VOLUME 19 No. 10
OCTOBER, 1956

Journal of

MILK and FOOD TECHNOLOGY

Official Publication

International Association of Milk and Food Sanitarians, Inc.

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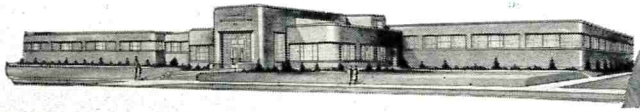

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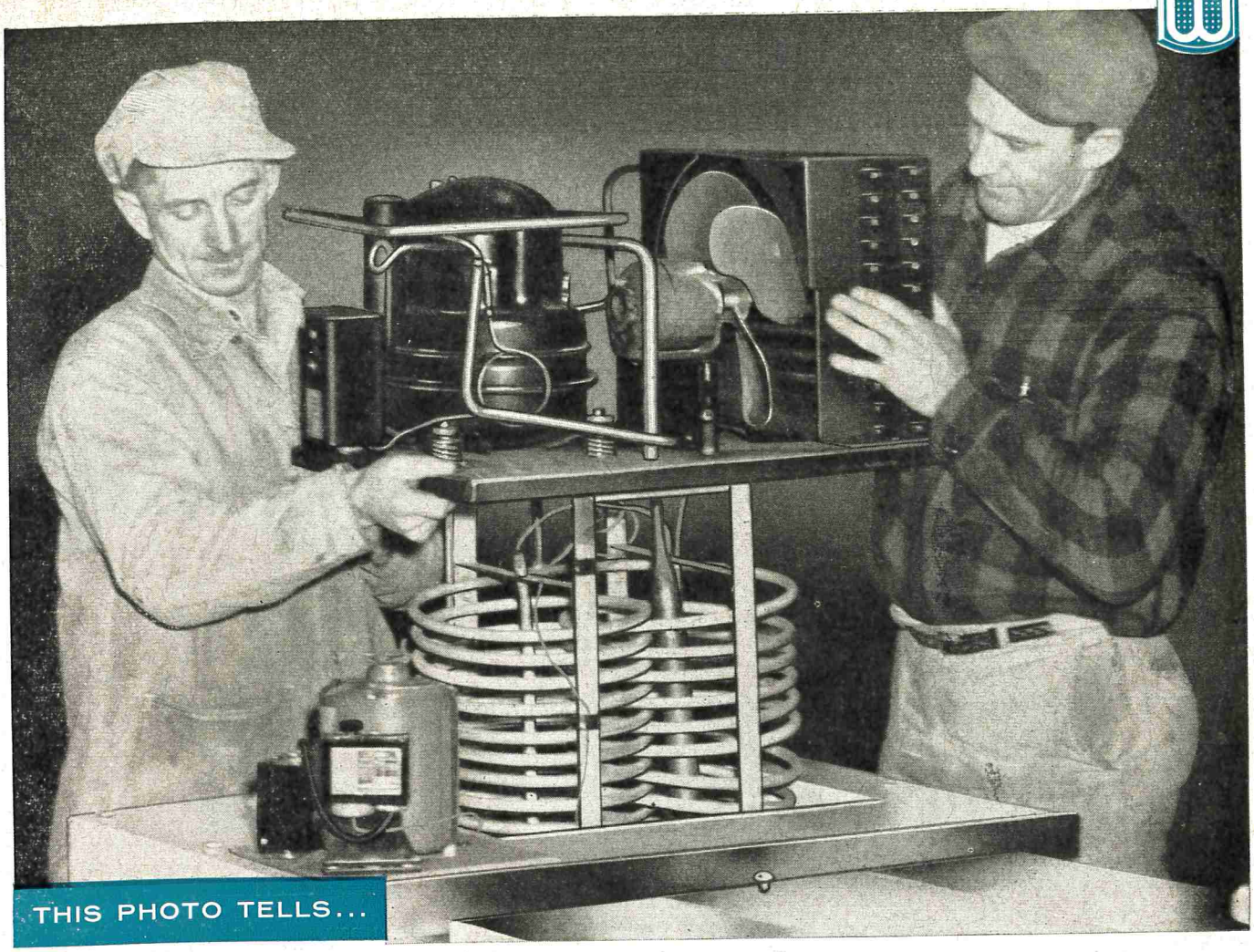

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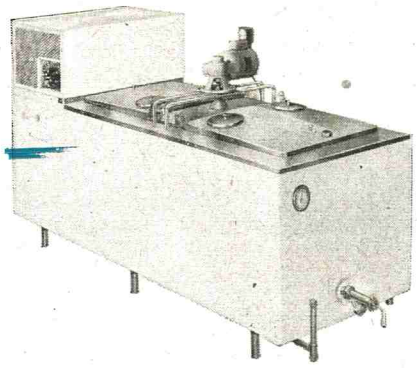

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PRESIDENTIAL ADDRESS[1]

HAROLD S. ADAMS, *President*
International Association of Milk and Food Sanitarians, Inc.

Once during the term of an officer of this Association, when he advances to the honored position of President, he has the rare opportunity of formally addressing an annual meeting. This is both a responsibility and a distinct privilege. During his tenure from Second Vice-President to President, normally a lapse of four years, the officer, in moving up, becomes intimately acquainted with an imposing amount of detail and with the many administrative and functional matters which must be handled on a day to day basis to keep International on a sound and strong footing.

When his time comes to present the annual presidential message he must decide the main theme of that address; he must try to determine what subject or subjects seem most pertinent and timely. His subject should have a direct bearing upon the future development and welfare of our Association. In addition, his message has a definite time limitation. This is not a simple task for there are many subjects of real interest to an Association such as this, numbering as it does among its membership men whose work involves industrial, regulatory, research and academic interests. But even amid this rather broad spectrum of diverse interest there is one theme which is of constant and enduring value, and that is professional growth and development.

I have chosen therefore as my main theme this subject of professional growth and development. I shall attempt to show where our Association has made progress and where more progress needs to be made.

It is trite to say that we either progress or retrogress, but trite as this truism may be it cannot be ignored. Either we progress or retrogress individually and as a whole. There is no standing still! The individual either advances professionally or he slips backward. And so it is with an Association. Either it moves forward with new plans, projects and developments or it begins to show signs of inactivity and decadence. It must be alive, vital and progressive.

With this theme in mind, I would review with you some of the indications of growth and development that have taken place in International within the past few years.

One of the most significant developments contributing to the strength and prominence of this Association with the appointment six years ago of a full time executive secretary for the Association, and, in dual capacity managing editor of the Journal. Through such office there was established a sound system of busi-

"Dick" as he is known to his friends, was born in Massachusetts and educated at the University of Massachusetts and at M.I.T. He began his career in public health with the Massachusett's Department of Health in 1930 and worked as a general sanitarian in the Nashoba Health Unit, Ayer, Mass., until 1935 when he became county sanitarian in Calhoun County, Michigan, a department then under the sponsorship of the W. K. Kellogg Foundation. From there he became director of food and sanitation at Flint, Michigan. In 1944 he joined the U.S. Public Health Service as a commissioned officer and worked in Chicago, Minnesota and Washington, D.C. Upon separation he headed the bureau of environmental hygiene of the Minneapolis City Health Department. In 1947 he became director of hotel and resort inspection for the Minnesota Department of Health. During 1950 while on leave from Minnesota, he served as associate project director for a National Research Council Committee studying milk regulations and the sanitary quality of milk in several large American cities. In 1952 he joined the faculty of the Department of Health, Indiana University School of Medicine, the position he now holds. In 1955, he was a member of a three man team studying public health and other training programs for nationals in India, Pakistan and the Philippines. He is author of the text, "Milk and Food Sanitation Practice".

In 1952 he was appointed chairman of the Association's Committee on Education and Professional Development. He was elected 2nd. Vice President of International in 1953 and will continue to serve on the Executive Board as past president through 1958.

He is married, has two sons and a daughter and two grandchildren. He makes his home in Indianapolis, Indiana.

[1]Presented at the 43rd Annual Meeting of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., at Seattle, Washington, September 5-7, 1956.

ness management and a centralization of managerial responsibility. Less than ten years ago this Association was in dire financial distress, membership was declining and affairs were in a most unstable and critical condition. Now, in 1956 we are in a strong financial position with a good balance and our business affairs are in order. In our Executive Secretary we have a man who is ready and willing at all times to assist and serve our 4200 members and the twenty-eight affiliates which make up International.

In 1947 another progressive step toward growth and development was taken. In that year the name of this Association was changed to broaden its base and interest. In that year, by vote the membership, the word, "Food" was added and we then became the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC.

In 1952, there was appointed a Committee on Education and Professional Department. This Committee, through its deliberations and program placed renewed emphasis on the professional advancement and status of the Sanitarian. It examined some of the avenues through which professional advancement could be attained. As a result, at the 41st. annual meeting in 1954, the membership took cognizance of the fact that sound and carefully conceived legislation for the certification or registration of sanitarians was one of several methods by which professional status might be enhanced. At the same time however, the Association was quick to recognize that registration and legislation directed toward it, must not be a false crutch upon which to lean, nor should it be used to protect mediocrity nor to perpetuate sub-professional performance. At the 41st. annual meeting this Association acknowledged, during public assembly and by vote, what must be and is one of our primary and fundamental objectives, namely the raising of milk and food sanitarians to a professional level comparable to others with whom they work in the regulatory field.

Quite in line with professional advancement is another development that has reached fruition during the current year. Without going into developmental and other detail it is heartening to report the establishment of an undergraduate scholarship which is to be awarded annually in the amount of $300.00 to a deserving student with acceptable academic standing who is taking major work in the field of sanitary science and public health. International through the Executive Board has appropriated $300.00 for the 1956-57 college year and a recipient of this first scholarship has been selected. The name of this student and his university will be announced at the annual banquet. Several affiliates have endorsed the plan and made contributions. Should the amount thus contributed be sufficient, it is possible that two $300.00 scholarships may be awarded in a given year. Since we have taken the firm position that adequate academic background is an essential stepping stone along the path of professional advancement the establishment of this scholarship is tangible evidence of our desire to promote it.

Still another development is of noteworthy interest and pertains directly to the immediate theme. It has been the feeling of several of our dedicated members that there exists a rather wide gap between technical information and its availability for use in the field. New developments, better ways of doing things, and technological advances do not become readily available to the man who most needs them because our lines of communication from the research laboratory to the field are often not as direct and clear cut as is desirable. Frequently a satisfactory solution to a problem worked out successfully in one section may not filter through to another area faced with a quite similar problem. This is unfortunate. However, in recognition of this situation your Association has created a new committee to be called, "This Committee on Research Needs and Applications". We are not so naive as to believe that the creation of this or any other committee will solve as vexing a problem as this, yet appointment of such a committee does indicate an awareness of a problem toward which this Association must work to develop the best possible solution. It must be said however, that this Committee will only be as useful as you members make it. If the Committee learns, through you, the kinds of problems for which a solution is needed the technical competence of this Committee is such that a solution will be found. I know you will hear more of this Committee as its program gains momentum.

I could mention many other matters which contribute immeasurably to the total stature of this Association, but I must pass on to other points. I want, however, to pay tribute to the fine and productive work of our numerous committees. In an Association as large as ours we must work under the committee plan and I particularly call to your attention the fine reports which will be presented here and which you will be able to read and study more carefully as they appear in the Journal.

As stated earlier, I wish to mention some areas of possible weakness in our Association. Perhaps these are not areas of weakness as much as areas where more critical evaluation is needed.

I believe we are at a point in this Association where we must ask the question, "Is a base built up on milk and food sanitation activities alone one that is sufficiently broad"? There are a number of factors which prompt this inquiry. We see around us other groups

organizing with interests which, in several respects, are similar to ours. In the mid-west we learn of an organization formed to solicit the membership of dairy plant field men and build them into a national organization. A large group of men in this work are devoted members of this Association. In the southwest an organization is being formed and promoted which is directed toward the "registered" professional sanitarian and aims to create a society by that name. In a substanial number of states, and in several instances in states where there are affiliates of International, the National Association of Sanitarians is active in soliciting membership from men engaged in the field of sanitation. And then, there are state associations in a number of states which are unaffiliated nationally. For reasons best known to themselves they prefer to remain alone or perhaps National Associations with whom they might affiliate do not appear to offer a program sufficiently appealing to them.

I point to these developments as indicative of the need for this Association to continuously take stock of its purpose and to constantly evaluate both its objectives and program.

Today we are a strong Association with some 4200 members, but are we close to the end of the line? There are over 9,000 men and women in public health sanitation work in this country and perhaps half again as many in other phases of regulatory work, yet the combined membership of the two leading sanitarian organizations is about 6,000. To what organization does the balance belong? If they belong at all, it is safe to say, that they are not in affiliates of our Association, yet they are there and they are potential members.

It seems to me we must recognize this need for expansion. How best to accomplish it is a problem needing our careful scrutiny and attention. Yes, we have shown remarkable growth in less than a decade, but what about the next ten years, the decade ahead? I am convinced that a careful study of areas of broadened interest, an exploration of new services which this Association might render, and a careful appraisal of trends would return excellent dividends and a membership of half again the number currently enjoyed. We should seriously question whether we should remain a specialist group. We should weigh the arguments pro and con for there are those who argue as vehemently for the generalist as for the specialist.

In addition, we must continue to give serious study and consideration to this whole area of professional qualification and development. The Sanitarian today, more than ever before, is seeking and striving for professional status. There is more current interest in legislation for legal registrations of sanitarians than ever before. Even in states where acts have been introduced without success, new plans are being laid for re-introduction. So active is the interest in some states that one defeat becomes a challenge to prepare new supporting evidence and to try again.

Trends such as these not only must be watched they must be anticipated. If study shows that this Association needs to broaden its base, enarge its scope and objectives, or otherwise change its emphasis, then, this must be courageously done. We must not be caught in the unfortunate situation of, "too little and too late".

As your President, I can only point out in this brief message some of the factors and some of the potentials as I see them. Alert as your officers, past and present have been, and are, they alone cannot carry the entire responsibility. It is you, the members, you on the firing line who carry out the important daily tasks, who must watch and listen and then raise your voices to be heard when a change of course is indicated.

My closing admonition then is this. Within the sphere of future growth and professional development of this Association must be all those things which continue to give it dignity, respect and stature. It is not an exclusive prerogerative of your elected officers to carry this whole responsibility. Each member must share this equally. Each must be alert to new developments, new projects and growth potentials that will continue to make International the strong vital Association it is today.

SANITARIAN'S AWARD SPONSORS CONFER IN SEATTLE

Shown in conference prior to the presentation of the $1,000 Sanitarian's Award at the 43rd Annual Convention of International Association of Milk and Food Sanitarians in Seattle, September 5-7, are these representatives of some of the firms which sponsor the award and IAMFS committee personnel. Left to right are W. V. Hickey, G. H. Steele, A. K. Saunders, C. A. Abele, J. C. Olson, Jr., John Faulkner, C. B. Shogren and J. G. Simpson.

JOHN H. FRITZ, KANSAS CITY, MO., HEALTH DEPARTMENT, IS SANITARIAN OF YEAR; RECEIVES AWARD AND $1,000

John H. Fritz, Chief of the Milk and Food Section of the Kansas City (Missouri) Department of Health, received the highest national recognition which can come to a professional local sanitarian – being named the "Sanitarian of the Year" and receiving the Sanitarian's Award from INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., which carries with it a check for $1,000.

The award is presented annually by IAMFS to the municipal or county milk and food sanitarian from the United States or Canada who, in the opinion of its Committee on Recognition and Awards, has made the most meritorious contribution to the health and welfare of his community in the past five years. The presentation occurred during the 43rd Annual Banquet of IAMFS at the Hotel Olympic in Seattle, Washington, September 6.

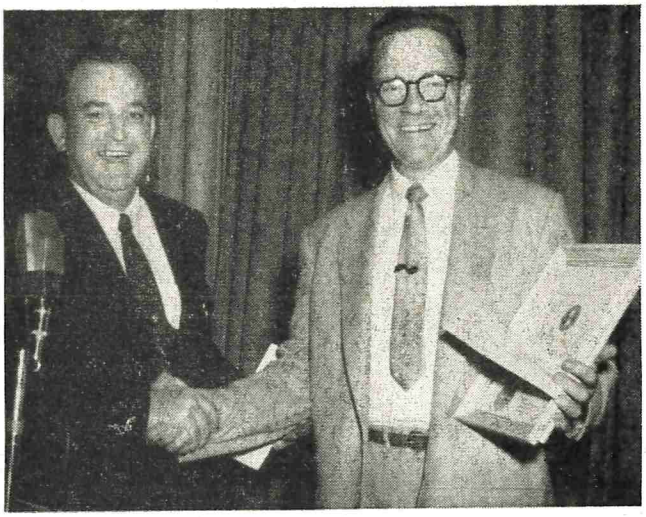
Chief of the Milk and Food Section of the Kansas City Health Department since September 1953, and Chief of the Food Section for two years previous to that, Mr. Fritz has developed one of the most effective and efficient programs of milk and food protection to be found in any municipality in the United States; further, he has maintained and fostered excellent relations with executives and engineers in the milk and food industries and the equipment and supply industries which serve them.

Almost 20 specific outstanding achievements of Mr. Fritz in the past five years were considered by the Awards Committee in deciding that he qualified for the title of 1956 Sanitarian of the Year. The Committee considered secret nominations for many sanitarians from all parts of the country before deciding that Mr. Fritz' total record of accomplishment merited him the title. Among these achievements were listed:

–his establishment of an effective program to protect the public against the potential hazards of milk and food-borne disease; this has resulted in the virtual elimination of all milk and food-borne disease in his community–

–his constant study and revision of ordinances affecting food, milk, frozen dairy products, and meat; this was considered particularly important because with rapidly advancing food technology, regulations must keep abreast of advancements in order to control effectively sanitation problems which may arise–

–his leadership in and maintenance of close liaison among Federal agencies and health bodies of the four states of Missouri, Arkansas, Oklahoma and Kansas; this has permitted close control to be exercized over attempted movements by certain unethical persons to transfer and sell condemned inedible products to the public in other localities–



JOHN H. FRITZ — SANITARIAN OF THE YEAR

Shown a few seconds after he had received the Sanitarian's Award and a check for $1,000 is John H. Fritz, Chief of the Milk and Food Section of the Kansas (Mo.) Department of Health. He is being congratulated by John D. Faulkner, U. S. Public Health Service, Chairman of the Committee on Recognition and Awards of International Association of Milk and Food Sanitarians. Presentation occurred at the 43rd Annual Meeting of IAMFS in Seattle, Washington, September 6.

–his diligence in conducting successful drives to eliminate use of preservatives in prepared meat products and his encouragement of food handling sanitation with a minimum of court action; this is indicative of the good public relations which he has established and maintained–

–his establishment of constant in-service training programs for personnel under his supervision; this has created one of the most efficient and admired staffs in the country and has brought about uniformity of approach and inspections with all of the sanitarians assigned to his progam–

–his setting up a procedure of testing dish washing machines to check proper temperatures, proper pressures and correct operation; this has resulted in properly cleaned and sterilized dishes, silverware and glasses used in public eating establishments, and restaurant operators themselves have welcomed this service and become aware of lessened complaints from their guests–

–his assumption of leadership, in July 1951, following a disastrous flood, in establishing close sanitary control on all food products which may have been

damaged by the flood; this resulted in there not being a single case of illness attributed to food damaged by the rampaging Kaw and Missouri rivers.

The Sanitarian's Award, presented to Mr. Fritz on behalf of IAMFS by John D. Faulkner of the U. S. Public Health Service of Washington, D. C., Chairman of the Committee on Recognition and Awards, carried the following inscription:

"This Award is conferred for distinguished service to his community in the field of public health; for meritorious achievements in milk and food sanitation; for outstanding accomplishments in both public and industry relations; and for his ability to personalize the ideals of the Sanitarian."

Associated with the Kansas City Health Department since 1949, Mr. Fritz is a man of high standing in both professional circles and community regard. Professionally, he is the author of numerous papers on sanitation problems which have appeared in most of the major sanitation industry journals; he is a sought-after speaker at meetings of sanitarians and of public health groups; and his advice has frequently been sought by others in the field of sanitation.

In his community, Mr. Fritz is active in civil defense work, in which he has taken a special interest in emergency food handling problems. He has worked closely with the Kansas City YMCA in setting up of new food handling facilities of a "Y" camp located outside of Kansas City. He has also been active in Boy Scouting.

Mr. Fritz is the fifth person ever to receive the Sanitarian's Award. Earlier recipients were:

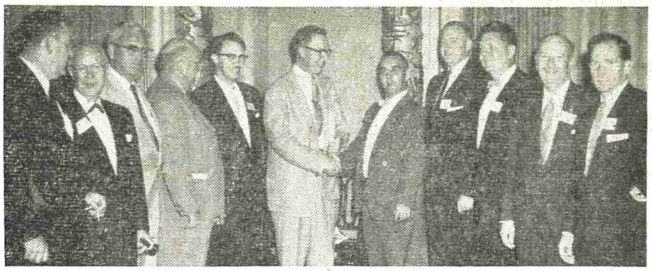
Paul Corash, Chief of the Milk Division, New York City Health Department (1952).

Dr. E. F. Meyers, Chief of the Milk, Meat and Food Division of the Grand Rapids, Mich., Health Department (1953).

Kelley G. Vester, Senior Sanitarian of the Rocky Mount, North Carolina, City Health Department (1954).

B. G. Tennant, Chief Sanitarian of the Escambia County Health Department, Pensacola, Florida (1955).

The Sanitarian's Award is sponsored by five companies: Diversey Corporation, Klenzade Products, Inc., Oakite Products, Inc., Olin Mathieson Chemical Corporation, and the Pennsylvania Salt Manufacturing Company. The award, with the accompanying check, is entirely administered by IAMFS, and the sponsoring firms have no voice whatever in selection or consideration of recipients.



SPONSORS OF SANITARIANS AWARD CONGRATULATE RECIPIENT

Receiving the congratulations of some of the sponsors of the $1,000 annual Sanitarians Award is John H. Fritz, Kansas City (Mo.) Department of Health, who received the prize at the 43rd Annual Meeting of International Association of Milk and Food Sanitarians, September 6 in Seattle, Washington. Left to right are John D. Faulkner, U.S. Public Health Service, Chairman of IAMFS Committee on Recognition and Awards; C. A. Abele, The Diversey Corp.; Bob Bovey and C. B. Shogren, Klenzade Products, Inc.; R. C. Cheek, The Diversey Corp.; Mr. Fritz; A. K. Saunders, The Diversey Corp.; J. G. Simpson and W. I. Maa, Pennsylvania Salt Manufacturing Co.; George M. Cunningham and George W. Finnegan, Olin Mathieson Chemical Corp. Not present, but also a sponsor, were representatives of Oakite Products, Inc.

K. G. WECKEL HONORED BY SANITARIANS FOR SERVICE TO PROFESSIONAL SOCIETY

A widely-respected past-President of INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., — Dr. K. G. Weckel, Department of Dairy Food Industry, University of Wisconsin— was presented with the IAMFS Citation Award, at the 43rd Annual Meeting of the Association, September 6, at the Hotel Olympic in Seattle, Washington.

The Citiation Award is presented annually to a member of the Association whose contributions over a period of years have furthered the professional advancement of IAMFS and have strengthened its growth and enhanced its reputation.

The plaque presented to Dr. Weckel bore the following citation:

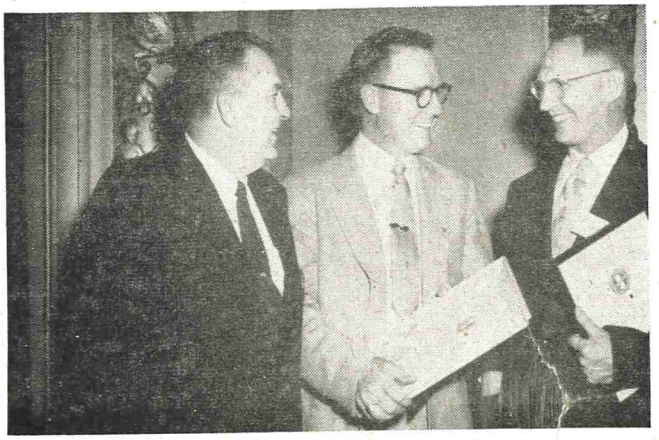
"Because his diligent work in behalf of this Association has contributed greatly to its professional advancement, growth and outstanding reputation; because he has unselfishly devoted so much time and effort as an officer, as a member of the Executive Board, and as chairman and member of many important committees; because he has served as an Associate Editor of the Journal of Milk and Food Technology and has contributed many scientific articles for publication in the 'Journal';

and because his wise counsel has been of inestimable value to our organization, this Citation is awarded for Distinguished Service to the International Association of Milk and Food Sanitarians, Inc."

During his tenure as President of IAMFS in 1950-1951, he was instrumental in the reorganization of the association's business structure and in the establishment of the position of Executive Secretary.

In the more than 15 years that Dr. Weckel has been a member of IAMFS, he has served prominently on the following committees: Committee on Applied Laboratory Methods, Committee on Frozen Food Sanitation, Committee on Research Needs and Applications, and he is currently one of four representatives of IAMFS serving on the 3-A Sanitary Standards Symbol Administrative Council. Additionally, he has served on many strictly internal IAMFS committees, including at various times those on Program, Recognition and Awards, Resolutions, and Nominating.

He is the author of 13 papers which have been published in the JOURNAL OF MILK AND FOOD TECHNOLOGY.



TOP SANITARIANS RECEIVE AWARDS

Left to right are John D. Faulkner, U. S. Public Health Service, Washington, D. C.; John H. Fritz, Kansas City (Mo.) Department of Health; and Dr. Kenneth G. Weckel, University of Wisconsin. Mr. Faulkner is Chairman of the Committee on Recognition and Awards of International Association of Milk and Food Sanitarians. Mr. Fritz was named Sanitarian of the Year, and received an award of $1,000 for mertitorious service to the health and welfare of his community over a period of the past five years. Mr. Weckel received the Citation Award for outstanding service to IAMFS. Presentations occurred at the 43rd Annual Meeting of IAMFS, September 5-7, at the Olympic Hotel in Seattle, Washington.

AWARD WINNING SANITARIANS COMPARE AWARDS

John H. Fritz, Kansas City (Mo.) Department of Health, left, here takes a few pointers from Dr. Kenneth G. Weckel, University of Wisconsin. Mr. Fritz had just received the Sanitarians Award and a check for $1,000; Dr. Weckel the Citation Award and for outstanding service to International Association of Milk and Food Sanitarians. Scene was snapped September 6 during the 43rd Annual Convention of IAMFS in Seattle, Washington.

PAUL CORASH NAMED PRESIDENT OF INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS

Paul Corash, New York City Health Department, was installed as President of INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., as the 43rd Annual Meeting of that organization ended September 7 in Seattle, Washington. He succeeds Harold S. Adams, Indiana University School of Medicine, Indianapolis.

Harold B. Robinson, U. S. Public Health Service, Washington, D. C., was named President-Elect of the association. Previously, Mr. Robinson had been First Vice President.

To the First Vice Presidency was elected Dr. Franklin W. Barber, Senior Scientist and Chief of the Division of Fundamental Research of National Dairy Research Laboratories, Inc., Oakdale, Long Island, N. Y. Dr. Barber is newly come to the roster of officers of the Association.

Another new officer, William V. Hickey, Director of the Division of Foods and Sanitary Engineering of the Salt Lake City (Utah) Board of Health, was elected to the Second Vice Presidency.

Howard H. Wilkowske, of the Department of Dairy Science, University of Florida, Gainesville, Fla., was re-elected Secretary-Treasurer.

H. L. Thomasson, Shelbyville, Ind., was re-named Executive Secretary.

In bringing the three-day session to a close, members adopted a unanimous resolution commending the Washington state affiliate group for the warm hospitality afforded visitors and their wives during the convention. In addition to boat tours in Seattle's harbor, a beef barbecue, and other entertainment functions, special activities were also arranged for about 50 wives of the convention visitors who had accompanied their husbands.

The 44th Annual Meeting of INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., will be held at the Brown Hotel in Louisville, Kentucky, in October 1957.

IAMFS OFFICERS FOR THE COMING YEAR

Shown as they were introduced to more than 300 members of International Association of Milk and Food Sanitarians as they brought the 43rd Annual Meeting of that association to a close September 7 in Seattle, Washington, are newly elected officers. Left to right are Ivan E. Parkin, Pennsylvania State University, Senior Past President; William V. Hickey, Salt Lake City (Utah) Board of Health, Second Vice President; Dr. Franklin W. Barber, National Dairy Research Laboratories, First Vice President; Harold B. Robinson, U. S. Public Health Service, President-Elect; Paul Corash, New York City Department of Health, President; Harold S. Adams, Indiana University School of Medicine, Immediate Past President; and Howard H. Wilkowske, Gainsville (Florida) Agricultural Research Station, Secretary-Treasurer.

IAMFS GAVEL CHANGES HANDS

Paul Corash, left, newly elected President of International Association of Milk and Food Sanitarians, here accepts the gavel from retiring President Harold S. Adams, as IAMFS brought to a close its 43rd Annual Meeting September 7 in Seattle, Washington.

UNIVERSITY OF MASSACHUSETTS STUDENT RECEIVES FIRST IAMFS AWARD FOR FUTURE SANITARIANS

Thaddeus E. Midura, a student majoring in sanitary science and public health engineering at the University of Massachusetts, Amherst, Mass., has been selected as the first recipient of a $300 scholarship offered by INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC.

Announcement of the award to Mr. Midura was made during the 43rd Annual Meeting of IAMFS at the Hotel Olympic, Seattle, Washington, September 6.

Dr. John J. Sheuring, University of Georgia, Chairman of the IAMFS Committee on Educational and Professional Development, announced that the award will be made annually to an outstanding student in his (or her) junior year, who is pursuing a course in public heath engineering and sanitary science. At present, approximately 16 universities are believed to offer four-year courses i nthis subject.

The $300 which the scholarship carries will be applied by the recipient to tuition and other educational expenses.

WIDE RANGE OF TOPICS COVERED IN SCIENTIFIC PAPERS READ AT ANNUAL MEETING OF ASSOCIATION AT SEATTLE

Papers dealing with subjects ranging from radiation-resistant bacteria to procedures to follow in foodborne disease outbreaks were among the many heard at the 43rd Annual Meeting of INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., September 5-7 in Seattle, Washington. Because of the wide general interest in the papers, summaries of some of the major papers are given below.

Sanitary Aspects of Radiation-Resistant Bacteria in Foods, by Dr. PAUL R. ELLIKER, Oregon State College — The presence of bacterial species of extremely high resistance to gamma radiation has been definitely established. The organisms are gram-positive, non-spore-forming micrococci which possess a brownish-red pigment. They have survived in meats which have been irradiated with gamma rays up to 5 million rep. Strains of the organisms, isolated from naturally contaminated unirradiated meat, demonstrated the same high order of radiation resistance as organisms taken from treated meat; this would indicate that the radiation-resistance is probably an inherent, stable characteristic not acquired as the result of one or a few exposures to gamma radiation. The mechanism or protective agency responsible for such remarkable radiation-resistance has not been established. Radiation-resistant bacteria may enter food products along with the raw meat or in the processing plant. Because of the limited degree of radiation which certain foods will tolerate from flavor and other standpoints, radiation-resistant bacteria must be prevented from entering the raw product or must be limited to low numbers before processing. If processing of food by gamma radiation is to become widespread in the future, this situation may require a highly specialized type of sanitary inspection of production facilities to assure successful processing.

Research Needs in the Field of Milk and Food Sanitation, by Dr. KEITH H. LEWIS, U.S. Public Health Service, Cincinnati, Ohio — A host of important new problems continues to arise in the prevention of foodborne diseases of microbial and chemical origin. They are associated not only with changes in food technology and consumer habits, but with unusual circumstances involving established processes and products. The opportunities for worthwhile expermentation in the field of milk and food sanitation are so diverse that research organizations must limit the number and character of problems which they undertake. The criteria applied in establishing priorities for support of projects play an important role in the success of long-range program planning as well as the conduct of current investigations. From the viewpoint of improving public health, increased emphasis on research in several aspects of milk and food sanitation is urgently needed. Among the areas considered most worthy of attention on a continuing basis are: (1) Detection and control of specific microbial or toxic contaminants in foods. (2) Development and evaluation of indicator methods for food sanitation. (3) Determination of critical time-temperature relationships for maintaining the sanitary quality of perishable foods during preparation and holding. (4) Study of the sanitary efficacy of high-temperature short-time and "no-hold" pasteurization processes. (5) Evaluation of the influence of aquatic environments and commercial practices on the sanitary quality of shellfish. (6) Estimation of the significant microbiological and chemical changes associated with commercial processing and marketing of poultry, fish, and other food products of animal origin. (7) Development of standards for sanitary processing, storage and prepartion for serving of precooked frozen foods and other non-sterile products that are essentially ready to eat as marketed. (8) Investigation of materials, procedures and conditions for cleansing and disinfection of milk and food equipment. (9) Exploration of food sanitation problems associated with industrial use of atomic energy. (10) Provision of improved sanitation procedures applicable to mass feeding and salvage of food supplies in natural disasters and civil defense emergencies.

The Bacteriology of Pre-Cooked Frozen Foods, by Prof. H. H. WEISER, Ohio State University, Columbus, Ohio — During production, processing, storage and distribution of pre-cooked frozen foods the microbial content must be kept low, if the quality of the product is to be maintained. The ingredients used in pre-cooked frozen foods are perishable and usually will support microbial growth, especially if the temperatures are above freezing. Growth can increase very rapidly if the temperature approaches 68-70°F. If the temperature is favorable for increased growth, the metabolic activity may produce off-flavors, off-odors, off-colors and may be the ultimate cause of certain types of infection. Obviously, a few careless producers or distributors can do much harm in creating an unfavorable impression on the part of the consuming public of the whole pre-cooked frozen food industry. Reasonably high standards should be constantly maintained. The dissemination of basic principles of microbiology should be encouraged thus instilling a sense of respect and devotion to the maintenance of high quality from the raw product to the finished product, and ultimately into the hands of the consumer. The consumer, after all, will be the final judge in accepting or rejecting pre-cooked frozen foods.

Quality Standards for Pre-Formed Milk Cartons, by HAROLD WAINESS, Executive Secretary, Milk Carton Pre-Forming Council, Chicago, Ill. — In 1955, approximately 48 per cent of fibre containers used for milk were of the pre-formed type, and there are presently plants for manufacturing pre-formed milk cartons in every section of the United States. The manufacturers of these cartons have formed a council to establish sanitary standards to govern the fabrication of the cartons at the pre-forming plant and their handling in the filling plant up to the time of actual filling and sealing. Beyond this point, existing 3-A Sanitary Standards for filling and sealing may be considered as adequate.

Aspects of Chemical Food Additives, by Dr. K. G. WECKEL, University of Wisconsin, Madison, Wisc. — With fewer and fewer acres used in food production, and with the devastating toll of food taken by insects, rodents, mites, fungi, weeds and depleted soils, chemicals must be used on the land to enable full maturity development of foodstuffs. Transportation and storage of fresh foods, even in the raw state, necessitate certain chemical modifications, such as gassing, packaging, refrigerating, etc., to enable their subsequent use in even a simple form. Chemicals are also used in modification of food at the processing plant: cereals are refined and blended with other foodstuffs; vegetables and fruits are modified and pack-

aged for ready-serve uses; meats and fish are pre-packaged for ready distribution; and fats and oils are modified. Homogenization, comminuting, cutting, blending, cooking, grinding, pulping, blanching, sterilizing, melting, salting, brining or scraping, dehydrating, stabilizing and emulsifying, enzyme treating, spicing and preserving, and numerous other processing procedures are among the steps by which raw food materials are made ready for consumption. Production procedures as those just mentioned are not always possible without the use of chemicals. Through the provisions of the Food, Drug and Cosmetics Act, and its enforcement, the use of unsafe chemicals has been largely delimited. On the other hand, control officials generally recognize the usefulness of safe chemicals in the production and distribution of food.

The Etiology and Epidemiology of Paralytic Shellfish Poisoning, by H. I. EDWARDS, Department of National Health and Welfare, Vancouver, B. C., Canada — Outbreaks of food poisoning with paralytic symptoms, following the consumption of toxic shellfish, have resulted in more than 40 deaths in coastal areas of North America since 1927. Intensive studies have revealed that the toxic agent exists pre-formed in certain members of the dinoflagellate plankton species, *Gonvaulax,* which occur with seasonal frequency in the food supply of several commercially important shellfish varieties. The paralytic toxin has been extracted from both plankton and shellfish, and concentrated to a high degree of purity. In the absence of suitable chemical methods, its determination is conducted by biological assay. Frequent routine sampling of shellfish from potentially dangerous areas, and the establishment of quarantine measures when necessary, have greatly reduced this hazard to public health.

Food-borne Disease Outbreaks, a panel discussion presided over by Dr. R. J. HELVIG, U. S. Public Health Service, Washington, D. C.; and with a panel composed of DR. W. R. GIEDT, Washington State Department of Health, Seattle; K. R. BERQUIST, Laboratory Department of Health, Seattle; Dr. SAMUEL HOPPER, Indiana University School of Medicine, Indianapolis; and HAROLD B. ROBINSON, U. S. Public Health Service, Washington, D. C. — After determining that only a very few states and municipalities have guidelines which can be followed by the average milk and food sanitarian in initiating an investigation of a suspected food-borne disease outbreak, and after determining from contacts with professional epidemiologists, health officers and sanitarians, that a definite need for a guideline exists, the Committee on Communicable Diseases Affecting Man initiated in 1952 the development of a suggested procedure for the investigation of food-borne disease outbreaks. Principal objectives were: (1) To provide public health workers with a suggested procedure for guidance when confronted with an outbreak of disease which may be attributed to milk, food, or water. (2) To prevent future outbreaks, through application of knowledge gained as a result of complete and thorough epidemiological investigations. (3) To stimulate an active interest on the part of public health workers in the epidemiological aspects of their programs. (4) To improve reporting of food-borne disease. The Committee has this year completed the preparation of "A Suggested Procedure for the Investigation of Food-Borne Disease Outbreaks." This will soon be published in booklet form as a separate association publication. Announcement will be made in an early issue of the *Journal of Milk and Food Technology* as to its availability.

Q-Fever Studies, by Dr. JOHN B. ENRIGHT, University of California, Davis, Calif. — Q-fever is a disease caused by a rickettsia, affecting both animals and man. Symptoms are often very difficult to observe in infected animals, and in man. The organism which causes Q-fever is discharged in large numbers with body secretions, including milk. Animals most frequently infected in the United States are sheep, dairy cows and goats. Because of the possibility that Q-fever might be transmitted to man through milk from an infected cow, special studies were undertaken at the University of California to determine the efficiency of pasteurization in destroying the Q-fever organism in cow's milk. These experiments were sponsored jointly by U. S. Public Health Service, Milk Industry Foundation and Dairy Industries Supply Association. Results of experiments have indicated that slightly higher temperatures than those currently specified for the low temperature holding method of pasteurization would be desirable to assure total destruction of the rickettsia in milk. No change was recommended for the time-temperature relationship specified for the high-temperature short-time method of pasteurization.

Some Field Trial Studies with a Detergent-Sanitizer in the Sanitation of Milking Utensils, by Dr. MARVIN L. SPECK, North Carolina State College, Raleigh, N. C. — In a field study covering 15-16 months and which involved 155 Grade A milk producers in three widely separated areas, a detergent-sanitizer was compared with customary methods of milk utensil sanitization. Producers were divided into two comparable groups, one using the detergent-sanitizer method continuously and the other using regular methods. No supervision was made of the producers other than that normally given by the sanitarian and fieldman. In one area, the thermoduric count of milk was significantly lower when the detergent-sanitizer was used. This was the case for another area, except that the lower thermoduric count was not statistically significant. Raw milk counts were also lower when the detergent-sanitizer was used, although the difference between the counts of milk produced under the different methods of utensil sanitization was not statistically significant. Milking utensils appeared cleaner and milk-stone deposits were absent from the utensils of those producers who used the detergent-sanitizer method. There was no evidence of residual sanitizer in the milk as determined from interference with starter culture activities. Since this study covered an extended period of time with only normal supervision of the producers, the detergent-sanitizer method appears to be one that can be used routinely over an indefinite period of time with entirely satisfactory results.

Flavor Defects in Milk and Their Relationship to Farm Holding Tanks, by Prof. C. C. PROUTY, Washington State College, Pullman, Wash. — The flavor of milk should be a major concern to both producers and processors of the product, as it is flavor which is the major criterion of quality applied by consumers to milk. Some observers have reported their belief that the flavor quality of milk has decreased in areas in which farm bulk holding tanks have replaced milk cans, although there is little evidence to support this view. Perhaps the most important factor which must be considered in assuring the absence of off-flavors in milk procured by the bulk tank system is proper training of the tank truck driver in flavor evaluation. Data gathered from Washington state farms showed that feed flavors were the most common off-flavors encountered.

Sanitation Problems in the Manufacture of Cottage Cheese, by Prof. J. C. BOYD, University of Idaho, Moscow, Idaho — Cottage cheese is an economical, easy digested, high-quality

protein food which builds, repairs and maintains the tissues of the body. As cottage cheese is the result of a controlled bacteriological fermentation, its successful manufacture and distribution is largely a matter of controlling certain bacteriological and sanitation problems. These may be broken into three categories: (1) Those that affect the manufacuring procedure. (2) Those that affect the shelf life or keeping quality of the finished product. (3) Those that affect the spread of disease. The program recently initiated by the Spokane Health Department of placing cottage cheese under the same sanitary inspection program as bottle milk is to be commended and will no doubt result in a better quality product which will continue to enjoy good consumer acceptance.

Complete texts of the papers summarized above will subsequently appear in future issues of the *Journal of Milk and Food Technology*, official publication of INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS.

THE PRODUCTION AND HANDLING OF QUALITY MILK[1]

Paul Corash

Division of Milk Control
New York City Health Department

The dairy industry and official milk control agencies have the common objective of providing the consumer with a safe, wholesome, nutritious product of good flavor and attractive appearance and they realize that this must be done within a price range which enables the consumer to buy adequate quantities.

The term "quality" is not always uniformly defined. It is likely to mean different things to different people. However, certain basic characteristics must be considered in almost any definition that can be offered and certainly there can be no question that safety is of greatest importance.

Safety reaches back to the health of the cow and of the people handling the milk. Here, we think not only in terms of freedom from bovine tuberculosis and brucellosis but also freedom from mastitis. It is recognized that it is hard to keep a herd free from infection but this difficulty should not cause us to regard the disease as inevitable and hope that pasteurization will take care of the matter.

Without minimizing the public health value of pasteurization, we still should not permit it to be used as a cover-up for deficiencies in the production and handling of milk. While pasteurization will kill the bacteria found in udder infections, there is one type of staphylococcal infection sometimes found in mastitis which produces a toxin that is not destroyed by conventional pasteurization treatment. Fortunately, we do not see too much of this illness but the possibility of milk borne gastro-enteritis should not be overlooked.

The purpose in mentioning staphylococcus toxin is to point out the need for a multi-barrier protection concept in a well rounded milk control program. It is unwise to place our complete dependence upon either farm inspection, pasteurizing plant control or post pasteurization control. All three phases should be integrated in a complete system.

The recent outbreak of paratyphoid fever in Lancaster, Pa., will probably serve as a good illustration of this point. You may recall from sketchy newspaper reports that over 200 people in the city of Lancaster, Pa., were stricken with paratyphoid fever shortly before last Christmas.

[1]Presented at the meeting of the Rhode Island Quality Milk Association, Providence, R. I., March 9, 1956.

Mr. Paul Corash received the B. S. degree in Dairy Husbandry from the University of Massachusetts in 1923. After having worked in the milk and ice cream industry for several years he was appointed as Milk Sanitarian in the New York City Department of Health in 1927. In 1944 he became Chief of the Milk Division and has served in that position since that time. During the early years of his professional work Mr. Corash attended the New York Law School, was graduated from that institution in 1930, and was admitted to the New York Bar in 1931. He has been active in Association affairs for many years and presently in *President-Elect* of the International Association of Milk and Food Sanitarians, Inc.

Investigation indicated that most of the patients had one thing in common namely, the consumption of milk from a certain pasteurization plant in the city. The plant was eventually closed down pending completion of an investigation and the epidemic was finally brought under control.

The first reports on the cause of the trouble expressed the belief that two of the plant workers were paratyphoid carriers and a short time later another story was published to the effect that there was a carrier on one of the dairy farms supplying the plant.

These explanations of the cause of the epidemic leave a great many unanswered questions:

1. Did any or all of the three reputed carriers ever have an active case of paratyphoid fever or were

they completely unwitting victims? It would seem to be a great coincidence if the latter were the case.

2. If any of the three ever had an active case, was it reported to the health authorities and was their carrier status ever determined? Were they ever cautioned against working as milk or food handlers? Is the disease a reportable one in the respective state.
3. Since we know that proper pasteurization will destroy the organisms of paratyphoid fever, what went wrong either during or after pasteurization to enable the survival of enough organisms to cause over 200 cases of infection over a period of several weeks?

Since the reports seemed to have absolved the plant of blame, this inevitably would lead to the conclusion that the cases arose through post-pasteurization contamination. However, there has been no explanation of just how this came about and there are very serious doubts as to whether such an explanation can stand scientific scrutiny.

While there is no sure way of preventing contamination of milk at the point of production, certainly the employment of known carriers on a dairy farm cannot be defended and certainly a good farm inspection program involving cooperation with the State's communicable disease control program, can greatly reduce the possibility of this type of contamination. If we were to disregard farm inspection completely and depend solely upon pasteurization, it becomes obvious that a failure in the pasteurizing process could be disastrous.

It is also obvious that if both farm control and pasteurization should fail, we still have a possible deterrent to harm if post-pasteurization control is properly enforced. Here, one thinks in terms of adequate cover capping of the bottle and good refrigeration at all times to discourage bacterial growth, some of which could conceivably be pathogenic.

There is one more interesting and unfortunate sidelight to the Lancaster picture. Sixty-eight producers were unable to deliver their milk. They found themselves innocent victims of mass fear since no milk plant operator in the general area would risk accepting milk from these producers.

Brief mention was made earlier of mastitis as a factor in evaluating milk quality. In the past six or eight years, there has been a tremendous increase in the use of antibiotics for the treatment of mastitis. These new drugs are a blessing to dairymen but as very frequently happens, abuses have come into the picture. In their eagerness to expand the sale of antibiotics, drug manufacturers have made them available all over the country for home medication.

Many producers either have not realized or have disregarded the necessity of withholding milk from treated cows for at least three days with the result that a great deal of market milk is found to contain traces of antibiotics. In 1954, the Food and Drug Administration made a limited survey throughout the country and found that about 3 percent of all samples collected contained penicillin. A wider survey was made in 1955 with 25 market milk samples taken from each of the 16 Food and Drug Stations throughout the country. This study revealed that approximately 11 percent of all samples contained penicillin or other antibiotics.

From a public health standpoint, we are concerned with this problem for two reasons:

1. Since there are generally some pathogens present in limited numbers even in the healthy human body, would the continued ingestion of milk containing penicillin build up a resistance in these organisms to such an extent that treatment with the antibiotic would be ineffective in case of a serious illness?
2. Would the continued ingestion of the antibiotic bring about a sensitivity of the person to the drug?

The Food and Drug Administration asked these questions of some of the foremost experts in the country and received a somewhat reassuring comment that, based upon the amounts found in the samples, there would probably be no harm to people except possibly in the case of those individuals who might be "exquisitely sensitive" to the drug.

A new and more intensive sampling survey has been started and we are waiting for the results with considerable interest. Even if the health risk is remote, the definition of milk in most ordinances or regulations prohibits the addition of any substance to milk unless specifically provided for in the ordinance or regulation. It is doubtful that we can remain wholly unmindful of a condition where such a large percentage of the milk contains even trace amounts of an antibiotic.

Let us look at some of the other aspects of quality which are not directly concerned with health but are related to flavor and esthetic values. Several years ago, a study was made of milk delivered by 100 dairymen in one of the northeastern states. It was revealed that 70 percent of these dairies were producing and delivering milk with off flavors. The study further indicated that 40 percent of these off-flavored samples were bad enough to cause the milk to be considered unfit. This was not a very attractive situation and it is probable that the same results could have been obtained in many other areas. The flavor defects which were involved in this particular study were the usual ones

which are some times described as grassy, barny, salty, rancid, oxidized, acid, medicinal, etc.

We know enough about these undesirable milk flavors to be able to eliminate most of them without much difficulty or expense. In most cases it means the exercise of a little more care on the part of the producer. Feed flavors can be corrected by feeding cows after milking or by witholding feed for a few hours before milking. Barny and musty flavors can be prevented by keeping the cows and stables clean and dry. Salty flavors are caused by the shipment of milk from mastitis infected animals or strippers. Rancid taste comes from stripper milk and from unnecessary agitation of warm milk. Acid or sour milk results from improper cooling, and oxidized milk arises in part from poorly tinned equipment and from unnecessary exposure of milk to the light.

Why was the condition which was found in the survey permitted to develop to such an undesirable degree? If we are honest with ourselves, we probably must all take a share in the blame. Inspectors habitually concern themselves mostly with physical conditions on the farm and although odor examinations are sometimes made, they seldom concern themselves with the taste of milk. The receiving station operator has, perhaps, been concerned only when the milk was obviously so poor as to make it unmarketable. The producer perhaps, did not care very much as long as his milk was not rejected and the Extension Service and educational groups may not have been getting their messages over where it would do the most good.

Increased attention to the detection of off flavors in milk is essential in maintaining consumption at a high level. There is need for greater education of people engaged in the procurement of milk relative to the recognition of the variety of off flavors which may occur in raw milk supplies. Some of the Extension Services are assisting in this work by holding grass-root clinics. Here producers, fieldmen, inspectors and other interested people learn how to find poor flavors and what to do about eliminating them.

The physical requisites which are basic to the production of high quality milk are generally well understood. They include such things as healthy cows kept in a clean barn, clean utensils, good refrigeration, properly equipped and well kept milk houses for the handling and storing of milk, a potable water supply and proper sewage disposal. However, since farm inspections of necessity are made infrequently and since a satisfactory farm score today provides no assurance of proper conditions a week later, it is necessary to use certain tests or techniques to more adequately evaluate the day-to-day performance of the producer.

We have been following a program of deck examination which seems to provide a good way to do a job under the conditions which apply in our milk shed and under our budget allowance. As we practice deck inspection, it involves the examination of every can of milk delivered, in order to determine if there are abnormal odors such as those associated with mastitis, unclean utensils, improper cooling or feed flavors. Men can be trained to acquire a certain skill in recognizing these conditions by smell. A thermometer and strainer dipper are used to supplement the inspector's usual equipment and when abnormalities are detected, a direct microscopic examination is made for bacteriological evaluation. Obviously, poor milk is rejected and sent back to the producer with an explanation.

Since our limited field staff can reach only a comparatively small percentage of our receiving stations daily (we have about 400), we require operators to train a man for deck examination work which must be done on each producer's milk. The plant is required to keep an individual producer's quality control record on which are listed all adverse deck findings, all high counts, all rejections and all unsatisfactory conditions which are revealed on farm inspections.

Company fieldman are required to visit farms when poor results are found on deck examination and to see if the cause can be ascertained and eliminated. Our field staff make comparisons of their own deck findings with those of the plant and we expect to find some degree of correlation. Failure to find some comparability, calls for an explanation by the operator and his field inspector.

When farm holding tanks came into the picture in our area, it became necessary to substitute other control measures since the ability to make deck examinations on individual cans brought in by producers, no longer was possible. The other controls which we have applied are as follows:

1. A requirement for a quarterly veterinary examination in place of the annual one to serve as an aid in the control of mastitis.
2. A requirement for a monthly farm inspection by the company fieldman in place of the yearly one required for conventional dairies.
3. A requirement for the plant operator to make a weekly standard plate count and thermoduric determination of each producer in lieu of the monthly total count required in the case of conventional dairies.
4. A more rigid bacteria standard for the farm tank dairies (50,000 per ml. as against a count of 150,000 per ml. for the conventional dairies).

These substitute requirements may not be completely equivalent to the deck examination procedure which we follow but we think they have merit in the maintenance of good quality.

It is now necessary for us to look at the processing end of the fluid milk industry for further consideration of the factors which affect milk quality. Proper pasteurization, of course, is the keystone in the whole structure of milk quality considerations. Without this, there is no safety and where safety is lacking, other refinements of quality would be purely academic.

Plant operators simply cannot afford to be satisfied with anything less than the most careful adherence to all the details which will give complete pasteurization. No time saving or money saving shortcut can possibly be worth the risk of disaster which would surely follow a milkborne outbreak.

No detail in the checking of equipment and its operation is so unimportant that it can be overlooked with impunity by control agencies. One can never be sure when a plant sewer pipe may develop a leak – so they cannot be tolerated over a milk vat. One can never be sure when a plant well may become contaminated – so we do not want it interconnected with the regular water supply. One never knows when a plug valve may start to leak – so inlet and outlet valves of vat pasteuuizers should be properly leak protected. Flow diversion valves and thermal limit controllers must be checked frequently to see that they function properly. Short-time units must be tested regularly to see that holding times are adequate. Coolers sometimes develop leaks through which contaminated water may enter the milk and the same thing may happen in case of spray vats used for precooling.

This list of possibilities is by no means a complete list of items to which the inspector and the plant operator must be alerted. They are merely illustrations of the myriad of details which enter into the maintenance of proper pasteurization procedure.

Pasteurization cannot convert poor milk into good milk. If one wishes to finish with a good product, he must start with good raw material. Bacteriological measurements are still highly regarded as a means of evaluating sanitary quality, and good control dictates the making of standard plate counts on raw supplies. However, it is well to know something about the types of organisms present, for example, thermoduric types. The presence of an excessive number of this type in raw milk will make it difficult to obtain low counts in pasteurized milk. Thermoduric bacteria are routinely detected by making laboratory pasteurized counts. Plate and coliform determinations on the pasteurized product should complete the bacteriological examinations for all practical purposes.

In any discussion of milk quality, some mention should be made of chemical control procedures. It is safe to say that the days of gross and crude adulterations are, for the most part, passed. Nevertheless every well run plant and every regulatory agency must make at least the basic determinations to see that the butterfat and total solids contents are up to standard. The cryoscope, of course, is of great value in determining whether water has been added to milk.

For his own protection, the plant operator should make phosphatase determinations and keep a careful record of his findings. If vat pasteurization is used, a phosphatase test of every batch should be made and if the short-time method is used, several samples taken at different periods of the run should be tested. Time does not permit a complete discussion of the numerous other things which demand continuous attention.

A person uninformed of the details and intricacies of the modern American milk industry is likely to ask whether all this detailed care is necessary, but a brief examination of the way in which milk is handled after it leaves the dealer will soon bring the necessary enlightenment. No other food product of comparable perishability gets as much abuse as milk. How unusual is it for milk to be left on the doorstep for two or three hours of a hot summer Sunday morning while the family is catching up on its sleep? Do stores handling large volumes of milk have sufficient refrigerating capacity to keep their peak volumes properly cooled? Do all storekeepers carefully control their inventory of milk so that old milk does not accumulate in the back corner of the refrigerator? Have any of you noticed milk warming up on the table an hour or more after the meal is finished? These are some of the abuses to which milk is subjected during its distribution. For these reasons and for others the plant must provide milk with those necessary quality factors which will enable the milk to withstand to some extent the abuse to which it is frequently subjected.

The production of milk of good sanitary quality is not something that just happens. The producer, the processor and the distributor must recognize the fundamental things that relate to quality and must work at the job of providing them all of the time. The consumer's confidence in the milk supply is in direct ratio to the quality of the product. Increased milk consumption can be obtained by taking positive steps to eliminate inferior milk.

SHELLFISH AND PUBLIC HEALTH

EUGENE T. JENSEN

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Oysters and clams have been an important item in man's diet for thousands of years. In Japan, oyster shells 4500 years old have been found in kitchen middens. The great East Coast shell piles are striking evidence that oysters were a favored food item of the coastal Indians. The reputation of the clam and oyster as tasty sea foods have continued to our present time.

Unlike most other marine animals, the bivalves feed by pumping water — as much as 25 gallons a day — through a complex system of gills which filter out the suspended marine organisms and bacteria. This feeding mechanism was of little consequence as long as man's settlements were small and primitive. But with urbanization, great quantities of sewage were discharged into the rivers and estuaries. The bivalves, lacking the power to discriminate between harmless organisms and pathogenic bacteria, assumed public-health significance. Dr. J. A. P. Pasquier's report in 1816 and 1818, on the apparent relationship between oysters and disease in France, were the first of a long chain of evidence associating shellfish with enteric disease.

Corroborating evidence continued to accumulate, with medical journals all over the world reporting a relationship between shellfish and diseases. The Health Officer of Brighton (1), England, estimated that about one-third of the typhoid-fever cases reported in Brighton during the four-year period 1894-97 were due to sewage- polluted oysters or mussels. Mason (2) in 1902 reported 10 cases of typhoid in Auckland, New Zealand, caused by oysters which had been stored in baskets near the mouths of sewers. Remlinger (3) in 1902 reported numerous cases of typhoid in Constantinople caused by oysters which had been stored in sewage-polluted tanks at a market. Vincey in 1912 (4) estimated that proper sanitary control of oysters sold in Paris would prevent 385 cases of typhoid fever yearly. In Japan, Kawakubo (5) reported 813 cases of shellfish-caused typhoid during 1924-26.

In the United States, the relationship of typhoid and enteric disorders to shellfish was also reported. Marvel (6) in 1902 reported 80 cases of typhoid fever at Atlantic City, traced to oysters and clams. Stiles (7) in 1911 studied 18 outbreaks of oyster-caused typhoid and 97 cases of enteric disease at Newburgh and Goshen. At San Diego in 1917, an outbreak of typhoid fever was attributed to polluted oysters by Banks (8).

Mr. Jensen received a B.S. degree in civil engineering from Colorado A & M in 1949. After a brief employment as a Sanitary Engineer with a Colorado local health department, he joined the Public Health Service as a commissioned officer. Assigned duties have included malaria control, water pollution control, general sanitary engineering activities in connection with the Korean War and milk and food sanitation. Since 1954 he has been acting chief of the Public Health Service Shellfish Sanitation Section.

These few of many reported outbreaks serve only to indicate the worldwide interest in the problem.

In the United States, the last major link of the epidemiological chain was forged by the 1924-25 typhoid epidemic. On December 5, 1924, the Chicago Health Department recognized an unusual prevalence of typhoid in the city. Within a few days, abnormal typhoid rates were noted in New York City, Washington, D. C., and several smaller cities. On December 9th, in what was perhaps the first use of the radio for disseminating vital public-health information, the Chicago City Health Commissioner warned the public to refrain from eating raw oysters. On December 19th, the New York City Health Commissioner requested the Surgeon General of the Public Health Service to prevent the interstate shipment of oysters from certain contaminated bays. An extensive epidemiological investigation finally attributed 1,500 cases of typhoid, resulting in 150 deaths, to sewage-polluted oysters (9).

The effect on the industry was devastating; in some areas, sales of oysters and clams dropped almost to zero. At the request of the shellfish industry and several State health officers, the Surgeon General of the Public Health Service held a conference of interested health and industry representatives to determine what steps should be taken to insure against a repetition of the 1924-25 epidemic and to re-establish the public's confidence in oysters as a food.

The work of a special committee (10) formed the basis for the system of shellfish sanitation now used in the United States and Canada. This system, based entirely upon a cooperative understanding among the States, the Public Health Service, and the shellfish industry, is familiar to most food-control workers (11). Whereas, in the milk, food-processing, and restaurant industries, a high degree of control can be obtained through plant inspection and product examination, the biology of shellfish has dictated that the major control effort – perhaps 80 percent – must be directed toward the water in which shellfish grow.

Shellfish which are shipped in interstate commerce are, of course, subject to the provisions of the Food, Drug, and Cosmetic Act. However, in practice, the cooperative shellfish-certification program and the activities of the Food and Drug Administration are so integrated that there is no duplication of effort. Other factors tending to regulate the interstate shipment of shellfish include the Public Health Service's Interstate Quarantine Regulations, and the Federal Purchasing Specifications.

The cooperative certification program has been highly effective in controlling the spread of shellfish-borne disease. However, this does not mean that shellfish-borne typhoid or enteric diseases are things of the past, and that sanitary standards may be relaxed. It must be remembered that the low incidence of many diseases is due to the artificial barriers which the public-health professions have constructed. The cooperative shellfish-certification program is one of these barriers.

The continued existence of disease-causing bacteria is evidenced by the occasional small outbreaks of typhoid fever or enteric disease which occur when the certification system is broken or circumvented. In 1939, Old and Gill (12) described a Louisiana typhoid epidemic, involving 87 cases and 8 deaths, that was caused by a typhoid carrier bootlegging oysters. In 1948, Connecticut's first case of typhoid in seven years occurred when a local resident dug clams only 200 yards from a large sewage-treatment-plant outfall (13). In 1953, a small outbreak of enteric disease attributed to oysters was reported in California (14).

The sanitation of shellfish shucking and packing plants is a component part of the certification procedure. A complete system of plant inspection has been developed by the States and the Public Health Service to assist the industry in maintaining sanitary conditions in the processing plants (11). The bacteriological changes which take place during oyster shucking and processing have been investigated by Kelly and Arcisz (19).

The ability of oysters, clams, and mussels to concentrate a poison from marine organisms gives a second reason for sanitary control of the shellfish industry. In many respects, our understanding of this phenomenon has paralleled that of the bacteria-shellfish relationship.

The first reported death in North America from paralytic shellfish poison occurred on June 15, 1793, when John Carter, a seaman on Vancouver's ship, *Discovery,* died at Poison Cove, Alaska, after eating roasted mussels (15). Vancouver's records show that one of his noncommissioned officers had had mussel poisoning in England and knew how to treat the poisoned crew member. On the East Coast of the continent, Medcof, et al. (16), report that paralytic shellfish poisoning was reported in New Brunswick by Ganony as early as 1889.

No major outbreak of paralytic shellfish poisoning was reported in the United States or Canada until 1927, when 102 cases, resulting in 6 deaths, were reported from California. This outbreak, primarily due to mussels, resulted in the quarantine of California beaches during the summer months.

Toxic shellfish may be found along the West Coast from California to Alaska, and in some portions of the Canadian Maritime Provinces. The toxicity patterns in these latter areas have been investigated extensively and control measures devised. The control effectiveness is indicated by the fact that only two outbreaks of shellfish poisoning have been reported in the last two years, both of which were caused by eating shellfish from noncommercial sources (17) and (18).

The shellfish-certification program can assure that the shellfish beds are free from pollution, that the shellfish are from toxin-free areas, and that the processing plants are operated in a sanitary manner. However, the program cannot protect individuals who harvest shellfish from polluted or toxic areas, nor can it protect the community which does not exercise some control over the local sale of shellfish.

To maintain adequate sanitary control over the sale of shellfish (oysters, clams, and mussels), local food-control officials should: (1) Use the Public Health Service list of State-certified shellfish shippers to identify shipments of shellfish as originating in State-

certified sources; (2) require wholesale and retail food markets and restaurants to refrigerate shucked shellfish; (3) require that shell stock be protected against accidental contamination during storage; and (4) require that local food markets sell shucked shellfish only in the original sealed container as received from the processor.

Adherence to these simple guidelines will give maximum assurance that shellfish sold in the community will be from safe, nonpolluted sources, and have been processed in establishments meeting prescribed sanitary standards.

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REPORT OF THE COMMITTEE ON FROZEN FOOD SANITATION — 1955[1]

During the past year, your committee selected two projects to work on. First, we attempted to complete the work started by the previous year's committee in drafting "Suggested Regulations for Roadside Stands Dispensing Frozen Dairy Foods". It is the feeling of this Committee that this project has advanced sufficiently far that our final draft can now be submitted to the Committee on Ordinances and Regulations for their further study and action.

The second project undertaken by your committee was a survey of plants processing and freezing "heat and eat" items, such as chicken pot pies. This survey was directed primarily toward the problems of sanitation in the processing plants, the presence of extraneous material or filth, and the sampling of raw materials and finished products for bacteriological examinations.

Although the survey has covered only seven plants at the present time, some pertinent information has been gathered. This is a relatively new and fast-growing industry, and evidently no standard operating procedures have been developed as yet. Each plant seems to have built its own equipment and developed it own processing methods.

Most of the plants which were inspected on the survey met the basic requirements for such items as water supply, waste disposal, construction of the building, toilet and handwashing facilities for employees, lighting, ventilation, etc. However, several plants where homemade equipment was used, were found unsatisfactory because the equipment would not meet sanitary standards in respect to proper construction and ease of cleaning. Processing procedures leave much to be desired with reference to sanitary standards. For example, in every plant surveyed, chickens were boiled until tender, cooled to approximately 120° F., so that they could be handled, and then boned by hand. In only one plant were the women boning the chickens provided with rubber gloves. In some cases, the chickens were cooled under refrigeration; in other cases, they were allowed to cool at room temperature. In two cases, after boning, the meat was placed under refrigeration for as long as twenty-four hours before dicing. In the other cases, the meat was diced immediately after boning. After dicing, the meat was placed in the pie pan along with other ingredients, the dough covering was applied, and the pie was then wrapped or packaged and taken to the freezer. In no case was the meat heated or cooked after the boning operation. Therefore, it was not too surprising that several samples of the finished product were found to contain coliforms paracolons or Proteus organisms.

TABLE 1 — LABORATORY EXAMINATION OF FROZEN FOODS

Product	Plate count per gram	Coliform group	Other organisms isolated
Chicken Pot Pie	620,000	+	Paracolon group
Chicken Pot Pie	>3,000,000	+	Prateus mirabilis
Chicken Pot Pie	27,000	+	. . .
Chicken Pot Pie	920,000	+	. . .
Chicken Dinner	12,000	−	. . .
Chicken Dinner	300	−	. . .
Chicken Dinner	1,800	−	. . .
Chicken Dinner	710	−	. . .
Chicken Dinner	600	−	. . .
Chicken Pot Pie	20,000	+	. . .
Chicken Pot Pie	100,000	+	. . .
Chicken Dinner	38,000	+	Paracolon group

In addition to the survey inspections, a number of samples of frozen chicken pies were obtained on the retail market for bacteriological examination. The laboratory results are shown in Table 1. This table can be summarized as follows:

1. The total plate count per gram, using the AOAC method, varied from 300 per gram to more than 3,000,000 per gram.
2. Seven of the twelve samples examined were positive for the coliform group.
3. Two of the twelve samples examined were positive for the paracolon group.
4. *Proteus mirabilis* was isolated from one sample.

Your committee realizes that due to the small number of plants inspected and the small number of samples examined in the laboratory, we lack sufficient information to make any definite recommendations at this time concerning the sanitary practices or operating procedures in this industry, or to recommend a tentative maximum bacteria count for this type of product. The committee feels, however, that the information that has been obtained concerning certain unsatisfactory practices in the industry; this coupled with high plate counts and the presence of coliforms, paracolons, or *Proteus mirabilis* in the finished products, warrants additional investigation of the practices in this industry.

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[1]Presented at the 42nd Annual Meeting of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC. at Augusta, Georgia, October 2-6, 1955.

A CRITICAL LOOK AT PASTEURIZATION STANDARDS[1]

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Since microorganisms differ in thermal resistance, the data for a single organism should not serve as a basis for establishing minimum pasteurization standards at all temperatures. Were data for all microorganisms that limit pasteurization available for plotting "safe" minimum-process graphs, the resulting curve would not be a straight line. Until additional thermal resistance data are available, approved "no-hold" and similar high temperature processes should require more severe treatments than those predicted from the limited criteria that have commonly been used to indicate safe treatment at temperatures in the range of vat and HTST pasteurization.

Considerable difficulty is involved in interpreting thermal resistance data in terms of requirements for pasteurization and sterilization. To simplify, let us speak in terms that apply specifically to pasteurization, although the same principles apply to sterilization, because basically pasteurization and sterilization are very nearly the same. In pasteurization we wish to destroy any disease-producing microorganisms that might be present in raw milk and those microorganisms that are most troublesome in causing off flavors and odors, particularly, at refrigeration temperatures. In sterilization we seek to destroy all microorganisms. This includes the very heat resistant spores produced by certain bacteria. The basic difference between the two processes is that the heat-treatments are "aimed" at different microorganisms.

The destruction of microorganisms by thermal processes has been studied over a period of many years. Most of the early studies of "thermal death point" and "thermal death time" were incomplete in certain fundamental aspects (3), and hence seem incomplete as a basis for establishing standards for such processes as "no-hold" pasteurization. However, they did serve in the establishment of our present-day pasteurization standards.

The temperature and time of heating influence the destruction of a microorganism. This is illustrated by the minimum temperature-time relationship for the vat method of pasteurization and that for the HTST method — 143° F. for 30 minutes, and 161° F. for 15 seconds, respectively.

Let us consider the way bacteria die when exposed to a destructive agent such as heat. Let us assume that species X is a pathogen or a microorganism that rapidly produces a defect during storage. We can add a large number of species X to milk at a constant temperature (e.g., 140° F.) and remove 1-ml. samples at various intervals — say 5-minute intervals. Each sample, immediately after it is taken, should be added to a dilution blank containing sterile, buffered ice-water. We then make plate counts to determine the number of species X in each sample. The whole procedure should be repeated several times and average values for the plate counts determined, because we do not want to be misled by errors that might occur in only one trial.

We will now plot the average numbers that we found after each 5-minute interval (Figure 1). For the plot we use a sheet of semi-logarithmic graph paper. Numbers of bacteria are plotted on the vertical, unevenly-spaced scale (the logarithmic scale), and time at 140° F. is plotted across the bottom, on the evenly-spaced arithmetic scale.

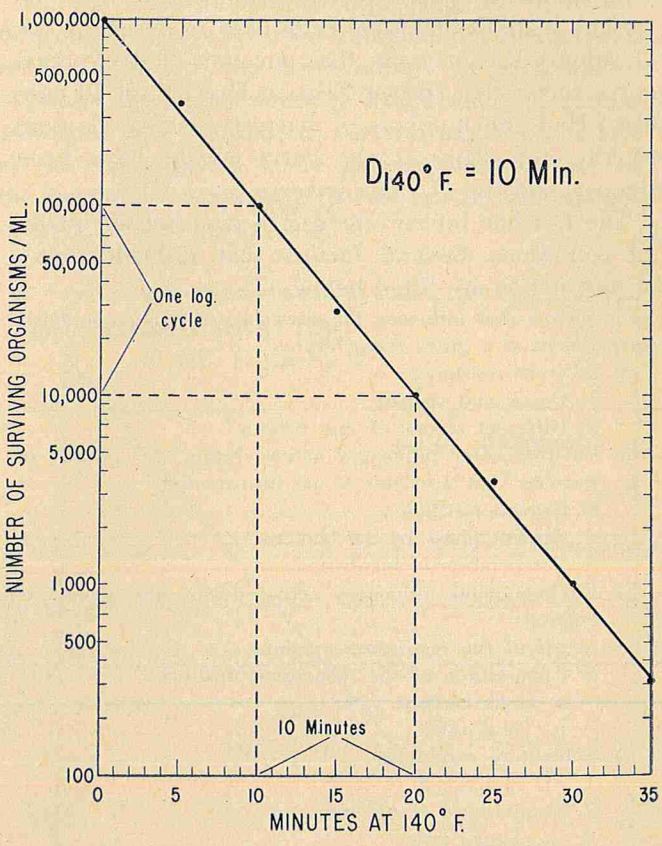

Figure 1. Rate of destruction curve for a hypothetical microorganism, species X.

Notice that a line connecting the average values is

[1]Presented at the Annual Dairy Industry Conference at the University of California, Davis, January 23, 1956.

a straight line. Although the line is straight, it is referred to as a "rate of destruction curve". Most bacteriologists agree that rate of destruction curves are straight lines, except for initial curvature in some cases (4). In our graph we have demonstrated the generally accepted view that, in the presence of a destructive agent such as heat, the order of death of bacteria is logarithmic in nature.

Notice on the curve that we had one million organisms per ml. at 0 minutes. After 10 minutes at 140° F. the plate count was only 100,000 per ml. The heat had destroyed 900,000 or 90 per cent of each original one million. A destruction of 90 per cent is referred to as one log. cycle of destruction. Notice that 90 per cent of the 100,000 were destroyed during the second 10 minutes. The same occurred during the third 10 minutes. Starting at any point on the curve, we find that a destruction of 90 per cent or one log. cycle occurred during 10 minutes. The number of minutes required for a destruction of one log. cycle is called the "D" value. (Schmidt (3) discusses the various symbols that have been used to designate the D value.) We may say that our rate of destruction curve shows that species X has a D_{143}° F. of 10 minutes. Had the numbers of bacteria decreased more rapidly, the slope of the curve would have been steeper, and the D value lower.

The D value for an organism is not constant under all conditions. Several factors that influence rates of destruction are listed below.

Some factors that influence the resistance of a microorganism to treatment at a given temperature.

A. Inherent resistance
   1. Genus and species
   2. Different strains of one species.

B. Environmental influences active during the growth of bacteria that are later to be heat-treated
   1. Growth medium
   2. Growth phase of the bacteria
   3. Temperature of incubation

C. Environmental influences active during the period of heating
   1. pH of the suspension medium
   2. Composition of the suspension medium
      a. Sugar content
      b. Total solids

D. Subculture conditions
   1. pH of medium
   2. Composition of medium
   3. Incubation time

Bacteria vary in inherent resistance. Even the strains of one species may differ in heat-resistance.

Environment is important during the growth of the bacteria to be tested, during the heat-treatment, and during the growth of those organisms still living after heat-treatment. Some of these factors increase the heat-resistance of certain bacteria by as much as 200 to 300 per cent. Think of the difference in pasteurization standards for ice cream mix as compared to milk. A major reason for the difference is the protective action of the sugar in ice cream mix. Certain organisms are much more resistant when grown on an agar medium than when grown in milk. Which would you expect to find more resistant, (a)

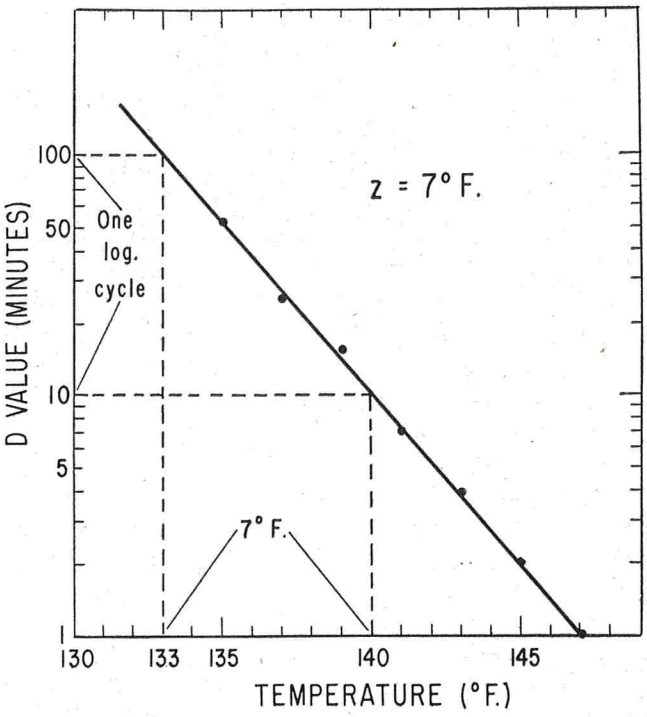

Figure 2. Thermal resistance curve for a hypothetical microorganism, species X.

an organism that is permitted to grow in improperly cooled milk, or (b) the same organism permitted to grow on unclean equipment and then permitted to get into cold milk by contamination? You likely would find the latter more heat resistant. Instances have been observed where supposedly "thermoduric" bacteria were isolated from pasteurized milk and then found not to be thermoduric after they had been permitted to grow in milk.

Let us consider what would be necessary to establish the minimum pasteurization requirements for our hypothetical organism, species X. In Figure 1 we found that the D value at 140° F. was 10 minutes. This one D value alone is not sufficient for our purpose. We must determine D values for species X at several other temperatures.

We will assume that this has been done and that the D values are those given in Table 1. It is not surprising that the D values decrease as the temperature increases, for each D value represents the same thing – the number of minutes required for a destruction of one log. cycle, or 90 per cent, at the given tempera-

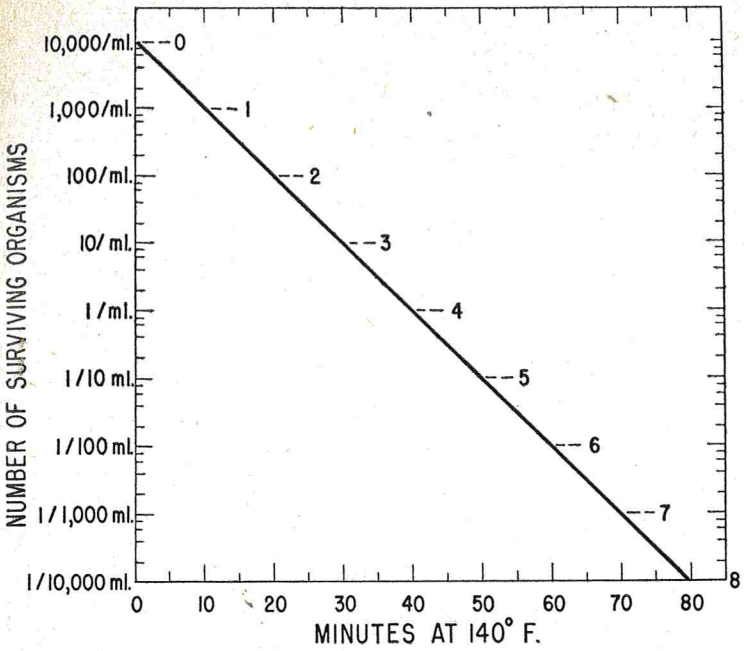

Figure 3. Extrapolated rate of destruction curve for a hypothetical microorganism, species X. If it is assumed that the maximum initial population is 10,000/ml., the arbitrary tolerance of survival is 1/10,000 ml., and the D value at 140° F. is 10 min., the minimum "safe" time at 140° F. can be calculated as follows:
D(log. 10,000 − log. 0.0001)=10 [4.0 − (− 4.0)]=80 min.

ture.

The D values may be plotted on a sheet of graph paper like that used for Figure 1. This time we plot increasing temperature across the bottom on the arithmetic scale, and time on the vertical logarithmic scale (Figure 2). When we draw a line joining the D values, we find that this line also is straight. It is called a thermal resistance curve (3).

Each point on this curve is a D value, representing a temperature and the number of minutes at that temperature required for a destruction of one log. cycle. Any point represents a time-temperature relationship equal in destructive effect on species X to that represented by any other point.

Notice that when the holding time is 100 minutes the temperature is 133° F. When we reduce the time to 10 minutes (e.g., by 90 per cent or one log. cycle), we must add 7 degrees to the temperature. The same is true for any place you start on the curve. If we reduce the time one log. cycle (10-fold) we must increase the temperature 7 degrees; if we increase the time one log. cycle the temperature is decreased 7 degrees. The amount of destruction is the same in all cases. When we express the slope of a thermal resistance curve as the number of degrees necessary to cause a 10-fold change in time, we have the "z" value. For species X the z value is 7 degrees.

For our hypothetical problem we want to know the minimum time-temperature relationships that we can use in pasteurization to destroy species X. We would like our pasteurization processes to destroy every single organism of species X. In the early days of experimental work, it was thought that every single organism could be destroyed. Now we know that it is theoretically impossible.

To demonstrate this point, the rate of destruction curve for species X has been reproduced on a larger sheet of graph paper (Figure 3). Notice that there are 10 organisms per ml. after heating for 30 minutes at 140° F. There is 1 per ml. after 40 minutes, 1 per 10 ml. after 50 minutes, 1 per 100 ml. after 60 minutes, etc. The curve could be extended indefinitely with the volume in which one organism is found getting larger and larger. Theoretically we would never destroy every single organism.

Certain undesirable microorganisms are more undesirable than others. Since "complete destruction" can not be achieved, the undesirability of each microorganism should be carefully considered. For certain pathogens the tolerance of survival might be as low as one organism in many gallons; with certain of the less important spoilage species, several bacteria per milliliter might be tolerated.

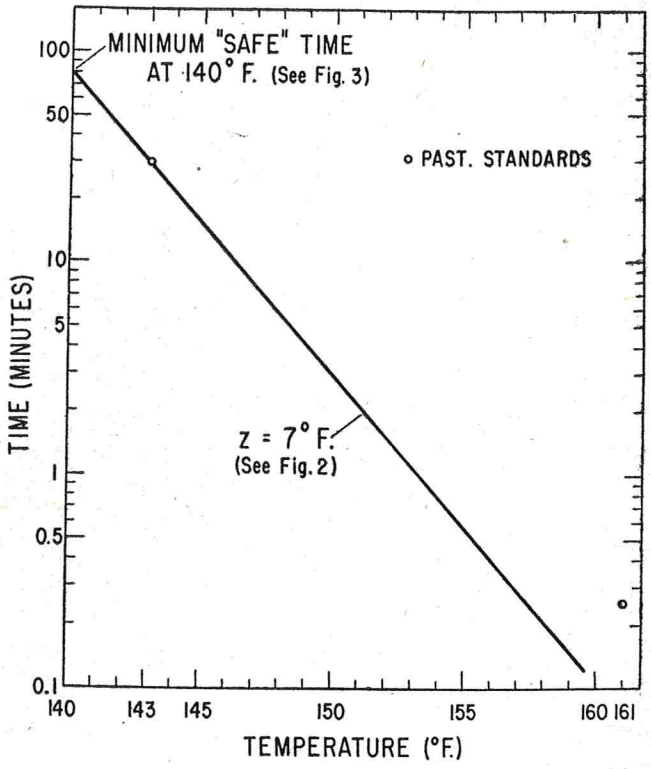

Figure 4. Minimum "safe" process graph for a hypothetical microorganism, species X.

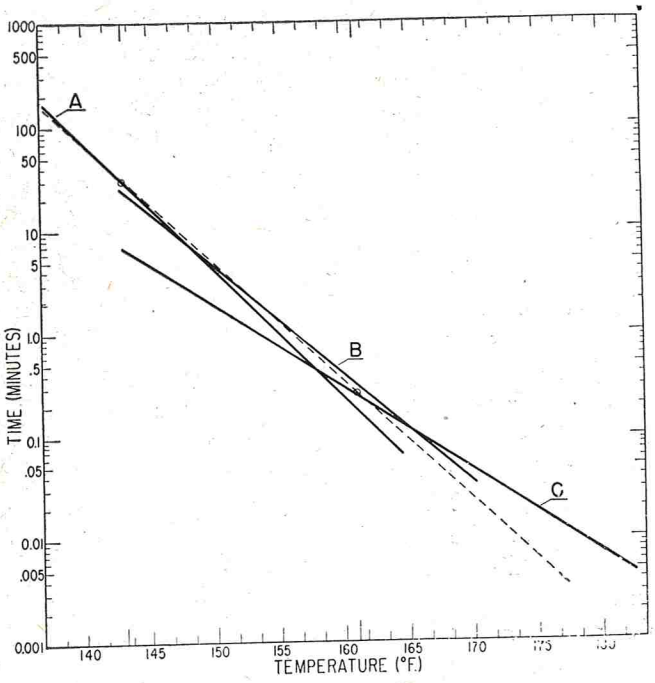

Figure 5. Minimum "safe" process curve limited by three hypothetical microorganisms. The broken line is drawn through the present pasteurization standards and extrapolated for comparison.

The number of species X we will wish to destroy by pasteurization will be determined by two values, (a) the tolerance of survival, and (b) the maximum initial number that might be found in raw milk. The tolerance of survival will be a decision; the maximum initial number that might be found will be an estimate or a determination.

Assume that for species X we decide that one organism per 10 quarts (approximately 10,000 ml.) will be permitted in the pasteurized product. Suppose experiments have shown that the maximum number we might encounter in raw milk is 10,000 per ml. We now can use the graph (Figure 3) for counting the number of log. cycles of destruction that we are going to require in pasteurization. The number is eight, which incidentally is a destruction of 99.999999 per cent of the initial population. It would be practically impossible to accurately determine this amount of destruction by the plate count. We have been able to arrive at the value by assuming that bacteria die according to the logarithmic law.

We found that species X has a D value of 10 minutes at 140° F. — that 10 minutes are required one log. cycle of destruction. At this same temperature the arbitrarily chosen eight log. cycles of destruction will require 80 minutes. This value is the "safe" minimum time at 140° F.

The "safe" minimum time at 140° F. has been plotted in Figure 4 and a line drawn through it with a slope having a z value of 7 (7° F.). The resulting curve shows the time-temperature relationships that we have judiciously considered as "safe" pasteurization requirements for species X. We will call this curve a "safe" minimum-process graph. Any pasteurization process that employs a time-temperature relationship equal to those shown by this minimum-process graph — or greater — is "safe" with reference to species X. Notice that the present pasteurization standards are plotted on the graph and that they indicate "safe" processes. For species X the HTST method of pasteurization has a greater margin of safety than the vat method.

The minimum-process graph that we have established has significance only for species X. Several different pathogens and several different defect-producing species must be considered before one can safely propose pasteurization standards.

Unfortunately, known data do not permit the drawing of "safe" minimum-process graphs for many of the species that are important in pasteurization. The inadequacy of known data becomes acute when one attempts to use known data in evaluating pasteurization processes that use very short times and temperatures that are higher than those presently used.

It is known that different pathogens and defect-producing bacteria differ in resistance to treatment at low temperatures of about 143° F. This simply means that the D values for different species are not the same. We know that microorganisms react differently to increases in temperature, i.e., the z values are different. In fact, z values have been reported as ranging from about 6.0 or 7.0 up to about 18 or 20 (1). Further, maximum initial numbers are not the same for the many species that might be found in milk. Still further, microorganisms differ in their importance, and therefore the tolerances of survival for different species should not be the same.

The above considerations make it obvious that a single microorganism will not limit pasteurization processes at all temperatures. This is important because the organisms that are considered to limit vat pasteurization might not be the most important species at the temperature of HTST pasteurization and, particularly, at temperatures above those used at present.

Were sufficient data available, one could plot the "safe" minimum-process graphs for all microorganisms that limit pasteurization processes and one could establish a "safe" minimum-process curve. This curve likely would not be a straight line. The hypothetical graphs drawn in Figure 5 show a minimum-process curve limited by only three organisms. The curve is not straight; each organism limits the curve in a different temperature range. The present pasteurization

standards have been placed on the curve to show that a straight line drawn through them and extrapolated to higher temperatures would not appropriately designate "safe" pasteurization processes.

Several experiment stations are investigating standards for "no-hold" pasteurization. Theoretical considerations show that at high temperatures the destructive effects during heating and cooling can be sufficient to accomplish pasteurization without a holding period. Establishing minimum pasteurization requirements for no-hold processes is more difficult than establishing them for the conventional methods.

Practically all of the z values available for the microorganisms important in pasteurization were obtained at relatively low temperatures, about 140 to 150° F. The reason is that experimental difficulties limit the use of a "holding" procedure to low temperatures such as that which we imagined using for species X. Thus, the validity of extrapolating "safe" minimum-process graphs, as was done in Figure 5, has been proved for very few organisms (2).

Although sufficient data are not available at present to establish "safe" minimum treatments for no-hold processes by the procedure outlined above, investigators are aware of the need for additional thermal resistance data, and undoubtedly the needed information will be established.

Certain criteria have commonly been used to indicate safe treatment at temperatures in the range of vat and HTST pasteurization. These criteria are not adequate for the much higher temperatures used for no-hold processes. They include: (a) destruction of phosphatase (which has a z value approximately the same as that for a line drawn through our present pasteurization standards), (b) destruction of test organisms that have z values similar to that of a straight line drawn through the present pasteurization standards, and (c) extrapolation of a straight line drawn through the present pasteurization standards. Until additional thermal resistance data are available, approved no-hold and similar high temperature processes should require more severe treatments than those predicted from the above criteria.

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NEWS AND EVENTS

NEW TRAINEESHIP PROGRAM IN PUBLIC HEALTH TO BE AVAILABLE

The Health Amendments Act of 1956, which was passed by the Senate on June 11, 1956, and by the House of Representatives on July 23, 1956, authorizes the Public Health Service to establish a program of traineeships for graduate public health training of Professional public health personnel. The only difference between the House and Senate versions is the duration of the programs authorized under Titles I and II. The establishment of this new traineeship program is contingent upon enactment of the legislation and appropriation of funds by the Congress for the present fiscal year.

The public health traineeship provisions of the Act are designed to supplement — *not replace* — the training activities currently being supported by State and local health agencies. In order to get the program under way as early as possible, priority will be given to individuals who are newly entering public health work or who have been employed for a longer period.

With respect to provision of training for engineers under this program, only graduate or specialized public health training will be provided — not basic professional preparation.

An expert advisory committee is being appointed to advise on administration of the traineeship program, including the development of program standards and policies. Policy and procedural materials will be widely distributed as soon as they are completed.

Information regarding availability of traineeships for engineers, and regarding stipends, allowances, submission of applications, etc., are urged to contact the Chief, Division of General Health Services, Public Health Service, Washington 25, D. C.

CP APPOINTS H. L. MITTEN TO ASSISTANT TO VICE-PRESIDENT

The appointment of Horace L. Mitten as Assistant to Vice-President has been announced by The Creamery Package Mfg. Company, Chicago, manufacturers of dairy processing and refrigerating machinery. His

duties will include coordination of sales and research engineering to make the latter more readily available and useful to CP's sales organization and customers.

Mr. Mitten ("Joe" to his friends and associates) brings a broad experience to his new responsibilities. He has served for five years as Senior Research Engineer, with headquarters in the company's general engineering department at the Fort Atkinson, Wisconsin, plant. Before joining Creamery Package, he was Assistant Professor of Dairy Technology at Ohio State University. As a member of the teaching and research staff, he was manager of the university dairy plant during part of this period. His experience also includes several years in dairy industry processing plants.

Mr. Mitten holds a B.S. degree from Ohio State University and an M.S. in dairy engineering from Michigan State University and was a Captain in the U.S. Field Artillery. He is a member of National Agricultural Honor Society—Gamma Sigma Delta. He holds memberships in the American Dairy Science Association and International Association of Milk and Food Sanitarians.

KENNETH W. BOWMAN

Kenneth W. Bowman, Executive Secretary of the Colorado Dairy Products Association and Manager of the American Dairy Association of Colorado, died of a heart attack while visiting his son in Estes Park on August 13, 1956. Ken is survived by his widow, Louise; a son, Charles, and a daughter Kay.

Mr. Bowman was born in Iowa in 1907. He graduated from the University of Iowa in 1928. He was associated with the Pillsbury Flour Company in Kansas City for a number of years. In 1941, he joined the sales staff of the Diversey Corporation. In 1945, until 1947, he was associated with the Drake Supply Company as a manufacturers representative. In 1947, he joined the Klenzade Products Company sales staff in Missouri. He was transferred to the Denver office of that Company in 1949. He made his home in Boulder.

In 1953, Mr. Bowman was appointed to the position he held at the time of his death. He was very active in sanitation work throughout his career in that field. He was also, very active in the Rocky Mountain Association of Milk and Food Sanitarians.

GOVERNMENT CHEMISTS TO DISCUSS LAW ENFORCEMENT METHODS

The seventieth annual meeting of the Association of Official Agricultural Chemists will be held October 15, 16, and 17 at the Shoreham Hotel, Washington, D.C. This meeting will emphasize application of modern methods of analysis to the enforcement of the nation's laws regulating the composition and labeling of foods, drugs, cosmetics, animal feeds, fertilizers, and pesticides which are purchased and used by the American and Canadian consumer. Dr. R. E. Proctor, Head of the Food Technology Department of the Massachusetts Institute of Technology will discuss at a general session of the Association "Radiation Problems of Foods and Drugs." Dr. E. P. Laug of the Food and Drug Administration will present a recently declassified report on his Civil Defense project to determine the effect of nuclear explosions on foods which were exposed during Operation Teapot in the spring of 1955. The application of gas chromatography, a technique less than 5 years old, to food analysis will be presented by R. D. Stanley and F. H. Vannier of the U. S. Department of Agriculture, Pasadena, California.

CLASSIFIED ADS

FOR SALE: Single service milk sampling tubes. For further information, please, write: Bacti-Kit Co. 2945 Hilyard Street, Eugene, Oregon.

FOR SALE: New fiberglass insulated sample case with individual compartment for each bottle and a convenient carrying bail. Bacti-Kit Company, Box 101, Eugene, Oregon.

This meeting, which will be held in cooperation with the Food and Drug Administration, Department of Health, Education, and Welfare, and the Meat Inspection Branch, Department of Agriculture, will commemorate the fiftieth anniversary of the passage of the Pure Food and Drug Act and the Meat Inspection Act. It will also honor Dr. Harvey W. Wiley — the father of the Pure Food and Drug Act.

NEW WORLD DAIRY MARKETS IS THEME FOR INTERNATIONAL MEETING IN ATLANTIC CITY

New World Markets for Dairy Products will be the theme of the Tenth Annual Meeting of Dairy Industries Society, International, to be held in Atlantic City, New Jersey, on Sunday afternoon, October 28 at the Hotel Traymore on the eve of the 20th Dairy Industries Exposition, and conventions of major dairy processing associations.

First hand reports will be heard from all corners of the globe concerning the efforts of the dairy industries to increase utilization of the world's milk by opening up entirely new markets for dairy products, an effort in which DISI and its members have played significant roles.

George O. Tiffany, President of the Society, has invited all dairy industry people who are in Atlantic City at that time to attend this concentrated briefing session on world milk utilization progress.

"Dairy Industries Society, International believes that the story of the efforts of the dairy industries in many parts of the world to find ways of getting more milk to more people will be of interest to every member from every country. Therefore, whether you are a Society member or not, we want you to feel free to attend the Sunday afternoon session and to drop in during the week at the International Lounge at the Dairy Industries Exposition, Where DISI will act as host to overseas visitors and those interested in meeting them. You will learn of the hundreds of thousands of persons who have had their first ice cream and pasteurized milk at a dairy educational exhibit at one or another of the great International Trade Fairs. You will learn of the serious efforts of national and international agencies to widen the markets for dairy products. You will get first hand reports from the scores of DISI volunteers who have undertaken dairy missions in Asia, Europe and Latin America. You will meet forward-looking dairy people from a score or more countries."

Mr. Tiffany himself will have just returned from a Foreign Agriculture Organization *ad hoc* Working Party for Dairy Products in Rome, at which the Society will have been one of four international groups called in for consultation by the FAO. Also back from this meeting will be George B. Pfeifer of St. Paul, Minnesota, who has also been serving as DISI chief-of-mission at the International Trade Fair in Salonika, Greece.

C. J. Macdermott of Australia will relate the forward march of the ice cream industry in the Far East and Australia . . . Gordon Lamont and Joseph O. Eastlack will tell of the launching of a long range program in Colombia, in cooperation with Colombian producers and processors, to get more milk into the national diet . . . a representative of a Colombo Plan nation will tell of the work of this organization in establishing dairy operation in the Far East . . . C. J. Babcock, its dairy chief, will tell how the Foreign Agricultural Service of U. S. Department of Agriculture, under Public Law 480, puts to work surplus agricultural products in opening new markets around the world, a work in which DISI is the official industry cooperator . . . T. A. Burress, a DISI volunteer, will describe the reaction of the Yugoslav public to milk and ice cream . . . Robert E. Jones and Irving C. Reynolds will tell of the similar impact of milk, ice cream and cheese on the public of Spain and Japan. Each will give a brief report at the DISI meeting and most of them, plus a score of other DISI volunteers who worked with them overseas, will be available for conference in the International Lounge throughout the week.

The annual election of officers and directors of the Society will also be held on October 28th.

DAIRY MANUFACTURING SCHOLARSHIP AWARDED

Three dairy manufacturing scholarships have been awarded by the University of Kentucky (Lexington) through a fund established by the dairy industry in Kentucky and related fields.

The grants, amounting to $200 each, are the first ever awarded in the UK Manufacturing Section, according to Dr. T. R. Freeman, professor of dairying and dairy technologist.

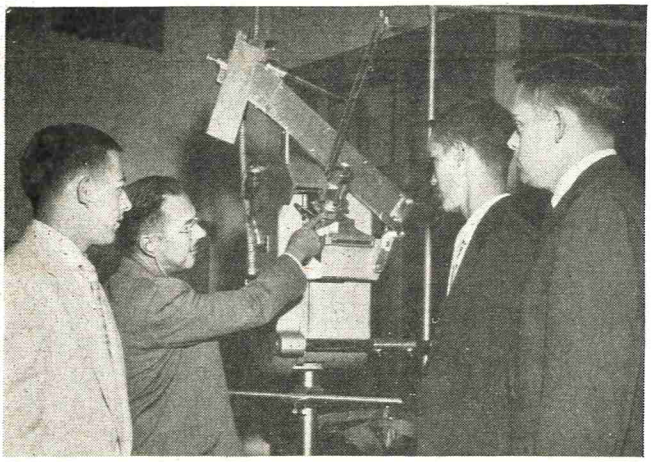
The recipients, all Kentuckians, are Aubrey Etherington, Lawrenceburg, and Robert Goodlett, Bondville, both juniors, and Gordon D. Toohay, Cave City, a freshman.

The awards are part of a student recruitment program designed to stimulate interest in the curriculum, and to satisfy the great demand for dairy manufacturing technologists.

The curriculum prepares students for positions directly involving the process operations in dairy plants; dairy plant field work; research; managerial positions, and sales work.

The scholarship selections were made on the basis of qualifications and interest in dairy manufacturing.

Underwriting the scholarship program this year are Armour & Co., Bessire & Co., Marshall Dairy Laboratory, Kentucky Manufactured Milk Improvement Association, Murphy Body Works and U. C. Milk Co.



DAIRY MANUFACTURING GRANTS AWARDED BY UNIVERSITY OF KENTUCKY — The University of Kentucky Dairy Manufacturing Section, in a move to stimulate interest in dairy manufacturing, recently awarded scholarships to three Kentuckians — the first such grants ever given by the dairy section. Dr. T. R. Freeman, second from left, UK professor of dairying, is pictured explaining the operations of a bottle capping machine to the scholarship recipients — from the left, Robert Goodlett, Gordon D. Toohey and Aubrey Etherington.

PIPE ORGAN WILL BE HEARD AGAIN AT OPENING CEREMONIES EACH DAY OF 20TH DAIRY INDUSTRIES EXPOSITION

"All this and music, too" is a phrase quite likely to come to the minds of visitors at the 20th Dairy Industries Exposition in Atlantic City's Convention Hall, October 29-November 3. For not only will the displays of 400 dairy industry supplier-equippers be spread out in dynamic panorama before them but, at opening ceremonies each day of the Exposition the famous Convention Hall pipe organ will sound a musical welcome.

The voice of this organ, reputed to be one of the largest pipe organ installations in this country, will be greeted as that of an old friend by many returning

visitors to the biennial Exposition, among them L. E. Hubbard, President of the Defiance Dairy Company in Defiance, Ohio.

It was music-loving Mr. Hubbard whose letter of inquiry about the organ triggered an investigation by Dairy Industries Supply Association, Exposition sponsor, into the possibility of having the instrument played during the Show.

Although the organ's use has been hampered in recent years by a dearth of suitable repairmen to keep the great apparatus in top condition, DISA found that this year, fortunately, the organ is in good order and promptly secured the services of Atlantic City organist Lois Miller. At the same time, arrangements were made to complete the musical side of the Show with the singing voice of Elsie Mecaskie who will be guest soloist on the first and last days of the Exposition.

In order not to miss the daily organ recital, prospective visitors would do well to keep the following Exposition opening times in mind:

Monday, October 29———12 noon;
Tuesday, October 30———9 A. M.;
Wednesday, October 31———12 noon;
Thursday, November 1——— 9 A. M.;
Friday, November 2———12 noon;
Saturday, November 3———10 A. M. and 1 P. M.

In addition to viewing the marvels on display for them in Convention Hall, visitors also will be attending to the serious business of the concurrent convention sessions of dairy industry organizations including Dairy Industries Society, International; International Association of Ice Cream Manufacturers; Milk Industry Foundation; National Association of Retail Ice Cream Manufacturers Association; National Ice Cream Mix Association; and Evaporated Milk Association.

More than 25,000 dairy industry men and women—processors, regulatory officials, sanitarians, educators, students — are expected to throng Convention Hall aisles during the Exposition to keep themselves abreast of the industry's forward strides—strides noted in the Exposition's theme, "Frontiers for Profit: Men—Methods—Machines."

PAPERS PRESENTED AT AFFILIATE ASSOCIATION MEETINGS

Editorial Note: The following listing of subjects presented at meetings of Affiliate Associations is provided as a service to the Association membership. Anyone who desires information on any subject is encouraged to write to the Secretary of the Affiliate Association concerned for the address of the speaker. Information desired then may be requested from the speaker (a copy of the paper presented may be available for the asking.)

SOUTH DAKOTA ASSOCIATION OF SANITARIANS

(Annual Meeting, June 6-7-8, 1956)

Louis Remily, *Sec.-Treas.*, Pierre, So. Dak.

Suburban Developments and Environmental Sanitation. M. O. Wasser

Experiences in R. C. Vector Control Program. R. J. Morgan

Rural Occupation Health Program. Dr. Donald G. DeValois

Current Recommendations for Fly Control for the Milk and Food Industries. C. E. Gerhart

Public Health Significance of Antibiotics in Milk and Other Foods. Dr. Edward C. Berry

Film — "A New Standard of Precision in Microfiltration and Analysis". Courtesy Millipore filter Corporation

General Discussion; Intra Regional Milk Seminar — Milton Held — Robert Hayward — Charles Halloran

Radiological Hazards Associated with Shoe Fitting Devices. Paul F. Woolrich

Recent Consideration in the Bulk Milk Enforcement Program. Milton Held

State Institutional Sanitation Program. R. S. Wallace

Report on Research Project on Stockyard Waste Disposal. Dr. E. C. Berry

Panel Discussion —

Trends in Public Health Legislation in South Dakota. Moderator- Loren Carlson

A Milkman's Interest in State Legislation. Gus Rachetto

A Restaurant Operator's Interest in Food Laws. Carl Burgess

A Senator's View of Milk and Food Laws. L. A. Johnson

A Representative's View of the Milk and Food Laws. Albro Ayres

Trends in Milk and Food Laws in Our Bordering States. Milton Held

Life in Rural India. George Jacobson

Organization of Local Health Departments. Louis Remily Dr. Paul Mallinckrodt, Harlan Stricklett, Dr. T. E. Eyres

Sanitation in Disaster. Gerald Ferguson

INDIANA ASSOCIATION OF MILK AND FOOD SANITARIANS

(Sixth Annual Meeting, June 12, 13, 14, 1956)

Karl K. Jones, *Sec.*, 1330 W. Michigan St., Indianapolis 7, Ind. *Panel Discussion — Bulk Tank Conversions.* Moderator — George Norman.

Kermit Kester, Arthur Swindell, Robert Davis, W. K. Moseley

Revision of the USPHS Restaurant Ordinance and Code. James A. Westbrook and David E. Hartley

Public Health Aspects of Frozen Foods. Frank E. Fisher

Panel Discussion — Private Water Supply Problems and Requirements. William Shillinger. James C. Barringer, Donald R. Sisson, George G. Fassnacht

Complaints — Investigation and Handling. Sam R. McGurk and Clarence L. Taylor

Proposed Grade A Milk Legislation.

Presentation of Proposed Law. G. L. McFarland, Jr.

Public Health Aspects. Harold S. Adams

Discussant. Lewis A. Stoy

Discussant. Louis C. Lukemeyer

MINNESOTA MILK SANITARIANS ASSOCIATION

(Regional Conference)

George Steele, *Sec.-Treas.*, State Office Building, St. Paul, Minn.

Rancidity and Other Quality Problems in Milk Supplies. Dr. J. C. Olson, Jr.

Setting Up A Bulk Tank Program. H. E. Birdsall

Driver Training Problems in the Bulk Tank Pickup Operation. Dr. W. C. Lawton

Keeping Up To The Times. Dr. J. H. Gholson

DAIRY SANITARIANS ASSOCIATION OF WESTERN PENNSYLVANIA
(Third Annual "Seminar", Feb. 23, 1956)

C. J. Milroth, *Sec.* Greater Pittsburgh Dairy Industry Assoc.
Looking Ahead. Herbert Dunsmore
Dairy Waste Disposal. R. Rupert Kountz
Mastitis. Ivan E. Parkin
The Department of Agriculture Looks Ahead. L. H. Bull
Protective Milk. Howard W. Theole
What the State Expects of a Sanitarian. Dr. Howard Johnston
What the Pittsburgh Department Expects of the Sanitarian. Henry Albert
What the Dealer Expects of the Sanitarian. Walter Merry
What the Sanitarian Expects of the Dealer. Clarence Moss

EXCERPT FROM SUPPLEMENT TO 1956 ANNUAL REPORT OF THE COMMITTEE ON SANITARY PROCEDURE*

The 3-A Symbol Council is somewhat perturbed by indications that some regulatory sanitarians propose to adopt the policy that, after a specified date, only equipment to which the 3-A Symbol has been affixed may be installed within their jurisdictions. In the opinion of the Council, it is too early to impose such rulings, even if the question of their legality is waived. All of the potential problems arising in the administration of usage of the 3-A Symbol have not been encountered and solved, and situations may arise in which application of the policy of mandatory affixing of the 3-A Symbol may have embarrassing sequelae.

It *is* the function of regulatory sanitarians to assure themselves that new equipment conforms to sanitary standards, of which those known as 3-A are the current epitome. But, since the 3-A Symbol program has been envisioned and presented as a means of VOLUNTARILY indicating conformance to sanitary standards, the application of pressure to force participation in the program subjects the sincerity of its proponents and sponsors—including this Association as an entity—to question.

It is urged that those contemplating policies of this nature reconsider the matter.

*"The foregoing excerpt from the Supplement to the 1956 Annual Report of the Committee on Sanitary Procedure is published in advance of the remainder of the Report, because of its timeliness."

NEW MATERIALS AND VISUAL MATERIALS ON HEALTH CAREERS— Information for Health Agencies

Paralleling the current school distribution, sample sets of the new Health Career materials are now going to the following organizations and officials in the health field:

—nationally, to voluntary and government organizations which have been participating in the Health Careers Project, and NHC member agencies generally;
—in the states, to commissioners of health, health councils, and state-wide Health Career committees;
—locally, to full-time local health officers, health councils and community Health Career committees.

Distribution to the state and local affiliates of national organizations is being worked out along the lines developed last year when the Health Careers Guidebook was issued. The NHC is consulting cooperating national organizations; their state and local affiliates will hear from them as to whatever arrangements are worked out. It will be helpful if those receiving this communication will pass this information along, if questions come to their attention from any of the groups concerned.

This preliminary distribution data-sheet has been prepared for the use of the health organizations listed above, in order to answer questions that may come up as they make their distribution plans and prepare to request supplies of the new materials.

The publications and posters included in the sample packet call for only brief additional notes. But since sampling is not practicable for the flipchart and related visual aids, these materials are described in more detail. The final section covers some points which might seem too obvious to mention, if experience had not proved that they raise questions and cause complications.

FACTSHEET and NOTES ON COMMUNITY ACTION FOR HEALTH CAREERS — The purpose of these two pamphlets is to provide working information for health agencies and other groups interested in developing community activities. They are available for all individuals and agencies who need and can use such tools, but are neither appropriate for more general distribution nor available in sufficient quantity.

HEALTH CAREERS FLIER — To Youth in Search of Their Future — Of all the Health Career materials, this is *T-H-E* piece for general distribution.

The specific purpose of this flier is to introduce Health Careers to the individual "consumer" — young people, parents, community leaders, and the general public. Designed for wide coverage, it lends itself to many school and community situations; it can serve, for example, as a take-home reminder to give to individual young people in counseling interviews and similar person-to-person contacts; as distribution material for school career days, community meetings and exhibits; as a mailing stuffer.

Available — in quantity — to national, state and local health agencies for their own distribution, the flier provides a special space for overprinting the signature of the distributing agency. The NHC hopes that participating agencies will take full advantage of this device for identifying themselves as a source of Health Careers information. (This signature space is in the lower left-hand column of the back cover-page. A rubber stamp can be used, if desired.)

POSTER SERIES — As the titles indicate, two of this series are oriented primarily for community use, and two are specifically directed to the important role of counseling services in connection with Health Career activities:

Partners for Health — Poster A
Health Needs People — Poster B
Health Careers Calendar — Poster C
First Steps Toward First Jobs — Poster D (Prepared with the cooperation of the National Vocational Guidance Association, this is the first poster on counseling services available for general school and community use.)

Posters may be requested in sets of all four titles, or singly — if the latter, please identify by title and letter-designation. (For this designation, see the signature line on the face of each poster.)

A substantial printing of the posters provides adequate supplies, but quantity is not unlimited. It will be helpful if agencies can plan either for relatively permanent display or for repeated use of the posters. Where requests from a single community seem to overlap, the Health Careers office may double-check before shipment to avoid duplication and waste.

For information on additional display materials, see the next section; for some of the many school and community uses for Health Career posters and visual presentations, see below — *Suggestions on Exhibits and Displays.*

FLIPCHART and RELATED VISUAL AIDS—This graphic material provides a 24-page Health Careers picture-story produced in color — charts and illustrations tied together with brief captions. Addressed primarily to community leaders — school people, health people, and others — its main purpose is to give health agencies a tool to use in stimulating community Health Career activities. But, as explained below, this tool is, in fact, a "convertible"; its component parts can be put together in many combinations and for many purposes.

THE GOLDEN JUBILEE PLATFORM OF THE AMERICAN DAIRY SCIENCE ASSOCIATION

Adopted at the 50th Anniversary Meeting of the Association Storrs, Connecticut, June 19-21, 1956

The American Dairy Science Association, being the leading educational, scientific and professional organization in the Dairy Industry, believes that the Golden Jubilee year is an appropriate time to state its position with reference to this great industry.

The Association recognizes that many of the major modern-day problems are of mutual concern to the various segments of our Industry and may be treated adequately only by full cooperation between all interested agencies and organized groups. Therefore, the Association takes this occasion to emphasize its desire to cooperate with other organized groups in programs designed to further the welfare of the Dairy Industry, programs which relate particularly to classroom and adult education, to fundamental and applied research and to the development of Industry leaders.

One of the main functions of the Association is to foster research and to disseminate research information through the JOURNAL OF DAIRY SCIENCE, which is distributed throughout the world. The Association takes cognizance of the fact that research is responsible for the present well-being of our Industry – and will determine its future progress.

That there is a shortage of well-educated dairy school graduates qualified for responsible positions in the commercial industry, in educational institutions and in federal agencies, is well recognized by the Association and Industry alike. Since the members of the Association are the educational leaders of the Industry and are those who must, of necessity, be responsible in large measure for the recruitment of secondary school students, for their dairy education, and for their eventual placement, it appears logical that the Association be considered as an active cooperator with other Industry groups in all steps taken to further the recruitment of secondary school students for the Dairy Industry.

In respect to attracting a larger number of superior young people into the Dairy Industry, the Association has taken the initiative by publishing in the JOURNAL OF DAIRY SCIENCE, (September 1955), a report entitled "A Guide for Secondary School Recruitment Programs in the Dairy Industry". It recommends this for general use. At the 1955 meeting of the Association, a resolution was adopted calling the attention of the dairy organizations and companies to the need for a public relations and recruitment film and offering the cooperation of the Association in its production. Films and printed material are vital tools of communication needed to convey to the secondary school student the story of our Industry and the opportunities it offers. No time should be lost in obtaining full cooperative effort to produce this recruitment material and to make effective use of it.

The Association recognizes the need of better organized and more effective training and development programs for the college graduates by the commercial industry. An Association Committee on Personnel Training and Development, consisting of university and industry members, is preparing a manual suitable for use by the companies comprising the industrial phase of dairying.

The Association is aware that it must keep abreast of the times in its educational objectives and teaching techniques. A permanent Education Committee has been established and has embarked upon an ambitious program designed to assure adequate education of dairy students for leadership in science and industry. A symposium was arranged by this Committee for the Golden Jubilee meeting in Connecticut on "Educational Objectives in Dairy Science". To encourage contined improvement in teaching, a Teaching Award of $1,000 is made available each year through the Association to an outstanding teacher in Dairy Science.

The Association acknowledges that dairying is basically a science area and that there exists a great shortage of scientists. The Association believes that the quality and value of research work in the Dairy Industry will be enhanced by more thorough education of American youth possessing exceptional potential ability, and is exerting its efforts to interest more of such students to study for advanced degrees. Three Awards of $1,000 each are presented each year through the Association for original research by its members, for the purpose of encouraging and recognizing research accomplishments.

The Association believes that no time should be lost in putting the results of the research of its members to work to the fullest extent. Those members of the Association engaged in dairy extension work are meeting this challenge. To recognize effective adult education endeavors, a special award of $1,000 is given annually through the Association to an outstanding Dairy Extension Specialist.

The Association believes that the full appreciation of the contributions of science to the advancement of the Dairy Industry has not been realized either by adults outside of the field or by potential college students in dairying. Therefore, it recommends that full attention of all segments of the Industry be given cooperatively to a national program designed to inform the public at large of the importance of science to the success of the Dairy Industry and thus to the welfare of the nation.

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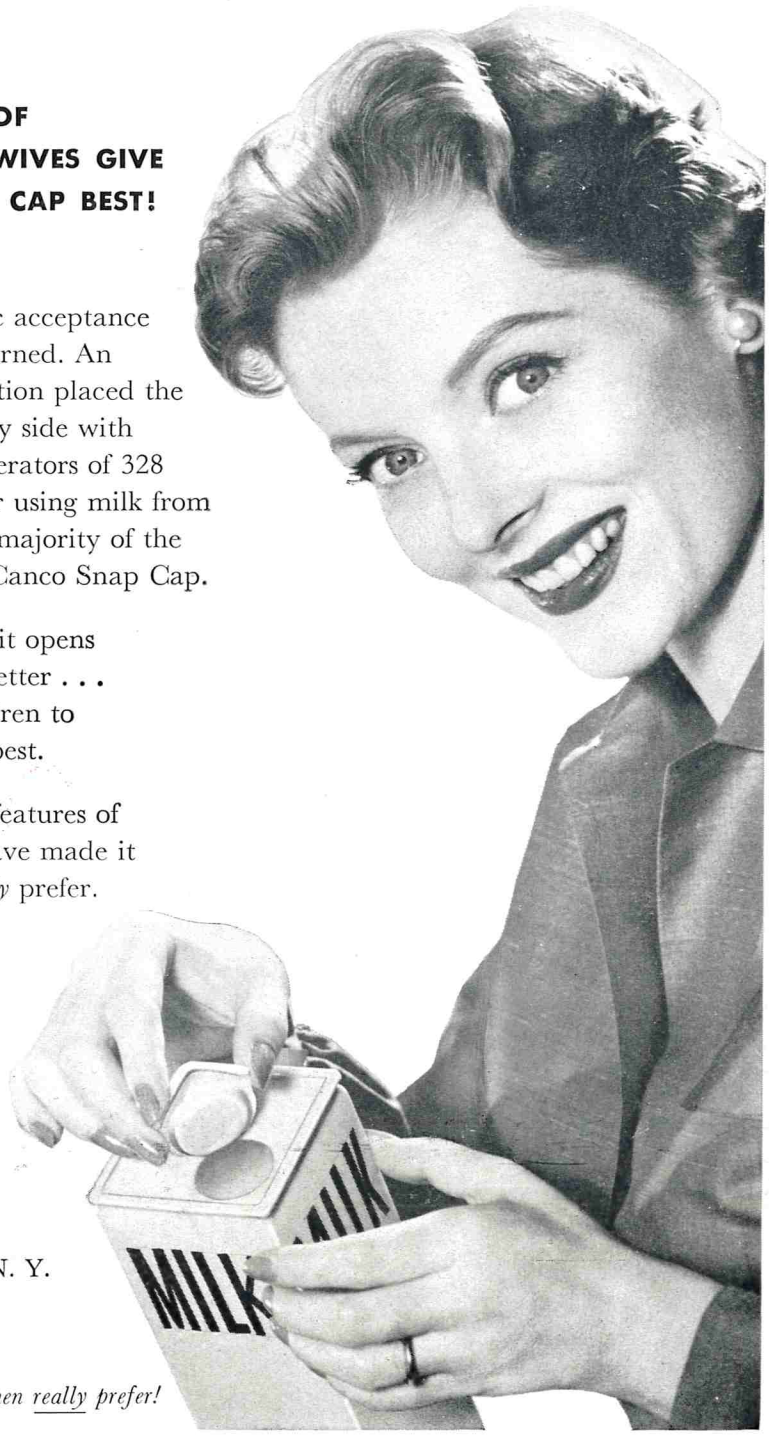

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