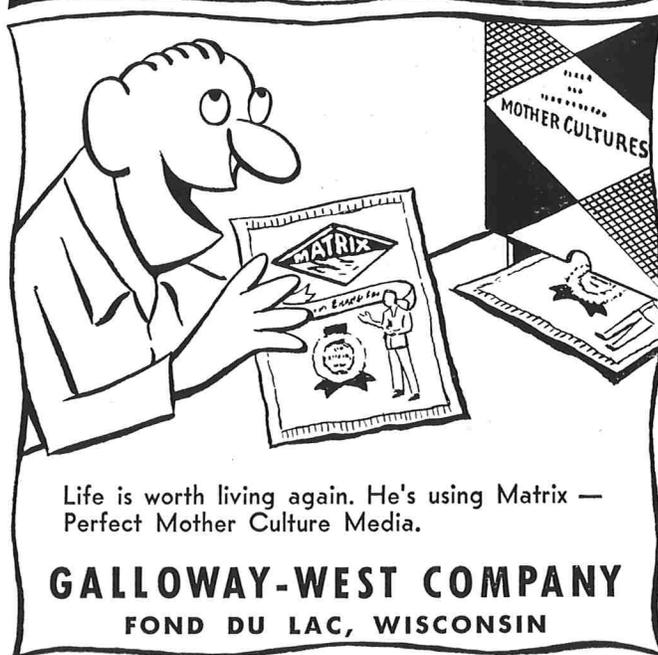
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*Journal of*

# MILK and FOOD TECHNOLOGY

INCLUDING MILK AND FOOD SANITATION AND MILK TECHNOLOGY

*Official Publication*

International Association of Milk and Food Sanitarians, Inc.

REG. U. S. PAT. OFF.

Vol. 22 November No. 11

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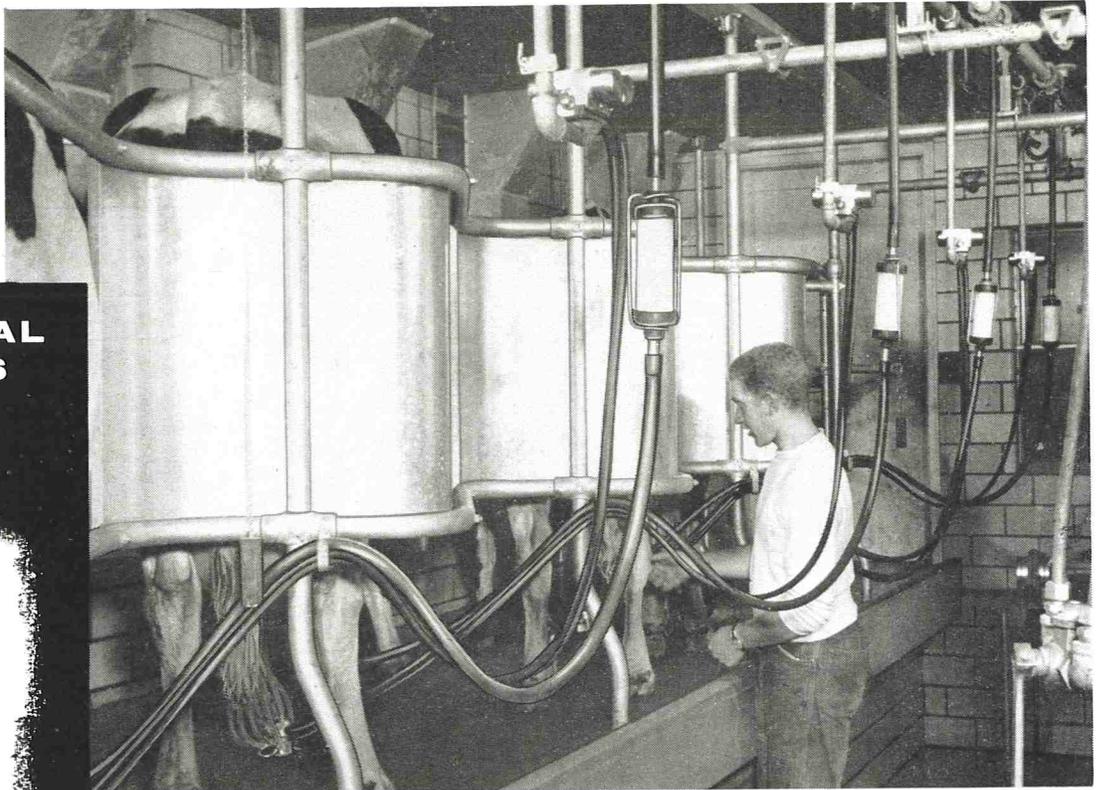
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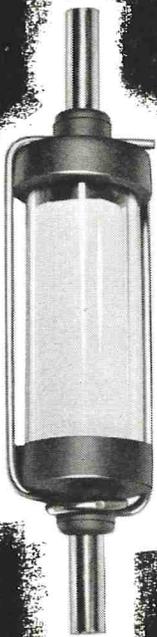
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# A RAPID DISC ASSAY METHOD FOR DETECTING PENICILLIN IN MILK

BERNARD ARRET AND AMIEL KIRSHBAUM

U. S. Department of Health, Education, and Welfare  
Food and Drug Administration  
Washington, D. C.

## NATIONAL SURVEY FINDINGS

Four nationwide surveys to determine the incidence of antibiotic residues in fluid milk have been conducted by the Food and Drug Administration<sup>1, 3</sup>. Penicillin was detected in 3.2 per cent of the samples tested in the 1954 survey, 11.6 per cent in 1955, 5.9 per cent in 1956, and 3.7 per cent in 1959. In these surveys an assay procedure requiring 16 to 18 hours was used<sup>4</sup>. Obviously, for regulatory purposes such a method is too time consuming to be of use in preventing the movement of adulterated milk in interstate commerce. Therefore, there is a need for a rapid method to assist regulatory agencies and the dairy industry in detecting the presence of penicillin in milk.

## OTHER TEST PROCEDURES

Several microbiological methods have been developed for the detection of penicillin in milk. The overnight test previously mentioned is a cylinder-plate method using *Sarcina lutea* as the test organism<sup>4</sup> and it is sensitive enough to detect the presence of 0.005 unit per ml. Silverman and Kosikowsky<sup>5</sup> employed a disc assay method with *Bacillus subtilis* as the test organism and were able to detect 0.1 unit per ml. in 4 to 6 hours. Mattick et al<sup>8</sup> utilized the inhibitory effect of penicillin on the growth of *Staphylococcus aureus*, and by measuring the decreased production of nitrite from nitrate they were able to detect 0.1 unit per ml. Slatter<sup>9</sup> and Pital et al<sup>10</sup> described tests for the detection of penicillin in milk based upon its interference with the microbial reduction of resazurin. These test swere insensitive to concentrations of antibiotic below 0.1 unit per ml. Shahani and Badami<sup>11</sup> described a resazurin disc assay method which could detect 0.064 unit per ml. in 2 to 3 hours.

A "physical development" method described by Goyan et al<sup>6, 7</sup>, is reported, in which a seeded plate was impregnated with silver nitrate, exposed to light, and finally subjected to a technique of physical development essentially equivalent to development of a latent image on a photographic emulsion. In our experience, this procedure neither shortened the incubation time nor increased the sensitivity of the test. Cerny and Morris<sup>12</sup> described a test that in 8 hours could detect 0.01 unit per ml.

In the methods described above, either the incubation time is relatively long, the test is insensitive to low concentrations of penicillin or the method is not readily adaptable to field testing. This report describes a simplified method which can detect the presence of 0.05 unit of penicillin per ml. of milk in 2-½ hours. The procedure is such that would permit a dairy technician to trace the source of milk containing penicillin by carrying a portable incubator and refrigerator in a car or truck, testing a milk sample on the farm, and obtaining results within 2½ hours.

## PROCEDURE

**CULTURE MEDIA.** For carrying the test organism and for performing the assay, use a medium of the following composition (medium #1): Peptone 6 Gm., pancreatic digest of casein 4 Gm., yeast extract 3 Gm., beef extract 1.5 Gm., dextrose 1 Gm., agar 15 Gm., and distilled water to make 1,000 ml. The final pH after sterilization is 6.5 to 6.6. For preparing the test suspension use a medium of the same composition as medium #1 except that it contains in addition 300 mg. of MnSO<sub>4</sub> · H<sub>2</sub>O per liter (medium #2).

**WORKING STANDARD.** Dilute the penicillin working standard with sterile 1 per cent phosphate buffer pH 6.0 (2.0 Gm. dipotassium phosphate and 8.0 Gm. monopotassium phosphate per liter) to make a stock solution containing 100 units per ml. This stock solution may be used for no more than 2 days when stored at 15 C or less.

**PREPARATION OF SAMPLE.** The sample is undiluted milk.

**PREPARATION OF TEST ORGANISM.** The test organism is *Bacillus subtilis*, ATCC 6633. Maintain the test organism on nutrient agar medium #1 and transfer to a fresh slant every month. Inoculate a fresh slant of agar medium #1 with the test organism and incubate at 37°C for 16-24 hours. Wash the culture from the slant with sterile physiological saline onto the surface of a Roux bottle containing 300 ml. of medium #2. Incubate 37°C for 5 days. Wash the resulting growth from the agar surface with 50 ml. of sterile physiological saline, centrifuge, and decant the supernatant liquid. Reconstitute the sediment with sterile physiological saline and heat-shock the suspension by heating for 30 minutes at 70°C. Maintain the spore suspension at approximately 15°C. This spore sus-

pension will keep for several months. Add 2 ml. of the spore suspension to each 100 ml. of agar medium #1 for the test.

**PREPARATION OF PLATES.** Add 10 ml. of inoculated agar (prepared as above) to each 20x100 mm. Petri dish. Plastic dishes may be used. Distribute the agar evenly in the dishes, cover with porcelain covers glazed only on the outside and allow to harden. Store at approximately 15°C for not less than three, nor more than five days. Remove each Petri dish as needed and use within 15 minutes.

**Discs.** Use round, white paper discs with a diameter of  $\frac{1}{4}$  inch. The paper used for the disc should be Schleicher and Schuell No. 740-E, No. 470-W, or No. 470, or paper of comparable grade, absorption, performance qualities, and purity. No. 740-E is available as discs already punched to the recommended size. The others are available in sheets from which discs may be punched.

**ASSAY PROCEDURE.** At the time a new spore suspension is prepared test plates should be run to determine its maximum sensitivity to penicillin. In our laboratories the maximum sensitivity has been 0.05 unit per ml. of milk.

Use a pair of forceps and dip a paper disc completely into the sample to be tested. Shake the disc to remove any excess milk and place on the surface of the agar, touching the disc gently with the tip of the forceps to ensure proper contact of the disc with the agar. Place the discs so that they are at least 20 mm. apart when measured from center to center to avoid overlapping of zones. In this manner many samples may be tested on the same Petri dish. Control discs may be prepared by dipping the discs in milk containing 0.05 unit of penicillin per ml. These may be dried and used for several days if stored in tightly stoppered vials. Incubate at 37 C for approximately 2- $\frac{1}{2}$  hours and then examine for any sign of inhibition of the test organism. At this time the test organism will have grown sufficiently so that if penicillin is present in milk at a concentration of at least 0.05 unit per ml., a zone of inhibition will be discernible. The plate should be held at various angles to be light source until the light is at the proper angle for best observing the zone of inhibition.

If a zone of inhibition is obtained, determine if the activity is due to penicillin as follows:

Add 0.05 ml. (approximately one drop) of penicillinase concentrate to a 5 ml. aliquot of the milk sample and shake well. Prepare three discs from the penicillinase treated sample and three discs from an untreated aliquot of the sample. Place all six discs on one plate, proceeding as described under "Assay procedure." A zone around the discs dipped in untreated

milk, but no zone around the discs dipped in penicillinase treated milk, is a positive test for penicillin.

#### EXPERIMENTAL

Samples of milk were prepared containing graded concentrations of penicillin. The minimum incubation period at 37°C required to observe sufficient growth of the test organism, in turn making it possible to see a zone of inhibition, was 2- $\frac{1}{2}$  hours, and the maximum sensitivity of the organism was 0.05 unit per ml. A control disc was placed on each Petri dish. Modifications of methods previously described such as the use of resazurin were attempted. Indicators had a tendency to mask the growth of the test organism, thus making it more difficult to detect a zone of inhibition. In all instances, a zone could be observed more readily if no indicator or dye was used. Preincubation of the inoculated dishes for  $\frac{1}{2}$  or 1 hour at 37°C was also attempted in order to decrease the time required for the test. However, while growth of the test organism was noted in a shorter time, the test was not as sensitive.

#### DISCUSSION

The rapid method described in this paper is only one-tenth as sensitive as the overnight procedure.<sup>4</sup> However, it should be of value for detecting in a minimum amount of time those milk samples which contain relatively high concentrated of penicillin (greater than 0.05 unit per ml.). It is estimated that in the nationwide surveys of 1954, 1955, 1956, and 1959, the rapid method would have detected penicillin in 33, 7, 16, and 58 per cent, respectively, of the samples which were reported as containing penicillin when tested by the overnight procedure.

#### SUMMARY

A simplified and rapid method is described for detecting the presence of penicillin in milk in concentrations as low as 0.05 unit per ml. The method may be used by the dairy industry with a minimum of equipment.

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**AMENDMENT TO  
SUPPLEMENT No. 3 TO THE  
3-A SANITARY STANDARDS FOR FITTINGS USED ON MILK AND  
MILK PRODUCTS EQUIPMENT AND USED ON SANITARY LINES  
CONDUCTING MILK AND MILK PRODUCTS, APRIL 26, 1955**

*Serial #0803-A*

*Formulated by*

*International Association of Milk and Food Sanitarians*

*U. S. Public Health Service*

*The Dairy Industry Committee*

*November 1959*

In keeping with the provisions of the 3-A Sanitary Standards for Sanitary Fittings and Connections Used On Milk and Milk Products Equipment, this supplement incorporates the following paragraphs covering "Special Sanitary Fittings" into the standards:

SPECIAL SANITARY FITTINGS

As 3-A Sanitary Standards are not intended to limit individual ingenuity, this supplement sets forth a basis for the approval of special sanitary fittings to meet specific applications where standard 3-A Sanitary Fittings designs are not applicable.

Where special sanitary fittings are required and interchangeability with respect to face to face, or center-line to face dimensions is not important, the following conditions must be met:

These special fittings must qualify with respect to material, finish, construction, thread dimensions (if threads are used), and use of gaskets as set forth for approved 3-A fittings in the standard to which this statement is a supplement. All product contact surfaces of such fittings shall be accessible for cleaning and inspection. All internal angles shall have radii of not less than 1/16-inch, except gasket recesses and grooves in which all sharp corners shall be avoided.

This amendment becomes effective upon publication.

## REPORTING OF FOODBORNE DISEASES<sup>1</sup>

C. C. DAUER, M. D.

*Department of Health, Education, and Welfare  
Public Health Service  
National Office of Vital Statistics  
Washington 25, D. C.*

During the past few decades, there has been a very material change in the eating habits of the population of this country. The number of persons who eat one or more meals each day in public eating establishments has been growing steadily, because more and more people are living in homes that are remote from their work. People travel more, and larger numbers of women have been employed in offices and industries, both of which contribute to the change in eating habits.

The magnitude of the industry needed to cater to these eating habits can be shown by a few statistics. First, it may be mentioned that the food service industry is said to rank fourth among all of the industries of the nation, which means an investment of many billion dollars in buildings and equipment. More than 16 billion dollars are spent annually on meals consumed outside the home. There are about 200,000 public eating places, such as restaurants, cafeterias, lunch counters, and similar types of establishments. Meals are also served in more than 26,000 industrial restaurants, in 15,000 hotels, many thousands of hospitals, schools, and college dining halls, and on trains and airplanes. More than 40,000 drug stores sell food and soft drinks. Boarding houses, institutions, churches, and others too numerous to mention should also be added to the above list.

Nearly 90,000 food manufacturers or processors whose products enter interstate commerce supply the needs of the food service industry. The 14,000 milk pasteurizing plants and an equal number of processors of milk products also should be included in the category of food suppliers.

In 1951, the National Office of Vital Statistics assumed the responsibility for the collection and publication of reports of food and waterborne disease outbreaks as a part of its overall program of obtaining current information on all unusual occurrences of diseases. Instead of requesting reports at the end of each year, State health authorities were asked to report outbreaks as soon as investigations were completed. It was suggested that provisional informa-

tion should be sent before all investigative procedures were completed when certain types of outbreaks occurred, for example botulism or an outbreak involving milk or food processing. Each report was summarized in the "Morbidity and Mortality Weekly Report" under the heading of "Epidemiological Reports." When preparing annual summaries, we also departed from the procedure used by the Milk and Food Branch of the Public Health Service, who previously had collected the reports, in that details of individual outbreaks were omitted, because they already had been published in our weekly report. A narrative type of annual summary with tables has been published in *Public Health Reports* each year, beginning with 1951. This has proved to be quite satisfactory, because this Journal is distributed to State and local authorities and to a large number of agencies and individuals in and out of government. Further indications of its acceptance are to be found in the large number of requests for reprints of this annual report, which have come from persons in other countries as well as in the United States.

There is a wide variation in the number and content of reports of foodborne outbreaks received from the States. A few furnish a large proportion of those submitted each year, others send a moderate number, and some seldom or never send reports. Some States need a good deal of prodding to supply information on an outbreak that we may learn about from items appearing in newspapers. The reporting of outbreaks occurring in many large cities is even more disappointing. Some never report such occurrences, and a few supply only minor details about outbreaks. It seems preposterous to assume that foodborne disease outbreaks never occur or are so infrequent in many of the large urban centers.

Undoubtedly, there are a number of reasons why some States and many cities report poorly or not at all. First, there may be a lack of understanding of the need for investigation and reporting of food and waterborne diseases. Perhaps, some health authorities feel there are so many other problems of greater importance that need their attention and are not interested in promoting investigations of disease outbreaks.

Another reason may be the lack of trained person-

<sup>1</sup>Presented on May 25, 1959, in a training course on Epidemiology and Control of Foodborne Diseases, Communicable Disease Center, Atlanta, Georgia.

nel who can carry out reasonably adequate epidemiological investigations or who can plan programs of investigation and reporting. In some States, the responsibility for these activities is with agencies other than the health department. In some instances it appears that a close liaison has not been established for exchange of information between agencies, which seems to have an adverse effect on reporting.

In our opinion, a very common defect in the program for collection of information on disease outbreaks is a poor liaison between State and local health authorities and especially between State and municipal authorities. This poor type of liaison may be the fault of one or both. Perhaps the State has not developed a program for investigation and reporting and does not ask for reports. On the other hand, the local health officer may resist any or many requests for information, because he thinks that it is an infringement on his authority to carry out his program. A few States have found that frequent consultation with local health officers on all phases of their programs is an excellent mechanism for establishing better relationships, a better understanding of the needs for reporting, and more or less incidentally stimulating more thorough investigation of foodborne diseases.

In some instances, it appears that health officers are reluctant to report some outbreaks that occur in schools, hospitals, and other institutions or in certain groups of people, because they are fearful of unfavorable or unjustified publicity. Our answer to this objection is that we never publish names of institutions, schools, or eating establishments. Furthermore, we avoid using any information that would identify an institution or group, such as its location in a certain county or city. We would not think it unreasonable if the health officer requests that the report not be summarized in our weekly report. However, we would expect to include it in our annual summary, which would preclude the possibility of identifying a particular outbreak. We also adhere to the policy of not divulging names and locations, except for official purposes.

Now, I would like to turn to a discussion of the needs for information of foodborne diseases, particularly at Federal level.

First, the officials in the Milk and Food Branch use the reports to assist them in promoting more effective milk and food sanitation programs in State and local jurisdictions. The information made available is also used as background material in the development of ordinances and codes designed to improve sanitation of food manufacturing and handling. This past year we provided two States with a considerable amount of data on epidemics that were

associated with the eating of sandwiches. This was used in support of legislation dealing with the sanitary control of these articles of food.

The material collected is often used for training purposes. Multiple copies of our annual summary have been supplied several times for use in training programs conducted by different agencies for personnel concerned with food sanitation. Instructors in several medical schools receive one or more copies of our weekly report, which they use in the teaching of microbiology or preventive medicine. One instructor in a school of public health informed me that he used certain of the items which appear under the heading of "Epidemiological Reports" to illustrate what might happen in any community.

I would like to remind you that more complete reporting of foodborne diseases is needed for detection of biological warfare. Some of the microbial agents which cause food infections or intoxications could be used in this type of attack. Biologic warfare cannot be discounted as a possibility as long as international tensions exist. However, we are aware of the fact that it would probably be quite difficult to detect a real attack with BW agents.

There is a great need at all levels of government and food industry to know more about the actual volume of foodborne diseases, the relative importance of various etiological agents which cause such illnesses, and the various types of food that are most commonly involved. More complete information would be of great assistance to local, State, and Federal agencies in planning more effective programs for the prevention of foodborne disease.

It appears to be a reasonable assumption that more complete reporting of foodborne disease will not be accomplished until more local or municipal health officers and personnel responsible for food sanitation programs recognize the need for more than a cursory type of investigation and the bare minimum represented by a report of the occurrence of an outbreak. However, the stimulus for bringing about such an improvement in attitude will have to come principally from State and local health authorities. Physicians, hospitals, persons in charge of institutions, camps, and schools, operators of food handling establishments, and the public must be made aware of their responsibilities for prompt notification to the health department or other agency having jurisdiction. It should be emphasized to these persons or groups that notification of illness that presumably is foodborne is not primarily for the purpose of punishing violators of codes or ordinances, but is a prelude to an investigation that will benefit and protect the operator of the food establishment and for the protection of the public.

The States not only have the authority for making reporting a requirement, but they also have the responsibility for investigating or prescribing the procedures for investigation. Reporting of outbreaks in Federal installations such as Army, Navy, and Air Force, Federal prisons, etc., is sometimes made to State authorities, but investigation is usually the sole responsibility of Federal officials. Investigations of outbreaks occurring on interstate or common carriers (planes, railroads, steamships) is the responsibility of the Public Health Service. The Federal Food and Drug Administration has jurisdiction in dealing with certain aspects of foodborne outbreaks associated with commercially processed foods that enter interstate commerce.

I do not regard it as my function to describe how investigations of foodborne diseases should be conducted or to recommend a specific type of form for recording the various findings of an investigation. I would like to say, however, that forms used or distributed by some States to local areas do seem to promote greater uniformity and tend to stimulate the investigator to obtain more complete information. The International Association of Milk and Food Sanitarians has prepared a booklet entitled "Procedure for the Investigation of Foodborne Disease Outbreaks," which not only contains recommended procedures but also suggests forms that could be used with advantage by anyone investigating foodborne diseases. The booklet probably would be especially helpful to investigators who have had no training or experience in epidemiology.

There are certain items for which we would like information in order to make our weekly and annual summaries more useful. These are: time and place of occurrence of the epidemic; type of population involved (school, institution, social group, family, public, etc.); estimated number of persons with possible exposure to the disease; number of those who were ill; number of deaths, if any; the kind of food that was found to be the vehicle or probable vehicle of infection; how the food was contaminated; the average incubation period and the range of time from onset of the first to the last case; results of laboratory tests on food samples; evidence of infection among persons who prepared the contaminated food; results of laboratory examination of specimens from food handlers when appropriate; and, finally, a narrative description of the epidemic. The narrative

should contain a list of symptoms of those made ill; laboratory examinations of specimens from those made ill; food handling practices; and any deviations from recommended practices (lack of refrigeration, storage at room temperature, etc.). It is recognized that information on each of the above items cannot be obtained in every investigation because of varying circumstances, some of which will be beyond the control of the investigator. For instance, the outbreak may be reported so late that it is possible to obtain information on only a few items. While this list of items may seem to be long, they usually can be recorded on one side of an 8"x11" sheet of paper. I would like to repeat that a form for recording them in an orderly fashion is recommended, principally because it promotes more uniformity in the content of the reports of investigations and stimulates the investigator to obtain certain information. However, some very excellent reports have been received which are entirely narrative in type, but most of them have been written by experienced epidemiologists or other investigators.

In my opinion the most important item when notifying State or Federal agencies is not the number of persons who became ill after eating a specified food. The most essential items are: (a) the food that was found to be the vehicle or probable vehicle of infection; (b) the organism or toxic substance that caused the illness; (c) the probable way the food was contaminated; and (d) the factors (poor food handling practices) that contributed to multiplication of microorganisms in the food. In other words, the qualitative type of information is much more important than the quantitative.

Our policy has always been to insist that reports prepared by local authorities be sent to us by or through State health officers. There have been very few exceptions in this procedure. This insures that the State authorities are aware of any unusual occurrences in their jurisdictions and can take appropriate actions when necessary.

I think this discussion can be summarized briefly by saying that reporting of foodborne diseases is very incomplete with respect to number of outbreaks that occur and in content of many reports. More qualitative as well as quantitative information is needed for planning more effective programs for the prevention of these diseases.

## 1958 SUMMARY OF DISEASE OUTBREAKS<sup>1</sup>

CARL C. DAUER, M.D., AND DONALD J. DAVIDS

The pattern of foodborne and waterborne disease outbreaks in 1958 did not differ greatly from that of the previous years (table 1). However, a closer inspection should be made of some aspects of the pattern. For instance, there is no convincing evidence that staphylococcal food poisoning and foodborne *Salmonella* infections are becoming less frequent.

The decline in number of outbreaks and cases of staphylococcal food poisoning reported in 1958 and in 1957 compared with previous years is more likely to be due to failure in reporting than to a reduction in this type of illness (table 2). Two outbreaks involving cheese were among the reports received in 1958. In one outbreak cases occurred in two adjoining States receiving shipments of cheese processed in another State. Staphylococci were isolated from samples of the cheese obtained from the distributor and the factory. Furthermore, the organism was found in milk from dairy herds supplying milk to the cheese factory. Some strains of staphylococci isolated from samples of milk were resistant to certain antibiotics. The second outbreak occurred in an institutional population that had been supplied with cheese manufactured in the same State.

A review of reports received in past years shows that staphylococcal food poisoning associated with fluid milk, dried milk, and cheese is not uncommon. It is also known that bovine mastitis caused by staphylococci is common. Furthermore, the indiscriminate use of some antibiotics in the treatment of mastitis has favored the development of strains of staphylococci that are resistant to the antibiotics. Therefore, there is need to investigate more thoroughly many aspects of the whole problem of staphylococci in milk and milk products and to study the relationship between staphylococcal infections in man and animals. More intensive studies of outbreaks should also be made when milk or milk products appear to be vehicles of infection.

Fewer cases as well as fewer outbreaks of foodborne *Salmonella* infection were reported in 1958 than in 1957. The numerous sources of infection reported emphasize the wide distribution of these organisms, particularly in animals and animal prod-

ucts, such as meat and eggs (table 3). In one outbreak caused by *Salmonella dublin*, infection was traced to a certified raw milk dairy. Laboratory examination revealed the presence of this organism in specimens of feces of a dairy farm employee, but *Salmonella* organisms were also isolated from three cows in the dairy herd. In another State, employees on a dairy farm presumably were infected by contact with cows that had diarrhea. *Salmonella typhimurium* was isolated from both cattle and men that were ill.

Salmonellae were isolated from shell eggs and frozen egg whites in several epidemics and from packages of a powdered scrambled egg product. Numerous outbreaks were reported following the eating of chicken and turkey meat, especially the latter. In others, food handlers were the probable source of infection. A number of cases of salmonellosis were traced to contaminated well water, seldom reported as a source. The wide distribution of *Salmonella* and the possibilities for spread in a community are indicated by a summary prepared by the health department laboratory service of a large western city. Twenty-seven different subtypes of the organism were isolated from 209 persons in 1958. These subgroups included 10 in group B, 11 in group C, 3 in group D, 2 in group E, and 1 in group G. Seventy-two strains of *S. typhimurium* were isolated, 23 of *Salmonella saint-paul*, 16 of *Salmonella oranienburg*, 14 of *Salmonella newport*, 13 of *Salmonella montevideo*, 11 of *Salmonella infantis*, and 10 of *Salmonella give*. The same variety of types has been reported where laboratory diagnostic services are extensively utilized.

Since only a fraction of the outbreaks caused by staphylococci and salmonellae and by other organisms appear to be reported, the real extent of the foodborne diseases is unknown. Year after year the same few States report the majority of the outbreaks summarized in these annual reports. Other States report a moderate number, and some report none. The reports from certain large cities are conspicuous by their absence. More complete reporting is needed not only for measuring the magnitude of the problem but also to show what is needed for improvement in food handling facilities and practices and for planning more effective control programs. Furthermore, the food industry is fourth largest of all industries in the United States, and the quality of its products is the direct concern of all persons.

The various categories of foodborne and water-

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<sup>1</sup>Reprinted by permission from *Public Health Reports*, Vol. 74, No. 8, August 1959.

TABLE 1. FOODBORNE AND WATERBORNE DISEASE OUTBREAKS REPORTED IN 1958, BY VEHICLE OF INFECTION

Area <sup>1</sup>	Water		Milk and milk products <sup>2</sup>		Other foods <sup>2</sup>	
	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases
United States...	4	445	13	441	236	9, 925
New England:						
Maine.....					5	183
Massachusetts.....					13	425
Rhode Island.....					2	101
Connecticut.....					2	43
Middle Atlantic:						
New York.....	1	11			17	747
New Jersey.....					4	470
Pennsylvania.....					3	947
East North Central:						
Ohio.....					1	45
Indiana.....			3	124	7	694
Illinois.....					5	223
Michigan.....			1	21	3	342
Wisconsin.....					1	43
West North Central:						
Minnesota.....					3	36
Iowa.....			1	200	1	60
Missouri.....	1	61			3	85
South Dakota.....					2	16
Nebraska.....			1	5		
South Atlantic:						
Maryland.....					1	61
Virginia.....					1	16
West Virginia.....					6	17
North Carolina.....					3	347
South Carolina.....					2	391
Georgia.....					3	196
East South Central:						
Kentucky.....					3	60
Mississippi.....					2	234
West South Central:						
Louisiana.....			1	31	2	23
Oklahoma.....					2	141
Mountain:						
Idaho.....					1	32
Colorado.....	1	350			1	5
New Mexico.....	1	23				
Pacific:						
Washington.....					2	64
Oregon.....					5	120
California.....			6	60	130	3, 758
United States 1957...	4	131	8	67	250	11, 085
United States 1956...	9	1, 719	31	873	210	11, 133

<sup>1</sup> States not listed submitted no reports.

<sup>2</sup> Includes outbreaks among military personnel.

borne disease outbreaks reported in 1958 are discussed and tabulated in the same manner as in the report for 1957.

#### WATERBORNE OUTBREAKS

Only four outbreaks were demonstrated to be due to contaminated water. An outbreak of shigellosis followed failure to chlorinate the public water supply of a small city for several days while the water inspector was out of town because of illness in his family. Another outbreak of shigellosis occurred in a group of campers who drank inadequately treated water from a livestock watering tank. The other two outbreaks included salmonellosis resulting from the use of a polluted well and gastroenteritis due to contamination of a public water supply, although the manner in which the supply was contaminated was not determined.

#### MILKBORNE OUTBREAKS

Milk and milk products were considered the source of infection for 13 outbreaks. Cheese and cheese spreads were implicated in five outbreaks, several of which occurred only among members of individual families. The outbreaks involving Cheddar cheese have been described.

Thirty cases of salmonellosis were traced to raw milk from a certified dairy. In this episode a bottle washer continued to work at his job while he was ill. About a week after the onset of his illness, a stool specimen was found to be positive for *S. dublin*. In another State, five cases of salmonellosis were thought to be due to milk from a small uninspected dairy. An outbreak of salmonellosis in a hospital was traced to malted milk, but raw eggs used in the preparation of the milk drinks may have been the primary source of infection. Another outbreak in a hospital, not included in the milkborne category, was thought to be due to eggs used in making eggnog. Investigation revealed the flock which supplied the eggs was infected.

Reconstituted dried, nonfat milk was the source of infection for 15 cases of gastroenteritis in a labor camp. Not included in the milkborne category was an outbreak of 75 to 80 cases of gastroenteritis, thought to be due to milk served from dispensers in a university dining room. But this could not be proved, and milk obtained several days later from the dispensers did not show evidence of contamination.

#### TYPHOID FEVER

Only one outbreak of typhoid fever was reported during 1958 in which food or drinking water was incriminated. The organisms recovered from the ill

TABLE 2. FOODBORNE, WATERBORNE, AND OTHER DISEASE OUTBREAKS REPORTED IN 1958, BY TYPE OF INFECTION

Area <sup>1</sup>	Typhoid fever		Salmonellosis <sup>2</sup>		Shigellosis		Trichinosis		Botulism		Staphylococcal food poisoning <sup>2</sup>		Streptococcal infections		Gastroenteritis, etiology unknown <sup>2</sup>		Toxic agents	
	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases
United States	1	30	27	1,043	3	392	7	68	3	4	62	2,291	2	598	134	6,216	14	169
New England:																		
Maine							1	4			1	5			3	174		
Massachusetts			3	177							2	142	1	12	7	94		
Rhode Island			1	4											1	97		
Connecticut			1	3											1	40		
Middle Atlantic:																		
New York			5	164							3	130			9	458	1	6
New Jersey															4	470		
Pennsylvania							1	7							1	840	1	100
East North Central:																		
Ohio							1	45										
Indiana											6	749			4	69		
Illinois											2	108			3	115		
Michigan			2	277							2	86						
Wisconsin			1	43														
West North Central:																		
Minnesota							1	9			1	20					1	7
Iowa											2	260						
Missouri					1	19									3	127		
South Dakota			1	7											1	9		
Nebraska			1	5														
South Atlantic:																		
Maryland											1	61						
Virginia											1	16						
West Virginia							3	3			1	5			2	9		
North Carolina			1	140					1	1	1	206						
South Carolina															2	391		
Georgia			1	58											2	138		
East South Central:																		
Kentucky									1	2					1	38	1	20
Mississippi											1	34			1	200		
West South Central:																		
Louisiana			1	31											1	22	1	1
Oklahoma															2	141		
Mountain:																		
Idaho															1	32		
Colorado					1	350					1	5						
New Mexico					1	23												
Pacific:																		
Washington											2	64						
Oregon											2	6			3	114		
California	1	30	9	134					1	1	33	394	1	586	82	2,638	9	35
United States 1957	4	70	30	1,607	11	754	1	14	6	12	58	1,660	4	1,030	135	6,065	8	68
United States 1956	7	52	23	1,999	8	1,107	11	98	11	22	111	4,313			88	6,688	9	160

<sup>1</sup> States not listed submitted no reports.<sup>2</sup> Includes outbreaks among military personnel.

TABLE 3. OUTBREAKS OF CERTAIN FOODBORNE DISEASES REPORTED IN 1958, BY TYPE AND SOURCE OF FOOD

Source	Salmonellosis		Shigellosis		Staphylococcal food poisoning		Streptococcal infections		Gastroenteritis, etiology unknown	
	Number of outbreaks	Number of persons affected	Number of outbreaks	Number of persons affected	Number of outbreaks	Number of persons affected	Number of outbreaks	Number of persons affected	Number of outbreaks	Number of persons affected
	Type of food									
Poultry	8	162	0		6	214	0		28	1,672
Other meat	1	58	0		31	651	1	586	44	975
Custard-filled dessert	1	23	0		6	40	0		5	234
Salad	0		1	19	8	825	0		6	204
Other	6	442	0		9	471	1	12	17	438
Not determined	10	347	0		2	90	0		33	2,632
Total	26	1,032	1	19	62	2,291	2	598	133	6,155
	Source of food									
Public eating establishments	10	117	0		17	214	1	12	30	346
Private clubs	1	40	0		1	141	0		4	68
Schools	1	140	0		3	840	0		8	516
Colleges	0		0		1	65	1	586	5	326
Hospitals and institutions	4	191	0		4	321	0		8	2,418
Recreation camps	0		0		0		0		4	162
Labor camps	0		0		0		0		7	432
Social gatherings	4	185	0		7	285	0		9	273
Bakery caterers	1	24	0		1	8	0		3	235
Private homes	2	28	0		16	215	0		34	234
Transportation	0		0		1	2	0		1	10
Other	2	39	1	19	10	180	0		16	880
Not stated	1	268	0		1	20	0		4	255
Total	26	1,032	1	19	62	2,291	2	598	133	6,155

persons were phage type E<sub>1</sub>. However, several other episodes of typhoid fever were reported. Three boys became ill with typhoid fever after swimming in a stream which carried untreated sewage. The organism in this instance was also phage type E<sub>1</sub>. In another instance, six cases with one death occurred over several weeks in a slum community which did not have public water and sewage facilities.

#### SALMONELLOSIS

Twenty-seven outbreaks of salmonellosis were reported in which laboratory confirmation was made either by isolation of organisms from the food, from the stools of the ill persons, or from food handlers. Four of the outbreaks were related to ingestion of chicken meat and four to turkey meat. The source of the food for 10 of the outbreaks was public eating establishments. Eleven species of *Salmonella* organisms were isolated. Among these were *S. typhimuri-*

*um* in seven instances and *S. dublin*, *Salmonella sandiego*, and *S. saint-paul* in two outbreaks each.

Several other outbreaks were reported, but no foods were thought to be involved. *Salmonella reading* was isolated from a package of powdered egg product which was served at a Boy Scout ranch, but no cases resulted.

#### SHIGELLOSIS

Three outbreaks of shigellosis were reported. Two resulted from contaminated water supplies and the other from a tossed salad. The responsible organism in each instance was *Shigella sonnei*.

*Shigella flexneri* 2a was found to be responsible for a number of cases of shigellosis which occurred over a 2-week period in an unsanitary labor camp. And *S. flexneri* 4 was responsible for an outbreak in a boarding home for children, but no common source of infection was found in either episode.

## TRICHINOSIS

In two of the seven outbreaks of trichinosis reported during 1958, the source of infection was home-made pork sausage. In another, it was pork sausage prepared by a local butcher. In a fourth outbreak, dietary histories indicated that ham had been eaten. Investigations revealed that the ham itself probably was free of viable *Trichinella* and that contamination could have taken place by the addition of raw pork. In this outbreak 78 persons developed symptoms of trichinosis, and about 45 of these gave definite laboratory evidence of recent infection.

## BOTULISM

Four cases of botulism were reported. Two persons became ill after eating home-canned string beans which had been discarded by another family because they looked spoiled. The beans were heated in a skillet before serving. *Clostridium botulinum* was identified morphologically and culturally from the original jar of beans. One other case resulted from eating home-canned mushrooms, and no particular food was incriminated in the illness of the fourth person.

## STAPHYLOCCAL FOOD POISONING

Most of the 62 outbreaks of staphylococcal food poisoning occurred following meals in public eating establishments and private homes. The foods most often involved were meats other than poultry. Eclairs and custard-filled desserts were proved by laboratory tests to be the vehicle of infection in only six outbreaks.

## GASTROENTERITIS, ETIOLOGY UNKNOWN

More than one-half of the local waterborne and foodborne outbreaks were of unknown etiology. Poultry and other meats were the suspected vehicles in 72 of them. The two most frequent sources of infected foods were public eating establishments and private homes. Usually food samples were not available for laboratory examination, and, when specimens were obtained either from the food or from the ill persons, the results were negative or inconclusive for food-poisoning organisms.

## CHEMICAL POISONING AND NOXIOUS FOODS

Five reports of chemical or noxious food poisoning, each affecting only a few persons, were related to the ingestion of wild mushrooms. Another report stated that 20 children became ill when a dining room was sprayed with an insecticide while the group was eating. Several other outbreaks of chemical poisoning resulted from contamination of punch drinks with metal from the containers in which the drinks were stored. Zinc, antimony, and copper were the metals involved.

In two instances beef and French doughnuts were found to be contaminated, and in another instance a number of persons became acutely ill while eating soup in a restaurant. Investigators thought the illness was due to chemical poisoning, although there was no definite evidence of such contamination. One case of lead poisoning resulted from ice used in alcoholic drinks. The ice was stored in a chest which had a lead slab lining the bottom, and chips of the lead were scooped up along with the ice.

## THE DEVELOPMENT AND APPLICATION OF A FOOD SANITATION PROGRAM<sup>1</sup>

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### FOOD SANITATION DEFINED

Before going too deeply into the subject matter, we should first define what we mean by a food sanitation program. There are many individual ideas as to what a food sanitation program encompasses. The following is probably one of the better descriptions of such a program.

"Food sanitation encompasses the entire chain of events from production of food on land or sea, its processing, distribution, storage and marketing, down to the actual preparation and serving of meals and the disposal of wastes. It includes the effects of heat, irradiation, freezing, and other methods of treatment; contamination by dirt, micro-organisms, insects or rodents, chemical additives including radioactive substances, at any stage advertently or inadvertently, and the effects of all of these on the structure, safety, nutritional value and wholesomeness and palatability of the food or beverage. The production of food takes one on land into the rural environment and on water into the marine environment. Factors of contamination in food production must be dealt with in these outlying places since the ability to reclaim contaminated food by processing is limited. For the same reason, places where food is processed must be included. The food sanitation program, in other words, must 'follow the food' back to its beginning and not be confined to places where food is sold or served. It must even follow the food into the home and up to the instant of actual consumption." (1)

There are a number of ways to develop and institute a food sanitation program. It is extremely important that such a program be widely accepted by the public, by the food industry itself, and that it be administered by dedicated, competent and well trained personnel. Let us look at these points one at a time.

### DEDICATED, COMPETENT AND WELL TRAINED PERSONNEL

The Health Officer must be interested in food sanitation and be willing and able to back up his con-

victions when unhappy members of the industry want special consideration. It is important that he be equally willing to stand by his decisions when confronted by people of influence, politicians, etc. A strong Health Officer is a primary pre-requisite for success of a real action program.

The Chief of the Division of Sanitation must have similar convictions and be willing to stand up for these convictions as the need arises, as it most certainly will. In short, he must be a true believer in public health.

All supervisors and sanitarians must likewise believe in public health and be able to withstand individual pressures and perform their duties without showing favoritism to anyone regardless of race, creed or color. A public health sanitarian must not be a political appointee but must be an educated and well trained Civil Service appointee. The possession of the "proper" education is not necessarily an assurance of success as a sanitarian. In addition to a sound professional training in the sanitary sciences, he must have a pleasing personality and high moral standards. To be frank, he must be above the acceptance of gifts and gratuities regardless of their worth. The following definition of a public health sanitarian by Ben Friedman (2) I believe is very apropos. "A public health sanitarian is a person whose education and experience in the biological and sanitary sciences qualify him to engage in the promotion and protection of the public health. He applies technical knowledge to solve problems of a sanitary nature and develops methods and carries out procedures for the control of those factors of man's environment which affect his health, safety and well being."

### WIDELY ACCEPTED BY THE PUBLIC

A program without public support and recognition will falter and eventually die. To obtain public support is quite often a long and sometimes painful process but it can be done. One of the most useful persons to employ to accomplish this purpose is the health educator. They are adept and trained to help you place your program before the public by the various means of communication, such as press, radio and television. They can also help you plan the methods of presenting your program to other groups,

<sup>1</sup>Presented at the 46th annual meeting of the Association at Glenwood Springs, Colorado, August 26, 1959.

both citizen and within the industry. The public should be thoroughly informed of the ramifications of a food sanitation program as to the basic ingredients of the program, the purpose of the various aspects of the program and the end result which is expected.

#### ACCEPTED BY INDUSTRY

Without industry's acceptance and support, a food sanitation program is doomed to failure. The acceptance and support of industry can be obtained but this too is often a long, drawn-out process. It may take longer, but it will pay dividends. To obtain this support, it is necessary that representatives of industry, where possible, be brought into the formulation of all ordinances and regulations. This is best done by having the industries themselves appoint members from their own group to a committee or committees which will develop the laws, ordinances and regulations which you propose to enforce. Naturally you must have a definite proposition to put before them or at least have very definite ideas as to what the contents will be. When the committees meet it is then up to you to sell your point to industry relative to the various aspects of the program. One of the secrets of such a selling job is to contact a few influential members of industry who will be appointed to your industry committee. If you can sell them before the committees-at-large meet, your battle is 90% won. The acceptance and support of industry, such as the Restaurant Association, etc., makes it much easier to have many laws and regulations passed by the governing body and it also makes it easier to enforce in the field for obvious reasons.

#### PLAN BEFORE YOU TAKE ACTION

Now, what about the actual development of a food sanitation program?

A food sanitation program should be developed by means of the following essentials:

1. *Research*
2. *Sanitary survey*
3. *Analysis and interpretation*
4. *The implementation of the program itself*

I think all of us will agree that scientific research is a fundamental basis for such a program. It is important that the program encompass the findings of basic research and dependable fundamental knowledge. It must also contain and incorporate new technological advances and knowledge as the need arises. The sanitary survey is important because it is the means by which field data are collected and actual existing conditions in the area are measured so that your program is geared to actual rather than assumed conditions. I strongly recommend a rest-

aurant evaluation survey for your area. This survey should be impartial and based on good public health practices. It is possible to have such a survey made by the U. S. Public Health Service or by your own State Health Department.

By the way, the field survey should be a continuing and periodic process to keep your program from becoming stagnant and to keep you informed as to the actual progress of the program once it has been instituted. After the sanitary survey has been made, the field data must naturally be analyzed and interpreted so that you can actually develop a plan of action. This will help you take care of any peculiarities or unique characteristics of your area. In addition, sanitary surveys are valuable as:

1. "A factor in stimulating active public interest in the conditions which affect community health.
2. An instrument in promoting public health education.
3. The best means for determining objectively the status of the health conditions in a community and the inter-relation of the factors involved.
4. A weapon for introducing health reform.
5. A means of measuring the element of time and facilities of certain health programs.
6. A measure of facilities and natural resources." (2)

The actual program itself will finally depend upon how well you utilize the available tools of education, information, consultation, demonstration, persuasion, and law enforcement.

#### HOW WE WORK IN SAN DIEGO COUNTY

Mr. Hickey of the Paper Cup and Container Institute asked our department to tell you how we have developed and applied the food sanitation program in San Diego City and County. First of all, I might say that we have a Health Officer who is very interested in food sanitation and sanitation in general and supports the division in every way possible. The Chief of the Division of Sanitation and our sanitarians as a whole meet the afore-mentioned qualifications. We have a qualified and enthusiastic Bureau of Public Health Education interested in working with us in the sanitation program.

The basic ordinances with which we were working in 1955 contained the basic essentials of a good food sanitation ordinance. However, we were having a certain number of difficulties from time to time as to what constituted satisfactory compliance with the various items enumerated. Inasmuch as we graded all establishments where food is processed and served to the public on the premises, such as restaurants, cafes, cafeterias, bars, etc., satisfactory compliance

and interpretation became an important point with the industry affected. In the early part of 1955, the Division of Sanitation contacted the local Restaurant Association, asked the association to appoint members from their group who would serve as a committee along with Health Department personnel and restaurant supply houses. The group was large enough so that a number of sub-committees were formed which worked on certain items of the ordinances, such as floors, walls and ceilings, etc., and after several months' deliberation, definite recommendations were made to the Health Officer and the Board of Health as to what would be satisfactory compliance for each of the items of the ordinance. Through such a process, there is naturally a certain amount of give and take; however, in my opinion we lost very little ground as far as recommendations of the Health Department were concerned. The completed recommendations were submitted to the Health Officer and the local Board of Health and these were adopted without objection from industry. Earlier I had stated that this procedure would make such a program easier to administer. It is easier in this respect: when an owner or manager disagrees too violently with what he thinks is a silly requirement, it is easier sold and he will more readily accept the requirement when informed that his own restaurant association had a part in drawing up these items of compliance and that they were approved by his association as being reasonable and good for the industry as well as for the protection of the public health.

We have continued to keep our program before the public in various ways, one of the latest being the result of a survey made by a team of sanitarians from the California State Health Department under the direct supervision of Mr. Larry Tarbett, Senior Sanitary Engineer. Mr. Tarbett has been most helpful to our department on many occasions due to his wide experience. He also sees the sanitarians' viewpoint, having been one himself before becoming an engineer. The result of their findings indicated not only a significant improvement since the survey made two years prior, but that we had the highest score of any health department they had surveyed, serving a population of 50,000 or more.

Another example of the cooperation of industry dealt with the vending vehicle business. The industry made certain proposals to the Health Department which were not satisfactory to the Health Department or to the local Restaurant Association. Again, members of the Restaurant Association were appointed to meet with the members of the vending vehicle business and the Health Department to arrive at a satisfactory ordinance which was acceptable to all concerned. Even the local Police Department made cer-

tain recommendations in that it did not want the vending vehicles to be parked in the public streets in certain downtown congested areas. We did reach a satisfactory proposal. When an ordinance was submitted to the City Council, it passed unanimously without discussion due to the support of the Restaurant Association and the vending vehicle business.

Our latest example of working closely with industry dealt with the sport fishing boats operating from San Diego Bay and Mission Bay in the City of San Diego. The original discussions involved the United States Coast Guard, San Diego City Harbor Department, the State Department of Public Health, representatives from the Sport Fishing Boat Association, and the local Health Department. From this original discussion group it was determined that a plan of action should be taken. A committee was formed by the Sport Fishing Boat Association to meet with the local Health Department which evolved a set of regulations under the existing ordinances satisfactory to both the industry and the Health Department and afforded protection to the public.

To properly administer your program you *must* keep meaningful records and files on your establishments. The past records of an establishment are most helpful when reviewing the past history with the owner.

You should also keep records of complaints received and of all food poisoning outbreaks. They are an excellent source of information as to the weaknesses in food handling operations, giving you an excellent basis for emphasis in enforcement, training and education.

I would like to briefly describe what is probably the best tool we have in San Diego for administering our restaurant sanitation program. That tool is the "grading system." I want to be the first to admit that it's a controversial subject within our profession. I will also admit that it has its weaknesses; but, in our opinion, its strong points far outweigh its weaknesses. One first and important point is that it is no easy program. It takes work. It cannot be done by "side-walk" inspections.

Our system has three different grades, "A," "B" and "C." A restaurant degraded to "C" must be able to score at least a "B" within thirty days or close. Many of our restaurants so degraded, lose so much business as a result that they never fully recover even though they regain their "A" rating.

At the completion of the grading inspection, all degraded items are called to the owner's or manager's attention. He is told where the violation actually exists, what he can do to correct the violation, and why it should be corrected (education, information, consultation, demonstration, persuasion, and law enforcement). The owner or manager receives a copy

of the inspection sheet which he signs. In addition, a written notice is given, when warranted, which lists the violations and the time limits given for compliance. The value of this procedure is that it is down in black and white so there are no misunderstandings such as arise with verbal notices. When the time for compliance has expired, the sanitarian makes a reinspection. Compliance is secured with the majority of the notices within the time limits given and no further action is necessary. If very little or no progress toward compliance has been made, the sanitarian will issue an invitation to appear within three days at the office of the Division of Sanitation to explain why the defects noted have not been corrected. The notice also states that "this is a final notice before legal action is taken." When the individual appears we generally reach an agreement as to when the corrections will be made. The agreement is written and signed by the owner. At the expiration date of the agreement, a reinspection is made to determine compliance. If the defects have not been corrected, permission is obtained from the Health Officer to cite individual before the appropriate City Attorney or District Attorney for an informal office hearing. I might add that the person who fails to appear at our office is cited to the City Attorney without delay. The City Attorney explains the law and the reasons for the law and specifies certain time limits for correction. The individual is told that non-com-

pliance will result in the issuing of a complaint by the attorney's office with resulting court action. This will generally end the matter in 99 out of 100 cases as the individual sees that we mean business.

#### SUPPORT OF PUBLIC AND INDUSTRY IS VITAL

In conclusion I want to re-emphasize the necessity of obtaining the support of the community as a whole. It is important to work with and obtain the support of the local restaurant association; waitress, bartender and food service employees' union; P.T.A.; etc. Naturally these groups and their actions take time, running anywhere from a few months to maybe even a year. However, the results which are derived from such cooperative action are worthwhile because of the resulting universal acceptance of the ordinances and regulations and the easier administration resulting therefrom.

The seal of San Diego County bears the following inscription which I believe to be especially significant for public health workers: "The Noblest Motive is the Public Good."

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## PENICILLIN AND OTHER ANTIBIOTICS IN MILK

Widespread use, by dairy farmers, of animal antibiotic preparations, notably penicillin, which are commercially available for intramammary treatment of bovine mastitis, has led to the frequent occurrence of detectable amounts of penicillin and other antibiotic components in milk distributed for human consumption. The presence of penicillin and other antibiotics in consumer milk arises chiefly from the failure of some dairy farmers to withhold from marketing the milk of animals treated for mastitis until such preparations have been completely eliminated from the udders. There is also some suspicion that the preparations are being used promiscuously in healthy dairy herds or are being directly added to milk as a preservative against spoilage during warm weather. The significance of penicillin in the milk supply devolves chiefly around the question of its potentiality to cause allergic reactions in previously sensitized persons or to sensitize previously nonallergic individuals.

Penicillin preparations for use in the local treatment of bovine mastitis were first certified for direct sale to dairy farmers in 1947 by the Food and Drug Administration. In 1951 this agency instituted a regulation requiring the printed matter accompanying such preparations to bear the statement, "Important: Milk from treated segments of udders should be discarded or used for purposes other than human consumption for at least 72 hours after the last treatment." The FDA subsequently found that, although repeated doses of 25,000 units of penicillin for each infected segment of the udder were usually considered adequate for effective treatment of mastitis caused by penicillin-susceptible micro-organisms, competition among manufacturers had gradually resulted in an increase in the potency of some preparations to as much as 1,500,000 units per dose. Such highly potent products were considered likely to increase the length of time required for complete elimination of the antibiotic from the milk of treated animals whereas there was no evidence to indicate that massive doses would increase the efficacy of the drug. Accordingly and on the basis of three nationwide surveys which showed that collected and tested samples of market milk contained variable small amounts of penicillin, the FDA held a conference with representatives of all interested groups and a panel of medical authorities on antibiotics, allergy, and pediatrics to consider the potential

health hazard of exposure to antibiotics in market milk. It was the consensus of this panel that antibiotics such as bacitracin, neomycin, polymyxin B, and the tetracyclines, all of which may be found in mastitis preparations, do not pose a hazard to health even though they might find their way into market milk. On the other hand, it was agreed that even in the small amounts present in milk, penicillin, which is highly antigenic, is capable of causing allergic reactions in highly sensitive individuals. It was estimated that the number of such persons comprised something less than 10% (17 million) of the total population and that the reactions to penicillin in milk could vary from mildly transient to possibly serious ones.

Early in 1957, the FDA published in the *Federal Register* its intention to limit the labeling directions for use of penicillin mastitis preparations to 100,000 units per dose. The chief opposing arguments to this proposal were (1) that penicillin could be excluded from milk without reducing unit dosage by incorporating a nontoxic dye in mastitis preparations to color milk from recently treated animals and (2) that the public health would be protected by restricting use of the preparations to prescriptions by licensed veterinarians. Both of these alternatives were overruled by the FDA because no assuredly nontoxic dye suitable for the suggested purpose was available and because restriction for use only by prescription of veterinarians would involve extra expense and possible hardship to dairy farmers due to the inaccessibility to veterinarians in some localities, plus the fact that, under the law, adequate directions for lay use could be written for use of mastitis preparations. Accordingly, federal labeling regulations were amended and became effective respectively as follows in July and August of 1957: The immediate containers, rather than the package literature, of preparations intended for the treatment of prevention of mastitis in dairy animals, are required to bear the statement, "Warning—Milk taken from dairy animals within \_\_\_\_ hours after the latest treatment for mastitis must not be used for human consumption." (The blank is to be filled in with the number 72 unless proof is furnished to justify a shorter period for a particular preparation.) The directions in the labeling for such use of penicillin preparations are required to specify single doses not to exceed 100,000 units. In cooperation with the U. S. Department of Agriculture, the FDA also undertook an intensive program to educate farmers through the National Milk Producers Fed-

eration concerning the importance of not using milk for human consumption from cows treated for mastitis for a period of three days after the last treatment. The FDA has indicated that, if the current regulations and educational program are not adequate to eliminate penicillin from the milk supply, it may become necessary to prohibit its use in animal mastitis preparations.

The American Veterinary Medical Association has expressed the view that there is an adequate number of veterinarians to supervise and provide this form of local treatment for mastitis and that penicillin is the drug of choice in treating certain forms of bovine mastitis. In its opinion, elimination of penicillin for this purpose would constitute unwarranted interference with veterinary service, whereas restriction of penicillin to a professional level would eliminate almost entirely the abuses now observed.

The majority of a representative group of allergists, whose opinions were sought regarding the current status of the problem of allergic reactions to penicillin-contaminated milk, are in substantial agreement that such reactions have occurred and probably have gone undetected in a large number of instances than is reflected by reports in the medical literature. Some allergists have not encountered such reactions; others have seen reactions after ingestion of milk, which suggested sensitivity to penicillin. A few are inclined to the view that the small amounts of penicillin found in milk are harmless to penicillin-sensitive persons except in the rare, exceptionally sensitive individual. As little as 2 to 3 units of ingested penicillin have produced an immediate anaphylactic type of reaction in extremely sensitive persons. Recent experiments also have shown that an oral dose two or three times the intravenous dose is required to produce reactions in subjects whose skin has been passively sensitized by injections with serum which contains antibodies to penicillin.

Most of the allergists consulted who have observed reactions ascribed to penicillin in milk indicate that these are usually of the commonly encountered, delayed type of chronic or recurrent urticaria. A minority of the consultants believe that definite clinical proof is available to show that immediate and delayed reactions are caused by penicillin in milk and that, although the incidence of penicillin contamination of milk samples is declining, the problem of allergy is increasing as a greater portion of the population becomes sensitized to penicillin. There appears to be more uncertainty regarding the capability of the small amounts of penicillin in milk to induce penicillin sensitivity than

to produce reactions in persons already sensitive to the drug. However, in certain studies of rheumatic fever, considerable information is available relative to the development of sensitization to orally and subcutaneously administered penicillin. One consultant has suggested the possibility of limiting penicillin therapy of mastitis in dairy animals to systemically injected soluble preparations of the drug as a means of avoiding the contamination of milk. The further suggestion that testing procedures be established for detection of penicillin in market milk would be very difficult to carry out with the techniques for testing which are now available, particularly at the level of local milk receiving centers.

#### SUMMARY AND CONCLUSIONS

The failure of some dairy farmers to withhold from the market milk from animals that have been recently treated for mastitis by intramammary infusion of penicillin preparations sold directly for this purpose together with their abuse of such preparations in healthy dairy herds or as preservatives by direct addition to milk, has created a public health problem by exposure of consumers who are allergic, or may be sensitized, to variable small amounts of penicillin in the milk supply. The presence in milk of other antibiotics arising from similar use and abuse of such preparations does not appear to constitute a similar hazard.

Current federal labeling regulations require that animal antibiotic preparations intended for lay use for the prevention and treatment of mastitis by local intramammary infusion be sold with a marking on the container against human consumption of milk from treated animals up to 72 hours after the last treatment and that penicillin preparations intended for this purpose be sold with directions for use of single doses not to exceed 100,000 units each.

There is presumptive, if not conclusive, evidence that ingestion of penicillin-contaminated milk has produced, and is capable of producing immediate and delayed generalized allergic reactions in persons highly sensitive to this antibiotic and that although comparatively rare, reactions attributable to this source have probably gone unreported or unrecognized. The potentiality of ingested penicillin in milk to induce penicillin sensitivity in nonallergic individuals is suspected but not established.

There does not appear to be adequate evidence to prohibit totally the use in animals of antibiotics to which bacterial resistance may develop and which may be considered essential for treating human infections.

## DEPENDENCE OF OXIDATION-REDUCTION POTENTIAL OF MILK ON ITS VITAMIN C CONTENT<sup>1</sup>

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In experiments designed to correlate various changes in milk during storage, a striking parallel was noticed between changes in the oxidation-reduction potential and the reduced ascorbic acid content. Raw milk from 30 individual cows was examined within two hours of milking, stored for 5 days at 4°C and re-examined. The bacterial counts were less than 7000 per ml and did not increase appreciably over the 5 day period.

The  $E_h$  was determined on a Beckman Model M pH meter using a calomel electrode and a Beckman platinum electrode. Prior to each measurement, the platinum electrode was thoroughly cleaned in hot dichromate cleaning solution, rinsed several times with distilled water, and dried before insertion into the milk sample. The instrument was standardized before the start of a series of readings and checked intermittently as the determinations proceeded. Each sample was in contact with the electrodes for 20 minutes prior to recording the  $E_h$  reading. The analysis for reduced ascorbic acid was carried out according to Hawk, Oser and Summerson (1). Iron was determined by the bipyridyl method and copper by the ammonium thiocyanate - guaiacum method as described by Snell and Snell (4). The Pearson Product-Moment Coefficient of Correlation,  $r$ , was used in analyzing the results. A perfect positive correlation has a value of +1.0 and a perfect negative correlation has a value of -1.0. From the data, the correlation coefficient  $r$  was calculated.

$$\begin{array}{l} 0 \text{ hours} \quad r = -0.777 \\ 5 \text{ days} \quad r = -0.626 \end{array}$$

According to Lacey (2), the coefficient at the 1% level for 28 degrees of freedom is  $\pm 0.463$ .

There would therefore appear to be a definite inverse relationship existing between the oxidation-reduction potential of milk and its reduced vitamin C content. This is true both in fresh milk and in milk stored at 4°C for 5 days. The results are expressed graphically in Figures 1 and 2. The best curve was calculated by the Method of Least Squares.

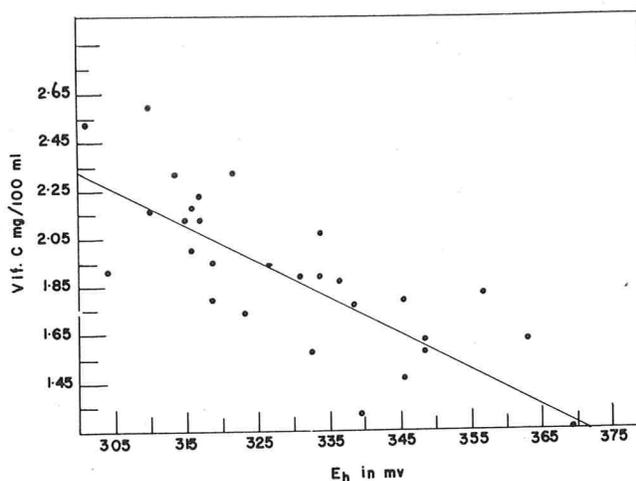


Figure 1. Correlation of  $E_h$  of fresh raw milks with reduced ascorbic acid content.

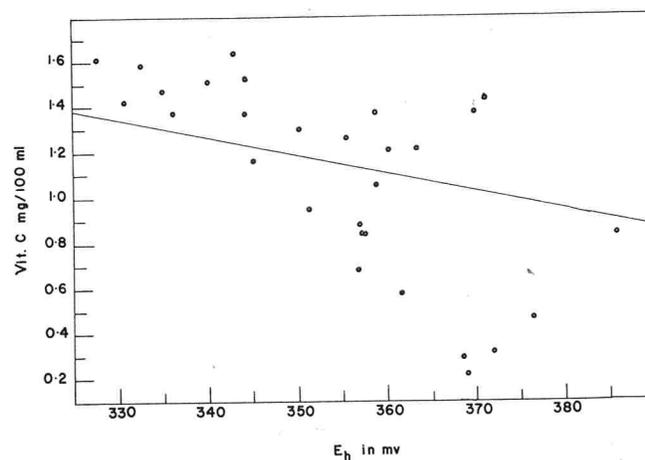


Figure 2. Correlation of  $E_h$  of raw milks, refrigerated for 5 days, with reduced ascorbic acid content.

Confirmation of the role of ascorbic acid as the major determinant of the  $E_h$  of milk was obtained by allowing samples of raw milk from 8 individual cows to age at 4°C. The change in  $E_h$  and reduced ascorbic acid content was determined and the level of reduced ascorbic acid brought back to its original value by the addition of the calculated amount of a 20 mg. % solution of reduced ascorbic acid. When this was done, the  $E_h$  was found in most cases to be almost identical to that at zero and one must con-

<sup>1</sup>Contribution from the Dairying Laboratory, The University of British Columbia, Vancouver 8, Canada.

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TABLE I—ABILITY OF L ASCORBIC ACID TO RESTORE THE  $E_h$  OF AGED SAMPLES OF RAW MILK

Cow No.	L ascorbic acid required to bring stored milk to zero time ascorbic acid content		Eh at zero time	Eh after 5 days storage	Eh after addition of L ascorbic to stored milk
	mg	%			
1	.92		335.	350.	324.
2	.92		337.	356.	327.
3	1.20		309.	343.	310.
4	.60		315.	331.	315.
5	.96		314.	344.	314.
6	1.76		316.	375.	315.
7	.80		333.	354.	338.
8	1.56		316.	360.	315.

clude that the destruction of vitamin C normally accounts for the principle changes in  $E_h$  of milk on storage (Table I).

These data are in agreement with the observations of Swanson and Sommer (5) obtained with milk from 4 cows. Nilsson (3) has shown that the  $E_h$  of mastitic milk decreased markedly on storage and has concluded that this change in  $E_h$  might be used to determine the presence of mastitic milk in a mixed milk supply. It would appear that any factors which accelerate the destruction of vitamin C will tend to counteract the changes brought about by the mastitic milk and will decrease the usefulness of  $E_h$  determination as an indication of mastitis.

It was found that milk from several cows consistently showed a rapid decrease in reduced ascorbic acid content. At first it was thought that this was due to enzyme action but on further examination it

was found that the causative agent was heat stable and dialyzable. This implicated elements such as copper and iron. Iron determinations on a number of samples of milk revealed no differences whereas the copper content of all milks showing rapid destruction of reduced ascorbic acid was almost twice that of the normal milks (Table II). There were no known differences in the feed available to the different cows nor was there any known pathological condition, so the reason for the consistently high copper content is not obvious. The observations were made over a period of several months and appeared to be characteristic of particular cows.

## SUMMARY

A study of individual samples of raw milk from 30 cows revealed an inverse relationship between the oxidation-reduction potential and the vitamin C content. This was true both for fresh milk and milk that had been refrigerated for 5 days. It was also found that the restoration of the vitamin C level in stored milk to its original value also returned the oxidation-reduction potential to its original value, thus indicating that the decreased vitamin C content largely accounted for the change in oxidation-reduction potential.

The milk from a few individual cows showed an abnormally rapid loss of vitamin C and this could be correlated with the copper content of the milk. No explanation for the high copper contents was available.

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TABLE 2—DESTRUCTION OF REDUCED ASCORBIC ACID AS A FUNCTION OF THE COPPER CONTENT OF RAW MILK

Cow No.	Eh		Vitamin C		Cu content
	0 days	5 days	0 days	5 days	
	mv.	mv.	mg/100 ml		p.p.m.
11	—	—	1.82	.18	.275
12	316	375	2.23	.47	.235
13	379	489	1.10	.34	.210
14	344	384	2.19	1.92	.125
15	362	369	1.63	1.37	.140
16	314	344	2.13	1.16	.175
17	337	504	1.77	.16	.305

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# Procedure for The Investigation of Foodborne Disease Outbreaks

Recommended by  
**INTERNATIONAL ASSOCIATION OF MILK AND FOOD  
SANITARIANS, INC.**

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## NEWS AND EVENTS

### AWARD MADE TO OUTSTANDING SANITARIAN OF TENNESSEE



Outstanding Tennessee Sanitarian award being presented to Dorcie Lee Yates (right) by retiring president Glenn W. Kilday at the annual meeting of the Tennessee Association of Sanitarians.

For the first time in Tennessee, the Outstanding Sanitarian Award was made on September 30, 1959 at the annual dinner meeting of the Tennessee Association of Sanitarians. At the 1958 meeting a year earlier, the machinery had been set up for making the award, and at that time a committee had been selected, made up of the following members:

- Director of Local Health Services, Tenn. Dept. of Public Health
- Chairman, Health Officers Section, Tenn. Public Health Assn.
- Chairman, Sanitarians Section, Tenn. Public Health Assn.
- President of Tennessee Association of Sanitarians
- Director, Division of Sanitary Engineering, Tenn. Dept. of Public Health.

Principal qualifications for candidates for the award include employment as a full time sanitarian in a local health department in Tennessee, at least two years of past service, no more than the past five years included in the period used in selecting qualifications for the award, etc. Each of the six In-Service Training groups for sanitarians was allowed to nominate not more than two candidates. The sanitation consultants then collected data on each candidate for submission to the committee, and from the seven candidates, the committee made the final selection.

The award for 1959 was made to Mr. Dorcie Lee Yates, Sanitarian for the Humphreys County Health Department, Waverly, Tennessee. Humphreys County is a rural county, with Waverly the largest town having a population of approximately 3,000. Mr. Yates began work with the local health department in 1949. At that time, there was no organized sanitation program in the county. At present there is no full-time health officer, but the health officer of the adjoining county exercises administrative control over the unit. The accomplishments of Mr. Yates in Humphreys County have been numerous. Examples of his activities are as follows: During 1955 and 1956 a system of sanitary sewers and a treatment plant were constructed in Waverly. At present, the city limits population is 90% sewerred. He has initiated a county wide spraying program for insect control; it is estimated that 75% of the homes in the county have been reached, and in addition a fogging machine has been used in the three principal towns. Under his general direction, a successful rabies control program has been carried out.

The construction programs that have been carried on to build the New Johnsonville Steam Plant and a large DuPont plant have resulted in many trailers, temporary housing, crowded living conditions, etc., in the county. Mr. Yates' efforts at New Johnsonville have resulted in a complete sewer system and sewage lagoon to serve that town. He has succeeded in having all of the schools in the county install approved water and sewerage systems. In 1953, only 2 of 37 schools were so equipped.

Through his efforts, all schools now have approved cafeterias; all now serve only pasteurized milk. A sanitary landfill was initiated for Waverly in 1956, and in 1958 the U. S. Public Service ordinance and code (1953 edition) was adopted for Waverly; only pasteurized and graded milk is now sold there.

Mr. Yates has also been very active in civic affairs. He is a member of the local Exchange Club, the American Legion, and the Masonic Lodge. He has done much work for the Boy Scouts, and has received from them the Log Rifle Award and other honors. In 1957 the Exchange Club elected him to the honor of "Man of the Year" for the town of Waverly.

Public acceptance of Mr. Yates' program has been excellent, and in all areas in which he has worked, outstanding results have been obtained. His record should be an inspiration and a challenge to all sanitarians.

## MILLIONS SPENT ON DIET AIDS AND REDUCING DEVICES

The American Medical Association has estimated that overweight Americans are being fleeced of \$100,000,000 a year in their purchase of spurious diet aids and useless mechanical devices. Postmaster General Arthur E. Summerfield has stated that reducing schemes are probably the most lucrative of medical frauds today, and that use of the mails to promote medical quackery is at the highest level in history.

Weight control is a serious medical problem for many people, and for many others it is a cosmetic or an esthetic problem with an important relationship to mental health and well-being.

But these facts merely create an intense demand for an article that science has not yet produced: a simple, safe and sane food, drug, or device which will bring about loss of body weight without exercise of the will to cut down the food intake.

There is no such article. But unscrupulous promoters by the scores have rushed into the vacuum with their worthless pills, potions, freak diets, mechanical gadgets, and the like. Riding the crest of the popularity wave at the moment are the electric vibrator devices, running the gamut of hand units, pillows, chairs, tables, and mattresses. These have been held forth with tempting claims for massaging and shaking off the excess pounds, "spot" reducing and firming tissues, and for treatment of serious diseases. The infinite variety of products which have been sold for reducing is a tribute to the imagination, if not the scruples, of the promoters. A list prepared by the National Better Business Bureau includes, in addition to those already mentioned:

- bath salts and bath cabinets
- soaps, pastes and creams
- garments, girdles and belts
- rubber suction cups for "spot" reducing
- purgatives and laxatives to rush food through the system
- bulk producing agents to fill up the stomach and cause loss of appetite
- drugs to stimulate metabolism
- drugs to depress the appetite
- dehydration drugs alleged to "flush" or "melt" fat off
- food products to appease the appetite

And of course vitamin products have been sold under promotions which imply a direct weight reducing effect, whereas they would have value at most only for supplementing a rigid diet (a fact usually stated in the fine print.)

The Food and Drug Administration has at one time or another encountered most of the products listed

above, and also has recently found even cigarettes and chewing gum with label claims for weight reducing. While most such products are harmless, although worthless, some have been outright dangerous and others would not be safe for persons with certain diseases.

To summarize the important facts about reducing:

*Medical guidance* can be important to almost anyone who needs to loose weight. This may be true even for the person wishing to lose only a few pounds. The possibility of undetected chronic disease, or the continuing need for health counseling and guidance, indicate the wisdom of consulting a doctor. The individual who wishes to lose a large amount of weight has a serious medical problem, and without exception needs expert guidance.

*Restriction of food* is the principal factor in reducing. Lowered caloric intake is necessary for anyone to reduce, and certainly there is ample dietary information available. The person who wants to reduce should be sure to obtain dietary information from competent sources. The U. S. Public Health Service, the American Medical Association, and family physicians are among such sources.

*Exercise has a role* in reducing, and moreover can be of general health benefit. Authorities point out that to be beneficial exercise need not be violent or prolonged. Mild exercise of short duration can be helpful in reducing and aid to the general health condition. Here again, however, the amount and kind of exercise best suited to the individual's needs and health can best be determined by a physician.

*Finally, don't believe those false promises* that one can eat as he pleases and still lose weight simply by using some food, drug or mechanical gadget.

From a press release issued by the Secretary, Department of Health, Education and Welfare.

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## LABORATORY SURVEY OFFICER'S COURSE ANNOUNCED

*Methods and Practices for Milk Laboratory Survey Officers* is the title of a new course to be presented by the Training Program at the Robert A. Taft Sanitary Engineering Center, Cincinnati, February 1-5.

This course takes the place of "Microbiological and Chemical Examination of Milk and Dairy Products," which had been scheduled for the same period.

Designed for survey officers responsible for certification of laboratories examining milk supplies for interstate shipment, the new course will take up, among other subjects, changes in the eleventh edi-

tion of "Standard Methods for Examination of Dairy Products," preparation and shipping of split samples, statistical analysis of plate counts on samples split with state laboratories, tests for pesticides in milk, detection of added water in milk, phosphatase reactivation in HTST pasteurized milk and cream and current developments in programming for certification of interstate shipments.

Lectures, demonstrations, and laboratory practice compose the course. No fee is charged. Applications should be addressed to the Chief, Training Program, Robert A. Taft Sanitary Engineering Center, 4676 Columbia Parkway, Cincinnati 26, Ohio, or to a PHS Regional Office Director.

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### TRAINING SEMINARS PLANNED BY WISCONSIN GROUP

A series of Grade A seminars will be held early in 1960 at strategic locations in the state. The first of the series will be for supervisory personnel to be followed later with joint sessions with fieldmen and supervisory personnel. Purpose of the seminars is to keep all sanitarians and fieldmen abreast of the latest developments in Grade A production and processing and as a refresher course in interpretation of Grade A requirements. Evert Wallenfeldt, Extension Dairy Specialist, Clarence Luchterhand and Myron Dean of the State Department of Health will plan and guide the programs.

Another series of meetings are also being planned. These will be cooperative ventures, under the joint sponsorship of the University of Wisconsin, the Department of Health and the Department of Agriculture. These will have as their purpose the dissemination of information on pasteurization among plant operators and their employees. With the advent of the compulsory Grade A law and accompanying regulations it is important that all concerned know the reasons behind the various requirements for Grade A processing. Details for the operations of these meetings are under the guidance of Harvey Weavers of the Department of Agriculture.

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### DENVER TRAINING PROGRAM ANNOUNCED

A course in the Epidemiology and Control of Food-Borne Diseases will be offered by the Communicable Disease Center, Public Health Service, at Denver, Colorado, December 7-11, as a part of the continuing program of the Center's Training Branch.

This course is designed for health officers, epidem-

ologists, food program administrators and others who are concerned with planning and supervising public health activities in the control of food-borne diseases. It will provide information on the current status of food-borne diseases and on applicable epidemiological and investigational techniques. Emphasis will be placed on the measures necessary for the control of these diseases with particular reference to newer concepts in planning and implementing a food hygiene program. A look at contemporary food problems will also be taken. Utilization of various types of presentations will be made, including an epidemiological problem which will be solved by the group method. Registrants will be expected to attend all sessions of the course.

Further information and application forms may be obtained from: Chief, Communicable Disease Center, Public Health Service, 50 Seventh Street, N. E., Atlanta 23, Georgia, Attention: Chief, Training Branch; or from: Public Health Service, Region VIII, First National Bank Building, Denver 2, Colorado.

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### FLIGHT INTO SPACE REQUIRES EXTENSIVE NUTRITIONAL KNOWLEDGE

Even before it has "scratched the surface" on the earth, the science of nutrition is confronted with the challenge to grasp the problem of space flight, reports Miss Jane C. Ebbs, Special Feeding and Nutrition Advisor to the United States Army.

In a special report prepared for the Nutrition Foundation on the role the science of nutrition must play in man's exploration of outer space, Miss Ebbs quickly makes one concession: The engineering problems involved in piercing the earth's atmosphere "are more nearly solved" than those of nutritionally providing for the astronauts to be sent aloft.

The first question to be faced is necessarily that of how rocket blast will affect space travelers. Before building up sufficient velocity to "escape" the earth's gravitational pull, the space traveler will be subjected to the stress of a "force many times gravity at earth's surface." How will he survive?

Nutrition does not have definite answers, Miss Ebbs says, as to the way in which it can guard against this acceleration stress or assist in recovering from it. The clear evidence of the problem's importance was attested, however, in the recent flight experience of the U. S. monkeys, Able and Baker. The Soviet Institute of Nutrition is also giving similar studies high priority. In fact, while the U. S. press only credits them in sending three animals in space flight, the Russians claim far more. Miss Ebbs' views "even

before Sputnik II carried the dog into space" the Soviets had for a "number of years" sent animals on space flights, and "recovered them."

The highly publicized ascent of the Soviet dog, Laika, into Space has provided all scientists with valuable data, the army nutrition specialist states. While indicating a return to "normal" once in orbit, the experiment also showed that the dog suffered marked stress in initial acceleration and even greater stress at the point of "escape" — just before it reached zero gravity. However, once zero gravity is attained, Miss Ebbs suggests, it may be that the astronaut's energy requirement will decrease; "he will no longer combat the stress of gravity experienced by the earth-bound."

But at zero gravity the nutrition problems will have just begun. Everything, not fastened down, will float. Liquid will not pour and, if left in an open container, will break into particles. Similarly solid foods left in the open will turn into dust. The decomposition of both of the nutritive essentials would endanger the astronaut, if "aspirated". Only at the end of the line will the basic engineering problems connected with food consumption disappear: "Once inside the mouth," Miss Ebbs says reassuringly, "the food is secured by closing the lips . . . chewing and swallowing are no problem."

If "synthetic gravity" is not created for rocket ships, food supplies will have to be in liquid or semi-liquid form. Like the high-flying jet pilot of today, the astronaut will have these precious liquids packed in squeeze bottles or in closed containers piped "directly to the . . . mouth."

Even if "synthetic gravity" becomes available, there is little likelihood that the astronaut will be able to feast on steak or other traditional foods of Earth's surface. Miss Ebbs points out that the sort of foods we know and the equipment to prepare it, will be too bulky for the cramped rocket ship. The probability is that dehydrated, pre-cooked foods, only requiring the addition of hot or cold water, may be staple fare.

But the Army nutrition specialist notes that a trip to near-by Mars would take all of 500 days each way. Thus, even dehydrated food may be limited to relatively short hops, as, for example, the moon, only three days' distance from us. In fact, Miss Ebbs reports, "some scientists believe . . . a closed ecological system . . . will be the only source of food logistically feasible." Such a system, she says, "envisions the use of plants to provide food and oxygen to the space traveler, and utilization of the traveler's expired carbon dioxide and urinary and fecal products for the nourishments and growth of the plants."

The most likely plant to join man in the "closed

ecological system": the common green algae. The simple plant, nearly microscopic in size, normally lives in oceans, lakes and rivers. Five pounds of the living plant would produce sufficient oxygen for one man as well as clearing his respired carbon dioxide. Found to be "highly digestible," algae has these nutritive components: protein, 50%; fat, 25% carbohydrates, 15% and ash, 10%. It provides B vitamins, carotene and ascorbic acid.

If algae is to be the diet of the astronaut, science must devise means to "harvest" the tiny algae from its growing medium, find a process to make algae safe for human consumption and develop a technique "to incapsulate the algae into a container for swallowing." And then, the question remains whether algae will be "aesthetically acceptable" to a space traveler.

Perhaps, Miss Ebbs suggests, the whole problem will revert to the long-held theory that man in space will live on pills.

Water to quench the traveler's thirst will present similarly difficult problems. If it will be necessary for him to drink a minimum of five pounds of water a day, his requirement for a year would run to almost one ton. A load of that dimension just is not practicable for space travel. "A partial solution," Miss Ebbs states, "will be the development of means to recover, and make safe, water from expired air, perspiration, and from urinary and fecal waste products.

Whatever the final response to these problems, it is certain, Miss Ebbs concludes in her report for the Nutrition Foundation, the science of nutrition will have an important role in putting man into Space.

Reprinted from Nutrition Foundation News.

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### MISSISSIPPI ADOPTS PHS MODEL POULTRY ORDINANCE

The Mississippi State Board of Health has adopted, effective January 1, 1960, the sanitation provisions of the model Poultry Ordinance developed by the Public Health Service. Poultry production has become a major industry in Mississippi, and the Regional Office in Atlanta reports that many poultry processing plants are now preparing plans and specifications for major structural changes or alterations to meet the requirements of the new regulations. The PHS recommended Poultry Ordinance, first published in 1955, has now been utilized as the basis for new poultry sanitation regulations in 11 states.

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### URGES RAPID COOLING OF LARGE FOOD MASSES

If a large quantity of hot food is headed for the refrigerator, cool it rapidly to room temperature be-

fore putting it in the cooler and the use of cold flowing water is a good way to do it.

Miss Lenora Moragne, of the New York State College of Home Economics, Cornell University, reported her findings at a recent meeting of the Cornell Dairy Industry Conference and the New York State Association of Milk Sanitarians in Rochester.

Working under the direction of Professor Karla Longree, Miss Moragne measured the effects of warm foods on refrigerator temperatures and compared the speed at which foods cooled under varying conditions. The exact amount of hot food that can be safely placed in a refrigerator depends upon many factors including the total load of food placed in the cooler in relation to the capacity and efficiency of the refrigerator. Miss Moragne stated that small amounts will not cause refrigerator temperatures to rise dangerously high. She warns that when food is prepared and stored in large quantities it should not be stacked into the refrigerator while it is still hot, for temperatures favorable to the growth of harmful bacteria will persist for a sustained period.

It would seem that one means of reducing or eliminating the danger of raising the temperature in a refrigerator is to place food in it *that has been cooled rapidly before it was placed in the refrigerator. Precooling food at room temperature is a very slow process and therefore a hazard.*

Miss Moragne found that sauce that had been cooled to 80 degrees F. before it was refrigerated took less than one half as much time to cool as sauce that was not precooled. The use of a fan to circulate the air in the refrigerator was found to reduce the time required for cooling to as much as one half. There was also less variation of air temperature within the refrigerator when a fan was on, and the average refrigerator temperatures were lower when the air was circulated.

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### NEW RESEARCH PROJECTS ON BUTTER BEGUN

Looking toward a brighter future for butter sales through flavor development is the goal of research projects now being initiated by the American Dairy Association at the University of Minnesota and Oregon State College.

"Many people in the industry do not realize how rapidly butter manufacture is changing from the use of farm-skimmed cream to factory-skimmed cream," comments Dr. D. H. Jacobsen, product research director for the association, in pointing out the need for research in this field.

"Government reports today indicate that less than

half the butter produced in this country is manufactured from farm-separated cream," he declares. "This has resulted in a high proportion of sweet cream butter which is rather bland in flavor."

The new research projects are directed to (1) the possibilities of producing dairy spreads with distinctly different flavor levels; (2) methods of manufacturing and (3) consumer preferences.

"It is possible," Jacobsen adds, "that butter of more distinctive flavor would have special appeal for home cooking and baking uses."

Research on the development of a superior dairy spread has been started at the University of Minnesota, St. Paul, with Dr. S. T. Coulter and co-workers Dr. E. L. Thomas and Dr. Howard Morris. The project seeks to devise new methods of producing butter with the best spreadability, highest palatability and top keeping qualities.

Early stages of this project involve butter as it is known today. But the 3-year plan includes investigations of new compositions. The studies are designed to test new combinations of butterfat and other milk solids which may prove desirable as added products to broaden the market for butterfat.

First consideration is to develop products which will increase total consumption of butterfat rather than replace butter as it is known today.

Higher flavor levels in butter is the objective of another new project recently recommended by the research committee of the American Dairy Association and approved by its board of directors. This project is under the direction of Dr. Edgar A. Day in the newly organized department of food technology, Oregon State College, Corvallis. Working with him will be bacteriologists P. R. Elliker and W. E. Sandine.

Not only will the scientists isolate and measure chemical compounds responsible for flavor, but they will study methods for producing higher flavor levels.

"The unique flavor of butter is its strongest selling point," says Dr. Jacobsen. "Greater emphasis should be given to this quality by the butter industry in meeting the competition of lower priced spreads."

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### FDA REGULATIONS UNDER NEW HEAD

The Food and Drug Administration has announced the establishment of a new position of Assistant to the Commissioner for Regulations Making. J. Kenneth Kirk, presently head of FDA's Boston District, is to be transferred to the newly created post.

Commissioner George P. Larrick said that the new position has become necessary because of the increasing volume and complexity of regulations re-

quired in the administration of the Federal Food, Drug, and Cosmetic Act. Subjects covered include food standards, safe tolerances for pesticides and food additives, safety clearance of new drugs, and certification of insulin, antibiotics, and coal-tar colors, as well as interpretive regulations under the general provisions of the law.

Mr. Kirk will advise the Commissioner and the Deputy Commissioner and will act for them in discussions with industry and consumer representatives on proposed regulations. He will also coordinate the regulation making activities of FDA's scientific Divisions.

Kirk entered the Federal service as a Food and Drug Inspector at FDA's New York District in 1930. After tours of duty at New York, Buffalo, and Pittsburgh, he became Chief Inspector of the Philadelphia District in 1937. In 1940 he joined the staff of the Commissioner in Washington where he handled enforcement recommendations until his Boston appointment in 1957.

In 1955 he received the National Civil Service League Merit Citation for outstanding public service and in 1956 he received the Superior Service Award from the Department of Health, Education, and Welfare.

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### NEW BOOK ON FOOD PRESERVATION

Professor Norman W. DeRosier of Purdue University has recently published a new text entitled, *The Technology of Food Preservation*. The book deals with principles of the use of refrigeration, freezing, canning, fermentation, pickling, preserve making, chemical additives and radiation.

The book contains eleven chapters and four hundred twenty-five pages with appropriate tables and illustrations. The publisher is the Avi Publishing Co., Inc., Box 388, Westport, Conn. Price - domestic \$8.50 - foreign \$9.50.

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### SURVEY SHOWS HALF OF U. S. FAIRS HAVE POLICIES FAVORING PAPER SERVICE

About half of the nation's fairs have established policies favoring the use of paper service, according to a survey just completed by the Dixie Cup Division of American Can Company.

"Exact policies are difficult to determine," a Dixie Cup official said, "but the trend definitely seems to be to require paper at all concessions and in grandstands."

Questionnaires were sent to 104 leading fairs

throughout the country. Returns were received from 57, representing 38 states.

Dixie Cup said its survey indicated that paper was firmly established at fairs for food and beverage service, and that its use was growing.

Eighteen of the fairs responding reported that they expect increased consumption, ranging up to 60 per cent, of paper cups, plates and other items this year.

The strongest paper front at fairs apparently is for cold drinks, for 23 of the operators reported their exhibitions used paper cups exclusively for cold beverages. Only six fairs reported 20 per cent or less of its cold drinks being served in paper cups.

On hot drinks, 15 fairs said 100 per cent were served in paper cups, and only eight out of the 48 answering this question estimated that 25 per cent or less of all hot drinks were sold in paper cups.

The higher level of sanitation possible with the use of paper service was named as the most important reason for paper usage. Twenty-five fair officials mentioned it.

The labor-saving and less-dishwashing factor was noted by nine, while the same number cited the elimination of the bottle breakage problem.

Other important reasons were: convenience, safety, easier clean-up and disposal, health department regulations, maintenance of cleaner grounds, elimination of the bottle return problem, reduced investment required by vendors, scarcity of storage space, and avoidance of accidents.

"Paper prevents broken glass which could result in law suits," one fair general manager stated. "It's easier to pick up paper than bottles, and our cleaning costs are considerably less." Another operator echoed these opinions, noting that "no pick-up" is required and that "paper sweeps."

One fair man said there is less danger to exhibits when paper is used — presumably because bottles can cut or be thrown.

Still another maintained that "people like paper better for fairs and feel paper cups are cleaner." And one operator simply put it this way: "Concessionaires prefer it and so do we."

On the question of established policy, six fairs said they had no strict rules, but that their recommendations of paper to concessionaires generally were honored.

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### NEW ICE CREAM FLAVOR DESCRIBED

A new kind of ice cream flavored with pure maple syrup was described recently by a dairy industry scientist who has made a study of at least six possible

ways of combining the two foods.

The research was carried out at the New York State College of Agriculture, Cornell University, by Donald J. McDermott of the National Dairy Products Corporation, Long Island. McDermott, who did the research as a graduate student under Prof. William K. Jordan, reported the findings at a joint conference of the Cornell Dairy Industry Department and the New York State Association of Milk Sanitarians in Rochester.

McDermott said the Cornell researchers flavored ice cream with maple syrup in six different ways and gave the desserts to ten food judges for their opinions. The combinations included maple syrup as a revel or variegated material in a plain ice cream, as a revel in a maple flavored ice cream, as a confection in a plain ice cream, as a confection in a maple flavored ice cream, as a high-density topping for ice cream, and as a complete flavor for ice cream.

The six ice cream varieties were then given to Cornell students, staff members, and visitors for their judgments. The only combination that was not well received was ice cream with high density maple topping and McDermott said there are signs this could receive favorable acceptance "in limited areas."

Also at the Rochester conference, a leading New York State ice cream manufacturer told how ice cream is being revolutionized by science. Walter Woods, manager of the Utica Ice Cream Branch Operation, Dairymen's League Cooperative Association, said America's favorite hot-weather dessert is being produced with new types of equipment and under modern management principles which no other industry duplicates.

"The new methods include the use of insulated refrigerated tanks which are rapidly replacing ten gallon cans for storing and handling liquid ingredients, high temperature short-time pasteurization of ice cream mixes, automation in freezing and packaging ice cream, and new processes in ice cream hardening," he stated.

"New systems of inventory control, planning and scheduling, and work standards for measuring operating efficiencies are also being employed."

### **STRONTIUM-90 IS REMOVED FROM MILK BY TREATING WITH ION EXCHANGE RESIN**

An apparently promising method for removing strontium<sup>90</sup> from milk has attracted attention among medical scientists in St. Louis where levels of the radioactive isotope in milk are increasing at an extraordinary rate.

A University of Tennessee—Atomic Energy Commission research team reported to the American Dairy Science Association recently that an application of the ion exchange method can be used to remove up to 94 per cent of radioactive strontium from milk.

B. J. Demott, Associate Professor of Dairying at the university's College of Agriculture, Knoxville, explained that radioactive milk was treated by passing the milk through a cylinder containing a calcium-based resin. The treated milk, it was reported, contained more calcium than it did before processing, because it picked up additional calcium from the resin.

The calcium-retention factor is, of course, an important point. In 1954, AEC Commissioner W. F. Libby and other scientists at the University of California applied the ion exchange method to milk purification, using Dowex-50. The method removed most of the strontium<sup>90</sup>, but it also took out most of the calcium.

Demott's associates in the University of Tennessee—AEC work are D. G. Easterly and R. G. Cragle, of the College of Agriculture. They reported that the calcium-based resin method did not cause any appreciable change in the milk's flavor. They said this:

"The process is not yet ready for commercial use; there are many questions yet to be answered. However, should the need arise, we believe that the basic process developed here could be used by commercial dairies for removing radioactive strontium from milk — that the technological problems could be solved."

Demott said the work is continuing, one objective being to determine conclusively whether the process affects the food value of the milk. He believes it does not.

The University of Tennessee—AEC research was significant news in St. Louis because the city has been running consistently and inexplicably ahead of nine other localities where milk is tested for radioactivity each month by the United States Public Health Service.

#### *Record High for U.S.*

Figures for April, 1959, made public early in July, showed the St. Louis strontium<sup>90</sup> level at a record high for the United States, in the light of available data. The level was 37.3 micromicrocuries per liter of milk. In April, 1957, at the time the Federal testing program got under way, the St. Louis level was 6.5.

As was pointed out by the Greater St. Louis Citizens Committee for Nuclear Information, a fact-finding group, the new record level was well below the 80-strontium-unit maximum regarded as safe by the PHS and the AEC.

It was also pointed out, however, that the April figure for St. Louis was in excess of the new maxi-

mum of 33 units recommended by the International Committee on Radiological Protection.

The St. Louis C.N.I. includes a number of faculty members of Washington and St. Louis University medical schools, practicing physicians, and citizens who are interested in having the fullest available information about fall-out.

Scientists with C.N.I. have taken steps to assure the public that milk—radioactive or not—still is the best calcium source. They have urged that priority be given to research on strontium<sup>90</sup> reduction.

Reprinted from Scope Weekly, Vol. 4:32, August 12, 1959.

### PUBLIC HEALTH SERVICE RE-DEFINES SANITARIAN CATEGORY

For a number of years, and more specifically, beginning with World War II, the category, *SANITARIAN*, as a designation for either reserve or regular corp commissions in the U. S. Public Health Service, was confused. During this period, staff members for which there was no appropriate classification, were commissioned as *Sanitarians*. As a result, health educators, psychologists, statisticians and even lawyers were given that classification.

Early in 1958, the Division of Personnel, Commissioned Officers Corps, was seriously considering abolishing the classification. This came about because persons in other professions, not in the environmental sanitation field, felt that the classification, *Sanitarian*, failed to adequately define both their position and their responsibilities.

When the two leading Sanitarian organizations learned of the possibility that this might occur, letters of protest were addressed to the Service requesting that the whole professional place of the *Sanitarian* in the Service be reviewed. As a result, there was appointed a Sanitarian Task Force to study the problem and to suggest criteria whereby the professional sanitarian could rightfully be considered an important member of the public health team.

During the deliberations of the Task Force, a request was directed to The Sanitarian's Joint Council for advice in the development of the criteria which could be used as a guide for the appointment of Sanitarians in either the Regular or Reserve Corps. This was done, and as a result, the Task Force presented to the Division of Personnel, a document entitled: *Appointment - Qualifications Criteria for the Sanitarian Category of the Public Health Service*.

The Criteria in question given in abbreviated form are about as follows:

1. For Appointment to the Regular Corps
  - a. A baccalaureate degree in sanitary science and a master's degree in public health (Sanitary Science) or equivalent, or,

- b. A baccalaureate degree in the biological or physical sciences; a master's degree in these same fields, or in public health sanitation or equivalent and two years creditable experience in the field of environmental sanitation.

2. For Appointment to the Reserve Corps
  - a. A baccalaureate degree in sanitary science and public health, or equivalent, or
  - b. A baccalaureate degree with major work in biological or physical science and two years creditable experience in environmental sanitation.

For the purpose of these criteria, environmental sanitation includes, but is not limited to, programs for:

Air pollution control  
Community Waste Disposal  
Epidemiological studies  
Housing and institutional sanitation  
Milk and food sanitation  
Radiological health  
Insect and rodent control  
Water supply  
Rural, resort and recreational sanitation

3. Creditable Experience Shall Be in the Following Areas:
  - a. Practice of environmental sanitation activities
  - b. Teaching in the field of sanitation as a faculty member at a college, or university of recognized standing

In addition to the criteria shown above for the Sanitarian, the Public Health Service recently announced the creation of another category, *Health Services*. In this category will be included such professional health disciplines as *do not* fall into the category of medical and dental officers, engineers, pharmacists, nurses, scientists, veterinarians, dietitians, thereapists and sanitarians.

It is believed that this new classification gives recognition to the qualified professionally prepared Sanitarian who by training and experience can render valuable service in his chosen field. Persons who meet the criteria given herein, and who wish to apply for a reserve commission, should apply to the Division of Personnel, Commissioned Officers Corps., U. S. Public Health Service, Washington 25, D. C. In the letter of application, the applicant should give a resume of his academic background and indicate what his experience is in the environmental sanitation field.

### DISA-NADEM PRELIMINARY FIGURES SHOW 116,538 FARM BULK MILK TANKS ON U. S. FARMS

As of January 1, 1959, there were an estimated 116,538 farm bulk milk tank installations in the United States. This figure represents an increase of 28 per cent over the 91,363 installations reported for January 1, 1958.

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These preliminary figures have been announced jointly by Dairy Industries Supply Association and National Association of Dairy Equipment Manufacturers, which have conducted an annual census of farm bulk tank installations since 1955. The complete results of the survey are expected to be released at a later date. This year's census will include a first report of the number of installations in Canada.

Earlier annual figures were 57,386 on January 1, 1957; and 29,885 on January 1, 1956. The widespread adoption of the farm bulk system of milk handling has been one of the most rapid and revolutionary changes within the dairy industries in recent years.

Figures on farm tank installations in three western states — California, Nevada and Oregon — show no increase in 1958, and in several other states only slight 1958 increases are apparent. The survey's sponsors do not regard these instances as necessarily indicating that marketing saturation points have been reached or are imminent.

The largest dairy state — Wisconsin — leads all other states with a reported 14,457 installations, an increase of 3,000 within 1958.

Complete state-by-state figures are expected to be released soon from the respective headquarters of

DISA and NADEM to their two memberships, and subsequently the complete report will be made public.

### FEDERAL LEGISLATION ON MILK AND SHELLFISH PENDING

Identical bills dealing with the interstate sanitary control of milk have been introduced in the Congress by 19 Congressmen and 4 Senators. The initial bill, H. R. 3840, was introduced by Congressman Johnson of Wisconsin. The bills are drafted in agreement with the principles set forth in the October 1958 official statement and recommendation of the Association of State and Territorial Health Officers entitled "Need and Recommended Principles for Federal Milk Sanitation Legislation." The bills would provide authority for the Surgeon General to promulgate sanitation standards for milk and fluid milk products shipped interstate, to publish lists of shippers certified by the States, and would prohibit any state or local jurisdiction from excluding milk so certified because of differing sanitary requirements or other health regulations.

Bills designed to prevent the importation of polluted shellfish have been introduced in the House and Senate (H.R. 1244 and S-1127). The bills, which would amend the Tariff Act of 1930, provided that shellfish can be imported only if the Surgeon General is satisfied that the shellfish have been produced and processed under sanitary conditions equivalent to those required of domestic producers under the cooperative State-PHS program for the certification of interstate shellfish shippers.

### NEW MATERIAL GIVES GARBAGE CANS LOW TEMPERATURE TOUGHNESS

The principal disadvantage of plastic garbage cans — tendency to crack in cold weather — has been corrected by a newly developed polyethylene copolymer material.

Polyethylene garbage cans are a boon to the homeowner, because they are easier to keep clean than metal cans, and will not rust, dent or corrode. They are also silent, and add immeasurably to the peace and quiet of a community in the early morning.

Since the new material adds low temperature toughness to the other advantages of plastic containers, home-owners can leave the cans outdoors or in unheated garages throughout the winter.

The new polyethylene copolymer was developed by Union Carbide Plastics Company, Division of Union Carbide Corporation, after a five-year research program. In special tests, cans molded of the new plastic have easily withstood drops from six feet at ten degrees below zero. At ten degrees above, the same cans showed no damage after being crushed under the wheels of a 16-ton trailer truck.

In addition to this low temperature toughness, the compound also has excellent surface gloss, which contributes to an attractive appearance. Products that will benefit from its high rigidity and flex life are fishing tackle and tool boxes, tote boxes, flashlight cases, and many housewares.

Garbage cans molded of the new polyethylene copolymer are manufactured by Rubbermaid, Inc., Wooster, Ohio, and can be purchased in leading hardware and department stores.

### FACTS ABOUT NEW FOOD ADDITIVE LAW

Representatives of leading food manufacturing and distributing companies in the United States have been told the facts of the new food additive law as well as the urgent need for trained personnel in industry to conduct work in food technology.

Speaking during the Ninth Annual Food Forum

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sponsored by the United Fruit Company in the Hotel Plaza (November 5, 6) were outstanding leaders in the technical food world as well as government.

Wallace F. Jannssen, director of public information for the Food and Drug Administration who opened this segment of the program, revealed that "in very simple terms, (the) Pure Food and Drug Law was not adequate to protect the public (in the area of food additives).

"But the main reason for the new law," Mr. Janssen said, "was the constantly growing backlog of food additives which had never been studied sufficiently to establish whether or not they were safe. The big problem with most of them was not whether they would cause immediate or acute illness, but the long-term effects, what might happen in the body as a result of years or even a lifetime of exposure to minute amounts of the chemical. Several years of feeding tests on different kinds of animals are necessary to appraise these chronic effects. Proving what is toxic under such conditions may be very difficult," he said.

Paul Jacobs, executive vice-president of Gorton's of Gloucester, fish-packing concern, called for more government inspection in the fish industry "to raise the standards of quality" and predicted that consumers in the next few years will find a greater variety of higher quality fish and seafoods in their frozen food cabinets.

"We in the fishing industry have a basic and fundamental task before us," he said. "We are still in the dark ages. Fish could be more popular if its quality were improved. We need government inspection to raise the standards of quality because for two centuries, the industry hasn't made much progress on its own."

Mr. Jacobs declared that the industry has failed to grow because "it just hasn't been profitable."

"Without profit, you can't have research, product development, new equipment, advertising or promotion," he said. "Without profit, you have nothing and until recently, we in the fishing industry had little or nothing."

He noted, however, that success of a recent government inspection program and the development of several successful frozen fish items now cause an optimistic look to the future.

Professor Samuel A. Goldblith, acting head of the Department of Food Technology of Massachusetts Institute of Technology, described the necessity for the food industry and universities to co-operate in the drive to train more people capable of assessing "food for the public good."



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"The chemical industry is producing new food additives much more rapidly than the research scientist can assess their biological effects," Prof. Goldblith said. "There exists today a serious shortage of personnel trained to conduct work in food toxicology. These few personnel are overburdened at the present time. The prime purpose and role of the university is to train people and supply an adequate corps of trained toxicologists, pharmacologists and food technologists skilled in various problems relating to food toxicology. Good salaries is not the only or immediate answer. There are just not enough people with the requisite skills to supply the needs.

"This is a problem for the university," Prof. Goldblith said, "but it is also a problem for the food industry. In order to train people of this type, additional funds will be needed. This the food industry must be in a position to help supply since the food industry will by and large reap the greatest amount of benefit by obtaining a corps of trained food toxicologists."

Dr. Bernard L. Oser, president and director of the Food and Drug Laboratories, Long Island City, summed up the beliefs of the panelists. Frank Cogan, editor of Food Business, moderated.

### PUBLIC REFRIGERATED WAREHOUSES CONTINUE EDUCATIONAL PROGRAM ON GOOD HANDLING PRACTICES FOR FROZEN FOODS

To date, public refrigerated warehouses are the only segment of the frozen food business offering an industry-wide educational program on "Good Handling Practices for Frozen Foods." The program is designed to present to warehouse operating personnel the latest scientific and practical information on how to protect frozen foods from temperature damage.

The Refrigeration Research Foundation of Colorado Springs, Colorado, directs and, through its Scientific Advisory Council, presents this educational program. The first of these Seminars was held in San Francisco, California on September 22 and 23, 1959. Fifty-four representatives of nineteen public refrigerated warehouses on the West Coast were in attendance. The next Seminar will be held in Chicago on January 28 and 29, 1960, with a third one in the New York City area early in February.

The Refrigeration Research Foundation is a non-profit organization engaged in initiating and sponsoring scientific research at educational institutions and other food research installations.

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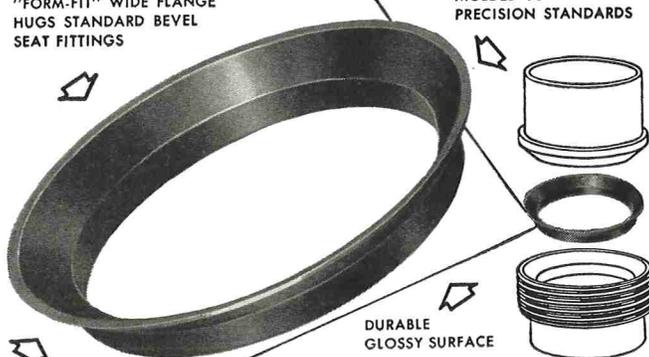
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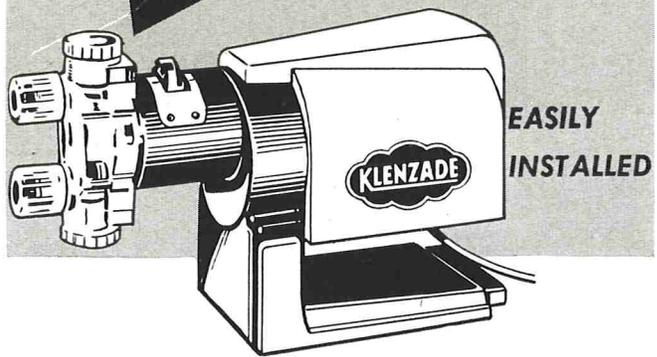
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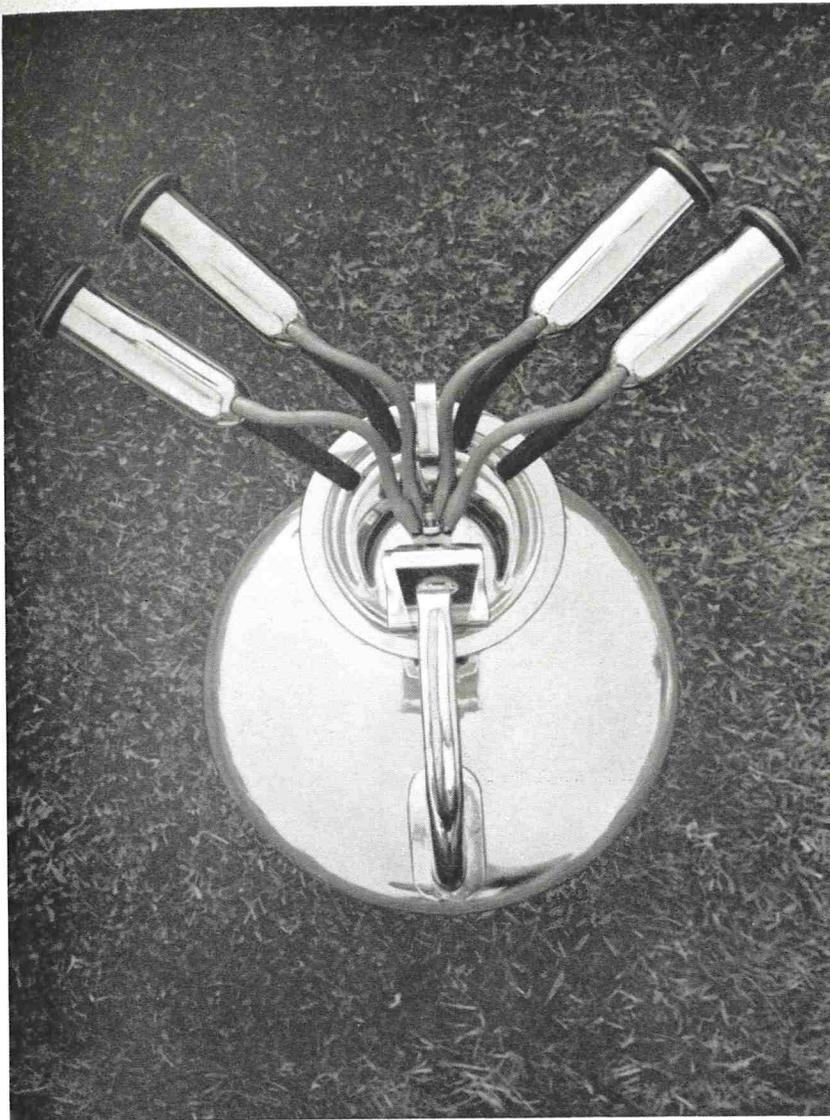
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