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Editorials

The opinions and ideas expressed in papers and editorials are those of the respective authors. The expressions of the Association are completely recorded in the transactions.

Sanitation at the Institute of Food Technologists

That sanitation is considered one of the most important considerations in the production of food is shown by the fact that seven (or 25 percent) of the twenty-eight papers given at the Seventh Annual Meeting of the Institute of Food Technologists held at Boston June 1 to 4, 1947, were on sanitation. No other subject commanded the attention that sanitation did. This despite the fact that the Institute is composed of technical men interested in the many facets of food such as growing, harvesting, processing, nutrition, machinery, administration, research, and many others. Sanitation is an important consideration in every one of these items. Even in so apparently a remote a thing as an inanimate machine, sanitation, as every sanitarian knows, is important. Those working with foods are just beginning to appreciate what every dairy worker has known for some years, that to produce a sanitary product you must have a sanitary machine, that is, one that can be easily cleaned and kept clean. One other thought along this same line and that is that every sanitarian who has been trained in dairy sanitation should consider himself fortunate because dairy sanitation, especially the production of market milk, is leading the field in this respect at present. A sanitarian trained in the dairy field will, for the present at least, have an advantage over other food sanitarians.

One entire session, consisting of four papers, was given over to sanitation. The papers ranged in scope from food handlers washing the hands with a disinfectant while handling food to "How California Instituted Sanitary Control in Food Plants." Other papers dealt with the latest developments in transportation and storage of raw foods for processing and the thermophilic food spoilage problem encountered by the Army. Papers dealing with the improvement of sanitary control through equipment design and "Sanitation Technics for Frozen Food Plants" were also presented.

F. W. Fabian

(Summaries of the papers are printed on pages 226-235 of this issue.—Editor)

Brucellosis in the United States

Miss Alice C. Evans, in her "Review Article," prepared by special request and published in the February, 1947, issue of the *American Journal of Public Health,* presents a clear and comprehensive story of the development and spread of brucellosis in the United States: one for which we had long been waiting. Based, as it is, on a complete review of the literature, it assumes special interest and authority from the fact that Miss Evans, herself, is one of the outstanding pioneers in research in this field and had much to do with making the history which her article records.

The prevalence, in Mediterranean countries, of so-called Malta or Mediterranean fever, due to contact with goats or use of their milk, had been generally recognized for many years before its existence in this country was first discovered. Sir David Bruce, in 1887, had discovered "Micrococcus melitensis." A disease of cattle now identified as brucellosis is reported to have existed in Great Britain before the settlement of the American Colonies and there is evidence suggesting its occurrence there as early as 1567. In 1897 Dr. Bang, a Danish veterinarian, discovered the "Bacillus abortus."

Brucellosis has existed in cattle in this country, Miss Evans points out, for more than a century. In 1843 a farm journal, published at Albany, N. Y., referred to losses, in New York, Pennsylvania, Delaware, and Virginia, from what quite evidently was this disease. Reports of different investigators in 1911 and in 1923 indicated that the infection probably had existed among goats in the southwest from the time of the importation of the original animals from Spain, Malta, Asia Minor, and South Africa, and that cases of human infection apparently were occurring in the early eighteen-eighties.

"The first publication to appear in this country on the causal organism of brucellosis in domestic animals was a confirmation of Bang's observation, by MacNeal and Kerr, in 1910." The following year Schroeder and Cotton, of the U. S. Department of Agriculture, reported finding the organism in milk from apparently healthy cows. It was found in over 11 percent of samples of market milk and "in the milk distributed by 6 among 31 dairies." This, the Chief of the Bureau of Animal Industry said, prophetically at the time, " . . . leaves no doubt that we are dealing with a phenomenon that is ominously serious in its significance for public health."

The history of the first appearance of brucellosis in swine is much more recent and definite. The first report was in 1914 when Traum, of the Department of Agriculture, reported the occurrence of the disease in several western and midwestern states. In the following six years swine infection in Kentucky and California was reported. In 1930 Hardy *et al.* reported finding positive evidence of infection in 18 percent of 611 hogs examined in Iowa. In the preceding year a swine outbreak had been reported from an eastern state. What apparently was the first evidence of swine infection in New York State was discovered in 1941.

Brucellosis infection quite evidently was occurring here in man for many years before it was identified. Reference has been made to its existence in the southwest. A Michigan physician, in 1878, reported that, since 1861, he had been seeing cases of "a mild type of fever" differing from malaria and typhoid. "He reported cases," Miss Evans said, "in which the symptoms were typical of acute brucellosis."

The first case of human brucellosis, determined to be "not of caprine origin," was reported in 1924. The victim had handled waste material in a slaughter house and the organism was of the porcine type. The first case traced to the bovine organism was reported in the same year. In the course of making tests for brucellar agglutinins on "remnants of samples of serum obtained routinely in Washington hospitals for the Wasserman test" Miss Evans found one serum which gave a strongly positive reaction. The history and symptoms agreeing, the physician made a diagnosis of brucellosis. The patient, who lived in Virginia, used raw cow's milk regularly.

"In April, 1925, an editorial appeared in the *Journal of the American Medical Association* calling the attention of physicians to the existence of brucellosis in parts of the United States where it was hitherto unsuspected." This was followed, in 1927, by a report by Miss Evans of laboratory studies in connection with 20 cases. "Then the number of recognized cases began to multiply by leaps and bounds" until, in 1938, *Public Health Reports* showed over 4,000 cases to have been reported. Since then the number of cases reported annually has not increased. Reference will be made further on to what Miss Evans characterizes as "The discrepancy between the actual number and the reported number."

The brucella have long been classed as three species: melitensis, abortus, and suis. In 1917, says Miss Evans, "in a conversation with Dr. Adolph Eichhorn (Bureau of Animal Industry) the idea evolved that it might be worth while to compare Bang's '*Bacillus abortus*' with the so-called '*Micrococcus melitensis*'." Of the various tests applied at that time, "that of agglutinin-absorption was the only one which could distinguish the strains of different origins." When the report showing the close relationship was published the following year, it was received with skepticism but the findings eventually were confirmed by the work of other investigators. It is Miss Evans' present feeling that the organisms are "too closely related to justify the recognition of three species" but that "varietal distinctions" are warranted.

The article includes the following outline based on "The present incomplete knowledge of susceptibilities to brucellar infection":

SPECIES	PRIMARY HOST	SECONDARY HOSTS
B. abortus	Cattle	Man Horse
B. suis	Swine	Man Cattle
B. melitensis	Goats (Sheep)	Man Cattle Swine

While cattle are susceptible to infection with *B. suis,* swine are insusceptible to infection with *B. abortus.* Man is susceptible to all but particularly so to *melitensis* and *suis.* Cattle being susceptible to all, man may be infected with any of the three varieties through contacts with cattle or use of their milk (unpasteurized).

"Human infections with *B. abortus* tend to be sporadic; those caused by *B. melitensis* and *B. suis* ingested in raw milk are more apt to occur in groups. In this country many of the outbreaks traced to cattle have been caused by *B. suis* in raw milk." "The relative percentages of the three brucellar species in the human infections in any locality depend largely on the extent of the development of the hog-raising and/or goat-raising industries."

In spite of the existence of brucellosis in cattle in this country for a hundred years or more, human infections have been recognized only within fairly recent years. "It may be," Miss Evans says, "that the bovine strains of earlier times were of comparatively mild virulence for man."

There is a wide discrepancy, in Miss Evans' opinion, between "the actual number and the reported number" of cases. Even acute cases of so-called undulant fever are not always easily diagnosed. In addition to these the disease occurs in a great variety of obscure chronic forms, much more difficult of diagnosis. On the basis of her own experience and figures supplied by other investigators who have made local, cross-section surveys, she estimates that the actual number of cases in any year probably is at least ten times the number reported.

The familiar and, in many cases, undescriptive term "undulant fever," she feels, should be discarded in the interest of clarity and the term "brucellosis" applied to the infection in all its forms, in man and beast. To this suggestion the present writer says Amen--and thanks, Miss Evans, for a most interesting and valuable article!

P. B. B.

Medical Examination of Food Handlers

ROUTINE, periodic, medical examination of food handlers, despite the accumulating evidence that this time-honored procedure has not been sufficiently effective and fruitful to justify what it has been costing in dollars, time, and effort, evidently is not yet a dead issue. This was indicated in the interchange of ideas on the subject, under the head of "Correspondence", in the May-June issue of the JOURNAL. One correspondent, having expressed the opinion that the routine examination procedure had proven of relatively little value, added that a thorough investigation should, however, be made in any individual case where there was reason to suspect the existence of a potentially dangerous condition. The other correspondent, reacting to this, asked how such a "potentially dangerous condition" could be discovered without the routine examination.

The primary purpose of this communication is to answer that question. But it may help to clarify the issue if we first consider what the conditions are against which our routine examination were designed to provide protection and just why they have not proven effective.

These conditions fall in one or both of two groups, i.e. those which may be responsible for food infection or poisoning, and those which may be communicated through personal contact. Of the food infections the most serious has been typhoid fever, and it has been the detection of typhoid carriers which, generally speaking, has been considered the most important objective of the routine examination. In several large areas, incidentally, the incidence of typhoid fever has been so far reduced in precent years that the menace of the carrier is becoming progressively less. The dysenteries, both bacillary and amoebic, and the paratyphoids also may be transmitted through food where carrier conditions exist. Outbreaks of scarlet fever and septic sore throat have resulted from contamination of milk and other foods by persons with throats or wounds infected with hemolytic streptococci of Lancefield's Group A.

Of the food poisonings, probably the most common and certainly the most serious (aside from botulism) are those caused by staphylococci, more particularly *S. aureus*. These are the common incitants of boils and other skin infections and may be present in infected wounds or in nasal discharges of persons with sinus infections and colds.

Several of the common communicable diseases could, of course, be communicated by contact to customers and fellow employees. However, if a food handler were suffering from one of these diseases or in contact, at home or elsewhere, with someone who was, and if the situation were brought to light, it almost certainly would be through means other than the routine, periodic examination. That, probably, would apply also to persons with open and infective tubercular or syphilitic lesions.

Dr. Smillie, in his *Preventive Medicine and Public Health* (1946) makes this statement: "Persons who prepare and handle food in restaurants, institutions, and for other large groups of people may be examined for the typhoid carrier state". The reader, then, is referred to the following foot-note: "This procedure is not very practical. Discovery of a single typhoid carrier by this means may cost $50,000." He evidently was thinking in terms of routine, periodic examination, as he had previously said: "The requirement of a health certificate for all food handlers is not a sound administrative procedure." His comment on possible cost might have been based on the study in New York City where it was found that hundreds of thousands of medical examinations had revealed a very small number of carriers. The routine examination of specimens of discharge for typhoid bacilli is a time-consuming and expensive operation. In many public health laboratories the conclusion was long ago reached that it was not worth while and should give place to more productive operations.

For some or all of the following combination of reasons the odds are against the discovery of an existing typhoid carrier condition through the routine examination: (1) the laboratory examination may not be required but may be left to the discretion of the physician; (2) there is a tendency for physicians employed and paid by the food handlers to give first consideration to the interests of their clients, going no further than "the law requires" in searching for conditions not obvious; (3) where a specimen is required, under ordinary circumstances there is ample opportunity for a person knowing or suspecting himself to be a carrier to substitute a specimen not his own; (4) in a laboratory not working regularly with typhoid specimens there is more than a possibility of the organisms, if present, being missed; (5) most important of all, the discharge of organisms by carriers usually is intermittent. There may be long periods in which no typhoid bacilli at all can be found in the discharges. In many cases where the carrier condition has been suspected, it has required the examination of from two or three to ten or more specimens before the organisms have been found. A negative report on a single specimen means very little. In the meantime there may be some comfort in the knowledge that a typhoid carrier who understands his condition and keeps his hands clean may not be a source of danger.

Needless to say, examinations for other enteric organisms are not likely to be made in connection with routine examinations, nor would they be profitable. Boils and other local infections discharging staphylococci or hemolytic streptococci are such transitory conditions that the chances of their being discovered through the routine examinations would be remote. Perhaps we should remind ourselves here that, even though food is contaminated with staphylococci, food poisoning will not follow if the food is adequately refrigerated.

How then may we hope to discover the potentially dangerous conditions since our routine, periodic medical examinations have largely failed to accomplish their purpose? Some of them will not be discovered until cases of infection or, possibly, outbreaks have been traced to them. There is no perfect system. Our hope, however, lies mainly in having the food handlers and their employers fully informed as to what the dangers are and the precautions to be taken to avoid them, and in securing their cooperation. This can best be accomplished through meetings and "schools" such as have been held in New York and other cities. An intelligent employer (and most of them have intelligence or they would not be employers) who has attended one of these "schools" will, it may be hoped, come to understand the dangers and precautions and to recognize that cooperation will be to his advantage. At least equally important, he may come to understand the protective value of refrigeration and personal cleanliness.

When the system works he will be on the alert for potentially dangerous conditions. If he observes an employee with boils, for example, he will not permit him to handle food until he has been examined by a physician and declared safe. Unexplained absences may be investigated. A new employee whose background is unknown, especially if he comes from an area where typhoid is endemic, may be required to "clear" with a health department physician or one selected by the employer. The physician, if there is anything in the history suggesting the possibility of the individual being a carrier, will take as many specimens for laboratory examination as may be necessary to settle the question with reasonable certainty. Naturally he will look for other conditions at the same time.

Experienced deer hunters, so I have observed, do not go aimlessly into the woods on the chance that deer may come their way. They wait until they have found a deer "run" and do their hunting where the deer are most likely to be found. The same principle should apply to examinations of food handlers. Aimless wandering in either field, from the standpoint of productivity, is largely time wasted. And it may be noted, in this connection, that the Illinois State Health Department [*Amer. J. Pub. Health* 73, 489 (1947)—April issue] has just declared for discontinuance of routine medical examinations of food handlers.

P. B. B.

A CORRECTION

Through an unfortunate omission, the letter from our good friend, L. Lloyd Barron, as discussed in our editorial on page 130, May-June issue, did not appear in that publication. It is printed in this issue, page 251.

J. H. S.

Trade Barriers in the Milk Industry*

A. W. Fuchs

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No traveler or tourist in the United States who purchases milk can fail to be impressed with the diversity of the grade labels on milk bottles. A nation-wide survey of milk control practice made by the U.S. Public Health Service some years ago (1) indicated that slightly more than one-half of the municipalities graded their market milk supplies, and that the wide range of grade designations included certified, grade A, grade B, grade C, grade D, select, inspected, guaranteed, special, market, family, as well as no grade label. Many of these grade designations were repeated for raw milk as well as for pasteurized milk. The survey also revealed the wide differences existing from state to state and from city to city as to the legal standards for corresponding grades and the frequency of inspection and sampling.

While the last few years have witnessed much progress in the direction of unification of milk control practice, the goal is still far off. Conditions are still sufficiently chaotic to affect adversely the milk consumer, the milk control official, and the dairy industry. It may therefore prove worth while to describe the present situation, to examine its results, and to suggest possible remedies.

The great mass of dairy legislation of the last two decades has been designed primarily to accomplish one or both of the following ends: (1) To protect the health of consumers of dairy products by insuring a clean and wholesome product, and (2) to stabilize the dairy industry and to increase the purchasing power of dairy farmers. These aims are often combined in the laws and are almost indistinguishable. In the attempt to attain these objectives, legislation has been adopted which has given rise to serious interference with interstate and even intrastate commerce. These trade barriers in the milk industry were fully discussed at the Federal-State Conference on War Restrictions called by the Department of Commerce in Washington in May 1942 (2). The laws and regulations adopted by the states, districts, counties, and cities prescribe, often in minute detail, the sanitary conditions under which dairy products shall be produced, processed, and distributed. To enforce the sanitation standards prescribed, official inspection is required. Control is exercised by the granting of licenses or permits to dairy farmers, processers, and distributors to dispose of their products in a given market only after certification of satisfactory inspection by the officials of the city or state concerned, and by revoking such permit or lowering the grade of the product upon repeated violation of the standards.

Overlapping Inspections

Members of the dairy industry supplying different markets are confronted with a real problem arising from the multiplicity of laws and regulations in effect in the different states and in the various municipalities within the states. They are frequently subjected to unnecessary inconveniences and expense of multiple and overlapping re-

* Read before the Kansas Association of Milk Sanitarians, Topeka, Nov. 7, 1946.

quirements and inspections, and even to outright inability to enter a distant market.

An excellent example of the lack of uniformity in milk control practice was described some years ago in the New York-New Jersey-Pennsylvania area (3). The State of New York, the City of New York, the State of New Jersey, and individual cities in New Jersey all require that the milk shipped to them from Pennsylvania must meet their individual requirements and must be inspected by their own staffs.

Only recently one of our District Offices reported that the new regulation of the Maryland State Board of Health governing construction and location of the milk house differs from those of both Baltimore and Washington, so that a Maryland producer complying with the State regulation may be unable to obtain a permit to ship to either of these cities.

The Federal Trade Commission cites a number of similar examples. It reports (4) that "one distributor who shipped milk to several cities and states claimed to be subjected to 57 different inspections. A Maryland receiving plant distributing in Philadelphia claimed to have been inspected by Pennsylvania State authorities 5 times in 3 months, by Maryland authorities 2 or 3 times each year, and by Philadelphia authorities once or twice each month. Although these may be extreme cases, duplication of plant and farm inspections was found in many areas visited by the Commission's representatives. . . . It is evident," the report continues, "that the additional expenses created by duplication of inspection must be borne by the producer, the consumer, or both. Also, it appears that inadequate inspection makes possible the evading of health requirements and is thus a potential health menace".

MARKET RESTRICTIONS

Numerous instances of tendencies toward market restriction of milk and dairy products are also given in a report by the Bureau of Agricultural Economics (5). It quotes a report of the Federal Trade Commission that "there are indications that Connecticut has used its milk-inspection laws advantageously in keeping out milk from other states, although it does not admit this use of its powers". It also lists other states, including New York, New Jersey, and Pennsylvania, whose laws require inspection by their own officials of all farms from which milk and cream are shipped into the state.

According to the same report, market restriction through inspection requirements is promoted by cities and towns as well as by states. Since 1906, New York City has maintained farm inspection of its sources of milk and cream supply, and since 1926 has definitely limited this inspection area. Several years ago Baltimore had a drastic limitation on its supplies of milk and cream. The commissioner of health of Baltimore ruled that cream for manufacturing ice cream could not be brought from a greater distance than 50 miles from the city except when "emergency" shortages were declared to exist. This ruling was contested in the Federal district court and found invalid.

Small towns as well as large cities place definite limits on the area from which they will accept shipment of dairy products. In a recent study of three Massachusetts towns, R. G. Bressler, Jr. pointed out that grade B milk for Haverhill must be produced within 40 miles of the town, for Walpole within 30 miles, and for North Attleboro within 8 miles.

A common practice for states as well as for cities is to limit the area in which inspection is conducted at public expense. Producers outside this area, or more often the distributors who buy from them, must, themselves, cover all inspection costs. Even where shippers of western cream are in a position to cover this inspection cost, they may be confronted with difficulties in persuading eastern public authorities to provide the inspectors. In such cases the western dairymen are inclined to believe that the refusal to provide inspectors is deliberate and designed to keep western cream from the eastern market (5).

One final aspect of the restrictive effect of health and sanitary regulations on dairy products should be mentioned. The insistence of cities and states upon their own regulations and inspection by their own officials reaches rather absurd limits in areas where the production is normally carried on for more than one market. A few examples of this kind have already been given. Reports from ice-cream manufacturing plants in many parts of the country indicate that their farm sources of cream supply are often subjected to inspection by three, four, or even more state, county, or city health departments. Cities often refuse to accept the inspection reports of their own state official, and neighboring counties or townships refuse to enter into reciprocal inspection agreements. These conditions were found by the Federal Trade Commission in its investigation of the New York milkshed.

If time permitted numerous other examples could be cited of restrictive milk control laws and practices by states and cities which tend to limit the milkshed and impose price regulations. Most of you have no doubt had your own experiences with them. What are the results of this lack of uniformity in milk control legislation and of this restriction of milksheds?

Health officials are concerned primarily with the cleanliness and the safety of milk, not with its price. However, they are compelled to take cognizance of price when it begins to affect the nutritional status of the public. Any sanitary or price regulation which interferes unnecessarily with the free flow of milk and milk products tends to increase the price of milk to the consumer, and thereby tends to reduce the consumption of this most nearly perfect food. The effect is particularly serious among low-income families who can afford little and frequently no milk for their children. Reduced consumption of milk and milk products may affect the nutritional status of the nation.

Most of us will agree, I believe, that the surest solution of the economic problem of the milk industry lies in increased consumption of milk and dairy products. The solution is not to be found in drastic curtailment of production, for this will not increase the farmer's total income from milk sales. In spite of all appearances, the market for milk and milk products is far from saturated. According to the survey of the Public Health Service, previously mentioned (1), the weighted mean consumption of fluid market milk, cream, and buttermilk in all municipalities of over 1,000 population in this country in 1936 was less than three-fourths of a pint per person per day. It may be slightly higher today. Nutrition experts generally recommend a quart per day for each child and a pint per day for each adult.

The maintenance of restrictions imposed against outside competition is not only contrary to the public interest but is a short-sighted policy from the viewpoint of the ultimate prosperity of the local dairy industry. Insofar as the elimination of competition from outside the local milkshed results in higher local milk prices, it tends to discourage local milk consumption and to encourage greater competition within the local milkshed. Such local competition is likely to be "stiffer" because of the shorter transportation distances involved.

The steady improvement of milk-shipping facilities makes possible an ever-increasing interstate shipment of milk and cream from areas of high production and low consumption to areas of low production and high consumption. With improved transportation it should be possible for areas which can produce milk and cream cheaply to supply those where production costs are high, thus reducing the price to the consumer and increasing the consumption of milk. Any restriction which tends to overdevelop the local dairy industry in high-production-cost areas instead of in naturally low-cost areas does not seem sound from the viewpoint of the industry as a whole.

During the war, the lack of uniformity of grade standards for milk made it impossible for the Army Quartermaster to obtain the same quality of milk for all camps throughout the country. A similar difficulty is experienced by interstate common carriers in obtaining a uniform grade of milk on all dining cars, planes, and vessels throughout the country. In some sections it is impossible for these carriers to secure grade A pasteurized milk conforming to the standards of the Interstate Quarantine Regulations.

Need for Uniform Regulations

The foregoing presents a brief picture of the restraints to the free flow of milk and milk products, as well as some of the results. What is the remedy?

That there is ample justification for ordinances and regulations governing the sanitation of milk supplies, as well as for the proper enforcement of such standards, is definitely indicated by the record of milk-borne disease. The absence of effective milk control in many of the municipalities of the United States, particularly in the smaller ones, is responsible for the occurrence of from 30 to 50 outbreaks of milk-borne disease each year. For the first 18-year period during which the Public Health Service has been compiling such reports, 765 milk-borne outbreaks were reported, involving 31,735 cases and 753 deaths. In the order of their importance the diseases reported were: typhoid fever, scarlet fever and septic sore throat, food poisoning and gastroenteritis, paratyphoid fever, diphtheria, and undulant fever.

It should be noted that this compilation does not include sporadic cases of typhoid fever, scarlet fever, septic sore throat, etc., since such sporadic cases have rarely been given sufficient epidemiologic study to determine the rôle of milk and milk products in their causation. Nor does this compilation take any note of such diseases as bovine tuberculosis, undulant fever, or infantile diarrhea, which are largely milk-borne, but which generally occur as sporadic cases rather than in epidemic form. For undulant fever alone between 3,000 and 5,000 cases have been reported annually during recent years in the United States, and it is estimated that these reported cases represent only one-tenth of the actual cases.

The occurrence of a milk-borne epidemic of disease not only ruins the business of the dairyman whose supply is implicated, but may undermine the confidence of all consumers and adversely affect the sales of every dairyman in the community. It is obviously to the industry's self-interest, therefore, to lay aside all minor differences and to cooperate with health officials and consumers in promoting a uniform, effective program of milk control in their community and in their State. The industry is indebted to the health officer for the most effective type of advertising, namely, the official promotion of increased consumption for adequate nutrition. The industry, in turn, must be willing to produce a product which the health officer can safely recommend.

Certainly the public health must be safeguarded, but this can be accomplished by the adoption of uniform standards and uniform interpretations thereof which would make possible the mutual acceptance by one area of inspection reports made by another. There is as little justification for needlessly stringent and unique requirements, which in effect erect "Chinese walls" around a milk shed, as there is for inadequate public health control.

STANDARD ORDINANCE

Since 1923 the U.S. Public Health Service has been engaged in making field and laboratory studies in milk sanitation. As a result of these studies it has formulated a model milk ordinance which is recommended for voluntary adoption by States, counties, districts, and municipalities, in order to encourage a greater uniformity and a higher level of excellence of milk control practice in the United States. To standardize the interpretation and enforcement of the Milk Ordinance, an accompanying code was formulated which gives the public health reason for each sanitation requirement and details of satisfactory compliance. While this ordinance and code embodies the best information at present available on milk-sanitation legislation, it is subject to change as improvements are developed through experience and research. All proposals for revision are considered by the Public Health Service Sanitation Advisory Board. A new edition is issued from time to time, the latest being that of 1939, published by the Government Printing Office as Public Health Bulletin No. 220. Two amendments have since been adopted.

Voluntary adoptions of the milk ordinance recommended by the Public Health Service have steadily increased from year to year, until at the present time it is legally in effect in communities ranging in population from less than 1,000 to about 3,500,000, and located in 39 states. It has been adopted state-wide in 3 states, and by 193 counties and 1,096 municipalities in 36 other states. It has been adopted as state regulations in 25 states, but in these cases enforcement is usually left to the local communities. It is undoubtedly the most widely accepted standard in this country.

No detailed discussion of the provisions of the recommended milk ordinance can be undertaken at this time, but a brief outline may be in order. The ordinance defines the sanitation requirements for several grades of raw and pasteurized milk, states the minimum frequency of inspection and sampling for grading, requires that the grade be shown on the container label, and permits each community to decide for itself at the time of adoption which grades it will permit on the market. It provides a choice of two methods of punishing violations—either by permit revocation alone, or by degrading *and* permit revocation.

RATING OF COMPLIANCE

However, it was early recognized that the mere adoption of uniform legislation throughout the country does not of itself assure uniformity of enenforcement. A city which passes the recommended ordinance but permits all milk distributors to label their milk grade A, irrespective of whether or not they satisfy all grade A requirements, must not expect to retain consumer confidence in the milk supply, nor can it expect its surplus milk and cream to be accepted without question by other areas.

In order that residents, travelers, and milk-receiving communities may have available a means of judging the excellence of enforcement, the Public Health Service has developed, as a part of its recommended program, a milk-shed rating method for the periodic measurement of the control work of municipalities by the state milk control authorities (6). This rating method uses as a yardstick the grade A pasteurized and the grade A raw milk requirements of the recommended ordinance. These nationally recognized standards, rather than the local requirements, are used as a yardstick in order that ratings of different milk sheds may be comparable with each other, both intrastate and interstate. For each community in which both raw and pasteurized milk are sold, two compliance ratings are obtained, a pasteurized milk rating and a raw milk rating. These ratings are not safety ratings, but represent the degree to which the community has enforced sanitation requirements designed to make pasteurized milk and raw milk, respectively, as safe as these grades may practicably be made. A rating of 100 represents perfect compliance, but if any requirements are not satisfied the rating is reduced by an amount proportionate to the volume of milk sold by the violators and to the relative sanitation importance of the violated items.

Most of the states having communities operating under the recommended ordinance make periodic milk sanitation ratings of these communities. In order to encourage these communities to attain and maintain a high level of enforcement, the Public Health Service has, since 1934, published semiannually in Public Health Reports a list of communities which have been awarded by their state milk sanitation authority a rating of 90 percent or more, based on the Public Health Service rating method. No community is retained on the list if its rating is more than 2 years old or if a later rating is below 90. This list was suspended for the war period, but will be resumed when normal conditions are reestablished. The Public Health Service makes available advisory assistance to the states in organizing their milk control programs and in standardizing their rating work. The district milk specialists of the Service also made occasional check ratings of communities on the 90 percent list and those which did not deserve inclusion were removed from the list.

Section 11 of the Public Health Service milk ordinance provides that milk and milk products from points beyond the limit of routine inspection may be approved by the health officer if he is satisfied that they have been produced and/or pasteurized under provisions equivalent to the requirements of this ordinance and that these provisions are properly enforced. The milk code recommends that such milk and milk products be approved by the health officer without his inspection if they have been awarded by the state milk sanitation authority a rating of 90 percent or more.

This system, developed by the Public Health Service, and employed by many states, was useful during normal times in acquainting areas experiencing a milk or cream shortage with areas from which satisfactory supplies could be obtained. The universal adoption of the recommended milk ordinance would remove all barriers created by differences in sanitary standards. The milk sanitation rating method provides the receiving community with a means of judging whether the uniform standards are uniformly interpreted and enforced, and makes possible the acceptance of reciprocal inspections. Check ratings by the Public Health Service reveal whether the rating methods of the state rating agency are acceptable. By this system a receiving community is afforded all necessary and legitimate public health protection of its distant sources of supply. It is offered as a means for overcoming existing multiple inspections and trade barriers.

An outstanding example of what can be accomplished along these lines was the action taken before the war by the Midwest Regional Conference on Milk called by the Council of State Governments at Chicago. In order to remove unwarranted barriers to interstate shipment, the Conference recommended the adoption of uniform sanitation and inspection standards for the production of milk and cream for acceptance by the ten states participating. The Conference appointed a Committee of

Dairy Technicians to formulate such standards. This Committee subsequently proposed the mutual acceptance by these states of milk and cream for manufacturing purposes which the shipping state certified as complying to the extent of 90 percent or more with production standards based on the Public Health Service milk ordinance standards for market milk but with some items or parts of items omitted. This reciprocal interstate agreement was officially approved in the States of Illinois, Indiana, Iowa, Kentucky, Michigan, Minnesota, Ohio, Tennessee, and Wisconsin (7).

Thus far the discussion has referred to normal peacetime conditions. The unprecedented demand for milk during the war period, particularly in military and war industry areas, created critical shortages of milk and milk products in many sections of the United States. As a result, many milk plants were forced to accept low-grade supplies from nearby producers or from other states—in some cases uninspected supplies that normally went into cheese, butter, milk powder, and evaporated milk. Lack of sufficient price differential between high-grade milk for the fluid market and low-grade milk for manufactured products tempted many producers away from the fluid market, and it was impossible in most places to get enough marginal producers to improve their methods so as to qualify for this market. Consequently, a definite deterioration occurred in the sanitary quality of raw milk for pasteurization throughout the country. Cities which had formerly achieved a rating of 90 percent or more found themselves losing ground, and surpluses from such areas no longer existed. Accordingly, in 1943 the 90 percent list that had been published semi-annually in public Health Reports was suspended for the duration of the emergency.

Although milk shortages are now less severe than during the war, they still exist in many areas, particularly during seasons of low production, so that certain markets still find it necessary to import milk from other states or from other milksheds in the same state. In the absence of high-grade surpluses in cities rating 90 percent or more, standard milk ordinance areas have been compelled to draw their supplies from almost any source available. In some cases importing areas are accepting shipments on the basis of approval by health officers of shipping states. The difficulty in reaching any agreement on interstate shipments lies in the fact that shipping states have been willing to certify whether shippers are meeting their standards, whereas receiving states and cities wish to know instead whether their own standards are being complied with. In other instances, the Public Health Service has been requested to survey out-of-state sources and to report to the receiving state whether such sources comply with the latter's standards. This clearance mechanism is satisfactory where such sources are restricted in number and are used regularly. But for a large number of sources, and particularly when these are shifted from week to week, it is obvious that the survey facilities of the P.H.S. district offices become inadequate because of their limited staffs.

CERTIFICATION PLAN

Spurred by the needs of certain states, the Conference of State and Territorial Health Authorities at its March, 1944, meeting approved the recommendation of its Committee on Interstate and Foreign Quarantine that the Public Health Service be requested to prepare a plan for the certification of interstate milk shippers by a procedure similar to that employed in the certification of shellfish shippers. Accordingly, such a plan was prepared and submitted to all State and Territorial Health Officers for their comment, in a letter from the Surgeon General dated November 24, 1944

(8). Because the P.H.S. standards are not accepted nation-wide, as is the case with its shellfish sanitation standards, the plan suggested the publication of two, or possibly three, separate lists. List 1 would include milk shippers certified by the state of origin as having a compliance rating of 90 percent or more on the basis of the P.H.S. grade A standards (9) and the P.H.S. rating procedure (6). List 2a would include shippers with ratings of between 80 and 90 percent on the same basis. List 2b would include those rating 90 percent or more on the basis of the Northeastern States Emergency Sanitation Standards (10). The state's rating procedure would be checked by the Public Health Service.

A report on the comments submitted by the States and Territories was prepared by the P.H.S. and considered by the Committee at the 1945 meeting. As only a minority of the states had registered their views on the plan, the Committee's report, approved by the Conference of State and Territorial Health Authorities on April 11, 1945, recommended that the plan be again brought to the attention of the members to secure a wider expression of opinion. This was done. Eventually, 40 states replied, only 8 of which were opposed to the certification plan. Publication of all 3 lists was favored by 9 states, of 2 lists by 16 states, and of only 1 list by 6 states. List 1 (P.H.S., 90 percent) was approved by 31 states, list 2a (P.H.S., 80 percent) by 20 states, and list 2b (NEES, 90 percent) by 4 states.

In view of the responses, the Committee recommended that the P.H.S. be requested to inaugurate the periodic publication of lists of shippers with surpluses certified by the State health or supervisory agency as complying with the standards of lists 1 and 2a, and that a third list (2b) be later inaugurated if the demand justifies. It also recommended that the lists be published quarterly, if necessary, in order to indicate current surpluses. The Committee's report was approved by the Conference in April, 1946.

However, the P.H.S. has not as yet inaugurated the certification procedure, although it hopes to do so by the beginning of 1947. There were several reasons for the delay. First, it was considered advisable to wait until increased appropriations were available for enlarging the field staff of the P.H.S. District Offices. For example, to date it has not been possible to obtain qualified milk specialists to fill two vacancies in the Kansas City District. Secondly, it was desired to see what action would be taken by the APHA Subcommittee on Reciprocal Sanitary Milk Control. Thirdly, possible action by the International Association of Milk Sanitarians in approving a uniform standard for raw milk for pasteurization was awaited.

In 1942, the International Association of Milk Sanitarians appointed a Committee on Milk Regulations and Ordinances for the purpose of drafting minimum essential standards that would be acceptable to the entire membership. The Committee, of which I am a member, includes representatives from both Standard Ordinance and Non-Standard Ordinance areas. It has been endeavoring for several years to arrive first at a mutually satisfactory standard for the production of raw milk for pasteurization, as it is in this field, rather than in pasteurization plant requirements, that the greatest differences exist between the P.H.S. standards and those of the northeast group of states. I am happy to report that the Committee finally reached compromises on disputed points and reported the proposed production standards to the International Association of Milk Sanitarians at its recent annual meeting in Atlantic City. The proposed standards have been closely patterned after those of the P.H.S. milk ordinance, and will, I believe, be generally acceptable both to Standard

Ordinance and Non-Standard Ordinance areas. The Committee was authorized by the Association (1) to draw up standards for receiving stations, tank trucks and tank cars, and pasteurization plants, (2) to submit the complete ordinance draft to the membership by mail, (3) to make such changes as may be suggested by a majority of the members, and (4) to submit the final draft to the P.H.S. for the consideration of the Sanitation Advisory Board in connection with the preparation of a new edition of the P.H.S. Milk Ordinance and Code. I have high hopes that through this united effort the goal so long sought by the P.H.S. will be reached—a set of milk standards that would eventually achieve universal acceptance. As the Surgeon General pointed out in his letter of November 24, 1944, to all State Health Officers (8), the universal acceptance of one set of milk standards would greatly simplify the procedure for the certification of interstate milk shippers, and would facilitate such shipments. As it now appears unlikely that the Committee can complete its draft and have it considered by the P.H.S. Sanitation Advisory Board in less than 5 or 6 months, it does not seem advisable to postpone the inauguration of the certification system that long. However, when a revised edition of the P.H.S. Milk Ordinance is issued, the revised standards will be used as a basis of certification instead of the present P.H.S. standards.

Another development that should be mentioned is the interest shown in this subject by the American Public Health Association. During the annual meeting of the Association in October, 1944, an informal conference was arranged to discuss reciprocal sanitary milk control among the states, with Dr. Haven Emerson presiding. The discussion emphasized that reciprocal acceptance of inspection data among the states would remove the expense and inconvenience of overlapping and conflicting inspections, and that no reciprocal action is possible without a generally accepted basis of dairy farm standards and a system of checking state certification procedure. The conference adopted a resolution calling on the Governing Council to study this matter further.

For nearly two years nothing more was done by APHA; but a few months ago their Committee on Administrative Practice created a Subcommittee on Reciprocal Sanitary Milk Control. At its meeting on September 6 of this year the Subcommittee, of which I am a member, discussed the subject, and agreed that each state should establish an inspection system to determine the adequacy of local control within the state, and that the Public Health Service should inaugurate a system of certification for interstate shippers with periodic spot checks to determine the acceptability of state inspections and laboratory supervision. It was suggested that instead of publishing lists of shippers who achieved minimum ratings of 90 percent and 80 percent, one list should be published containing all interstate shippers, together with their actual ratings. It was felt that this system would be of greatest service to receiving states as it would insure a larger list of shippers than would be possible in these days of shortages with a 90 percent or even an 80 percent list, and each community would be in position to obtain milk of the highest quality available at the time; nor is there any reason to believe that shippers would have less incentive for improvement under this system than under a two-list or three-list procedure.

And so we come down to the present day. In planning the certification procedure the Public Health Service is confronted with a number of problems. For example: (1) Shall certifications be accepted from State Agricultural Departments or only from State Health

Departments? (2) Shall lists be published semi-annually or quarterly, and should supplemental lists be issued monthly or whenever notices of additions or deletions from the list are received from the States? (3) Shall state certifications be based on only state inspection and laboratory results, or shall results of local official inspection and sampling be accepted if periodically checked and approved by the state? (4) On what minimum number of inspections and samples per year shall certification be based? (5) How often should the state's rating procedure be checked by the Public Health Service? (6) Should the rating procedure be checked for each state sanitarian inspecting sources for certification? (7) Should bacterial counts be given a greater weight than the present 15 points in computing the rating of producers? (8) Should the Public Health Service start with lists of raw milk shippers only, or include separate lists of pasteurized milk shippers and cream sources? Your comments and discussion of these questions would be welcomed.

In closing, may I point out that the certification procedure should not be too burdensome to the shipping state, yet it must be protected by adequate controls which will offer the receiving community a reasonable guarantee of the accuracy of the ratings.

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NOTE: Since the presentation of this paper, the Surgeon General has circularized all state milk control authorities for the purpose of inaugurating the publication of lists of interstate milk shippers. The letter follows this article.—Editor.

December 31, 1946

TO ALL STATE MILK CONTROL AUTHORITIES

Subject: Publication of lists of sanitary ratings of interstate milk shippers.

Upon the recommendation of the Conference of State and Territorial Health Officers, the U. S. Public Health Service is undertaking to issue periodically a list of interstate milk shippers and of supplies available for interstate shipment. These lists are intended to acquaint areas experiencing milk shortages with available sources and their sanitary ratings. Health officers of cities actually experiencing shortages will be in position to authorize the receipt by local milk plants of supplies from listed sources with the highest sanitary ratings. Application by shippers for listing as well as acceptance of listed supplies by any city will be entirely optional. Lists will be published quarterly, or oftener if necessary, beginning March 1, 1947, and will show sources of raw milk for pasteurization, pasteurized milk, and later cream and possibly other fluid milk products.

In order that health authorities of receiving areas may feel justified in accepting shipments from beyond their milk sheds without sending their own inspectors to the producing areas, the plan provides for the rating by the State of origin of sources which apply for listing, and for spot checks by the Public Health Service of the State's inspection, laboratory, and rating procedures to insure uniformity and to protect receiving areas against laxity. Ratings will be made and computed in accordance with the Public Health Service rating procedure which has been employed for years by many of the States. The rating figure indicates the weighted percentage compliance with the grade A standards of the Milk Ordinance and Code recommended by the Public Health Service. Receiving areas operating under the PHS Milk Ordinance may, in accordance with Section 11, accept as grade A the outside sources rating 90 percent or more, provided that the bacterial counts and the temperatures of the milk upon receipt are satisfactory. A proposed revision of the rating procedure to assign greater weight than the present 15 percent to bacterial quality and to provide for partial credits for higher counts will be considered at the next meeting of the PHS Sanitation Advisory Board.

No source will be retained on the list when its rating becomes more than 12 months old. Each State rating will be based on data obtained within the preceding six months, including an inspection of and four samples from each producing farm and each receiving station and plant included in the survey. Before rating a source the State sanitarian will obtain a list of all producing farms actually contributing to the supply to be shipped. If the number is less than 25, all should be inspected; if 25 or more, a sufficient number should be selected at random for inspection to reduce the probable error for each item of sanitation to less than 5 percent (see table, p. 3, Reprint 1970 from P. H. Reports), in which case the probable error of the entire rating will be less than 1 percent. Thus, at least 25 producers must be inspected out of 50, 32 out of 100, 38 out of 200, 42 out of 500, and 44 out of 1,000. A truly random selection should be made, as by picking names out of a hat or by dividing the area into districts and selecting one or two roads in each district. Although inspections by local authorities may not be used for rating purposes, the State may accept reports from local official laboratories that have been approved by the State laboratory director as complying substantially with APHA Standard Methods and as checking within 10 percent on results obtained at least twice a year on split samples.

A rating report of each source for which listing is desired should be computed and submitted by the State to the appropriate District Office of the Public Health Service. For each source all producers inspected should be listed, with their violations, on page 3 of milk rating form 9421, and the receiving station and the pasteurization plant, if any, on page 4. The rating forms may be obtained without cost from the Public Health Service. The inspection forms, from which the field data are transferred to the rating form, are purchasable fom the Govenment Printing Office in Washington at 35¢ per 100 for the producer form 8976-D and 40¢ per 100 for the plant form 8978-C. For each source the following additional data should be submitted: name and location of source, kind and volume of supply available at different seasons, total number of producers, number inspected, date of inspection, inspector's name, date inspector was last spot checked by PHS, last 4 counts (or reduction times) and delivery temperatures for each producer and the last 4 counts (or reduction times) of the mixed milk (if mixed), name and location of laboratory, date of last check by State (if a local laboratory), and date of last laboratory spot check by PHS.

To inaugurate the program, the State health or other supervisory agency which is in position to participate should circularize milk plants and receiving stations in the State with a view to receiving applications for ratings from sources which ship or desire to ship interstate. The State agency should assign a competent milk sanitarian to the rating activity. Detailed information and guidance concerning standards and rating procedures may be obtained from the PHS District Office.

Upon receipt of rating reports from the State, the PHS District Office will check all data and computations for completeness and accuracy. If satisfied from previous spot checks that the State sanitarian's inspection and rating methods and the laboratory's procedures are satisfactory, the District Office will forward to the Milk and Food Section in Washington all pertinent data for listing. The District Office will spot check annually the rating methods of each State sanitarian assigned to this activity, to determine agreement within 5 points, and will request the PHS Cincinnati Station to spot check annually the laboratories whose results are used by the State for the rating of sources, to determine substantial compliance with APHA Standard Methods

Any suggestions you may have for improving this program will be given careful consideration.

THOMAS PARRAN,
Surgeon General.

The Use of a Quaternary Ammonium Compound As a Supplement to Heat in the Rinse in Mechanical Dishwashing

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INTRODUCTION

THERE is no question that dishes can be washed and sanitized in a mechanical dishwasher. When dishes are rinsed at a temperature of 170° F., all health hazards have been removed. When dishes which are sanitized at 170° F., bacteriological examinations will demonstrate that the bacteria counts are well below the standard of 100 bacteria per unit set by the U. S. Public Health Service (1).

In unpublished data, the senior author has demonstrated that temperatures of 150° F. and below do not reduce the bacterial load appreciably and rinsing dishes at such temperatures does not render the dishes safe as demonstrated by proper bacteriological procedure.

In a survey of mechanical dishwashing in restaurants sponsored by the National Sanitation Foundation, we found that most machines were operated at temperatures far below 170° F. All of these restaurants were under supposedly close supervision by the County Health Unit. The fact that most rinse temperatures were below 170° F. was not due to laxity by the sanitarians but primarily to the fact that it is difficult for the small restaurant owner to provide heating facilities such that 170° F. water can be delivered to the machine throughout the entire period of washing.

Further, we find that the small lunch counter or soda fountain operators resort to handwashing, first, because of inadequate facilities for supplying 170° F. water in volume and, second, because the machine must be placed back of or under the counter where the escape of hot vapor from the machine is objectionable to the customers seated at the counter in close proximity to the machine.

A survey of lunch counters and soda fountains demonstrated that, where machines were used, they were invariably operated at relatively low temperatures. Where hand washing was used, rinse temperatures were even lower than where machines were used. In most instances, dishes were inadequately rinsed so that health hazards existed. There is definitely a need for a better method of sanitizing dishes for lunch counters, soda fountains, and small restaurants. There is a definite need for an effective means of sanitizing tableware washed in dishwashing machines without the requirement of a high temperature rinse and the objectionable hot vapors.

There have been many attempts to supplement hot water rinsing by the application of sanitizing agents as additive agents to implement the action of water at 120° F. or higher for proper sanitizing action.

For the past several years our laboratories have been studying the germicidal activities of the quaternary ammonia compounds (cationics). These compounds which have high germicidal values, also have excellent wetting properties so that they enter into all surfaces effectively bringing the germicide into intimate contact with the surface to be disinfected.

LABORATORY STUDIES

To determine their applicability for rinsing dishes it was necessary to develop a new laboratory technic for testing disinfectants at short time intervals. This test is an adaptation of a speed reaction technic devised by Mallmann and Devereux (2). Tests were made by introducing a 1 milliliter amount of a saline suspension of the test organisms into 9 milliliters of the sanitizing agent in various concentrations. The organisms were cells washed from the surface of a 24 hour agar slant culture. The 1 milliliter suspension of organisms was introduced rapidly into the sanitizing solution to produce effective mixing of the bacterial cells and the sanitizer. The culture was added after the sanitizing solution had reached a constant temperature. One milliter samples were removed from the medication tubes at intervals of 5, 10 and 15 seconds. To facilitate rapid sampling, the pipettes were equipped with rubber bulbs calibrated to deliver 1 milliliter quantities. The test samples were immediately delivered to 9 milliliter cold saline solution. To eliminate any possible bacteriostatic activity of the sanitizer, various neutralizing agents were added, such as 10 percent blood serum, equivalent amounts of anionic wetting agents, and soap. Appropriate dilutions were made from saline solution and plated in tryptone glucose extract agar. All plates were incubated at 37° C. for 48 hours. Tests were made at temperatures of 70, 120, 125, 130, 135, 140, and 150° F. with concentrations of the cationic sanitizers of 1-15000, 1-10,000, 1-15,000, and 1-20,000. The cationics selected for study were alkyl-dimethyl-benzyl ammonium chloride compounds.

Three test organisms were used. *Escherichia coli,* a strain used for measuring resistance to heat. This strain has a resistance to heat and disinfectants considerably higher than most Gram-negative pathogens.

Staphylococcus aureus. This culture is Food and Drug Administration strain No. 209 used as a standard for testing disinfectants.

Micrococcus caseolyticus, a thermoduric Gram positive organism isolated from milk. This organism is currently in use for measuring heat resistance in our studies on mechanical dishwashing.

The results of these studies are presented in Table 1, 2, and 3. The number of organisms in the controls vary for each series because the tests were made on different days. It will be observed that a close correlation

TABLE 1

The action of alkyl-dimethyl-benzyl ammonium chloride at various temperatures on *Staphylococcus aureus*

Temperature	*Dilution of sanitizer*	*Number of surviving bacteria per ml.* 5 sec.	10 sec.	15 sec.
70° F.	None	25M	27M	24M
	1-10,000	0	0	0
	1-15,000	0	0	0
	1-20,000	20,000	0	0
120° F.	None	24M	25M	24M
	1-10,000	0	0	0
	1-15,000	0	0	0
	1-20,000	140,000	0	0
1125° F.	None	46M	45M	42M
	1-10,000	0	0	0
	1-15,000	0	0	0
	1-20,000	120,000	0	0
130° F.	None	32M	29M	30M
	1-10,000	0	0	0
	1-15,000	0	0	0
	1-20,000	50,000	0	0
135° F.	None	29M	28M	29M
	1-10,000	0	0	0
	1-15,000	0	0	0
	1-20,000	0	0	0
140° F.	None	500,000	440,000	330,000
	1-10,000	0	0	0
	1-15,000	0	0	0
	1-20,000	20,000	10.000	0
150° F.	None	780,000	1,200,000	490,000
	1-10,000	0	0	0
	1-15,000	0	0	0
	1-20,000	40,000	0	0

was obtained in the controls for 5, 10, and 15 seconds. This indicates that the mixing obtained by dipping the tip of the pipette containing the test organisms below the surface of the sanitizing solution, and discharging rapidly gave an effective mixing of organisms and sanitizing solution.

The data show that in 5 seconds all test organisms were killed in a concentration of 1-10,000. At temperatures of 120° F. and higher, in 10 seconds all test organisms were killed in concentration of 1-15,000.

The results of these tests would indicate the possible use of these sanitizing solutions in rinsing dishes in machine dishwashing. The results are well below the standard of 100 bacteria per unit set by the U. S. Public Health Service (1).

TABLE 2

The action of alkyl-dimethyl-benzyl ammonium chloride at various temperatures on *Escherichia coli*

Temperature	*Dilution of sanitizer*	*Number of surviving bacteria per ml.* 5 sec.	10 sec.	15 sec.
70° F.	None	98M	91M	93M
	1-10,000	0	0	0
	1-15,000	360,000	120,000	20,000
120° F.	None	42M	44M	41M
	1-10,000	0	0	0
	1-15,000	40,000	0	0
	1-20,000	100,000	0	0
125° F.	None	61M	64M	61M
	1-10,000	0	0	0
	1-15,000	0	0	0
	1-20,000	220,000	0	0
130° F.	None	72M	64M	66M
	1-10,000	0	08	0
	1-15,000	0	0	0
	1-20,000	160,000	20,000	0
135° F.	None	44M	42M	35M
	1-10,000	0	0	0
	1-15,000	0	0	0
	1-20,000	60 000	0	0
140° F.	None	92M	77M	72M
	1-10,000	0	0	0
	1-15,000	0	0	0
	1-20,000	90,000	60,000	60,000
150° F.	None	88M	51M	38M
	1-10,000	0	0	0
	1-15,000	0	0	0
	1-20,000	120,000	80,000	20,000

TABLE 3

The action of alkyl-dimethyl-benzyl ammonium chloride at various temperatures on *M. caseolyticus*

Temperature	*Dilution of sanitizer*	*Number of surviving bacteria per ml.* 5 sec.	10 sec.	15 sec.
70° F.	None	640,000	460,000	200,000
	1-10,000	0	0	0
	1-15,000	0	0	0
	1-20,000	30,000	0	0
120° F.	None	88M	76M	87M
	1-10,000	0	0	0
	1-15,000	0	0	0
	1-20,000	0	0	0
125° F.	None	62M	64M	61M
	1-10,000	0	0	0
	1-15,000	0	0	0
	1-20,000	220,000	0	0
130° F.	None	32M	29M	30M
	1-10,000	0	0	0
	1-15,000	0	0	0
	1-20,000	0	0	0
135° F.	None	25M	28M	29M
	1-10,000	0	0	0
	1-15,000	0	0	0
	1-20,000	0	0	0
140° F.	None	142M	114M	90M
	1-10,000	0	0	0
	1-15,000	0	0	0
	1-20,000	0	0	0
150° F.	None	40,000	30,000	0
	1-10,000	0	0	0
	1-15,000	0	0	0
	1-20,000	0	0	0

FIELD STUDIES

All of the field studies were carried out under conditions encountered in actual practice. Inasmuch as the use of a germicidal rinse would be largely applied to small food establishments a quick lunch restaurant was selected. This place had a counter seating 20 people and three tables seating 12 people. The machine was an SM 4 Hobart* especially equipped with an automatic disinfectant feeding device which dispensed any desired amount of disinfectant into the rinse water in in an even concentration for 10 seconds. In this machine the rinse water is discharged directly into the wash water. The excess wash water is dis-

*This study was made possible by co-operation of the Hobart Manufacturing Co. who installed the machine in a local restaurant.

charged into an overflow drain. When a disinfectant is added to the rinse water, the disinfectant would be introduced into the wash water.

Taking into consideration the fact that most small restaurants are not equipped with high temperature water, studies were made with wash water temperatures of 120° F. and rinse water temperature of 120, 130, and 140° F. In these studies the washing period was set at 2 minutes and the rinse period at 10 seconds. In order to obtain typical conditions, experiments were conducted in most cases at the noon hour when the machine was in continuous use. No disinfectant rinses were used prior to each set of experiments so that washwater bacterial populations would be high at the start of the tests. Tests were always made prior to the use of disinfectant rinses to determine the populations of the dishes and wash water for comparative purposes. The automatic disinfectant feeder was then started and after three trays had passed through the machine, tests were taken of the dishes and wash water to determine bacterial reductions. Tests were repeated after the sixth tray had passed through the machine.

The method of testing for bacterial populations consisted of swabbing following the procedure of the U. S. Public Health Service (1). This consists of swabbing an area of four square inches on plates and the rims of cups to a depth of ¾ inch on the inside and outside surfaces. The swab after sampling was returned to the swab bottle containing 10 ml. Butterfield's buffer solution. The swabs were immediately brought to the laboratory, and 1 ml. portions were plated on tryptose glucose extract agar. All plates were incubated at 37° C. for 48 hours. Bacteria counts are reported as the total number of organisms isolated from the utensil.

The first series of tests were made at a concentration of 1-6400 (approximately 150 p.p.m.) of the quaternary ammonium compound in the final rinse. Concentrations are checked by measuring the uptake of solution by the feeder and the total volume of water passed in the rinse in 10 seconds. Also tests were made by a field kit for measuring alkyl-dimethyl-benzyl ammonium chloride devised by Hucker and distributed by Onyx Oil and Chemical Company.

The results are presented in Tables 4 and 5. These tables represent averaged results from a number of daily tests. The results for 120° and 140° F. sanitizer-rinse water are approximately the same. The third tray of dishes was tested in each instance rather than the first tray so that these would be assurance that the dispensing equipment was working efficiently. Chemical titrations showed, however that the first tray did receive the proper dosage of sanitizer. The dishes from the sixth tray after the use of the sanitizer-rinse water approached zero on both cups and plates.

It is extremely interesting to note that wash water counts dropped rapidly. For example in Table 4, the count fell from 37,000 per ml. to 6,000 after the introduction of three sanitizer-rinse waters into the wash water. After 6 sanitizer-rinse waters the count fell to 300. This is especially striking as the wash water contains considerable organic matter which would be expected to destroy to a large extent the germicidal activity of the quaternary ammonium salt.

The germicidal action in the wash water is comparable to results obtained in the chlorination of sewage where chlorine doses give a high percentage kill even though the amount of chlorine added satisfies only part of the chlorine demand of the sewage.

The results obtained with sanitizer-rinse concentrations of 1-6400 show that effective sanitization can be obtained with rinse water temperatures of 120-140° F.

In the second series of tests the sanitizer-rinse concentrations was set

TABLE 4

The average results obtained by rinsing dishes in a 1-6500 solution of cationic sanitizer with a wash temperature of 120° F. for 2 minutes and a rinse temperature of 120° F. for 10 seconds

Dishes swabbed	*No. of dishes swabbed*	*Concentration of cationic sanitizer*	*No. of bacteria per dish*	*No. of bacteria per ml. of wash water*
Tests of dishes just before use of sanitized rinse				
Plates	16	0	88	37,000
Cups	16	0	75	
Test of dishes in 3rd tray after starting use of cationic rinse				
Plates	16	1-6500	4	6,000
Cups	16	1-6500	3	
Test of dishes in 6th tray after starting use of cationic rinse				
Plates	16	1-6500	0	300
Cups	16	1-6500	1	

TABLE 5

The average results obtained by rinsing dishes in a 1-6500 solution of cationic sanitizer with a wash temperature of 120° F. for 2 minutes and a rinse temperature of 140° F. for 10 seconds

Dishes swabbed	*No. of dishes swabbed*	*Concentration of cationic sanitizer*	*No. of bacteria per dish*	*No. of bacteria per ml. of wash water*
Tests of dishes just before use of sanitized rinse				
Plates	16	0	89	50,000
Cups	16	0	89	
Tests of dishes in 3rd tray after starting use of cationic rinse				
Plates	16	1-6500	1	8,000
Cups	16	1-6500	2	
Tests of dishes in 6th tray after starting use of cationic rinse				
Plates	16	1-6500	0	170
Cups	16	1-6500	4	

at a dilution of 1-10,000. The averaged results for a number of daily runs are presented in Tables 6 and 7. Rinse temperatures of 130° and 140° F. were used. The results after three sanitizer-rinses are not as marked as these obtained with sanitizer concentrations of 1-6400, however after 6 sanitizer-rinses the final results are comparable to these obtained at concentrations of 1-6400. The reduction of wash water counts were comparable to these obtained with dilution of 1-6400.

These results would indicate that a concentration of 1-10,000 of the quaternary ammonium salts in the rinse water gave effective results.

In the last series the sanitizer-rinse concentration was set at a dilution of 1-13,000. The averaged results of all runs are presented in Table 8. The counts on the sixth sanitizer-rinse was 79 which represents only a slight reduction. Wash water counts fell from 41,000 to 22,000, a reduction of only 50 percent approximately. These data show definitely that a sanitizer-rinse of 1-13,000 has little value in reducing bacterial population on both dishes and wash water.

These data would indicate that the minimum concentration is approximately 1-10,000. Because there is little difference in reductions of 1-6400 and 1-10,000 dilutions it would appear that 1-10,000 would give satisfactory results.

A further check was made to be sure that a 1-10,000 concentration would be satisfactory. This test was made by checking bacterial populations on dishes and wash waters where the sanitizer-rinse was in continuous use, starting with a contaminated wash water. The data are presented in Table 9. These data show that after the second tray had passed through the machine, the bacterial populations rapidly fell to zero and remained at zero for the rest of the day. The bacterial populations of the wash water

TABLE 6

The average results obtained by rinsing dishes at 1-10,000 solution of cationic sanitizer with a wash temperature of 120° F. for 2 minutes and a rinse temperature of 130° F. for 10 seconds

Dishes swabbed	*No. of dishes swabbed*	*Concentration of cationic sanitizer*	*No. of bacteria per dish*	*No. of bacteria per ml. of wash water*
Tests of dishes before use of sanitizing rinse				
Plates	20	0	224	65,000
Cups	20	0	230	
Tests of dishes in 3rd tray after starting use of cationic rinse				
Plates	16	1-10,000	54	14,000
Cups	16	1-10,000	36	
Tests of dishes in 6th tray after starting use of cationic rinse				
Plates	16	1-10,000	4	800
Cups	16	1-10,000	4	

TABLE 7

The average results obtained by rinsing dishes in a 1-10,000 solution of cationic sanitizer with a wash temperature of 130° F. for 2 minutes and a rinse temperature of 140° F. for 10 seconds

Dishes swabbed	*No. of dishes swabbed*	*Concentration of cationic sanitizer*	*No. of bacteria per dish*	*No. of bacteria per ml. of wash water*
Test of dishes before use of sanitizing rinse				
Plates	20	0	160	45,000
Cups	20	0	110	
Test of dishes in 3rd tray after starting use of cationic rinse				
Plates	20	1-10,000	38	11,000
Cups	20	1-10,000	32	
Tests of dishes in 6th tray after starting use of cationic rinse				
Cups	20	1-10,000	4	
Plates	20	1-10,000	4	800

TABLE 8

The average results obtained by rinsing dishes in a 1-13,000 solution of cationic sanitizer with a wash temperature of 130° F. for 2 minutes and a rinse temperature of 120° F. for 10 seconds

Dishes swabbed	*No. of dishes swabbed*	*Concentration of cationic sanitizer*	*No. of bacteria per dish*	*No. of bacteria per ml. of wash water*
Test of dishes before use of sanitizing rinse				
Plates	8	0	160	41,000
Cups	8	0	80	
Tests of dishes in 3rd tray after starting use of cationic rinse				
Plates	8	1-13,000	84	31,000
Cups	8	1-13,000	84	
Tests of dishes in 6th tray after starting use of cationic rinse				
Plates	8	1-13,000	79	22,000
Cups	8	1-13,000	79	

TABLE 9

The results obtained by rinsing dishes in a 1-10,000 solution of cationic sanitizer with a wash temperature of 120° F. for 2 minutes and a rinse temperature of 140° F. for 10 seconds

A CHRONOLOGICAL STUDY FOR ONE DAY

Time of Test	*Number of bacteria on dishes* Plate No. 1	Plate No. 2	Cup No. 1	Cup No. 2	*No. of bacteria per ml. of wash water*
	Before treatment with cationic rinse				
10:30 A. M.	310	270	220	260	46,000
	First tray after starting cationic rinse				
11:00 A. M.	140	160	150	120	21,000
	Second tray after starting cationic rinse				
11:30 A. M.	60	40	30	40	4,000
12:00	20	10	20	0	1,000
12:30 P. M.	10	0	0	0	780
1:00 P. M.	0	0	0	0	340
1:30 P. M.	0	0	0	0	410
2:00 P. M.	0	04	0	0	600
2:30 P. M.	0	0	0	0	440
3:00 P. M.	0	0	0	0	120
3:30 P. M.	0	0	0	0	90
4:00 P. M.	0	0	0	0	76
4:30 P. M.	0	0	0	0	43
5:00 P. M.	0	0	0	0	41
5:30 P. M.	0	0	0	0	65
6:00 P. M.	0	0	0	0	22
6:30 P. M.	0	0	0	0	12

fell rapidly at first from a population of 46,000 to a few hundred and then gradually dropped to counts under 100. These data show the effectiveness of a sanitizer-rinse at non-lethal temperatures as a means of properly sanitizing eating utensils.

The effectiveness of a sanitizer-rinse operated machine was demonstrated to be due to two actions. This is demonstrated in part by a study made of a machine operated at a wash temperature of 140° F. for 2 minutes. In these studies the dishes were removed before rinsing to determine the relationship of the wash water population and the bacterial populations of the dishes after washing but before rinsing. No sanitizer-rinse was used in these experiments. The data are presented in Table 10. It will be observed that there is a definite relationship between wash water populations and the populations of the washed dishes. It can be seen from these data that by holding wash water population

TABLE 10

The relation of bacterial count of wash water to washed dishes immediately after washing but before rinsing

Bacterial count of wash water	*Bacterial counts of dishes* Plates	Cups	Average
20,000	92	60	76
24,000	95	62	78
29,000	97	87	92
33,000	110	115	112
35,000	120	132	126
39,999	145	150	147

down in the wash water, the dishes enter the rinse with low counts. By adding a sanitizing agent to the rinse, the residual bacteria can be effectively destroyed at non-lethal rinse temperatures.

CONCLUSION

A new process of sanitizing machine washed dishes at non-lethal temperatures is presented.

Data are presented to show that quaternary ammonium compounds in concentrations of 1-6400 to 10,000 at temperature of 120° F. will kill both Gram positive and negative bacteria in 5 to 10 seconds exposure in the absence of organic matter.

A new technic, the speed reaction test is presented for measuring the rate of kill of disinfectants.

This new process of sanitizing machine washed dishes offers an effective method for use where high temperature whater is unavailable or impractical.

LITERATURE CITED

1. *U.S. Public Health Service, Ordinance and Code Regulating Eating and Drinking Establishments.* Public Health Bull. 280, 1943.

2. Sanitary Survey of Beverage Establishments. Mallmann, W. L., and Devereux, E. D. *Am. J. Pub. Health* **5**, 1007 (1935).

Food Inspection Plan of American Veterinary Medical Association

The American Veterinary Medical Association has drawn up a basic food inspection plan[1] for the guidance of interested agencies and individuals. "It provides for the protection of the public health by preventing the use in trade channels of food that is diseased, unsound, unwholesome, or otherwise unfit for human consumption, and is designed to prevent the misbranding and adulteration of foods." The plan is to operate under veterinary planning and direction. The main emphasis is meat inspection, including poultry, ante- and postmortem inspection, together with customary control of labeling, products, and waste disposal.

The ordinance is interpreted by a code which explains the conditions and details of enforcement.[2]

(An informative booklet on proper construction of a meat packing plant may be obtained from the U. S. Department of Agriculture, Washington 25, D. C.)

[1] *J. Amer. Vet. Med. Assoc.* **108,** 25 (1946).
[2] *Ibid.* **108,** 389 (1946).

New Wilster Award

At the recent thirty-sixth annual convention of the Oregon Dairy Manufacturers' Association, President E. L. Reeser announced the establishment of the "Dr. G. H. Wilster Award for Oregon's Finest Ice Cream." This was given in recognition of his achievements especially in ice cream manufacture. The trophy was placed in the ice cream division of the Oregon annual dairy products show. The winner of the highest scoring ice cream will be given a small replica of the Wilster trophy for his permanent possession.

A Sanitary Code for Pickle Plants

A Sanitary Code for Pickle Plants has been drawn up in ten mimeographed pages and is available for distribution by writing to the Michigan State College, East Lansing, Michigan. It deals with Premises, Control of Rodents and Insects, Equipment, Manufacturing Practices, Methods of Analysis, Personnel, and General Plant Orderliness, Cleanliness, and Maintenance.

Control of Pests on Animals and About Milk Products*

Walter E. Dove

Insecticide Division, Dodge & Olcott, Inc., Baltimore, Md.

All of us are interested in the production of maximum quantities of clean wholesome milk that will meet or exceed the requirements of food and health standards, and we are anxious to have milk products free from contaminations and foreign materials of any kind.

Six years ago the writer worked near the coast of a southern state where he observed numbers of cattle standing in water in efforts to protect their legs from stable flies, or so called "dog flies". It was found that some of the animals became mired in the swamp and were unable to free themselves without help. From inquiries it developed that some of the animals, not promptly extricated, actually died while standing in the mud. Further inquiries were made on the effects of the flies on milk production. It was learned that at this season of the year much of the milk consumed in this vicinity was trucked from dairies located about one hundred miles distant. The local dairymen reported that when the flies appeared there was an abrupt drop of about 25 per cent in the quantity of milk produced, and during outbreaks of "dog flies" the reduction amounted to as much as half of the normal production of milk. Because there was an increase in supply when the flies disappeared in the late fall months, the reduction during the fly season was attributed by the dairymen to loss of blood and to annoyance of animals by the flies.

By the following year it was learned that "dog flies" developed in deposits of certain marine grasses that were washed ashore along the inner bays and inlets, and in litter from peanut hay. At that time it was also found that certain treatments of these breeding places were effective in preventing outbreaks of the flies. Such treatments have been used during the past few years, and the local dairies have not experienced the reduction in milk supply that had always accompanied the outbreaks of flies during the previous years.

Other Pests of Animals

In most localities other biting flies also are serious pests of dairy animals and are capable of contaminating milk. Horn flies, horse flies, deer flies, and biting gnats feed upon warm red blood, and in doing so, they cause serious annoyance to the animals. In addition to these, houseflies and eye gnats visit wounds and natural openings of the body and are not only annoying but are extremely filthy in their feeding habits. In most localities sprays are used on the animals during the milking hours in order to prevent the cows from switching their tails in the face of the milker.

Frequently also, screwworms are found in different kinds of injuries of animals. At times they occur in wounds that result from the bites of ear ticks or horn flies, but more often among dairy animals these maggots are found in navels of newly born animals.

In the winter months cattle grubs make holes in the backs of animals, remain in this location about 30 days or longer, drop to the soil, pupate, and then emerge as heel flies. These flies

* Presented at the Thirty-third Annual Meeting of the International Association of Milk Sanitarians, Atlantic City, N. J., October 24–26, 1946.

lay eggs on the heels of cattle and are responsible for annoyance and even stampedes of herds of cattle.

Yellow lice increase their numbers by feeding on the hair and epidermal scales of the skin. In company with them, blue or blood-sucking lice are often found attached to skin. The different species of yellow or biting lice and the blue sucking lice increase in number during the winter months, and their presence is associated with rough scaly skin. All serious developments of lice occur when the animals are receiving the most costly feeds.

All of these parasites accompany the cows into the barn where the horn flies, houseflies, stable flies, and eye gnats have an opportunity of getting into the milk pail. Because they are annoying to the animals they may even cause the cows to switch or rub hairs or other particles into the pail. Some of the particles that are often troublesome are the granules of debris that occur about the openings of the cattle grub cysts. Others result from lice that cause roughness and dryness of the skin which are associated with the dropping of epidermal scales, hairs, and molt skins of the lice. Altogether, the animal carries a variety of pests in the pasture that are not only capable of annoyance and a reduction of the milk supply, but can actually accompany the animal to the barn where they are further capable of contaminating milk and the products made from it.

PESTS ABOUT MILK PRODUCTS

In addition to the pests that accompany animals to the barns, other kinds occur about milk rooms, creameries, factories, and processing operations where they have an opportunity of contaminating milk or its products. These include domestic pets, rodents, flies, cockroaches, skippers, cheese mites, rat mites, ants, fleas, mosquitoes, silver fish, spiders, scorpions, as well as the excreta, hairs, appendages, and other parts from different forms of life. In order to prevent contaminations from these sources, it is necessary to understand the biology of the pests so that development of menacing populations may be avoided, to apply the good principles of sanitation and dairy management, and to utilize to full advantage by proper application the safe and efficient insecticides and rodenticides that are available for this purpose.

PREVENT DEVELOPMENT OF PESTS

If the population of pests that normally develop about the premises are not prevented from developing, the continuous emergence of new ones can more than offset the advantage that is obtained from proper application of good pesticides. It is just as necessary as ever to remove manure promptly from the premises of the barn, and to use at regular intervals a good manure spreader that will insure drying of manure before any flies have a chance to develop in it. Fly maggots simply will not develop in dry breeding media. If houseflies, stable flies, and eye gnats are not allowed to build up in accumulations of manure and straw, the fly control problem will be concerned primarily with the numbers that reach the premises on delivery trucks or from migration.

Fleas, rat mites, bird mites, and poultry mites require meals of blood, and cannot exist about the premises if no animals are present to furnish the blood. If rats and mice are eliminated by rat proofing the buildings rather than by permitting visits from dogs and cats, it is possible to avoid parasites of these animals as well as the hairs and excreta from the animals.

When big populations of flies and parasites of rats and mice are prevented from developing, full advantage is gained from the use of insecticides. Despite claims that may have been misleading to the contrary, prevention remains the keynote of control.

INSECTICIDES AND RODENTICIDES

Insecticides and rodenticides that are used about foods and feeds should be free from hazards of toxicity to warm blood animals. This is not only good insurance against errors in applications by untrained or inexperienced persons, but also eliminates any possibility of the pesticide being a source of poisoning. If a case of suspected poisoning is reported, the owner of a food establishment should be able to say that no toxic insecticides or rodenticides have been used about his premises. If he should be unable to make such a statement, he could face circumstances that cause embarrassment, losses, and other unnecessary difficulties.

Next to safety, an insecticide or a rodenticide should be efficient in killing insects and rodents. On the inside of buildings effective use can be made of finely atomized sprays or aerosols for quickly killing any free flying insects, because only one-half of one milliliter of insecticide per 1000 cubic feet is sufficient for this purpose. If these methods of application are used with insecticides that are safe and the dead insects are removed promptly after treatment, before the foods are exposed, the chance for contamination by killed insects or by the insecticide simply does not exist. The use of surface sprays on the outside walls, trees, and animals will reduce the numbers of insects that can gain entrance to rooms containing edible products. This means a reduced number to be killed with aerosols or finely atomized sprays.

ROTENONE DUSTS OR SPRAYS ON ANIMALS

At intervals of 30 days or less, cattle grubs are effectively treated with rotenone dusts, and there is no known substitute treatment that can be used for this purpose. If all cattle on the premises are treated when the grub cysts are open, there can be no annoyance from heel flies in the spring of the year. The dust is prepared by an intimate mixing of ground cubé or derris with pyrophyllite, tripoli earth, or frianite, so that the finished mixture contains 1.66 per cent rotenone and the accompanying resins. Either of the diluents mentioned is more satisfactory than clays, talcs or sulfur, because the former consist of heavy particles that are capable of penetrating the hair and entering the cysts for contact with the grubs. Also, the same rotenone mixtures are effective for both biting and blood sucking lice, and can be used to control both kinds of lice at the same time the herd is being treated for cattle grubs. An interval of 16 to 18 days is selected between two of the cattle grub treatments. This period is sufficient to permit the louse eggs to hatch, and to insure death of the young lice by the second treatment before they are sufficiently developed to lay eggs. The dust is easily applied from a shaker-top can that prevents particles from floating in the air. If the cover of a jar or top of a can is perforated with a large nail, the holes will be big enough to permit simply pouring the dust through these openings. If this is done with one hand while the other hand is used for ruffling the hair, the dust will flow from the holes and will disappear into the hair.

Sprays made with 10 pounds of ground cube or derris, having a rotenone content of 5 per cent, in 100 gallons of water may also be used with equal effectiveness. The sprayer should be provided with an agitator and should develop from 300 to 400 pounds of pressure at the nozzle. If the nozzle is used at about nine inches from the back of the animal the spray will enter the cattle grub cysts and come in contact with grubs. If animals are put through a chute, and men are provided with a nozzle on either side of the chute, the herd can be treated quite rapidly. Some sprayers mounted on trucks are used for community spraying of herds of cattle for control of grubs and lice.

Pyrethrum Dusts

Ground pyrethrum dust has long been used safely on dry floors and in cupboards for control of ants, fleas, mites, silver fish, and scorpions, but it has been more universally used for control of cockroaches. For all of these purposes, the dusts impregnated with pyrethrum extracts are more effective than are the ground pyrethrum flowers. The quick killing action on roaches and other insects afforded by pyrethrum dusts, and the complete safety of the materials about food products, have had much to do with its wide and successful use in food processing plants and in food handling establishments.

Aerosols and Space Sprays

Aerosols or finely atomized sprays are especially effective against free flying insects and are dependable for quickly killing such insects in buildings. The flies that come from distant places as well as those resting in the buildings are killed within a few minutes. Both aerosols and finely atomized sprays will also kill moths, mosquitoes, leaf hoppers, and several other kinds of insects that are attracted to lights in buildings. Electric vaporizers and steam generators are finding some use for similar purposes. These treatments also can be used to kill cockroaches. The conventional type sprayer using a relatively high concentration of pyrethrum is quite satisfactory for the application of a surface spray.

Good space sprays, finely atomized sprays, and aerosols consist of particles that usually range from about 10 to 30 micra in diameter. Droplets larger than these fall rapidly to the floor. The small droplets in this range float in the air and remain effective for one-half hour or longer against mosquitoes, skipper flies, and some of the other smaller insects. All of these methods are most advantageously used just before foods are placed in open vats or otherwise exposed, and at other times when it is desirable to kill quickly the insects. It is then possible to remove the dead insects so that they cannot possibly get into the foods.

Surface Sprays

In contrast to space sprays, surface sprays are applied with large droplets which do not float in the air. They are applied to surfaces of buildings and animals for the primary purposes of producing a residue that will kill insects that rest on the treated surface. During the application of a surface spray any drifting of particles to the floor is considered an objectionable feature which should be corrected by a change to better equipment. The best applications of surface sprays are made from a nozzle having an opening of about 0.060 inch, and with a pressure of about 25 to 40 pounds per square inch. About 5 ml. per square foot or about 1 gallon to 1000 square feet is the usual rate of application that will give no run off but a good coverage of the surface. When such sprays contain the proper proportion of effective ingredients and are properly applied, they can be used effectively for treating animals, outside walls of buildings, and certain areas in buildings where dying insects would not fall into foods. Effective use of surface sprays can also be made on window glass where flies and other insects are attracted by the outside daylight. Insects are killed when they visit or rest on the treated surfaces long enough for the sensitive structures in their feet to contact the invisible film of insecticide. If surface sprays are used near foods, the purpose of this type spray may be defeated by causing contamination of food with dead or dying insects.

Prior to World War II, pyrethrum was used in surface sprays for control of malaria mosquitoes in India by Russell and Knipe of the Rockefeller Foundation. Because of the short supply that existed during the war, pyrethrum did not find general use in surface treatments for control of flies and other insects. Now that pyrethrum is being imported in quantities ample to meet all reasonable needs, and safe insecticides which are activated and extended by the addition of small amounts of pyrethrum extracts, it is reasonable to expect that the dairyman who has safety uppermost in mind will use increased amounts of such combinations in the future.

PRECAUTIONS

When it is necessary to caution the user of an insecticide or rodenticide to avoid eating, breathing, drinking, or absorbing the material because of ill effects on the health of man, the statement amounts to an admission that the insect and rodent problems are not yet satisfactorily solved. These problems will not be solved until rodenticides and insecticides can be handled effectively and economically without hazards of toxicity. Until this time arrives, is there any excuse for the user to choose an insecticide or rodenticide that offers hazards when safe materials are available to accomplish the same purpose?

Because of the possibility that toxic materials might be used on animal feeds, or in a negligent manner about locations where cream and milk are produced, would it not be desirable to consider the advisability of chemically testing representative samples of the raw products before they are processed into cream, butter, and cheese, so that the quality of the end products could be assured?

Report of Committee on Dairy Farm Methods*

M. P. Baker, Chairman

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Incident to the appointment of the Committee on Dairy Farm Methods for this past year, President Palmer indicated his desire that consideration to the care of milking machines be continued. The committee as a group has not carried on a research program; however, two of the members, Bober and Hopson, each had some work in progress a year ago collecting data relative to procedures in use on individual farms and the efficiency of these procedures as judged by the quality of milk produced on these farms. Bober has been continuing his work through this year and it is hoped these data can be made available later. Milking machines can be kept in a satisfactory condition by any of a number of procedures. The problem is to get compliance with some one procedure. That requires the coöperation of the milker. If he is interested he will probably do a good job and if he is not interested he probably will not. Cleanliness is not as closely related to the method followed as to the will to do a good job.

Sanitation Necessary

In spite of the available satisfactory methods, however, there is need for simplifying the care of milking machines in the interest of getting a greater degree of compliance in regard to acceptably clean and sterile machines. While it is recognized that a good way to enlist the interest of producers is to appeal to them on the basis of economy, the attitude of encouraging shorter or more simple methods on the premise that the producer does not have time to care for his machine has some disadvantages, and the committee feels that such an attitude or idea has been over emphasized. The producer cannot afford not to care for his machine properly. Often milk is his chief source of income. It is better to emphasize the need for producing good quality milk than to call attention to a desirable but not necessary need for saving time.

The time required for caring for milking machines on producing farms is not necessarily a function of the thoroughness of the care of the machine. It is apt to be a function of the general efficiency with which the care is planned and carried out. An example of this is the prompt rinsing with cold water of all milk utensils as soon as milking is completed. This tends to prevent the formation of milkstone and facilitates considerably the cleaning of the utensils. In the survey reported by Bober (1) it was observed that there was no definite relationship between the time required for care of the milking machines and quality of milk produced on farms. In fact time studies of the operations on these farms showed slightly less time taken by the group doing the best job as measured by the bacterial counts of the milks. This indicates that it is the planning and organization of the cleaning and sterilizing operations rather than the time that is important.

Simpler Practises Necessary

Studies of different procedures for the care of milking machines are now

* Presented at the Thirty-third Annual Meeting of the International Association of Milk Sanitarians, Inc., Atlantic City, N. J., October 24–26, 1946.

in progress as mentioned above. Considerable work has been, and is being done at some of the agricultural experiment stations to find simpler, less time-consuming methods. There are many who believe it is better to have greater compliance with a procedure that will result in an acceptable machine than to have a lower percentage of compliance with a more time-consuming procedure that will, if properly followed, yield a machine that is more nearly sterile. We, of course, do not expect a sterile machine in the strict sense but it is reasonable to expect one that is physically clean and is free from excessive bacterial contamination. There is need for a definite standard or understanding with the producer concerning this; and there is a need for a uniformity of such standards.

IMPROVED CLEANERS NEEDED

Studies with wetting agents give promise of finding new compounds or mixtures of compounds that will be more efficient in removing soil from utensils. These studies should be encouraged but the impression that they will be a cure-all in nature should not be given and sanitarians should stress the need for following certain fundamentals such as immediate treatment after milking, brushing all surfaces thoroughly, and proper draining, drying, and sterilization of milking utensils. Improved cleaning compounds quite likely will make proper cleaning easier but we should make use of that possibility to get more machines cleaner and not simply to save time. If we do the latter we shall not improve our position as far as quality of milk is concerned but simply be saving some time and much of that on those farms where quality improvement is most needed. Those who are already doing a good cleaning job are fitting known methods satisfactorily into their routine.

SIMPLER DESIGN NEEDED

There is need for simplification of the design of milking machines in the interest of sanitation. As pointed out by one of the members of the committee, Parfitt, much has been accomplished in this direction by redesigning homogenizers. Formerly there were many discussions in regard to methods for cleaning homogenizers much as there is now about methods of cleaning milking machines. With the improved designs of homogenizers which are more easily cleaned because surfaces are made more available for cleaning, this problem has been largely solved. It is hoped that the cleaning of the milking machines can be helped in a similar way.

IMPORTANCE OF INSTRUCTION

Proper instruction in the use and care of milking machines is important. This has been stressed before but merits repeating. Sanitarians and milking machine salesmen should carefully and thoroughly instruct users in their proper care. Sanitarians themselves should in many cases become more familiar with milking machine operation and problems so they will be better able to instruct dairymen. Milking machine salesmen also should be properly trained and instructed to teach owners the best known methods. Among the things that are neglected sometimes is the vacuum hose. Occasionally the milking pail is allowed to get too full and milk is drawn up into the vacuum hose, and if this is not cleaned properly a very undesirable condition may develop. Instructions to owners should include the proper care of these. It is suggested that both sanitarians and representatives of milking machine manufacturers inspect machines in use at frequent intervals and make any needed recommendations or adjustments. In the instruction of dairymen each step should be explained in detail including reasons. A dairyman will be able to carry through instructions better if he understands "why".

IMPROVED STRAINING NECESSARY

There is need for improvement and unification of straining practises on farms. As shown by sediment tests at receiving rooms much milk is not clean and has not been strained properly. It is suggested that efforts be made to unify recommendations concerning designs of strainers and their use This is another challenge to those in position to instruct dairymen in dairy farm methods. Among the things that should be stressed are: importance of properly fitting pads to the strainer, the dangers of using dented strainers, the proper place for straining milk, the significance of milk straining more slowly than usual, and the value of using the appearance of the strainer pad as an index to efficiency of efforts made to keep milk clean. Since slowness of straining is at the root of some of the trouble encountered, would it not be advisable to consider designs or sizes of strainers that would be faster and perhaps eliminate the necessity of changing the strainer cloth in the middle of the milking except in the case of large producers?

OTHER AIDS

There has been a considerable trend toward mechanical refrigeration and in some areas most or all of the milk is cooled on the farms that way. Since cooling to low temperatures effectively checks bacterial growth in milk there is a possibility of allowing the low temperature cooling to substitute to some extent for sanitation. This should be discouraged. Since the advent of mechanical coolers there has been more notice of thermoduric bacteria in milk. Whether there is any relationship between these is not certain. We should, however, be alert to recognize such a relationship if it exists so steps can be taken to correct it.

Increasing the efficiency of farm operations in general would be a great help in promoting quality of milk as well as lowering the cost of production. Carter (2) in 1943 reported on savings that could be made on dairy farms by a job analysis study. These savings were considerable. Dairy farm operations are just as subject to improvement by efficiency studies as are industrial operations but dairy farm operations are made up of small units and so have not been subjected to such studies. It is probable that labor saving through increased efficiency will be a big factor in the future in determining the profits from milk production. Such a trend could easily be a help in maintaining quality of milk.

1. Bober, L. E. Private communication.
2. Carter, R. M. Labor Saving Through Farm Job Analysis. I. Dairy Barn Chores. *Vermont Agr. Expt. Sta.*, Bul. 503 (1943).

M. P. Baker, CHAIRMAN

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The Formal Education of a Food Technologist

THE field of food technology long disregarded in favor of the other sciences is coming into its own. For example, the Institute of Food Technologists, a ten year old organization, has an enrollment of over 2,500 qualified members. In the past few years several colleges and universities saw fit to offer some work to students in food technology although close examination of these programs indicate outgrowths of established applied subjects such as dairy industries, industrial microbiology, chemical engineering, horticulture, poultry husbandry, and others. Very few of our higher educational institutions offer formal programs leading to degrees, undergraduate or graduate, in food technology. Of these the University of Massachusetts,* Massachusetts Institute of Technology, Oregon State College and the University of California are outstanding.

Food Technology

Food Technology has existed in a quiescent state or, as mentioned earlier, under the guise of one of the other sciences, for as long as man has taken advantage of improving on his food handling. Many of the present accepted developments in modern foods were outgrowths of primitive technics originated by fortuitous accidents of nature. It has been only comparatively recently that we have accumulated sufficient results of scientific studies regarding foods and their processing to justify the classification of this knowledge under the heading of food technology.

As a result of the progress made over a long period of time, food technology can now be fairly well defined comprehensively. The following definition is found in the constitution of the Institute of Food Technologists.

*Reorganization of the heretofore Massachusetts State College at Amherst.

"Food Technology is the technological application of science and engineering to the handling of foods. Food Technology is primarily based on the fundamentals of chemistry, physics, biology and microbiology, any of which sciences may find expression through an engineering operation. Knowledge of food technology enables its possessor to develop new products, processes, and equipment; to select proper raw materials; to understand and control food manufacturing operations; to solve technical problems of food manufacture and distribution, including those involved in plant sanitation, and those affecting the nutritional value and public health safety of foods; and to know the fundamental changes of composition and physical condition of foodstuffs which may occur during and subsequent to the industrial procession of the foodstuffs."

The scope of this definition is such that it is unreasonable to expect any one man to acquire a complete knowledge of the entire field and all it comprises in one lifetime. Facing a student of modern food technology is the limitation of time. Reasonably, the four years spent in college training could possibly be stretched to five in this field. A relatively few, capable of graduate study, may devote a maximum of seven or eight years to their formal education. The fact persists that the average college student today is prepared to spend only four years in this part of his training. Therefore, it is necessary and of utmost importance for the educator to consider carefully the subject material to be presented in his program of food technology. He must have the interests of both the student and the food industries in mind.

Educational Requirements

There are approximately 50,000 food industry plants in the United States. Probably less than ten percent of these companies now employ food technologists. Thus there is a large untried market for the services of a food technologist but this market has little or no preconceived notion as to what is wanted or needed. The smaller group are familiar to a certain degree with the services of a food technologist but there again, understanding is based on limited previous experience or careful analysis of limited specialized needs. Certainly not all these potential users of food technologists would agree on the type of man they desire or the training he requires, nor is it likely that any one type of training, whatever it be, could meet all these needs satisfactorily. Some will want food technologists and consider their sphere of activity as being only in the production divisions where administrative and engineering training are especially important. Others will want food technologists who are primarily, if not exclusively, laboratory men to be used as analysts, bacteriologists and biochemists. Research and development groups for new products and processes would call for men with constructive points of view and trained in specialized food fields. In the smaller organizations that have developed no technical or scientific staffs, a food technologist is generally expected to know all the answers. This also holds true for technical service men or "trouble shooters" for the larger supply and equipment organizations. In a few highly organized food companies there may be extensive research laboratories with divisions of the many sciences, basic and applied, which individually deal with the specific aspects of the problems met in their companies' activities, but with relatively few food technologists who are concerned with the over-all picture.

Fundamentally, two roads lie before the educator, the scientific road and engineering. If one were to follow the scientific course, the student would be required to take chemistry, including qualitative, quantitative, organic, physical and biological; physics; mathematics; microbiology (at least two years); and biology (botany, zoology, entomology, genetics). In addition to these subjects the required collegiate courses in English, history, political science, sociology, psychology, and other cultural subjects would fully occupy three or four years. The student would then have an excellent scientific background but would still be totally ignorant of food technology as such. It would require several years of practical work in a plant to acquire the background. This course of study might seem somewhat far removed from food technology and be criticized by many for that reason. Nevertheless it is the educational background of many of our outstanding food technologists of today chiefly because there was no other course of study offered. The chief criticism to this type of training is the lack of engineering knowledge which would have to be acquired by experience or by taking pertinent engineering courses after graduation.

The second approach to food technology is from the engineering standpoint. The training received in chemical engineering is a good background for much of the work encountered in food technology. However, the chemical engineer lacks the biological and microbiological training that is considered essential in food technology. This is not any greater handicap to him than the lack of engineering is to one trained only in the sciences. Neither of these two programs of study include the desirable and useful courses in horticulture and agronomy.

A more ideal approach is a combination of the sciences and engineering which is the technological one. The course of study may be limited to train the student in some special field such as cereal, dairy, fruit, vegetable, fish, or meat technology in which case the student acquires a general background of the sciences and then specializes in a particular branch of food technology.

Another possibility is to broaden the course of study to include a more thorough training in the fundamental sciences and in engineering and to include certain courses in food technology as such. These would give the student an understanding of: food processing, principles of canning, dehydration, refrigeration and freezing, salting, pickling, meat curing, cereal, dairy and fishery products, fermentation, food equipment, unit processes and operations, quality control, grading, food laws, adulteration, plant sanitation, packaging, storage, beverage manufacture, and the use of food adjuncts. Properly integrated such a course of study would teach the student the relations and applications of the sciences and engineering principles to the entire field of food processing rather than to any one specific food industry. This more nearly approaches the ideal training since it provides a more practical background not only for the student entering industry but also for those who, on completion of post graduate study and research, enter government, educational, and other institutions, research laboratories, and other agencies related to but not directly connected with industry. Such a student will have a more practical outlook on the problems to be solved for industry. Specialization can then take place after completion of the formal education.

In this latter program intensive training in well equipped laboratories and pilot plants at the universities is implied.

CURRICULA

That there is a wide divergence of opinion on what constitutes the best training for a food technologist is evidenced by the requirements of the curricula in various institutions throughout the country. Likewise, the training of food technologists in various institutions is carried on in departments varying widely in their interests. In some institutions they are trained in the school of agriculture, and in some in the school of engineering. In other institutions it is a departmental affair coming under the jurisdiction of such departments as bacteriology, biology, chemistry, dairy, or horticulture. Naturally the school or department in which the training is done frequently exerts an influence on the subjects required to be taken out of all proportion to their merits. For example, if the course in food technology is given in the school of agriculture, one may find a predominance of agricultural subjects required. In the school of engineering, the emphasis is more apt to be on engineering. The same is true when food technology is administered by the various science departments mentioned above. The emphasis will be on the subject matter of that particular department. It seems more reasonable to expect the ideal type of training to be conducted by an independent Department of Food Technology having no commitments to sciences other than food technology. Thus, electives and required courses in the curriculum would be impartially allocated.

The following is our present list* of colleges and universities in this country offering or developing curricula in the field of food technology:

Brooklyn Polytechnic Institute
Bucknell University
College of the City of New York
Illinois Institute of Technology
Iowa State College
Massachusetts Institute of Technology
Michigan State College
Ohio State College
Oklahoma A. & M. College
Oregon State College
Pennsylvania State College
Rutgers University
Texas A. & M. College
University of California
University of Georgia
University of Illinois
University of Maryland
University of Massachusetts
University of Minnesota
University of Missouri
University of North Carolina
University of Tennessee
University of Washington
University of Wisconsin

*If there are other institutions offering formal courses in food technology, we should like to include them in a later list.—*Editor.*

In addition to these four year college programs, there are a number of vocational short courses offered by various institutions. These are designed to train not food technologists but technicians for the food industries.

Of the universities listed above, many as yet have no graduates. Some are now seeking qualified staff members to get their proposed food technology programs started. Others are developing curricula influenced by and administered by established departments such as dairying, bacteriology or nutrition.

The University of Massachusetts, Oregon State College, Massachusetts Institute of Technology, and University of California were pioneers in the training of food technologists having long had programs leading to the graduation of students in this field. For example, the University of Massachusetts now has well over 200 Bachelor's, Master's, and Ph.D.'s who have received a sound background training in food technology, as outlined under the ideal setup, since 1930. Of these, thirty have the doctor's degree. Over ninety percent of the graduates are employed or established in some phase of the broad field of food technology.

To carry out this example of the University of Massachusetts further it might be well at this time to indicate the training and facilities offered. The Food Technology Department has its own building outfitted with pilot plant equipment for all phases of food processing. In addition, it has its own chemical, microbiological and nutrition laboratories for use by graduate students and undergraduate majors. Although students take courses in chemistry, bacteriology, horticulture, engineering, dairying, animal husbandry, nutrition, and cultural subjects in addition to food technology, the department is independent of these other departments. Graduate students take adanced post graduate courses in food technology and the other sciences. A major portion of their time is spent on a project of independent food research under the major supervision and guidance of members of the staff of the department. Minor subjects may be taken outside the department in which case other staff members are often called upon to cooperate in the supervision of the thesis project. In most cases this food research is conducted at the Food Technology Laboratories, which as previously mentioned are well equipped for many types of research programs.

From the trend of the past seven years it can be expected that the next ten years will see not only an increase in the number of universities offering programs in food technology but also an improvement in the quality of the curricula. Only by an honest effort on the part of our educators to teach food technology, necessarily aided by the other sciences, can we approach the ideal goal of helping to develop food technologists who will come closest to fulfilling the requirements as laid down in the Institute of Food Technologists' definition.

Abstracts of Papers Presented at 7th Annual Conference of Institute of Food Technologists

BOSTON, MASSACHUSETTS, JUNE 1--5, 1947

SINCE food technology deals entirely with matter in the colloidal state, E. A. Hauser, Massachusetts Institute of Technology, asserted that it is essential that food technologists should make colloid chemistry an obligatory part of their training. This phenomena of the great increase of surface over volume presented by matter in colloidal condition explains why it is far more reactive than its chemical composition would indicate.

MANAGEMENT

The research organization should report directly to top management, according to P. W. Pillsbury, president of Pillsbury Mills, Inc. Nothing is permanent; each advance constitutes the vantage point from which further progress starts. Research is essential to the welfare and stability of the company; it constitutes a threat to a competitor and insurance to the business.

"Research, experimentation and technology are the evidences of wise management and the insurance which investors look for to provide the elements necessary for institutional survival," averred Laurence F. Whittemore, president of the Federal Reserve Bank of Boston.

He noted that man's success in his struggle for survival "has been measured almost exactly by the development of food supplies." Value of research to sound business conduct is indicated by the history of New England industry, which shows many examples of concerns which failed to survive because of unwillingness or inability to meet changing conditions.

Substitution of "faith for fear" in management-labor relations was suggested by Charles P. McCormick, president of McCormick & Co., Baltimore, Md., in a discussion of human relations.

McCormick, widely known for his institution of a program of multiple management in his concern some 15 years ago, outlined this system of "junior boards of directors" which give employees of executive ability a voice in management and at the same time serve as a two-way communication system between the top management and the employees.

The Baltimore food company executive declared that "the principles and practice of regard for the welfare of our fellow man" must be reinstituted into business life, and asserted that the "enthusiasm and direction has got to come from the top."

"I believe that the logical leader of labor is the employer," McCormick asserted. "He had the job years ago before he lost contact with his employees. He can regain his position provided he is able to restore two-way communication between himself and his employees by returning to the 'dignity of man' principle."

The success of the McCormick multiple management plan as a practical demonstration of applied techniques in human relations was cited by McCormick in noting his company's 15-year record of no strikes or work stoppages, "and actually . . . no whispers of labor discord."

The importance of cooperation in research by industries and universities was stressed by Prof. William L. Campbell of the department of food technology at Massachusetts Institute of Technology.

He mentioned particularly studies

being conducted at M.I.T. on the effect of X-rays, cathode rays, and other radiation in sterilizing foods. Goal of the study is a means of effective sterilization without heat, an effect which can be produced by high-voltage X-rays or by cathode rays.

He pointed out that an adequate exposure to high voltage X-rays is needed because, although more than 99 percent of microorganisms are killed by an exposure of only one-tenth the full energy, the other nine-tenths of the high-voltage energy are required to kill the remaining fraction of 1 percent of bacteria.

Further studies are being conducted of the effect of X-rays on vitamins, color, texture and taste.

Cooperative research projects such as this, Dr. Campbell noted, not only aid industry in improving its product and often in lessening its costs, but also aid the universities by keeping them in close contact with developments in the field, thus improving their teaching.

According to Thomas M. Rector, Vice-President of General Foods Corporation, New York City, the first essentials in research are careful organization and planning. He pointed out that "Given good organization and good planning, the third element necessary to assure smooth operation and efficiency over a long period is good executive control of the research and development function, again not only by the research director, but also by general management. General management can help with organization. It can participate in planning. In both of these activities, however, the amount of help that general management can give its Research and Development Department is almost directly proportional to the amount of financial control information it has at its disposal.

"Research accounting, therefore, should by all means be done. It is the only effective way of giving the research director financial control of his operation and is also the only effective way of keeping general management in full touch with what is going on in its research and development departments."

The food industry "has found that the organization and operation of a research and development department is a necessary part of its business," L. E. McCauley, vice-president of Armour & Company declared.

McCauley said that the food industry as a whole spends about one-half of 1 percent of its gross income in research and development, to develop new techniques in order to keep their place in a competitive way. The natural variations in the raw materials of the food industry are in themselves a reason for maintaining a scientific staff to promote a higher degree of standardization of quality in the finished product.

ADDRESS OF MEDALLIST BALL

Scientific facts are not really basic until they can be generalized or rationalized, in terms of mathematics, Dr. C. Olin Ball, technical director of the Owens-Illinois Glass Company of Toledo, Ohio, declared in an address upon receiving the Nicholas Appert Medal award, given annually by the Institute of Food Technologists for distinguished contributions to the knowledge of food and food processes.

Speaking at the annual banquet of the Institute of Food Technologists at Hotel Statler, a high spot of the institute's four-day national meeting here, Dr. Ball suggested that scientists change their thought and terminology so that problems of research solved by the use of mathematics be called basic research, while those using experiment be called applied research.

Inherent in the address was a recognition of the great need for better mathematics training among scientists, and more extensive use of this basic tool of science.

"The use of precise mathematical methods in solving problems in science provides an instrument that is potentially capable of accelerating scientific and industrial progress," Dr. Ball declared. "Students of science should be encouraged to study mathematics not only to provide themselves with the facility for using this instrument but also to train themselves in the technique of analytical thinking. An increase in sound objective thinking is needed not only within the sciences but also in every other line of activity.

"Since mathematics deals objectively with quanta, and since quanta constitute the fundamental substance of science, the use of mathematics in scientific research is a logical verification of the basic nature of the research. Under this concept, research may simultaneously be both basic and applied because this proposed definition of basic research deals only with the technique employed in solving problems and not at all with the question of whether or not the results of the research are of immediate practical use.

"Precise mathematical processes applied judiciously in scientific research provide a shortcut to information that would otherwise have to be obtained through tedious experimentation, and the results are of equal reliability to those obtained in experimentation. An example of the accomplishment that is possible in the field of food technology is found in the calculation of sterilizing processes for food. Through the use of mathematical methods, the volume of experimental work in this sphere is reduced by more than 90 percent from that which would be necessary to obtain the same information by experimentation alone.

"There is strong reason to believe that benefits equivalent to that which is enjoyed by workers in food sterilization are available to workers on problems concerned with the growth of bacteria and with the preservation and destruction of vitamins, enzymes, hormones, amino acids, and other organic substances that are important in food technology . . . .

"It appears that, for years to come, the application of precise mathematical processes will necessarily be confined to objects which are included within a comparatively short range of complexity of structure. For the present, objects of the simplest structures are limited to treatment by the statistical method because of the impossibility of making objective measurements upon individuals of the class. Objects belonging in the higher categories of complexity respond to treatment by the statistical method only, because of the extreme variability existing in the properties of different individuals of these classes.

"These facts support the hypothesis that the manifestations upon which the application of precise mathematical processes depends are closely associated with the electromagnetic fields that control the behavior of objects. The simplest objects, at present believed to be the elementary particles, are under the absolute control of the forces of their individual electromagnetic fields. A body having complex physical structure is not decisively controlled by the force of its individual electromagnetic field because this force is the resultant of a vast number of forces that oppose one another within the body, and thus nearly reach a balance, so that the resultant force is weak compared to the aggregate strength of the contributing forces.

"Advancement in basic research technique is bound to be slow but sure. Every succeeding year, however (perhaps we should say every succeeding decade), will bring an increase in the structural complexity level of objects which will be successfully subjected to precise mathematical technic by scientific workers—with vast benefit to the rate of scientific progress."

Dr. Ball noted in his address that it required "a rationalist like Einstein to see the possibility of quick development of the atomic bomb."

"He took a leading role in convincing President Roosevelt that attack on this problem was urgent," Dr. Ball noted, "then took a major part in producing the atomic bomb, using as tools his brain, pencil, and paper. Sitting at his desk, he produced information mathematically and probably thus saved millions of dollars that would have been required to obtain the same information through experiments."

SPOILAGE REDUCTION

Vegetables gathered for market and processing "breathe," and they really get hot about it, W. T. Pentzer, plant physiologist of the U. S. Department of Agriculture at Fresno, California, reported. He stated that an indication of the heat producing capacity of fruits and vegetables can be obtained from their respiration rates. A ton of peas, string beans, corn, or spinach gives off approximately 40,000 B.T.U. (British thermal units) of heat in 24 hours when stored at 60 degrees (about as much as three pounds of coal would provide when burned). This heat is both a factor in spoilage and an indication of the chemical changes in the fruit or vegetable which lower the quality of the product. Furthermore, the heat promotes spoilage by bacteria.

Therefore, fruits and vegetables intended for canning or freezing should be given the best possible refrigeration before processing or else processed immediately. Watercooling at the field (use of hydrocoolers) was suggested, as well as liberal use of crushed ice and other treatments. Vegetables which give off large amounts of heat such as spinach should never be packed tightly in a large container.

The story of how science saved the Army millions of dollars by averting spoilage of canned vegetables was related by Dr. Hatton B. Rogers, director of quality control for the Phillips Packing Co., Inc., of Cambridge, Maryland. Spoilage of many non-acid canned goods in hot climates is caused by thermophilic or heat-loving bacteria which multiply only at high temperatures. Since these organisms often are present in canned products, especially non-acid vegetables, the spoilage problem was especially great for the Army Quartermaster Corps, which must supply food to forces throughout the world, many of them in tropical zones.

Since the thermophilic bacteria are not generally dangerous to health of themselves, and since they do not multiply at normal temperate zone temperatures, their presence is seldom a factor of great importance in canned goods in the United States, so Army purchases of canned goods containing them could be used without danger of spoilage in the temperate zones.

To detect the canning packs suitable for tropical zones the Army instituted a system of mobile laboratory units, mounted in huge truck-trailers, which traveled about the canning areas making spot surveys of the products. This action followed reports in 1943 that losses of food through spoilage in overseas areas had reached serious proportions.

The initial mobile laboratory unit was able to detect thermophilic bacteria in canning plants, and to determine the spots in the process where they entered the product, thus making it possible to advise the canners how to eliminate them.

In connection with the same problem of thermophilic bacteria, science made it possible to use large stocks of sugar for canning which had been regarded as unusable for this purpose because they were contaminated with spores of these organisms. A processing machine was developed in which the contaminated sugar, spread in a thin layer, was exposed to a battery of ultraviolet lamps that effectively killed the bacterial spores.

SANITATION CONTROL

Use of commercially-available chlorine-releasing germicides in combination with soap or after using soap in washing hands appreciably lowers the bacterial population of the hands, which soap alone fails to do, as shown by Drs. Alfred L. Sotier and Dwight B. Conklin of the Research Department of Wyandotte Chemicals Corporation, Wyandotte, Michigan.

The two scientists reported experiments in the laboratory and in the poultry dressing industry indicating the value of this practice. The germicide used is known as Chloramine-T, its chemical name in full being sodium paratoluene sulfonchloramide. They noted that it is next to impossible actually to sterilize the hands.

On the other hand, reduction in the number of organisms is highly desirable in the food industry. "From a public health point of view," the authors declared, "we may assume that the greatest good from hand sanitization will follow when cooks and waitresses in restaurants and all other food handlers include a hand sanitizing treatment whenever they wash their hands."

The chemical used for sanitization, non-irritating to the skin, can be dispensed from usual soap dispensers either alone or in combination with powdered soap, they noted.

Progress toward improving sanitary conditions in California's vast food processing industry since 1920 when a statewide effort was instituted, through legislation and education, was reviewed by Dr. K. F. Meyer of the George Williams Hooper Foundation at the University of California.

As the result of wartime pressures, labor shortages, inability to get new equipment or material for repairs, the situation in 1945 had deteriorated to a point where a further intensive effort was necessary. Major faults found in a survey in that year were obsolete construction of plants, obsolete and worn-out equipment, and contamination by dust, dirt, flies, and rodent infestation.

A new sanitation program planned in 1945, featuring revised health and sanitation surveys, has proved highly effective in bringing about improvements in sanitation. The National Canners' Association and the University of California have worked together in training sanitation experts and in developing standards and techniques for food plant sanitation which are becoming increasingly valuable in production of better processed foods, reducing spoilage, increasing production, and aiding in many other ways the economic advantages of the producers, as well as in achieving the vital end of safeguarding the public health.

Walter L. Obold and Barbara L. Hutchings of the department of biological sciences at Drexel Institute of Technology, Philadelphia, declared that the basic problem in plant sanitation operations is to distinguish between untidy and disorderly housekeeping in a food plant and those conditions which contribute directly to inferior quality such as freezing overripe foods, the presence of foreign matter, and prolonged holding of raw food resulting in excessive growth of bacteria, yeasts, and molds. They insisted on direct responsibility when assigning authority for the general sanitation in the processing plant.

Stainless steel is the metal of choice for all types of food processing equipment and machinery, stated Dr. Richard C. Cunningham, Chief Metallurgist of Industrial Steels, Inc., Cambridge, Massachusetts.

He noted that stainless steels are available to meet all problems in processing foods, and declared that their advantages generally and their low upkeep costs more than offset the high initial cost. There are really 28 separate and distinct alloys which are recognized as stainless steels by the American Iron and Steel Institute. Of these, four meet the needs of the food industry.

Basically, stainless steel is an alloy containing at least 12 percent chromium, a hard, corrosion-resistant metal which gives stainless steel its well known characteristics. Chromium, and other elements which may be added to some stainless steels, form a film on the surface which protects the steel and averts or delays corrosion. It does not affect the color, flavor, or food value of foods. Metallurgical research has made fabrication of stainless steel comparatively easy by all the usual processes, and improvements still are being made.

Labor costs involved in cleaning may in some cases be as much as 50 percent of the total labor cost of a dairy plant, averred Drs. H. G. Harding and H. A. Trebler of the National Dairy Research Laboratories, Inc., Baltimore, Maryland.

Since milk contains calcium, and most calcium compounds form insoluble precipitates in water, special agents are required which form soluble compounds or remove insoluble matter as a fine suspension.

They pointed out that clean water is the basic cleaning agent and that detergents merely condition the water to do the cleaning job as well as possible with the least possible labor. Valuable tables listed the composition of specific substances with comparative costs.

In an address given by Dr. H. A. Kingman, Jr., of Wilson & Company, Chicago, Illinois, he pointed out that meat packing ranks first in the nation in the total value of products manufactured. The ten year average production of the meat packing industry from 1929 to 1939 amounted to two and one-half billion dollars worth of product.

"Of the meat packer's sales dollar, seventy-six cents is spent for livestock or raw materials, thirteen cents for labor, seven cents for depreciation and repairs, three cents for taxes, and approximately one penny is net profit. The operating margin in the meat packing business is extremely narrow, yet the volume of production is tremendous." Refrigerated rooms present certain cleanup problems, since it is quite difficult to use steam or hot water to wash down walls or floors in these areas. Some 500 gallons of water are used per head of cattle slaughtered. This means about 4 pounds of water for each pound of meat.

Frozen Foods

Quick-freezing of foods, usually considered a modern business, is over 100 years old, stated R. C. Poole, research and development engineer for Birdseye-Snider Division of General Foods, New York. Food is frozen quickly in several ways. In one of these, the food is floated in pans on running brine; in another, food is frozen on flat metal plates under which the icy brine runs. Other methods freeze the product between two cold plates, or by spraying it with cold brine, or immersing it in brine.

Most widely used today, however, is freezing food by subjecting it to an icy air blast. Dr. Poole outlined details of machines in current use in the various methods of freezing foods and noted that in the method used by his company, the "quick-freezing" time ranges from 90 minutes to two hours, the packages of food passing between aluminum plates cooled by internal circulation of liquid ammonia.

While six billion pounds of food are being frozen annually in this country, Dr. Poole noted the possibility for expansion of the frozen food industry by commenting that this represents only 4 percent of the total quantity of perishable foods consumed annually in the United States.

A report that frozen pre-cooked foods may come to form a part of Army rations was given by Charles H. Harp of the Research and Development Division, technical branch of the

Quartermaster Food and Container Institute for the Armed Forces.

It is often necessary for armed forces to exist on stable food items for extended periods of time. At the present time the supply of such items is limited mostly to canned foods. With the advancements that have been made in food science, it now appears that frozen pre-cooked foods may be added to the present rations.

Dr. Alvin I. Nelson of the Loudon Manufacturing Division of Standard Brands, Inc., Terre Haute, Indiana, pointed out that varieties of peas and other vegetables suitable for freezing in an eastern location are not necessarily acceptable for commercial production in midwestern or western areas. He urged that advice of local seed companies and state experiment stations be followed in selecting varieties for freezing.

In frozen peas quality decreased generally during wartime, Nelson noted, with packers contracting for more peas than their existing equipment for processing could reasonably handle and still produce a high quality product.

In addition to more careful contracting for vegetables, Nelson noted the importance of soil and cultural conditions in producing high-quality crops, and the need for staggering planting dates so that no excessive amount will be ready for harvesting at any one time, thus avoiding jamming of processing facilities.

In processing peas, as an example, speed and cleanliness are the two essentials, as in any vegetable. Removed from their pods by a machine which flails the pea vine, the peas are preferable pre-cooled in refrigerated troughs or pipes and frozen as quickly as possible. Quality deteriorates if shelled peas are held longer than a maximum of ten hours under most favorable conditions.

FISHERIES TECHNOLOGY

Federal budget cuts which are wiping out about one-half of the already meager fisheries research sponsored by the government were rapped today by Prof. Carl R. Fellers of the University of Massachusetts. He asserted that loss from spoilage of fish, for example, causes a tremendous loss in the billion-dollar-a-year United States fishing industry "possibly as high as one-tenth of the total."

"Agriculture," he said, "is liberally subsidized by the government in many ways. Our fishing industry has received no such support. Only sporadic and poorly supported research has been sponsored by our government. The present department of the interior budget eliminates about one-half of the meager fishery research and statistical funds now allocated to fishery studies.

"This seems like a very short-sighted policy especially when we consider the vast amounts poured into agricultural experiment station and extension research and services in 51 states, territories and regional laboratories."

Giving a detailed explanation of the chemistry involved in fish spoilage, Dr. Fellers noted that it occurs not only in the tropics but in cold climates as well. No testing procedure has yet been developed which is a generally satisfactory measure of the degree of deterioration of fish. This is highly desirable in order to determine whether a given lot can stand shipment to distant points (for consumption, say 10 days later) or marketed immediately.

Among other points, he stated that studies have shown that salt, often used as a preservative, actually speeds deterioration of fish, under some conditions.

Nearly fifty studies of the general problem of fish spoilage and of chemical agents which may be used to delay or avert spoilage were reviewed by

Professor Cecil G. Dunn of the Department of Food Technology at the Massachusetts Institute of Technology.

Use of ice made from water in which preservative agents are dissolved was reported as one possible method of delaying bacterial spoilage. One of the processes reported makes it possible to sell clams from southeastern Alaska in the Pacific Northwest. The shucked clams are dipped in a mixture of brine and sodium benzoate before being stored in crushed ice for shipment and keep without spoilage for 14 to 15 days, while at the same time neither flavor nor palatability of the clams is altered.

Different fish present varied preservation problems dependent in part upon their fat content. Generally speaking, ethyl and sodium gallates have been found satisfactory in preventing rancidity, while hypochlorites, benzoates, and benzoic acid check bacterial growth. One of the greatest basic aids in checking spoilage, research has proved, is the greatest possible cleanliness aboard fishing vessels and at every stage of fish handling.

Fish frozen fresh from the ocean aboard ship is one of the latest developments in the fishing industry, it was reported by Drs. Norman D. Jarvis and Hugo W. Nilson of the Division of Commercial Fisheries of the United States Fish and Wildlife Service at College Park, Maryland.

Some Pacific coast vessels have been designed to process and quick freeze the catch immediately, insuring the housewife of the freshest possible fish. The vessels are combination trawlers and processing plants, and include an 8000-ton vessel especially equipped for quick-freezing and canning crabs and fish.

This paper described a wide variety of machines gradually entering use in the fish processing business in which fish may be filleted, scaled, salted, dried, smoked, packaged, or canned.

Of interest to housewives who found a preponderance of canned grated tuna on the market the past few years, it was explained that shortage of labor to pack solid meat tuna brought use of much machine-packed grated tuna.

Nonedible byproducts of fish are coming into use in a number of industrial and other fields, with further widespread extension of their use a strong possibility, were reported by Dr. H. L. A. Tarr of the Fisheries Research Board of Canada, Vancouver, B. C.

Use of fish liver oils as a source of vitamins is well known, but many other chemicals useful in medicine, such as the various proteins, insulin, protamine which is used with insulin, and the anti-pernicious anemia factor can be obtained from fish. The Japanese are said to have developed production of insulin from fish. Fish can be used as a source of synthetic egg white, and the Germans have used this product extensively. Of interest to the leather industry is the fact that materials useful in softening hides at certain stages in the preparation of leather can be produced effectively from fish. Surplus fish flesh proteins can be used to produce plastics like those derived from casein, a sort of artificial horn.

From the liquor left after cooking and pressing fish for fishmeal can be recovered a large amount of usable proteins which can be incorporated into livestock feeds. High quality fish meal itself is one of the few protein sources which will support growth of chicks entirely by itself, and from it there recently has been found a "Factor S" which is apparently responsible for chick growth.

MISCELLANEOUS PAPERS

Materials used in packaging foods may be and often are chemically treated so that they will kill or inhibit bacteria or fungi which might damage the food they wrap. Methods of giving food packaging materials this sanitary treatment were discussed by Dr. Louis C. Barail of the bacteriological department of the U. S. Testing Company, Hoboken, New Jersey.

Steam sterilization is used often for sterilizing paper bags and other containers but its protection ends when the container is opened. Use of antibiotics and chemicals, particularly so-called long-chain mercury compounds, halts growth of or kills bacteria for varying periods, he noted, thus providing positive, and lasting, protection for foodstuffs.

Such chemicals can even be incorporated in the pulp from which packaging paper and cardboard are made and also can be used in wax, lacquer, or varnish finishes applied to these materials. The ideal material also should be insect and rodent repellent, the latter requirement so far being unfulfilled. As a suggestion, Dr. Barail said he recommended plastics of the *vyncote* type as closest to ideal packaging materials for most foods, declaring they are "inert, non-toxic, tasteless, non-inflammable, and . . . can be treated with germicides, fungicides and insecticides, and thus afford the best protection to foods."

Novel soybean products which whip more rapidly and to greater volume than either egg white or gelatin are being used in making marshmallow candies and topping, nougat meringues, and meringue powders, reported by Dr. Ralph M. Bohn of Archer - Daniels - Midland Company, Minneapolis, Minnesota. He reported that the soybean products will do the most difficult beating job of all—making candy mazettas and frappes. Mazetta is a stiff foam of sugar, water, and a whipping agent which is added to cream centers, fudge, and other candy mixes to introduce air and control sugar crystallization.

He compared the qualities of gelatin and egg albumen as whipping agents, and described the essential processes by which soybeans are converted into whipping agents, starting with extraction of the oil from flaked or ground soybean, extraction of the protein, and the partial hydrolysis which turns the protein into an effective whipping agent. A number of technical difficulties remain to be overcome.

A comparatively new product, vacuum - concentrated, frozen orange juice, was reported to retain its vitamin C content almost intact even after a year of storage at temperatures ranging from zero to 40° by R. H. Cotton, C. M. Brokaw, O. R. McDuff and A. L. Schroeder of the National Research Corporation of Boston and the Citrus Research Laboratory at Plymouth, Florida, and W. R. Roy of Vacuum Foods Corporation, at Plymouth.

The product is concentrated by boiling off water at low temperature in a vacuum, and then the concentrate is diluted slightly with fresh orange juice before freezing, suffering only a slight loss in flavor even after a year of storage.

The product should be used promptly if thawed after storage at the customary 40° since, like fresh orange juice, the frozen product stored at higher temperatures tends to settle and separate fairly quickly when thawed. In use, the frozen concentrate is diluted by adding three parts of water to one part of concentrate.

Better bakery products using dried egg white as an ingredient may result from a new process which improves keeping qualities of dried egg white used commercially in cakes, meringues, and other products. Dried egg white tends to deteriorate in storage, and it has been demonstrated that the sugar content of the egg white is responsible for this deterioration. Profs. John C. Ayres and George F. Stewart of the Iowa Agricultural Experiment Station, Ames, Iowa, reported that yeast may be used to remove from the egg white this sugar—in the form of glucose.

Fermentation by yeast is used, if yeast extract also is added to the mixture. By controlling the fermentation carefully, the substance called mucin, which is highly essential for good results with egg white in whipping or in angel cakes, can be retained.

Other micro-organisms than yeast will also remove sugar, but only yeast gave the best results. Also there were objections to other organisms from the sanitary viewpoint, because they produce less of mucin, or because they give rise to objectionable odors and flavors. The paper outlined the technical details of the experiments and the process finally decided upon.

When fruit is under consideration, almost anyone thinks of green as opposed to ripe, and there is plenty of scientific basis for this common assumption. In fact, the amount of green color present in canned peaches or apricots affords a definite measurement of the fruit's ripeness. Two methods of measuring this green color, and from it, evaluating the ripeness of canned peaches and apricots were presented by Dr. Amihud Kramer of the University of Maryland and H. R. Smith of the National Canners' Association. They reported experiments in which slight variations in greenness were measured using a spectrophotometer in one method and measurement of fluorescence in the other. Under some conditions greenness may not be an accurate measurement since some fruit which is not fully ripe may give no indication of green color.

New Nutrition Award Established

The American Public Health has accepted an offer made by the Robert Gould Research Foundation of Cincinnati of a cash award of $1,000 to be given to the "individual responsible for the most effective work in the field of nutritional education of the public." The award for 1947 will be presented at the Association's 75th Annual Meeting in Atlantic City, October 6-10, 1947.

The Committee to select the recipient of the award is as follows:

Charles Glen King, Ph.D., *Chairman*
Marietta Eichelberger, Ph.D.
Marjorie M. Haseltine
Icie M. Hoobler, Ph.D.
E. V. McCollum, Ph.D.
William H. Sebrell, Jr., M.D.
Frederick J. Stare, M.D.

Nominations of persons who might be candidates for the award will be made by the members and fellows of the Food and Nutrition Section.

Institutions Accredited by the American Public Health Association

On January 25, 1946, the American Public Health Association released the following list of institutions recommended by its Committee on Professional Education as qualified to give the degree of Master of Public Health. This is the first accredited list issued by the Association. Additions to it will be made as the applications of other institutions are considered.

Columbia University, New York, N. Y.
Harvard University, Cambridge, Mass.
Johns Hopkins University, Baltimore, Md.
University of California, Berkeley, Cal.
University of Michigan, Ann Arbor, Mich.
University of Minnesota, Minneapolis, Minn.
University of N. Carolina, Chapel Hill, N.C.
Yale University, New Haven, Conn.
University of Toronto, Toronto, Canada.

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Administration
Bureau of Dairy Industry
Washington 25, D. C.

FEDERAL AND STATE STANDARDS FOR THE COMPOSITION OF MILK PRODUCTS

Requests for information on standards for the composition of milk and manufactured dairy products are received frequently in the Bureau of Dairy Industry. The table in this leaflet was compiled for the purpose of answering such inquiries as simply as possible. The information was obtained from statements furnished by Federal, State, and Territorial officials who are in charge of enforcing the laws and regulations pertaining to milk products.

The State and Territorial standards apply to products produced and marketed within the State or Territory, whereas the Federal standards apply to products entering into interstate commerce. Some States have standards for products not shown in the table, such as, for example, frozen custard, ice milk, and some of the less common cheeses.

The standards given in the table are those that were in force January 1, 1947, but it should be remembered that they may be changed from time to time by legislative action. The Bureau of Dairy Industry is in no way concerned with the establishment or enforcement of dairy legislation. Further information about standards and definitions of dairy products and about laws and regulations pertaining to such matters as adulteration of dairy products, sanitary measures required in dairy plants, and dates of expiration of war emergency standards should be sought from the proper officials of the respective State or Territorial governments.

	Milk			Skim milk	Cream	Butter	Sweetened condensed milk		Evaporated milk		Plain ice cream				Fruit or nut ice cream				Dry milk		Non-fat dry milk solids		Cheddar cheese		Swiss cheese	Other cheese
	Milk fat	Non-fat milk solids	Total milk solids	Total milk solids	Milk fat	Milk fat	Milk fat	Total milk solids	Milk fat	Total milk solids	Milk fat	Total milk solids	Weight per gallon	Food solids per gallon	Milk fat	Total milk solids	Weight per gallon	Food solids per gallon	Milk fat	Water	Milk fat	Water	Milk fat	Water	Milk fat	
	Minimum percent	Minimum percent	Minimum percent	Minimum percent	Minimum percent	Minimum percent	Minimum percent	Minimum percent	Minimum percent	Minimum percent	Minimum percent	Minimum percent	Minimum pounds	Minimum pounds	Minimum percent	Minimum percent	Minimum pounds	Minimum pounds	Minimum percent	Maximum percent	Maximum percent	Maximum percent	Minimum percent of solids	Maximum percent	Minimum percent of solids	
Federal	—	—	—	—	1/18	80	8.5	28.0	7.9	25.9	—	—	—	—	—	—	—	—	26.0	5	1.5	5	50	39	—	2-7/, inc.
Ala.	3.25	8.50	11.75	8.50	18	8/80	8.0	28.0	7.8	25.5	10	18	—	1.6	8	18	—	1.6	—	—	—	—	9/	39	45	
Alaska	3.25	8.00	11.25	8.00	18	Federal	Federal	Federal	Federal	Federal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Ariz.	3.25	8.50	11.75	8.50	10/18	8/80	8.5	28.0	7.9	25.9	10	—	—	11/	8	—	—	11/	—	—	—	—	50	39	—	12/
Ark.	3.25	8.00	11.25	8.00	18	80	8.0	28.0	7.9	25.5	10	18	—	1.6	8	14	—	1.8	—	—	—	—	50	39	—	
Calif.	3.30	8.15	—	8.80	13/20	80	8.5	28.0	7.9	25.9	14/10	—	—	14/1.6	8	—	—	14/1.6	26.0	5	—	5	50	39	45	7, 15/
Colo.	3.20	—	—	—	18	8/80	7.7	28.0	7.7	—	12	—	—	—	10	—	—	—	—	—	—	—	50	—	—	
Conn.	3.25	8.50	11.75	—	16/16	80	8.0	28.0	7.8	25.5	10	18	—	1.6	8	14	—	—	—	—	—	—	50	39	45	
Del.	3.25	8.50	11.75	—	18	—	8.0	—	7.8	25.5	12	—	—	—	10	—	—	—	—	—	—	—	—	—	—	
D. C.	3.50	—	11.50	9.00	20	80	—	—	—	—	8	—	—	—	8	—	—	—	—	—	—	—	—	—	—	
Fla.	3.25	8.50	—	—	18	8/80	8.0	28.0	7.8	25.5	10	18	—	1.6	8	14	—	1.6	26.5	5	—	5	50	—	—	
Ga.	3.25	8.50	11.75	9.23	18	80	8.0	28.0	7.8	25.5	10	—	4.50	—	8	—	4.50	—	—	—	—	—	50	39	—	
Hawaii	3.00	8.50	—	—	13/18	80	—	—	—	—	9	—	—	—	9	—	—	—	—	—	—	—	—	—	—	
Idaho	3.20	8.00	11.00	9.30	18	80	—	—	7.8	26.5	17/14	17/18	—	17/1.6	17/12	17/14	—	17/1.6	—	—	—	—	18/	—	—	
Ill.	3.00	8.50	11.50	9.26	13/18	80	8.0	28.0	7.8	26.5	12	—	19/	—	10	—	19/	—	27.0	5	1.5	5	20/50	20/39	20/45	
Ind.	3.25	8.00	—	8.50	21/18	80	8.5	28.0	7.9	25.9	10	18	4.25	1.6	8	14	4.25	1.6	—	—	1.5	5	50	39	—	2-7/, inc.
Iowa	3.00	8.50	11.50	22/	16	80	8.0	28.0	—	—	12	20	4.50	—	10	16	4.50	—	—	—	—	—	18/	—	—	
Kans.	3.25	—	—	—	18	80	8.0	28.0	7.8	25.5	10	20	—	23/	10	20	—	23/	—	—	—	—	50	—	—	
Ky.	3.25	8.00	—	—	18	80	8.0	28.0	7.8	25.5	10	18	—	—	24/10	24/18	—	—	—	—	—	—	50	39	45	
La.	3.25	8.50	—	8.00	18	80	8.0	28.0	7.8	25.5	10	20	—	—	8	18	4.25	—	—	—	—	—	18/	—	18/	
Maine	3.25	8.50	11.75	—	18	—	25/	26.5	25/	26.5	14	—	—	—	12	—	—	—	—	—	—	—	50	—	—	
Md.	3.50	—	12.00	—	18	80	8.5	28.0	7.9	25.9	26/12	26/20	4.50	—	26/8	26/16	4.50	—	—	—	—	—	50	39	—	
Mass.	3.35	—	12.00	9.30	27/16	80	8.0	24.0	7.8	—	10	18.5	—	1.6	8	16.5	—	1.6	—	—	—	—	50	—	45	28/
Mich.	3.00	8.50	—	—	13/18	80	8.0	28.0	7.8	25.5	29/12	30/	—	1.6	29/10	30/	—	1.6	—	—	—	—	50	40	45	
Minn.	3.25	—	—	—	20	80	8.5	28.0	7.9	25.9	31/12	20	4.50	—	31/10	16	4.50	—	—	—	—	—	50	39	45	
Miss.	3.00	8.50	11.75	8.50	18	80	8.0	28.0	7.8	25.5	10	—	—	—	8	—	—	—	—	—	—	—	50	39	—	32, 33/
Mo.	3.25	6.00	—	—	13/18	80	8.0	28.0	7.9	25.9	8	—	—	—	8	—	—	—	—	—	—	—	50	39	45	
Mont.	3.25	8.00	11.25	8.00	20	80	8.0	28.0	7.8	25.5	10	23/	—	—	9	23/	—	—	—	—	—	—	50	39	—	
Nebr.	3.00	—	—	9.25	18	80	—	—	—	—	14	20	4.50	—	34/12	34/18	4.50	—	—	—	—	—	50	38	43	
Nev.	3.25	8.50	11.75	—	22	80	8.0	28.0	7.8	25.5	14	—	4.50	—	12	—	4.50	—	—	—	—	—	50	—	45	
N. H.	3.25	—	11.85	8.50	18	8/80	8.5	28.0	7.9	25.9	35/14	—	4.50	—	35/12	—	4.50	—	—	—	—	—	50	39	—	
N. J.	3.00	—	11.50	—	18	8/80	8.0	28.0	7.8	25.5	10	—	—	—	8	—	—	—	—	—	—	—	50	39	—	
N. M.	3.25	8.50	11.75	—	18	8/80	8.0	28.0	7.8	25.5	12	20	—	—	10	—	—	—	26.5	5	—	5	50	—	—	
N. Y.	3.00	—	11.50	8.50	36/18	80	8.0	28.0	7.8	25.5	10	18	—	1.6	8	14	—	1.6	—	—	—	—	37/50	40	—	2/
N. C.	3.25	8.50	11.75	—	38/18	80	8.5	28.0	7.9	25.7	10	39/	4.50	—	8	39/	4.50	—	—	—	—	—	50	39	45	
N. Dak.	3.25	8.50	11.75	—	18	80	8.5	28.0	7.9	25.9	12	—	4.50	—	10	—	4.50	—	—	—	—	—	50	39	45	
Ohio	3.00	—	12.00	—	13/18	80	40/	—	—	—	10	18	4.25	—	8	14	4.25	—	26.0	5	—	—	50	—	—	7/
Okla.	3.50	8.50	12.00	—	41/18	8/80	Federal	Federal	Federal	Federal	12	42/	—	—	10	—	—	—	—	—	—	—	—	—	—	
Oreg.	3.20	8.50	11.70	—	18	80	—	—	7.8	25.5	43/12	43/20	—	—	43/10	43/16	—	—	—	—	—	—	44/50	—	—	
Pa.	3.25	—	12.00	—	18	80	8.0	28.0	7.8	25.5	10	—	4.75	1.8	8	—	4.75	1.8	—	—	—	—	—	—	—	
P. R.	3.00	9.00	12.00	—	Federal	Federal	Federal	Federal	Federal	Federal	—	—	—	—	—	—	—	—	Federal	Federal	Federal	Federal	Federal	Federal	—	
R. I.	3.25	—	12.00	—	45/18	80	8.0	28.0	7.8	25.5	8	—	—	—	8	—	—	—	—	—	—	—	50	39	—	
S. C.	3.25	8.00	11.75	8.00	18	—	8.0	28.0	7.8	25.25	10	18	4.25	1.6	24/10	24/18	4.25	1.6	—	—	—	—	—	—	—	
S. Dak.	3.25	8.50	11.75	—	18	80	7.7	28.0	7.7	28.0	12	—	—	—	10	—	—	—	—	—	—	—	50	39	45	
Tenn.	3.50	8.50	12.00	—	13/18	80	8.0	—	7.8	46/	10	18	—	1.6	8	14	—	1.6	—	—	—	—	50	39	—	
Tex.	3.25	8.00	—	—	18	80	8.0	28.0	7.8	25.5	8	—	—	—	6	—	—	—	—	—	—	—	50	39	45	
Utah	3.20	8.30	11.50	8.50	13/18	80	7.8	26.0	7.8	26.5	12	47/	—	1.6	9	47/	—	1.6	26.0	5	1.5	5	48/50	39	45	3, 32, 33, 49/
Vt.	—	8.50	11.75	8.50	18	8/80	8.0	28.0	7.8	25.5	50/14	—	—	—	50/12	—	—	—	—	—	—	—	50	39	—	
Va.	3.25	8.50	11.75	8.50	18	80	7.8	26.5	7.8	26.5	10	39/	4.50	—	8	39/	4.50	—	—	—	—	—	50	—	—	
Wash.	3.25	8.00	—	—	51/18	80	7.8	25.5	7.8	25.5	10	20	—	—	10	20	—	—	26.0	5	—	5	52/50	39	45	7, 32, 33/
W. Va.	3.00	8.50	11.50	9.00	13/18	80	7.8	28.0	7.8	25.5	8	18	—	—	24/8	24/18	—	—	26.0	5	—	5	50	—	—	
Wis.	3.00	8.50	—	9.00	18	53/82.5	54/8.0	54/28.0	54/8.0	54/28.15	13	—	55/	—	11	—	55/	—	—	—	1.5	5	50	39	45	
Wyo.	3.00	8.50	11.50	9.25	13/18	80	8.0	28.0	7.8	25.5	12	18	—	—	10	—	—	—	—	—	—	—	50	39	—	

Figures in the table that appear thus — 1/, 2/, 3/, etc. — refer to footnotes on the last page.

1/ Light, coffee, or table cream, not less than 18% milk fat but less than 30% milk fat; light whipping cream, not less than 30% milk fat but less than 36% milk fat; heavy or whipping cream, not less than 36% milk fat.

2/ Washed curd cheese, milk fat not less than 50% of solids, water not more than 42%.

3/ Colby cheese, milk fat not less than 50% of solids, water not more than 40%.

4/ Cream cheese, not less than 33% milk fat, not more than 55% water.

5/ Neufchatel cheese, milk fat less than 33% but not less than 20%; not more than 65% water.

6/ Plain and creamed cottage cheese, not more than 80% water.

7/ Creamed cottage cheese, not less than 4% milk fat.

8/ Butter, not more than 16% water.

9/ Cheddar cheese, not less than 30.5% milk fat.

10/ Heavy cream, not less than 30% milk fat; extra heavy cream, not less than 40% milk fat.

11/ Ice cream, not less than 30% total food solids.

12/ Skim-milk cheese, milk fat less than 16.5% of solids; No. 2 part-skim cheese, milk fat not less than 16.5% of solids but less than 27%; No. 1 part-skim cheese, milk fat not less than 27% of solids but less than 50%.

13/ Whipping cream, not less than 30% milk fat.

14/ War emergency standards--ice cream, not less than 8% milk fat; food solids per gallon, not less than 1.6 lb.

15/ Cream cheese, milk fat not less than 65% of solids, water not more than 55%; granular cheese, water not more than 42%; Monterey cheese, water not more than 44%; high-moisture Jack cheese, water not more than 50%; skim-milk Cheddar cheese, milk fat less than 30% of solids; part-skim Cheddar, milk fat not less than 30% of solids but less than 50%.

16/ Light cream, not less than 18% milk fat but less than 28%; medium cream, not less than 28% milk fat but less than 36%; heavy cream, not less than 36% milk fat.

17/ War emergency standards--plain ice cream, not less than 10% milk fat, 18% total milk solids, and 1.2 lb. food solids per gallon; fruit or nut ice cream, not less than 8% milk fat, 12% total milk solids, and 1.2 lb. food solids per gallon.

18/ Not less than 30% milk fat.

19/ Overrun not more than 100%.

20/ Tolerance of 1%; Swiss cheese, not more than 39% water with tolerance of 1%.

21/ Whipping cream, not less than 30% milk fat; double cream, not less than 36% milk fat.

22/ Skim milk, less than 11.5% total milk solids or less than 3% milk fat.

23/ Ice cream, total food solids not less than 33%.

24/ Before addition of fruit or nuts.

25/ Milk fat not less than 29.5% of milk solids.

26/ War emergency standards--plain ice cream, not less than 10% milk fat and not less than 18% total milk solids; fruit or nut ice cream, not less than 7% milk fat and not less than 15% total milk solids.

27/ Medium cream, not less than 25% milk fat; heavy cream, not less than 34% milk fat; extra heavy cream, not less than 36% milk fat.

28/ Cream cheese, milk fat not less than 70% of solids, not more than 55% water.

29/ Emergency standard until 3/15/47--plain ice cream, not less than 10% milk fat; fruit or nut ice cream, not less than 8% milk fat.

30/ Ice cream, not less than 0.9 lb. milk solids per gallon.

31/ War emergency standards--plain ice cream, not less than 10% milk fat; fruit or nut ice cream, not less than 9% milk fat.

32/ Cream cheese, milk fat not less than 65% of solids.

33/ Neufchatel cheese, milk fat not less than 50% of solids.

34/ Fruit or nut ice cream, not less than 14% milk fat and 20% total milk solids before addition of fruit or nuts.

35/ War emergency standards--plain ice cream, not less than 10% milk fat; fruit or nut ice cream, not less than 8% milk fat.

36/ Medium cream, not less than 25% milk fat; heavy cream, not less than 36% milk fat.

37/ Medium skim-milk cheese, not less than 13% milk fat; special skim-milk cheese, not less than 18% milk fat.

38/ Medium cream, not less than 30% milk fat; heavy cream, not less than 40% milk fat.

39/ Ice cream, not less than 35% total solids.

40/ Must be made from whole milk.

41/ Manufacturing cream, not less than 25% milk fat.

42/ Plain ice cream, not less than 32.5% total solids.

43/ War emergency standards--plain ice cream, not less than 8% milk fat and not less than 14% total milk solids; fruit or nut ice cream, not less than 6% milk fat and not less than 12% total milk solids.

44/ Half-skimmed Cheddar cheese, milk fat not less than 25% of solids; quarter-skimmed Cheddar cheese, milk fat not less than 12% of solids.

45/ Heavy cream, not less than 38% of milk fat.

46/ Evaporated milk, total milk solids plus milk fat not less than 33.7%.

47/ Plain ice cream, not less than 28% total solids; fruit or nut ice cream, before addition of fruit or nuts same as for plain ice cream; after addition of fruit or nuts, not less than 9% milk fat and not less than 26% total solids.

48/ Part skim cheese, milk fat not less than 30% of solids; skim cheese, milk fat less than 30% of solids.

49/ Monterey cheese, not more than 44% water.

50/ Suspended for the war emergency.

51/ Whipping cream, not less than 32% milk fat.

52/ Half-skim cheese, milk fat not less than 25% nor more than 50% of solids; quarter-skim cheese, milk fat not less than 12% nor more than 25% of solids; skim cheese, milk fat less than 12% of solids.

53/ Butter, 2.5% tolerance.

54/ With allowable tolerance, but no less than Federal standards.

55/ Ice cream, volume when melted shall not be less than 1/2 volume when manufactured or sold.

56/ Tolerance, 1%.

Paper Containers*

F. C. Baselt

American Can Co., New York, N. Y.

Just one year ago, it was our privilege to present to the New York Association of Milk Sanitarians a sketch of the future of fiber milk containers. We expressed, at the outset, the doubts we felt in regard to prophecies and our hesitation at joining the ranks of the soothsayers. The economic turmoil of the past year fully justified our fears, yet today we are again on the spot.

A part of our talk in New York dealt with consumer and market surveys. Time has not altered the validity of the results. They indicate:

The industry has a long way to go before reaching its full stature.

The demand for the containers is sound.

The acceptance by those who determine its success has been notable.

Untouched virgin markets exist.

It is reasonable to assume that the container's prewar annual rate of growth may continue for several years following the lifting of all restrictions on production.

Today we deal not only with fiber milk containers but the related products of closures for glass, and consider especially designs, supplies, delivery dates.

To assemble basic information required the cooperation of the industry and for this help we acknowledge our gratitude.

Materials are our first consideration.

Paper

The total annual paper production in the U. S. has grown from 14 million tons in 1937 to over 19 million in 1945. The normal expansion rate was about five percent per year. This growth was restrained during the war years. It is therefore estimated that the capacity of the industry is from 2 to 3 million tons below its proper level.

There are many new paper making machines projected with some being built now. The end of 1947 should see the situation greatly relieved and there is good reason for saying that production should catch up with demand in 1948.

We are especially concerned with six percent of this tremendous production, the sanitary virgin pulp used for fiber milk containers, for milk bottle plug caps, and for milk bottle hoods.

Under W. P. B. allocations for 1945, the three items received 68,000, 29,000, and 18,000 tons respectively, a total of 115,000 tons. This total should reach 148,000 tons in 1946, if current shipments provide a true index, and the 1947 estimate is 165,000 tons. Will this stock be available? The expansion programs now in progress indicate that it *will be there when needed.*

Paraffin

The total wax production rose from 230,000 tons in 1932 to 410,000 tons in 1945. About 80 percent of the output is the fully refined wax suitable for the milk industry. Imports will raise these figures somewhat.

Of this total 38,000 tons were used in our industry in 1945 and 44,000 tons will be used in 1946. The 1947 figure is 50,000 tons. There will be some who quarrel with these figures. Let me assure them that the quarrel is with the figures and not the speaker. The errors are not great enough to alter our conclusions.

Can these demands be met? There are increases in production capacity projected, one new plant is coming into production, but the others are not materializing. Paraffin is a by-product of the oil industry and its production is

* Presented at Symposium: Present and Future Status of Milk Plant Equipment and Materials. Thirty-third annual meeting of the International Association of Milk Sanitarians, Atlantic City, N. J., October 24–26, 1946.

tightly bound to that industry. More automobiles on the roads will lead to greater wax production. Should the most adverse events take place, the wax supply would become critical and might limit somewhat the total output of paraffined papers. Such a situation is not likely and the consensus is that the full paraffin demands will be met with only occasional local shortages occurring.

Stainless steel will not be a limiting factor. Substantial expansion programs are well under way.

Cellophane and similar materials are available in such quantities as to dispel all concern about them.

NEW DESIGNS

There was no information made available as to new designs. This is understandable. Manufacturers prefer to announce their own plans and accomplishments.

Fiber milk containers, at least in the foreseeable future, will be made of virgin pulp and fully refined paraffin. No new materials have even approached the trial stage.

Their shape will remain rectangular.

There will be a movement towards increased opacity to reduce further the small loss of vitamins by the action of light.

The maintenance, through the use of dry ice, of an externally dry package, will better fulfill the goal desired by us as sanitarians.

DELIVERY DATES

This is the sixty four dollar question which no one cared to answer. The glass closure manufacturers report they will be able to meet any demands and send assurances of their ability to serve the industry. The fiber milk container situation is not so simple. Only one manufacturer made available the future schedule of expansion. A 50 percent increase in output by the end of 1947 and another 25 percent increase in 1948.

These figures must have bored some of you but without them my message would seem unconvincing. Here it is:

Generally fair with some local thunder storms.

Federal Security Agency, U. S. Public Health Service

Washington, D. C.

March 1947

Sanitary Engineering Division, Milk and Food Section.

PARTIAL LIST OF FILMS RELATING TO MILK AND FOOD SANITATION

Sources from which films may be available for loan or rent: State Departments of Health; District Offices of the U. S. Public Health Service; State Departments of Education; University Extension Divisions; Health Officers News Digest, 1790 Broadway, New York 19, N.Y.; Y.M.C.A. Motion Picture Bureau, 347 Madison Ave., New York, N.Y.; Castle Films, Inc., 30 Rockefeller Plaza, New York 20, N.Y.

FILM CATALOGS

One Thousand and One, 75c, The Educational Screen, 64 E. Lake St., Chicago, Ill.

Health Films, 25c; Supplements 20c. Two supplements issued to date. American Film Center, Inc., Section on Health and Medical Films, 45 Rockefeller Plaza, New York 20, N. Y.

Sound Films for the Classroom, Erpi Classroom Films, Inc., 1841 Broadway, New York 19, N. Y.

KEY TO LISTING

x New entry not included in previous editions of this list.
(1) Suitable for schools for foodhandlers.
(2) Suitable for schools for milk handlers.
(3) Suitable for food sanitation seminars for sanitarians.

(4) Suitable for milk sanitation seminars for sanitarians.
(5) Suitable for the general public.
(6) Listed in various catalogs but not viewed.

GENERAL RESTAURANT SANITATION

x **A Dishwasher Named Red** (1946) (1, 3*) 12 min., sound, 16 mm., black and white, off stage commentary. General Pictures Productions, Inc., 621 Sixth Ave., Des Moines 9, Iowa. This film made under the technical direction of the Des Moines City Health Dept. shows in detail one method of washing glasses and two methods of washing dishes by hand. The dishwashing is accomplished in a two-compartment sink and both chemical and hot water bactericidal treatment methods are shown. Other procedures include sorting, scrapping, pre-washing, washing, draining and storage.

x **Dishwashing Dividends** (1946) (1*, 3*, 5) 20 min., sound, 16 mm., color. Economics Laboratory, Inc., Guardian Building, St. Paul, 1, Minnesota. The complete sequence of the several operations from bussing dirty dishes to dish pantry maintenance, required to produce clean tableware by machine dishwashing methods is illustrated in detail. An excellent animation sequence shows the internal operation of a dishwasher equipped with an automatic detergent dispenser. Many practical suggestions for restaurant management are contained in the film and in the booklet with the same title which is designed to accompany this motion picture.

Eating Out (1940) (1*, 3*, 5*) 26 min., silent, 16 mm., black and white. City Health Department, Flint, Michigan. Contrasts insanitary foodhandling practices with proper methods as used in a well managed eating place and finally reviews the rules for good foodhandling and restaurant sanitation.

Hashslingin' to Foodhandling (1945) (1*, 3*, 5*) 20 min., sound, 16 mm., color. Texas State Department of Public Health. Sanitary and insanitary methods of handling food and utensils are demonstrated by a sloppy waitress—a Hashslinger—and a well-trained waitress—a Foodhandler. Dark coloring material is used to illustrate the travel of germs from the mouth of a customer to utensils, the Hashslinger's hands and mouth, and another customer. Good, sanitary service protects the health of customers and employees and brings larger tips to waitresses and greater profits to the management.

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* Specially suited for the purpose indicated.

In Your Hands (1939) (1*, 3*) 22 min., sound slide film, black and white. Public Health Committee of the Cup and Container Institute, 1790 Broadway, New York 19, N. Y. An inspector discusses the reasons for and methods of proper cleaning and sanitization of eating and drinking utensils with a soda fountain operator and bar tender. The use of paper cups is emphasized.

It's No Picnic (1941) (1*, 3*, 5) 10 min., sound, 16 mm., black and white. New Mexico School Supply Co., 207 W. Copper Ave., Albuquerque, N. M. A picnic results in food poisoning. Bacteriological follow-up incriminates the potato salad, infected by improper handling. Correct foodhandling practices are shown.

x **Meats with Approval** (1946) (1, 3, 5*) 18 min., black and white, sound, 16 mm. U. S. Department of Agriculture, The Live Stock Division. A picture of general information which describes the activities of the Meat Inspection Service of the U. S. Department of Agriculture. The duties of inspectors in antemortem and postmortem inspections, and in the supervision of meat packing, canning, and labeling are shown. The importance of the services of trained inspectors in protecting the public from unsafe meat and meat products is emphasized. Slaughterhouse scenes are handled inoffensively.

Our Health in Your Hands (1945) (1*, 3*, 5). Series of four 10-15 minute sound slide films, black and white. Produced by USPHS. Castle Films, Inc., 30 Rockefeller Plaza, New York 20, N. Y. ($10 for complete series; $9 to non-profit institutions.)

1. *Germs Take Pot Luck.* The spread of disease in restaurants is discussed and dramatized; the habits of germs are shown by cartoons; the importance of each restaurant worker's part in preventing the spread of disease is pointed out.
2. *Service with a Smile.* A customer visits a restaurant where proper serving methods as well as good food are featured. His waitress demonstrates correct methods and explains the more important rules of personal hygiene and cleanliness. The manager discusses the employee training program and the importance of providing the essential sanitary facilities.
3. *In Hot Water.* An inspector discusses the customers' reaction to unclean eating utensils, the health hazards involved, and the importance of proper dishwashing. Good manual methods are shown in a step-by-step sequence. Machine dishwashing, glass washing, and the cleaning of cooking utensils are briefly covered.
4. *Safe Food for Good Health.* A county health officer emphasizes that food must be safe as well as nutritious. He visits a

restaurant where the manager and several employees discuss proper selection, preparation, storage, and protection of food and the elimination of flies, roaches, rats, and mice. After a brief summary of the four strips, the importance of over-all cleanliness is again emphasized.

x **Restaurant Operator** (1946) (1, 5) 10 min., sound, 16 mm., black and white. Vocational Guidance Films, Des Moines, Iowa. The importance of the restaurant business is outlined, and several types of establishments are shown. The duties of employees from manager to dishwasher are described. Training opportunities in the restaurant field are reviewed, and the importance of proper training for success illustrated. Some reference is made to clean food handling and restaurant sanitation.

Slinging Hash (1940) (1*, 3) 15 min., silent, 16 mm., black and white. Texas State Department of Health, Austin, Texas. Using an average restaurant as a background, the film explains graphically the sanitary and insanitary handling of food and eating utensils.

The Community Cup (6) 15 min., silent, 16 mm., black and white. West Virginia State Department of Health, Charleston, W. Va.

The Danger Point (1943) (1*, 3*, 5*) 12 min., sound, 16 mm., color. Public Health Committee of the Cup and Container Institute, 1790 Broadway, New York 19, N. Y. Discusses the spread of respiratory diseases and prevention by proper foodhandling sanitation. Transmission by improperly sanitized glasses is demonstrated. The use of paper cups is emphasized.

Tommy Fork and His Fountaineers (1945) (1*, 3*) 10 min., sound slide film, black and white. Syndicate Store Merchandiser, Inc., 79 Madison Ave., New York 16, N. Y. Using a soda foundain background, animated eating utensils and a counter-girl interestingly and humorously demonstrates proper handling and serving of food and utensils. Personal appearance is briefly covered. A silent photo-quiz trailer is included for audience participation.

Twixt the Cup and the Lip (1940) (1*, 3*, 5*) 22 or 13 min., sound, 16 mm., and 35 mm., black and white. G. S. Jacobsen, 204 Washington Ave., Albany, N. Y. After an outbreak of colds, the health department goes into action to obtain good dishwashing or single-service utensils at local restaurants. Shows proper methods of sanitization of multi-use utensils and methods of examination. Long version includes information on detergents. (For use at foodhandlers' schools, the sequence referring to "this cheap help" should be deleted.)

BACTERIOLOGY AND COMMUNICABLE DISEASE

Another to Conquer (1941) (1, 2, 3, 4, 5*) 18 min., sound, 16 mm., black and white. National Tuberculosis Association, 1790 Broadway, New York 19, N. Y. Diagnosis and treatment of tuberculosis among the American Indians of the Southwest. Excellent pictorial photography.

Body Defenses Against Disease (1937) (1*, 2*, 3*, 4*, 5*) 11 min., sound, 16 mm., black and white. Erpi Classroom Films, Inc., 1841 Broadway, New York 19, N. Y. Animated portrayal of the body's three lines of defense against disease. Microphotographs show the action of phagocytic cells in attacking and engulfing bacteria.

Confessions of a Cold (1, 2, 5) 10 min., sound; 15 min., silent; 16 mm., black and white. National Motion Picture Co., Mooresville, Ind. The dangers of the common cold and how to treat it. Animation used to emphasize the method of infection.

Goodbye Mr. Germ (1940) (1, 2, 5) 14 min., sound, 16 mm., black and white. National Tuberculosis Association, 1790 Broadway, New York 19, N. Y. Animated cartoon on the transmission of tuberculosis.

Let My People Live (1938) (1, 2, 5) 15 min., sound, 16 mm., black and white. National Tuberculosis Association, 1790 Broadway, New York 19, N. Y. Tuberculosis control in the South. Colored cast. Excellent sound including the Tuskegee Choir.

Man Against Microbe (1932) (6) 10 min., sound; 15 min., silent; 16 mm., black and white. Metropolitan Life Insurance Co., New York, N. Y. Dramatizes discoveries that were decisive in the fight against infectious disease.

Preventing the Spread of Disease (1, 2, 5) 10 min., sound; 15 min., silent; 16 mm., black and white. National Motion Picture Co., Mooresville, Ind. Stresses measures which the individual and community may use to reduce the amount of communicable disease.

FLIES

Swat the Fly (1936) (1*, 2*, 3*, 4*, 5*,) 10 min., sound, 16 mm., black and white. Edited Picture System, 330 W. 42nd St., New York, N. Y. Development and anatomy of the housefly; its role in disease transmission and some methods of control.

The Housefly (1935) (1*, 2*, 3*, 4*, 5*) 10 min., sound, 16 mm., black and white. Erpi Classroom Films, Inc., 1841 Broadway, New York 19, N. Y. Life cycle of the fly; its role in disease transmission; methods of control.

The Housefly (1933) (6) 15 min., silent, 16 mm., black and white. Eastman Kodak Co., Rochester, N.Y. Life cycle of the fly; its role in disease transmission; some methods of control.

MILK

All Washed Up for Clean Safe Milk (2*, 4) 15 min., sound slide film. Audi-Vision, Inc., 285 Madison Ave., New York, N.Y. Prospective plant-producer discusses the sanitation requirements with the milk sanitarian and observes good methods at a neighbor's dairy.

x **Battling Brucellosis** (1946) (2, 4*, 6) 20 min., sound, 16 mm., color. U. S. Dept. of Agriculture. The film describes the proper methods of ridding a herd of brucellosis as soon as it is discovered. Three steps recommended by the Bureau of Animal Industry are emphasized: (1) Testing of all cows by the veterinarian and the sale of the diseased animals for slaughter; (2) Thorough cleaning of barns, equipment, and yards; (3) Vaccination of the calves in the herd. Animated diagrams portray the physiology of the disease and the agglutination test used in determining infection is demonstrated. The sequence of technical processes is given continuity through the dramatization of a small dairy farmer's fight against brucellosis.

From Moo to You (6) 10 min., sound., 16 mm., color. The Borden Co., 350 Madison Ave., New York, N.Y. Animated cartoon in which Elsie, the cow, tells the story of milk.

x **Here's Health** (1946) (5) 25 min., sound, 16 mm., color. Ideal Motion Picture Service, 371 St. Johns Ave., Yonkers 4, N.Y. The story of milk production from cow to consumer is shown. Emphasis is placed on processing and laboratory control and the nutritional importance of milk is stressed. The film deals mainly with a large scale milk processing operation. (Note — The general distribution of this film is limited to the New York State area).

Home of the Free (1941) (1, 2, 5*) 11 min., sound, 16 mm., color. National Dairy Council, 111 N. Canal St., Chicago, Ill. The role of milk in nutrition in the national emergency; scenes in army kitchens and messes and in the home; illustrating proper selection and preparation of food.

Milk (1939) (6) 10 min., sound, 16 mm., black and white. Bell & Howell Co., 1801 Larchmont Ave., Chicago, Ill.

x **Milk** (1946) (5) 10 min., sound, 16 mm., black and white. Encyclopaedia Britannica Films, Inc., Richmond, Va. A simple, effective treatment of the story of milk from production to final delivery to the customer. The processes of production, transportation to the plant, pasteurization, bottling and delivery are described in an elementary, non-technical manner.

Milk and Its Products (6) 10 min., sound, 16 mm., black and white. Films Incorporated, 330 W. 42nd St., New York, N.Y.

Milk Parade (1937) (5*) 10 min., sound, 16 mm., black and white. Milk Industry Foundation, Chrysler Bldg., New York, N. Y. Steps in the production, pasteurization, and bottling of milk.

Milk Production (6) 16 mm., silent. Illinois State Health Department, Springfield, Ill.

Milk—The Master Builder (6) 10 min., sound; 15 min., silent; 16 mm., black and white. National Motion Picture Co., Mooresville, Ind. Nutritional value of milk and milk products.

Milk—White Magic (6) 30 min., sound, 16 mm., color. The Borden Co., 350 Madison Ave., New York, N.Y.

Miracle of the Meadow (6) 25 min., 16 mm., black and white. Bailey Film Service, P. O. Box 2528, Hollywood, Calif.

Modern Magic (1943) (2, 5*) 16 min., sound, 16 mm., color. Parrott Film Studios, 1700 Keo Way, Des Moines, Iowa. Stresses the importance of good milk. Does not give detailed procedures of milk production and processing.

More Life in the Living (1939) (1, 2, 5*) 12 min., sound, 16 mm., black and white. National Dairy Council, 111 N. Canal St., Chicago, Ill. An entertaining and stimulating film emphasizing the role of milk in nutrition.

More Milk (1944) 11 min., sound, 16 mm., black and white. U. S. Department of Agriculture, Motion Picture Service, Washington, D. C. A film designed to promote greater milk production. Not suitable for milk handlers sanitation courses unless it is desired to urge increased milk production at the course.

Quality Milk (1930) (2) 15 min., silent, 16 mm., black and white. U. S. Department of Agriculture, Motion Picture Service, Washington, D. C. The production of quality milk from the producer to the milk plant. An old film.

Quality Milk Production (1945) (2*, 4*, 5) 33 min., sound, 16 mm., black and white. National Dairy Products Corp., 230 Park Ave., New York 17, N.Y. The importance of safeguarding milk by using sanitary production methods is stressed. Proper methods are shown, including barn cleaning, grooming of cows, washing udders with chlorine water, use of strip cup, use of milking machine, including manipulation of udder, prompt straining and cooling, and protection during hauling. Sequences on cleaning of utensils stress the use of brushes, scapless cleaner, hot water, disassembly of milking machine, and chlorine rinse before use. Sequences at the milk plant show platform and laboratory tests with follow-up by field man. At end the film stresses the importance of training of future dairy farmers in FFA and 4H.

Safeguarding the Milk of Millions (1944) (2*, 4*) 30 min., sound, 16 mm., color. Portland Cement Association, 33 W. Grand St., Chicago, Ill. Deals chiefly with the construction of milk houses, cooling tanks, and barns stressing the use of cement.

Sentinels of Milk (1944) (2*, 4*, 5*) 16 min., sound, 16 mm., color. R. Hunter, 1105 East Grand River, East Lansing, Mich. Milk production, pasteurization, and bottling. Stresses sanitation and gives good information on cleaning and sanitizing milking machines.

x **Small Milk Plant Operation** (1946) (2*, 4*, 5). Series of three films, sound, 16 mm., black and white. U. S. Public Health Service, Washington 25, D. C. This series was produced for the purpose of teaching sanitation and correct methods of plant operation to the personnel of small milk plants. The films are based on the U. S. Public Health Service recommended Milk Ordinance and Code, Public Health Bulletin 220. They may be purchased from Castle Films, Inc., 30 Rockefeller Plaza, N. Y. 20, N. Y. There is a 10% discount to schools and other nonprofit institutions.

1. *You and Your Job*. 9 min., $14.09. A film teaching the concept that trained, responsible men are essential in the production of safe pasteurized milk. The extent of milk-borne disease and how it is spread is indicated. Good plant housekeeping, good health and personal hygiene, clean plants and regular equipment maintainance, in addition to the processing of the milk and the cleaning of equipment and containers, are shown to be important aspects of good plant operation.
2. *Milk Processing*. 21 min., $30.14. A training film explaining in detail the handling and pasteurization of milk by the holding process, from the time the raw milk is received until the pasteurized milk is bottled and loaded on a truck for delivery. The construction and operation of a vat-type pasteurizer with its necessary appurtenances are shown in animation. The importance of proper methods in guaranteeing a safe milk is stressed.
3. *Cleaning Equipment and Containers*. 26 min., $35.14. A training film demonstrating in detail satisfactory methods for the cleaning and bactericidal treatment of cans, bottles, piping and other equipment, following the accepted routine of flush, scrub, rinse, "sterilize." Cans are washed by hand, bottles both by hand and in a mechanical washer. The importance of the operations shown in the production of a safe milk is emphasized.

The Milky Way (4*) 25 min., sound, 16 mm., color. The Diversey Company, 53 W. Jackson St., Chicago, Ill. The bactericidal treatment of dairy farm and pasteurization plant equipment stressing the use of hypochlorites. A commercial film.

x **The Practical Production of Grade A Milk** (1946) (2, 4, 5) 25 min., sound, 16 mm., color. Texas State Department of Public Health. A comprehensive film including references to historical background, a review of milk production methods and dairy sanitation, the handling and distribution of raw milk, pasteurization plant operation, sanitary inspection and laboratory control methods, and advice to milk consumers.

The Problem of Bacteria in Milk (2*, 4) 14 min., sound slide film. William M. Hickman, Pennsylvania Salt Manufacturing Company, 1000 Widener Bldg., Philadelphia 7, Pa. A humorous film using cartoons to explain bacteriology to farmers and producers. Sound on reverse of record for *What Are Bacteria?*

The Story of Milk (6) 20 min., sound., 16 mm., black and white. Bailey Film Service. P. O. Box 2528, Hollywood, Calif.

What Are Bacteria? (2*, 4) 13 min., sound slide film. William M. Hickman, Pennsylvania Salt Manufacturing Company, 1000 Widener Bldg., Philadelphia, Pa. A humorous film using cartoons to explain bacteriology to farmers and producers. Sound on reverse of record for *The Problem of Bacteria in Milk*.

Your Daily Milk (1941) (4, 5) 10 min., sound, 16 mm., color. Milk Industry Foundation, Chrysler Bldg., New York. N. Y. Modern milk distribution with emphasis on economics. Animated charts of the milk distributor's dollar.

NUTRITION

Food and Nutrition (1940) (1, 3, 5) 11 min., sound, 16 mm., black and white. Erpi Classroom Films. Inc., 1841 Broadway, New York, N. Y. Normal dietary requirements of carbohydrates, fats, proteins, minerals, and water. Rather technical for foodhandlers. Contains no information on sanitation.

Hidden Hunger (1942) (5*) 22 min., sound, 16 mm., black and white (color trailer). "Hidden Hunger," 420 Lexington Ave., New York, N. Y. Dramatic film on nutrition. Crusading farmer campaigns to reform the nation's eating habits. Shows correct cooking procedures to preserve vitamins.

Meat and Romance (1940) (1, 3, 5*) 40 min., sound, 16 mm., black and white, (color trailer). Castle Films, Inc., 30 Rockefeller Plaza, New York 20, N. Y. Correct procedures in buying, cooking and carving meats; nutritional value of various meats. Although too long for general use of foodhandler schools, it is considered excellent for those operators who might wish to remain after the regular session.

What's Cookin'? (1, 3, 5*) 15 min., sound slide film. Zurich General Accident and Liability Insurance Co., Chicago, Ill. A film stimulating interest in nutrition. Restaurant setting.

RODENT CONTROL

Keep 'Em Out (1942) (1*, 2*, 3*, 4*, 5*) 10 min., sound, 16 mm., black and white. U. S. Public Health Service, Washington 25, D. C. Expository film; how rats spoil food, destroy property, and spread disease; rat control by poisoning, trapping, and ratproof construction.

Rat Destruction (1942) (6) 10 min., sound, 16 mm., black and white. British Information Service, 30 Rockefeller Plaza, New York 20, N. Y.

Vandals in the Night (1*, 2*, 3*, 4*, 5*) 20 min., sound, 16 mm., color. Acting Director, Fish and Wildlife Service, U. S. Department of Interior, Merchandise Mart, Chicago 54, Ill. An excellent film emphasizing the economic reasons for rat control in cities and rural areas.

REFRIGERATION

40 Billion Enemies (1941) (1, 3, 5*) 25 min., sound, 16 mm., color. Westinghouse Electric & Manufacturing Co., Visual Education Section, Mansfield, Ohio. Contains good information on maintainance and use of home refrigeration units and the storage of different foods. The causes of spoilage and the influence of temperature on germ growth are explained. No commercial message.

How to Get the Most Out of Your Refrigerator (1941) (1, 3, 5*) 30 min., sound, 16 mm., black and white. General Motors, Department of Public Relations, 1775 Broadway, New York 19, N. Y. Information on the care and use of home refrigeration units and the storage of different foods. No commercial message.

WATER AND PLUMBING

City Water Supply (1941) (6) 10 min., sound, 16 mm., black and white. Erpi Classroom Films, Inc., 1841 Broadway, New York 19, N. Y.

Contamination of Water Supplies by Back Siphonage (1937) (3*, 4*, 5) 20 min., sound, 16 mm., black and white. University of Minnesota, Bureau of Visual Education, Minneapolis, Minn. Several types of faulty plumbing fixtures are shown and proper corrective measures explained. Laboratory models illustrate back-siphonage.

Clean Waters (1946) (1, 2, 3*, 4*, 5*) 22 min., sound, 16 mm., color. General Electric Co., Schenectady, N. Y. The benefits to be derived from clean surface waters including the several economic public health, recreational, and esthetic factors introduce this film. Ways in which these benefits are adversely affected by domestic and industrial wastes are forcefully illustrated. Adequate sewage treatment as the solution to the problem is covered in a comprehensive general view of sewage treatment procedures.

Every Drop a Safe One (1939) (6) 11 min., sound; 15 min., silent; 16 mm., black and white. National Motion Picture Co., Mooresville, Ind.

Safe Drinking Water from Small Supplies (1939) (3*, 4*, 5*) 12 min., sound, 16 mm., black and white. University of Minnesota, Bureau of Visual Education, Minneapolis, Minn. Correct measures for the installation of small water supplies. Bored, drilled, and driven wells illustrated diagrammatically.

Safe Water (1943) (3*, 4*, 5*) 15 min., sound slide film. U. S. Public Health Service, Washington 25, D. C. The importance of safe water with emphasis on country supplies.

The Ominous Arms Case (1942) (3*, 4*, 5*) 30 min., sound, 16 mm., black and white. Pure Water Films Company, 1251 N. Clark St., Chicago, Ill. Using a story based on a law suit, the film shows that disease may result from the drinking of polluted water caused by back-siphonage.

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JOURNAL OF MILK AND FOOD TECHNOLOGY

As Their Official Organ

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Association News

New York State Association of Milk Sanitarians

The Executive Committee of this association has decided to hold the Annual Meeting at Utica, New York, on Thursday, Friday, and Saturday, September 18, 19, and 20, 1947. Headquarters are at the Hotel Hamilton.

W. D. TIEDEMAN
Secretary-Treasurer

A Handbook on Testing Dishwashing Practices in Restaurants and Beverage Rooms, issued by the Bureau of Food Sanitation, Rockford (Illinois) Department of Public Health. Off-set printing. 9 pages. 1946.

This is a practical little manual of the question-answer type, designed to inform the restaurant employee that by the use of the swab test, he can actually see whether the eating utensil is properly sanitized.

APPLICATION FOR HOTEL RESERVATION

........................, 1947

Hotel Schroeder
Milwaukee, Wisconsin

Gentlemen:

Please reserve for me a single/double room, in connection with the meeting of the INTERNATIONAL ASSOCIATION OF MILK SANITARIANS, INC., October ...., 1947.

Very truly yours,

....

(Clip, fill out, and mail to above hotel.)

THIRTY-FOURTH ANNUAL MEETING
MILWAUKEE, WISCONSIN, OCTOBER 16-18

Headquarters: Hotel Schroeder

The meeting will be held in cooperation with the WISCONSIN ASSOCIATION OF MILK SANITARIANS. Dr. K. G. Weckel, *President.*

LOCAL COMMITTEE: E. C. Kleffen (Luick Dairy Co.), *Chairman.*
Paul Mandt, Olsen Publishing Co.
Dr. O. M. Pilgrim, Milwaukee Health Dept.
George Rydzewski, Blochowiak Dairy Co.

Reservations: Rooms are to be engaged directly through the Hotel Schroeder, Milwaukee, Wisconsin.

Information needed:
1. Number of persons per room.
2. Price range.
3. Date of arrival.

Ladies' Accommodations: A special committee is planning entertainment that will be attractive to the ladies — teas, trips, parties, and style show.
Please write to Miss Norma Beloria, 1445 North Fifth Street, Milwaukee, Wisconsin, giving names of ladies in your party.

Program: The program will be particularly rich in the variety and scope of the papers that will be presented. These are scheduled to be delivered within twenty-five minutes each. A paper every half-hour.

A preliminary count of the recent vote on the constitutional amendments to broaden the scope of the objects of the Association to include general food sanitation carried by an overwhelming majority. Accordingly there will also be many papers on general food sanitary technology.

Visitors: We cordially invite our friends and colleagues, even though they are not members of the International Association of Milk Sanitarians. The meetings are open to all who are interested in milk and food sanitation.

Affiliations: We all recognize that in union there is strength. So we welcome any groups who would like to look us over to the end of considering a closer tie than just mutual professional interest. The expanding fields of usefulness open to us, here and abroad, in publications, in research possibilities, in technological application, in regulatory improvements, in educational developments, and in professional advancement, all these will be facilitated as we unite our efforts, pool our resources, and organize our objectives.

DAIRY INDUSTRIES SOCIETY, INTERNATIONAL PROGRAM OF ACTIVITIES FOR 1947

Some of DISI's major functions of 1947 are being carried out through 20 basic committees and subcommittees, having about 100 distinguished and expert members in nearly 20 countries.

A. *The Technical Advisory Committee,* with 7 Publications Subcommittees and 5 Product Subcommittees, is developing a "living library" of practical, impartial technical information used in answering inquiries, disseminating information, and suggesting practical programs for particular enterprises. Seven basic handbooks, developed by the Publications Subcommittees and now being prepared for publication in two or more languages, cover these subjects: Farm Cooling; Sanitation Factors in Milk Production; Sanitation Factors in Milk Processing and Milk Products Manufacture; Separation and Clarification; Packaging and Closing; Pasteurization; Transportation. The Technical Advisory Committee will also arrange for the publication in English of a comprehensive textbook, "A Dairy Handbook for Tropical America," by R. E. Hodgson and O. E. Reed, respectively Assistant Chief and Chief of the Bureau of Dairy Industry in the U. S. Department of Agriculture. This textbook is being published in Spanish and Portuguese by the U. S. Government.

B. *The Committee on Area Development* is studying the prospects for programs to advance dairy enterprise in particular countries or areas. The Committee will help organize and carry through programs supported locally by governmental and private elements—acting in a stimulative and consultative role and enlisting specialists from within or outside of DISI's membership. Preliminary inquiries are now under way in certain Caribbean and Far-Eastern areas.

C. *The Committee on Standard Terminology* will compile a glossary of technical and practical terms in the principal languages and regions. It will develop recommendations to facilitate international communication and comparison, including standard determinance of quality in dairy products. Arrangements are being made to permit DISI members to observe the U.S.A. Students' National Contest in Judging Dairy Products, which will occur simultaneously with DISI's annual meeting in Miami Beach, Florida, in the week of October 27 to November 1.

D. *The Committee on Consumer Education* is concerned with stimulating the consumption of milk and dairy products, by education and by developing simple, inexpensive, and readily taught facilities and practices to make consumption safer in areas lacking adequate sanitation. The Committee is looking into the question of a possible "standard" simple vessel for boiling milk where no other means of assuring sanitation are now feasible.

E. *The Committee on Exhibits* will plan the development, routing, and use of educational displays internationally.

F. *The Membership Committee* is disseminating information about DISI in all parts of the world, with an immediate goal of doubling membership in its first drive.

G. *The Finance Committee* will seek financial support beyond membership dues and advise as to the use of funds.

H. *The Speakers' Bureau,* working with DISI headquarters, will arrange for appearances by its members and others before groups of milk producers, dairy processors, exporters and importers, educators, public health and nutritional specialists, government officials, editors and publicists, etc.

In addition to the above-named committee functions, the following services are being performed by DISI's staff—which now contains two full-time members well equipped technologically and linguistically:

1. *Clearing House.* On a world-wide scale, a central service is offered for the interchange of information—scientific, technological, economic, dietary—on current dairy enterprise and its potentialities.
2. *Bulletins.* A many-sided "DISI Bulletin" and a "DISI Report to Members" are issued periodically to members, together with limited distribution to prospective members, periodicals, educational institutions, etc.
3. *Placement; and Student Exchange.* DISI will act as a neutral clearing house for information on available specialists in the various phases of dairy activity; and will aid in the placement of students in other than their native countries for limited periods of training.
4. *Continuing Surveys.* Covering the major conditions affecting dairy activity these are being carried on, area by area, with their findings published to members.
5. *Educational Publicity.* DISI is disseminating significant information through the principal channels of communication internationally, including releases to publications in dairy and related fields.

(Continued on next page)

Correspondence

March 31, 1947

Dr. J. H. Shrader
23 E. Elm Ave.
Wollaston, Massachusetts

Dear Dr. Shrader:

Allow me to take a good-natured exception to one point in your editorial in the January-February issue on "Laboratory Procedures in Sanitary Milk Control." In discussing the different approaches to the problem of routine bacteriological control of dairy deliveries, you intimate that one plan was essentially devised by engineers and the other by a "regular" health department, with the inference that the engineers as such have perhaps been more theoretical and less practical in their contribution. Actually, I think engineers have contributed substantially to both plans and that the essential difference between the plans lies not in the personnel, but the governmental background and setting wherein the procedures of control were devised. The control procedure which is developed in the absence of the immediate field responsibility for its functioning is less likely to be realistic than that devised by a working group directly confronted with the problems of field control and enforcement.

The concept of a "regular" health department now coming into general acceptance is one in which an engineer is responsible for the administration and the technical guidance of the whole sanitation program. It is further being recognized that this is an appropriate division of responsibility because of the fact that the health officer's training is medical and does not ordinarily qualify him to exercise sound judgment in matters relating essentially to sanitation and the working out of intricate problems in this field, although he may be highly competent in all other aspects of administration and medical health department functions.

The problem always in any organization is to select a type of personnel best suited to deal capably with the broad aspects as well as with the maximum of technical details of the given function or aggregate of functions. In the field of environmental health, there are places for many types of professional and scientific training, but, in my judgment, the sanitary engineer trained in public health problems comes nearest to satisfying the requirements of the over-all administrative job, with the executive health officer, of course, being responsible for the total program.

Very truly yours,

J. LLOYD BARRON. C.E.,
Sanitary Engineer.

(Continued from preceding page)

6. *Travelers' Introductions.* DISI arranges introductions—and, in some instances, inspection of facilities—for DISI members traveling abroad or for visitors in countries where DISI members reside.

7. *Miscellaneous Services and Projects.* When opportunities arise, arrangements can and will be made to provide special services and to sponsor special projects to advance DISI's basic purpose—

> . . . "to foster the extension of dairying and dairy industrial enterprise internationally through an interchange and dissemination of scientific, technological, economic, dietary and other relevant information and through a bringing together of persons and entities devoted thereto" . . .

ANNOUNCEMENT

DISI's first annual meeting is scheduled for Miami Beach, Florida in the week of October 27 to November 1. The place—served by international airlines—and the time coincide with the annual conventions of International Association of Ice Cream Manufacturers and Milk Industry Foundation. For information concerning DISI's program and hotel accommodations, write to:

DAIRY INDUSTRIES SOCIETY, INTERNATIONAL
1426 G Street, N. W., Washington 5, D. C., U. S. A.

New Members

ACTIVE

Arrington, L. T., Dairy Products Laboratory, Gainesville, Florida.
Bealmear, H. O., Box 846, Asheville, N. C.
Clapp, Richard F., U. S. Public Health Service, Washington 25, D. C.
Covington, Wm. V., Cabarrus County Health Dept., Concord, North Carolina.
Doetsch, Raymond N., 1120 E. Capitol Street, Washington 3, D. C.
Hale, Thomas N., Henry County Health Department, Paris, Tennessee.
Haskell, Wm. H., 707 Pere Marquette Bldg., New Orleans, Louisiana.
Hood, R. R., R. 3, Box 157, Pensacola, Florida.
Hoyt, John G., Box 458, Homer, Louisiana.
Jessup, Bernard L., 80 Hillcrest Drive, Concord, N. C.
Krienke, W. A., Dairy Products Laboratory, Gainesville, Florida.
Linker, Dr. Henry D., P. O. Box 245, Hope, Arkansas.
Maisel, Wm. J., P. O. Box 819, Bartow, Florida.
Miller, Charles F., 3602 W. College, Shreveport, Louisiana.
Minkin, J. L., Fla. St. Board of Health, Bureau of Sanitary Engineering, Jacksonville, Florida.
Mols, Chas. W., 1420 Tampa Street, Tampa 2, Fla.
Nussbaum, Morris, Kingston City Laboratory, Kingston, New York.
O'Brien, J. F., Field Training Station, Muscogee County Health Dept., Columbus, Ga.
O'Quinn, Charles A., Jr., P. O. Box 411, Madison, Fla.
Rohlader, Louis H., City Hall, Ft. Pierce, Fla.
Scott, Walter M., 3155 W. 40th Ave., Denver, Colorado.
Taylor, Julian R., Box 545, Newton, N. C.

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Bay, John J., 2823 South 12th St., Lincoln, Nebraska.
Brower, Dr. Nathaniel, 92 East 17th St., Holland, Michigan.
Bugbee, Clinton H., 1738 Van Buren St., Phoenix, Arizona.
Burress, Tom, 2603 Lefeber Ave., Wauwatosa 13, Wisconsin.
Campbell, Dwight, Fergus Dairy Cooperative, Box 504, Fergus Falls, Minnesota.
Chiquoine, Arnold, 501 Rutgers Ave., Swathmore, Pennsylvania.
Claydon, Professor T. J., Dept. of Dairy Husbandry, Kansas State College, Manhattan, Kansas.
Crews, Charlie J., c/o Health Department, Calhoun City, Mississippi.
Crye, William G., Monticello, Florida.
Davis, M. S., The Borden Co., Box 151, Denton, Texas.
Essary, Leland, Clinton, Oklahoma.
Fox, Allan J., 510 N. Pleasant St., Amherst, Massachusetts.
Fulton, E. E., 2531 W. Lake Shore Blvd., Jacksonville, Florida.
Gobrecht, Ralph W., R. D. 2, New Oxford, Pennsylvania.
Golding, Norman S., Washington State College, Pullman, Washington.
Gray, Farnum M., 62 N. E. 27th St., Miami, Florida.
Hall, Wm. J., P. O. Box 6, Opa Locka, Florida.
Hansen, Walter C., Vergennes, Vt.
Hendricksen, William A., Delta County Health Department, Escanaba, Michigan.
Jensen, J. M., Michigan State College, Dairy Department, East Lansing, Michigan.
Kellogg, E. B., Milk Industry Foundation, 1001 Fifteenth St., N. W., Washington 5, D. C.
Kotcher, Richmond, 1524 East 35 Street, Brooklyn, N. Y.
Lenning, John S., Berwick Creamery, 310 W. Front St., Berwick, Pennsylvania.
Lasser, David S., Milk Plant Monthly, 327 South LaSalle St., Chicago 4, Illinois.
Lillard, G. G., 210 South Camden Ave., Richmond, Missouri.
Livak, Charles, R.F.D. No. 3, Hamburg, Pennsylvania.
Mueller, Lester, 2059 Tyler St., Union, New Jersey.
Pfaff, Bernard, 315 Graham St., Columbus, Ohio.
Pruyn, C. P., 2933 Franklin Ave., Seattle, Washington.
Schroeder, Donald E., Box 176, Kingston, Ontario.
Schuler, Ethel M., 333 East 16th Ave., Denver, Colorado.
Shulkin, I. A., Control Laboratories, Storm Lake, Iowa.
Signorelli, John, 60-71 Metropolitan Ave., Brooklyn 27, New York.
Smith, H. B., 415 Oakwood Ave., Oconomowoc, Wisconsin.
Starkey, Charles T., Pet Dairy Products Company, 1701 Broadway, Knoxville, Tennessee.
Wells, R. L., 437 10th St., N., St. Petersburg, Florida.