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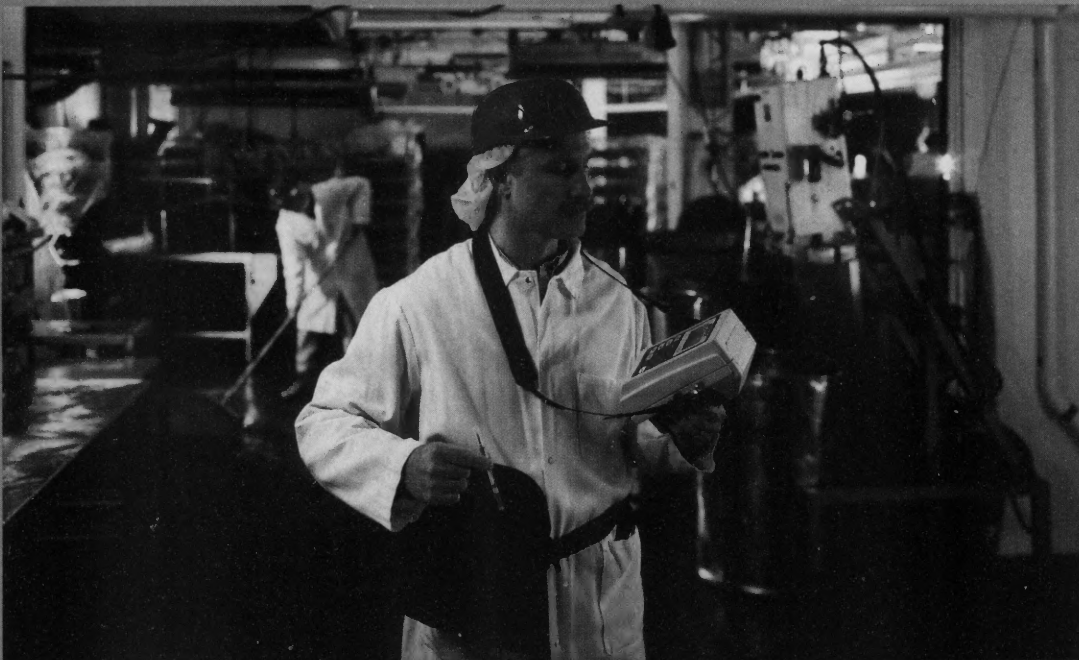
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ABOUT THE COVER...

Photo courtesy of West Agro Industrial Sales Group. Photo of liquid iodine solution being poured into a beaker sitting on a black chrome reflective surface.

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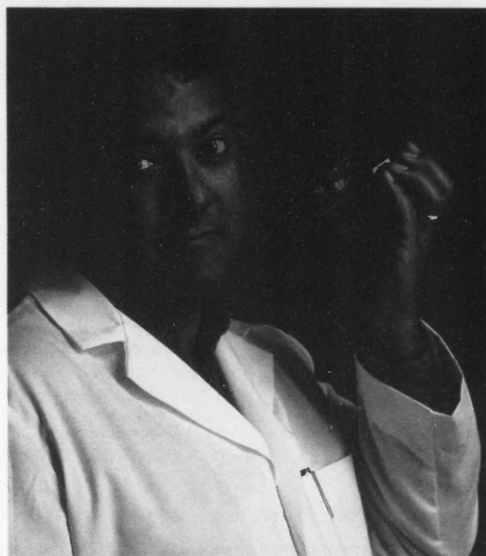
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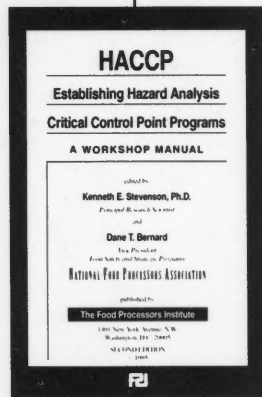
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Dairy, Food and Environmental Sanitation (ISSN-1043-3546) is published monthly beginning with the January number by the International Association of Milk, Food and Environmental Sanitarians, Inc. executive offices at 6200 Aurora Avenue, Suite 200W, Des Moines, IA 50322-2863, USA. Each volume comprises 12 numbers. Printed by Heuss Printing, Inc., 911 N. Second Street, Ames, IA 50010, USA. Second Class Postage paid at Des Moines, IA 50318 and additional entry offices.

Postmaster: Send address changes to **Dairy, Food and Environmental Sanitation**, 6200 Aurora Avenue, Suite 200W, Des Moines, IA 50322-2863, USA.

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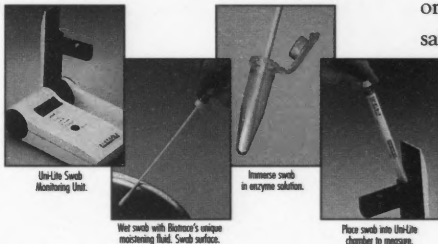
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- *The Department of Commerce and the Chicago Health Department* use of SERVSAFE programs to train field personnel.
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THOUGHTS

FROM THE PRESIDENT



By F. ANN DRAUGHON,
IAMFES President

“Foodborne disease education”

The Thanksgiving season brings so many fond memories of family and friends to mind. Unfortunately, it also brings to mind the specter of foodborne illness due to mishandling the traditional turkey dinner or family potluck feast. I always seem to get calls the week following Thanksgiving and throughout the December holidays from unfortunate individuals who have been visited by *Salmonella*, *Staphylococcus*, or other nasty bugs. There is so much information out there these days on proper food handling. Why don't our family, friends and non-food scientists know how to handle food properly?

Every survey conducted on food safety seems to show the public's lack of knowledge concerning safe food handling principles. Groups and government agencies committed to eliminating foodborne illness routinely recommend that consumer education be given top priority. However, integrating these recommendations into the modern lifestyle and educational system has been very slow.

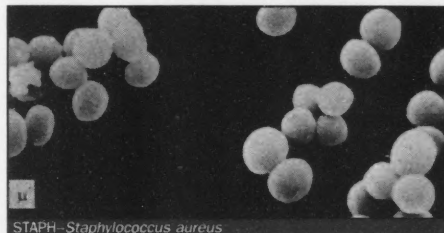
One of the key areas in which I would like to make progress during my year as President is for IAMFES to begin to take an active role in integration of existing knowledge on food safety into our K-12 educational system. I sincerely believe that we must begin public education on food safety in kindergarten and continue to increase and review knowledge yearly as people move through our educational system for individuals to integrate food safety principles into their daily lives. Changing habits is very difficult for most people and I think that this is where safe food handling

practices frequently break down. Many consumers know what may be safe or unsafe food handling but do not practice the proper handling procedure. Reinforcing safe food handling practices in adults through continuing education is essential to successfully preventing foodborne illness.

A new Education Task Force is being established in IAMFES which will be chaired by Dr. Bruce Langlois of The University of Kentucky. The Task Force will address the overall role of IAMFES in Food Safety Education for consumers. The mission of the Task Force is to identify key roles for IAMFES in assisting the transition of existing educational material from the producers to the educational system and to identify key areas in which there is a void in materials for education of young consumers and how IAMFES may fill the void. Anyone who is interested in being a part of this Task Force should contact Bruce at 606-257-5881 or fax 606-257-5318.

The search for Executive Director is proceeding smoothly with the help of the American Society of Association Executives and we hope to be interviewing very soon. The IAMFES office is running very smoothly thanks to the hard work of our Interim Administrator, David Tharp, and our outstanding staff. I hope you have enjoyed the special notes on our office personnel. Our publications group is dedicated to improving the quality of DFES. Why not give Carol a call if you have an idea for a great new section in DFES? Remember, ideas perish quickly if they just stay in our heads, they can't stand solitary confinement.

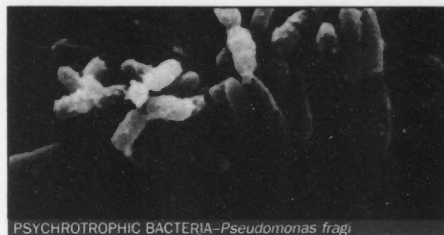
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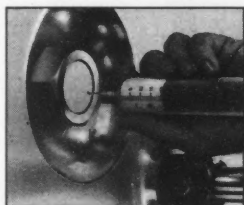
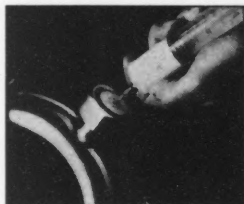


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A MESSAGE

From the Home Office

“The journals are an important part of IAMFES”

An important part of IAMFES is the publication of two highly respected journals, *Journal of Food Protection* and *Dairy, Food and Environmental Sanitation*. The production of these journals requires the talents of many individuals. First and foremost is the leadership from the Scientific Editors and the Journal Management Committees that guides the growth and quality of these publications. The *Journal of Food Protection* has grown to the point that we are now publishing between 20 and 25 manuscripts each month with plans to increase this number over the next year. Scientific Co-Editors Dr. Lloyd Bullerman and Dr. Larry Beuchat have been instrumental in this growth. Although we will be saying a reluctant but appreciative good-bye to our long-time Scientific Editor, Dr. Bullerman, this December, we know his efforts from the past have ensured a strong future. This future also includes the addition of Dr. John Sofos as the new Scientific Co-Editor.

Dairy, Food and Environmental Sanitation has seen many changes this last year, much of which has been guided by the Journal Management Committee and its dedicated chairperson, Dr. John Bruhn. Dr. Bruhn has, for the last several months, also been Acting Scientific Editor overseeing the newly established review process for DFES articles. With his and the committee's guidance, we hope to have an official Scientific Editor for DFES beginning in January 1996.

As you know, there are those staff members that work behind the

scenes who have also played a part in the growth and changes we've seen this last year in the journals. One integral member of the publications department is our Publications Specialist, Donna Bahun. Donna has been with IAMFES since November 1994 when she began as Publications Assistant. Due to the many changes that were occurring, she was called upon to learn new skills quickly and accept new responsibilities. She took on this challenge and has excelled! Donna now handles all the layout and production of *Dairy, Food and Environmental Sanitation*.

The managing of manuscripts for publication in two such quality journals requires an eye for detail and a willingness to learn. These two traits are very evident in a staff member who has been with IAMFES since February of 1995. Michelle Sproul, Publications Assistant has helped to overhaul and improve the process of managing the manuscripts and articles for both journals. Michelle's organizational skills have been called upon again and again during restructuring of the publications department. Her quality work has made her an asset to IAMFES.

Once again we have told you about changes in IAMFES and about those who have been guiding the changes. The only way that we know what we are doing is what our members want; is if the members let us know. The journals are an important part of IAMFES and your input will only help us to improve them. If you have a suggestion or a concern, take a moment to let us know. Drop us a note or give the office a call.

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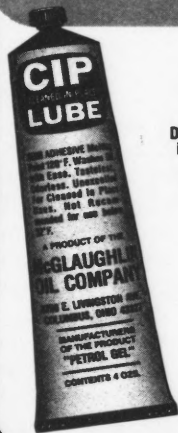


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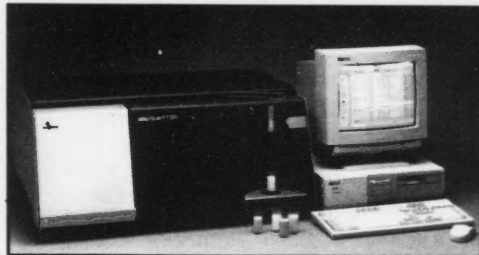
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This article originally appeared in the May 1995 issue of SCOPE, a technical bulletin of Silliker Laboratories.

Microbiological Testing and HACCP Programs

By John H. Silliker, Ph.D.
Founder, Silliker Laboratories Group, Inc.

INTRODUCTION

The Hazard Analysis Critical Control Point (HACCP) concept is a systematic approach to hazard identification and control. It focuses on critical factors directly affecting the microbiology of foods, eliminating wasteful use of resources on extraneous and superfluous considerations. The potential cost/benefit relationships are favorable to the producer, regulator, and consumer. HACCP has been successfully applied to the production of low-acid canned foods and monitoring of critical control points in the production of these products is subject to federal regulations.

The National Research Council (NRC) Subcommittee on Microbiological Criteria recommended the mandatory use of HACCP in the production of all foods, while a second NRC committee recommended the mandatory use of HACCP in the production of meat and poultry (3, 4). The Food and Drug Administration has also proposed the mandatory use of HACCP in the processing of fish and fishery products (1). It is apparent that the HACCP approach will soon be mandated by law in the production of all food products.

One of the purposes of HACCP is that it is designed to build safety and quality into the process, eliminating the need for inspection and testing of the finished product. Since the microbiological safety of the finished product is of prime concern, there remains a need for microbial verifica-

tion testing of the raw materials, environment, critical control points (CCPs), and overall HACCP plan. In specific critical situations with at-risk populations, microbial testing may be used for monitoring purposes where the product is kept within the plant's control until testing is completed. Microbial testing is advisable in developing a HACCP plan to ensure its effectiveness. A company that has assumed the cost and effort of implementing a HACCP plan needs to verify through microbial testing that the plan is working properly and the money has been well-spent.

This paper will discuss the role of microbiological testing in the establishment and administration of HACCP programs. It will not consider chemical and physical hazards normally analyzed for in a HACCP system as recommended by the National Advisory Committee on Microbiological Criteria for Foods (NACMCF) (6).

Hazard Analysis: The Foundation of HACCP

A thorough hazard analysis is the foundation on which the rest of the HACCP plan rests. The hazard analysis determines the points at which microbiological hazards exist and serves to identify the critical control points (CCPs) at which the hazards can be controlled. Critical limits that identify when a CCP is out of control, i.e., the limit which represents an unacceptable health risk, if exceeded,

must be established next. Monitoring methods, which provide rapid measurements, and are used to determine if the process is operating within the critical limits and under control must also be established.

The monitoring of CCPs should be frequent enough to prevent out-of-control situations from happening, i.e., changes in processing conditions are caught early before the process exceeds critical control limits. If a CCP is found to be out-of-control, corrective actions are initiated immediately. Conventional microbiological testing is precluded as a monitoring procedure as out-of-control situations must be detected instantaneously, not days after the fact. Thus, monitoring is restricted to real-time measurements, i.e., visual observations, moisture, pH, water activity and temperature.

HACCP greatly reduces reliance on routine microbiological testing to assess finished product safety. But the establishment of a HACCP system also requires that the effectiveness of the CCPs and the microbiological safety and quality of the finished product be verified through a microbiological testing program. While monitoring may indicate that control of CCPs is within established critical limits, true satisfactory control can only be determined by microbiological information which is within the established control limits, such as zero pathogens. Not only is microbiological testing needed to establish critical

limits for CCPs, it is also required to verify that the system is controlling microbiological hazards. Hazard analysis relative to microorganisms is an evaluation of the production, distribution, and use of raw materials and food products to:

1) Identify potentially hazardous raw materials and foods that can support microbial growth and may contain poisonous substances, pathogens, and/or large numbers of spoilage microorganisms;

2) Identify the potential sources and specific points of contamination by analysis of each step in the flow chart; and

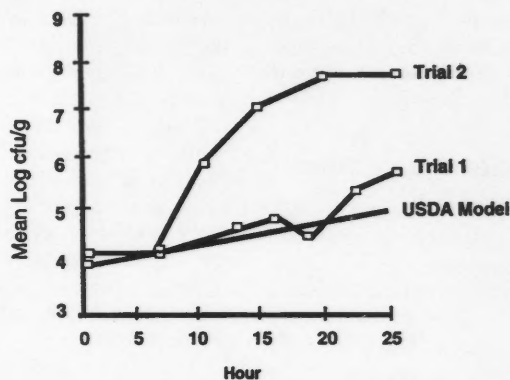
3) Determine the potential for microorganisms to survive or multiply during production, processing, distribution, storage, and preparation for consumption.

Epidemiological information associating a given food with foodborne illness is the best means of identifying the specific hazards for a particular food. In the absence of epidemiological evidence of a microbiological hazard, technical information must be obtained on all aspects relating to production and use of a particular food that could lead to a hazard. Proper hazard analysis requires a food microbiologist and appropriate process and product specialists who possess extensive knowledge of the process, product, and its intended use. The microbiologist must consider a number of factors that influence the potential contamination of a product with pathogens and their growth and survival in the finished product. These include product formulation and finished characteristics, such as pH and water activity, and intended production process, distribution, and use.

Based on the answers to such questions and other applicable information, the experienced food microbiologist can give a preliminary assessment of the hazards involved in the manufacture, distribution, and use of the product.

The amount of microbiological testing required in hazard analysis will be inversely related to the exper-

Figure 1. Differences between predictive and actual growth rates of *S. aureus* in creamed chicken at 70°F.



tise of the microbiologist and information available. Knowledge of potential sources of contamination and the influence of time-temperature profiles, pH, and water activity are some of the more important factors an experienced microbiologist will use in reaching a preliminary assessment of hazards. In many cases, it will be desirable to confirm the hazard analysis and the effectiveness of the resulting HACCP plan by microbiologically testing inoculated product at various stages of the process. Mathematical models for predicting growth, death, and survival of appropriate pathogens under various conditions of processing, distribution, and sale are useful in evaluating the hazards, control points and limits, and in the overall development of a successful HACCP plan. While these predictive models may reduce the scope of a challenge study, they are not a substitute for one. Microorganisms in complex food systems do not always respond as predicted by laboratory studies of pure cultures. The variations between predicted results and actual study results can be seen in Figure 1. Microbial challenge tests should include evaluating the effects of mishandling the product.

MICROBIOLOGICAL MONITORING OF CCPs

Microbiological testing is not generally an acceptable approach to monitoring CCPs because the time

required does not permit a rapid response when control is lost. However, there are two exceptions:

Critical Raw Materials

There are products the processing of which encompasses no lethal step; if a raw material contains unwanted microorganisms, they will be carried into the finished product. For example, if dry milk containing salmonellae is used to manufacture milk chocolate, the finished product will be adulterated with this organism. If starch containing thermophilic anaerobic sporeforming bacteria is used in the production of canned creamed corn, they may survive the heat process and cause spoilage of the finished product. In these and other cases, the microbiological status of the raw material can be a CCP which must be monitored by conventional microbiological sampling and testing as the raw material or finished product remains under plant control until testing is completed. Appropriate sampling plans should be used.

Finished Product

Foods for at-risk consumers with increased susceptibility to disease must be produced with "the highest degree of care" and the finished product should be treated as a CCP. The product should remain in the control of the processor until it has been sampled, analyzed, and found to be in satisfactory microbiological condition. As with critical raw materials,

appropriate statistically-based sampling plans and analytical methods must be used. Baby foods, dietetic foods, foods for hospitals, humanitarian relief foods, and foods especially high in protein composition fall under this category.

MICROBIOLOGICAL TESTING FOR VERIFICATION

Verification has been included as one of the seven principles of the HACCP process. This activity has been defined as "to use supplementary information to check whether the HACCP system is working" (5, 7). The International Commission on Microbiological Specifications for Foods (ICMSF) places emphasis primarily on microbiological testing conducted to determine the efficacy of a HACCP system (2). The NACMCF and Tompkin have indicated broader activities under verification to include complete review of all aspects of existing HACCP plans (6, 9).

Finished Product Verification

The purpose of hazard analysis is to identify the microbiological hazards that influence the safety and quality of finished products and the CCPs which control these hazards. Conceptually, this eliminates the need for finished product analysis. But it is a mistake to assume that a HACCP program is a cure-all and there is no need to microbiologically verify that the system is working. Testing of the finished product may indicate that one or more CCPs are not under proper control and the limits set at these points were too lenient. The results may also indicate that a CCP was not identified in the hazard analysis or an unanticipated hazard (e.g., *Listeria* in a pre-cooked refrigerated meat product) exists. Verification may lead to the discovery that *Listeria* is present, even though all hazards and CCPs initially considered are under control. Hence, it would be necessary to repeat the hazard analysis to determine if points of control were missed in the initial analysis.

Conducting incubation tests or shelf-life studies on finished product

can be one way of verifying the effectiveness of CCPs and a HACCP plan. The expected shelf-life of perishable products, e.g., packaged meats and dairy items, is integral to the HACCP plan. Holding products at expected storage temperatures may show that the target shelf-life is not being achieved. This should trigger an investigation into whether all CCPs are being properly controlled, that all CCPs have been identified, or that the original shelf-life estimate was realistic. Field reports are often a good source of data that there are shelf-life problems.

The HACCP approach should be used in the control of spoilage as well as safety problems. For example, incubation tests could be used on packs of aseptically produced sterile milk from a new operation. During initial production runs, heavy testing of incubated product can generate data on the microbiological profile of these products. After the process is validated, testing can be significantly reduced, but not eliminated. If contaminated products are found later in normal production that have a microbiological profile significantly different from this baseline, it would be necessary to determine whether: 1) The failure occurred as a result of an intrinsic control problem at a CCP; and/or 2) The monitoring system failed to detect an out-of-control situation at a particular step in the process. A further hazard analysis may be necessary, and this is likely to require the advice of an expert microbiologist and investigative testing.

ENVIRONMENTAL TESTING

The environment, as represented by facilities and equipment, is a frequent source of contamination, particularly with pathogens, and should be a critical control point in most HACCP plans. If the environment is contaminated, finished product contamination is a threat. This control is usually exercised through the pre-op review prior to the start of operations, but there should be a continual observation throughout the day for any potential sources of contamina-

tion of the product, equipment, or facilities.

Control of the environment is never absolute and monitoring by visual observation will not ensure control. Therefore, a regular program of environmental microbiological testing with swabs is essential to verify that the cleaning and sanitizing program is effective and that pathogens of concern are not present in the environment. Generally processors prefer to conduct alternative programs to ensure that the environmental CCP is under control rather than to do finished product testing. Microbiological testing is not absolute because small sample sizes are usually used with their attendant lower degree of confidence. Confidence in a processor's ability to control the environment and finished product is achieved through a history of testing of the environment and finished product over time.

Environmental sampling employs an investigational approach rather than a random one. The purpose is to find those areas that are most likely to be contaminated and hidden "growth niches," so that these areas are preferentially sampled. A processor needs to know if pathogens, which might contaminate the finished product, are present in the environment. This requires greater ingenuity than random sampling, as knowledge of the most vulnerable areas must be based on microbiology and experience with the process. A thorough sampling of the environment must include floors, walls, ceilings, fixtures, floor drains, and air, as well as equipment and food contact surfaces (Table 1). The objective of investigational sampling of the environment is to ascertain the "worst case scenario" that the environment presents to the product.

In the past, the time required for microbiological testing obviously precluded it as a means of monitoring a CCP. Now, however, there are several systems available based on bioluminescence-ATP technology that provides results in minutes (8). While the systems are not as sensitive as routine tests, they are useful in many situations and are being used as monitoring tools.

Table 1. American Meat Institute plant environmental survey; post heating survey

Location	% pastive <i>L. manacytagenes</i>
Floors	37%
Drains	37%
Cleaning aids	24%
Wash areas	24%
Sausage peelers	22%
Food contact surfaces	20%
Condensate	7%
Walls and ceilings	5%
Compressed air	4%

The frequency of environmental sampling will vary with the process and experience with it. While the sampling should be investigational, the scheduling should be random. A history of good results would indicate that less testing is needed, as long as the investigational testing has been thorough, and a history of poor results or problems would dictate more frequent testing and corrective actions.

Regardless of the sampling procedures, quantitative tests for total numbers, i.e., aerobic plate counts, are generally conducted to determine whether cleaning procedures have been adequate. In this connection, it is important to include in the sampling those areas which are most difficult to clean lest the impact of faulty cleaning practices be ignored. It is also essential to periodically analyze environmental samples for specific organisms such as *Salmonella*, *Listeria*, yeast, molds, and other specific agents of concern to obtain a complete picture of environmental control. It is important that a processor be aware of what organisms, particularly pathogens, are present.

Microbiological sampling studies may be carried out to determine how frequently equipment should be cleaned and sanitized, and ensure that areas of the environment do not harbor microbial growth during process-

ing. It is necessary to establish the microbial contribution of the product to the equipment and determine how long it takes before active growth occurs and how these organisms become distributed during processing. Factors to be taken under consideration should include: what is the build-up of microorganisms on the equipment, facilities, and product throughout the day during processing and what health risks are created. Effective cleaning schedules can then be established from this data, as well as possible changes to the process and equipment.

Environmental studies should also be considered to determine such things as: how microorganisms are spread from raw material areas to finished product areas, how employee and vehicular movement affects the distribution of organisms, how cleaning practices can be improved, and how organisms move from non-contact areas to food contact areas. Use of such studies can make a HACCP plan more effective and improve the overall operation.

In dry operations, experience has taught us that verifying that the environment is free of contamination is essential. A number of areas reflect the microbiological condition of processing environments. These include floor sweepings, dust collectors, and air filters. If samples are found to

contain *Salmonella*, for example, finished product contamination is inevitable, despite negative results in routine sampling and testing. Furthermore, certain samples directly relate to the condition of finished product (salvage or scrap material from chocolate operations, tailings from dried milk production, and static material on packaging equipment). Materials from these areas are virtually the same as the finished product, and samples taken from them are more likely to reveal unwanted environmental contamination than finished product. If such samples prove to be negative for a specific pathogen, then the probability of the finished product's freedom is very high.

Verification that the environment is free of contamination by hazardous microorganisms is essential. Regular sampling of the environment is important, since a new source of contamination may occur at any time and likely would go undetected through visual observations alone. If negative results are consistently found using sufficiently stringent environmental sampling programs, then company will have a relatively high degree of assurance that the environment is not a source of finished product contamination. Verification, through conventional microbiological tests of the process environment, must be an integral part of an effective HACCP plan.

SUMMARY AND CONCLUSION

Microbiological testing plays an essential and varied role in a HACCP plan. It is only through microbiological testing that the safety of the products produced and the effectiveness of a HACCP plan can be verified. Considering the cost and time involved in developing a HACCP plan, the company liability associated with producing an unsafe product, and the potential loss of business or customer goodwill the importance of verifying the effectiveness of a plan become obvious.

Microbiological testing is used to verify the effectiveness of cleaning and sanitizing procedures, the CCPs,

and the finished product. Testing studies are also used to assist in the identification of the hazards and critical control points of a process and to determine the presence of pathogens in the environment. In addition, microbiological studies are useful in determining the build-up and movement of pathogens and other organisms throughout the facility during processing. Where products to be used by at-risk groups are produced, microbiological testing may be used to monitor the safety of ingredients or the finished products. In these cases, the ingredients or products are held until the test results are received. Microbiological testing has an indispensable role in the HACCP system.

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*This reprint article has not been reviewed by the DFES Editorial Board.

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Foodborne Outbreaks in California

1993-1994

Reprinted from California Morbidity • May 19, 1995 • #19/#20

One hundred-eleven foodborne illness outbreaks were reported to the California Department of Health Services (CDHS) in 1993 and 1994. Foodborne outbreaks were reported each month, peaking in early fall (Figure 1). These outbreaks resulted in 2,366 individual cases of foodborne illness, and 3 reported deaths (2 due to *Salmonella* and 1 to *Escherichia coli* [*E. coli*] O157:H7). Outbreaks ranged in size from single cases of chemical poisoning or botulism to 140 cases among students at a middle school who consumed taco salad prepared by a cafeteria worker with nasal carriage of *Staphylococcus aureus*. Of the 111 foodborne outbreaks, 37 (33%) had a confirmed etiology, 32 (29%) a suspected etiology, and 42 (38%) an unknown etiology. Of outbreaks with a confirmed etiology, 32 (87%) were due to bacterial agents, 2 (5%) to viral agents, 2 (5%) to chemical agents, and 1 (3%) to a parasitic agent (Figure 2). Of outbreaks with a confirmed bacterial etiology, *Salmonella* was most commonly identified (20 outbreaks, 527 cases). The most common *Salmonella* serotypes responsible for these outbreaks were *S. enteritidis* (11 outbreaks, 154 cases), *S. typhimurium* (4 outbreaks, 202 illnesses), and *S. heidelberg* (2 outbreaks, 57 cases). There were 3 outbreaks due to other *Salmonella* serotypes (114 cases). *Shigella* was the second most commonly identified bacterial agent (4 outbreaks, 95 cases), followed by *Staphylococcus aureus* (3 outbreaks, 175 cases) and *E. coli* O157:H7 (3 outbreaks, 47

cases), then *Clostridium botulinum* (2 outbreaks, 3 cases) (Figure 3).

In 1993 and 1994, two multistate outbreaks of *E. coli* O157:H7 were reported (1, 2). The first, associated with hamburgers from a fast food chain restaurant, occurred from November 1992 through February 1993 and affected four states. San Diego County reported 34 cases (6 culture-confirmed), 1 of whom died. The second occurred in November/December 1994 and was associated with commercially produced dry-cured salami with cases reported in Washington and California. Four cases were identified in California, three of whom were culture-confirmed and another had serologic evidence of infection. A third outbreak of *E. coli* O157:H7 occurred in Mendocino County in July 1993 and was linked to homecooked hamburger purchased at a local market (3). There

were ten identified cases, three of which were culture-confirmed. Four of 15 hamburger samples from the implicated market were culture-positive and had the same phage type as the cases.

During the first three months of 1993, three *S. enteritidis* outbreaks occurred in separate southern California counties. In all three outbreaks, dishes prepared with raw or undercooked eggs, such as omelettes, hollandaise/bearnaise sauces, or mayonnaise prepared at restaurants, were epidemiologically implicated. Cultures of patients in all three outbreaks and a shipment of eggs used to make the implicated mayonnaise from one outbreak yielded identical phage and plasmid profile types. In all three outbreaks, the eggs were traced to the same large distributor. A trace-back to the farm of origin was not pursued since eggs from different

Figure 1. Foodborne outbreaks by month of onset, California, 1993-94.

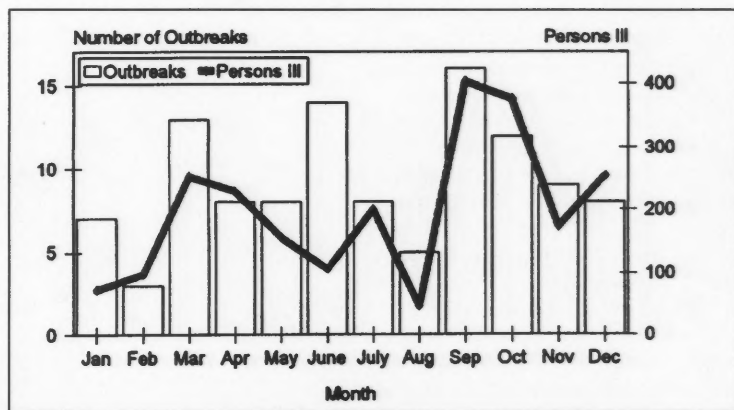
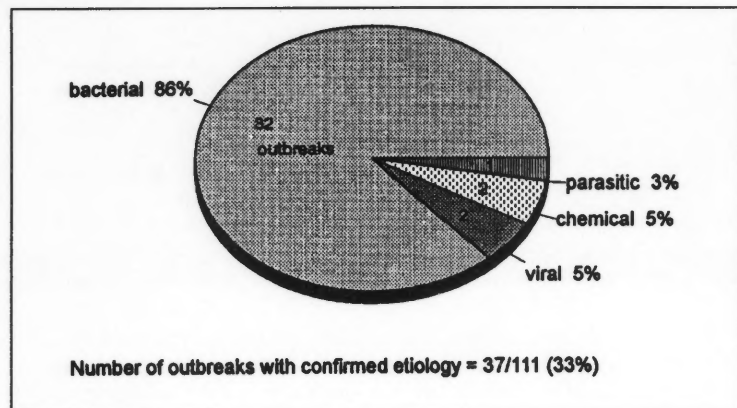


Figure 2. Distribution of 37 foodborne outbreaks with confirmed etiology, California, 1993-94.



farm sources were mixed at the distributor and USDA procedures limit trace-backs to source flocks when only one flock can be clearly implicated.

In September and October of 1994, a multi-state outbreak of *S. enteritidis* associated with Schwan's ice cream produced in Minnesota. Schwan's ice cream is distributed to 48 states, including California. In September 1994, members of five families from Sacramento and Yolo Counties reported gastrointestinal illness after consuming Schwan's ice cream. Six stool cultures from three of the families were confirmed as *S. enteritidis* by the Microbial Diseases Laboratory of CDHS. One hundred forty two cases were reported from Minnesota, South Dakota, and Wisconsin (5).

The largest reported *Salmonella* outbreak occurred in Tulare County in September 1994 among a group of Hmong immigrants from Laos. Illness was attributed to the consumption of raw beef in a traditional dish known as "lahb" which was served at a family celebration attended by approximately 200. Of these, more than 130 sought medical treatment, including a 2-year-old boy who died. *S. typhimurium* was cultured from both the implicated beef and 11 patient stools. The family hosting the gathering had purchased the steer from a local ranch and slaughtered it on site. It was then butchered and

prepared at the home of the family who hosted the gathering. Prior to preparation, the raw beef had been left unrefrigerated for seven hours at a time when the weather was unseasonably warm.

Another *Salmonella* outbreak, occurring among Hmong attending a gathering in San Joaquin County, was also attributed to "lahb," this time prepared with raw pork. Of 45 who attended, 28 (62%) reported illness. The pork was obtained from a local ranch/custom slaughter facility. The animal was slaughtered, skinned, eviscerated, and inspected at the site. The family transported the pork home where it was refrigerated and then prepared it on a sheet of plastic on

the garage floor. Some of the pork was cooked but some was served raw in the "lahb." Cultures of raw pork and 17 stools yielded *S. typhimurium*.

Raw pork, used to prepare another "lahb" dish, was epidemiologically implicated in an outbreak of trichinosis in October 1993 in Tulare County among several Mien immigrant families from Laos who had obtained the pork from a local hog ranch. Ten cases were confirmed by serology or biopsy; however, efforts to identify *Trichinella* larvae in the small portion of leftover pork or diaphragmatic samples taken from the ranch at slaughter were unsuccessful.

Two outbreaks of botulism occurred in 1994 as a result of improper storage of commercial foods. The first episode occurred in June 1994 when clam chowder, vacuum packaged in a plastic bag, was purchased from the refrigerated section of a supermarket and was subsequently stored at room temperature for one month prior to serving despite a "keep refrigerated" label. The soup was consumed by two individuals though they claimed that it "tasted bad," with one consuming a few spoonfuls and the other a bowl and a half. Both were subsequently hospitalized, the latter for over a month on respiratory life support. The second episode occurred in September 1994 when a commercial bean dip, purchased from the refrigerated section of the store, was stored at room temperature for three

Figure 3. Distribution of 32 foodborne outbreaks with confirmed bacterial etiology, California, 1993-94.

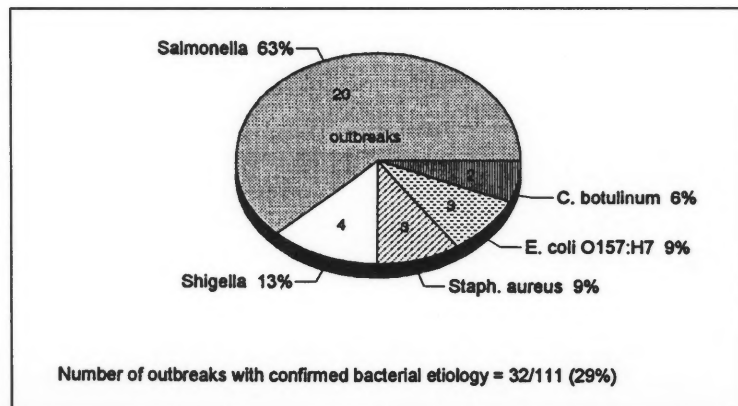


TABLE 1. California Department of Health Services—Division of Communicable Disease Control—Surveillance and Statistics Section—California, Selected Reportable Diseases Week 19 Ending 5/13/1995

Disease	Cases Reported for Period			Cases Reported to Date		
	1995	1994	1993	1995	1994	1993
Aids ¹	-	-	-	3,124	4,625	9,395
Amebiasis	14	19	29	338	351	445
Anthrax	-	-	-	-	-	-
Botulism:						
Foodborne	-	1	-	-	1	-
Infant ¹	-	-	-	5	12	7
Wound	-	-	-	4	6	1
Brucellosis	-	-	-	4	8	6
Campylobacteriosis	53	141	133	2,321	2,309	2,138
Chancroid ¹	-	-	-	4	16	54
Chlamydial Inf. ²	188	790	965	18,048	29,250	26,504
Cholera	-	-	-	2	2	4
Coccidioidomycosis	8	36	119	367	1,383	1,807
Conjunct. Newborn	-	1	-	22	18	17
Cryptosporidiosis	3	13	2	131	150	111
Cysticercosis	1	2	4	42	51	56
Dengue	-	-	-	4	2	2
Diarrhea, Nwb. O/B	-	-	-	-	-	-
Diphtheria	-	-	-	1	-	-
Encephalitis:						
Arboviral	-	-	-	-	-	-
Primary and other	1	5	2	28	42	46
Post-infectious	-	-	-	1	4	11
<i>E. coli</i> O157:H7	2	-	1	21	17	12
Foodborne Illness:						
Outbreaks	-	1	1	13	19	21
Cases	-	57	20	377	486	386
Giardiasis	39	114	161	1,729	2,214	2,452
Gonococcal Inf. ²	57	262	230	7,792	10,628	11,700
Granuloma Ing. ¹	-	-	-	-	-	1
Haemophilus Inflnz.	-	-	3	82	72	90
Hepatitis:						
Type A	49	96	78	2,375	2,190	1,939
Type B	23	43	28	665	792	814
Type D	-	-	2	-	1	5
Non-A/Non-B	4	10	8	158	182	252
Unspecified	-	3	2	60	59	76
Kawasaki Syndrome	2	1	3	50	43	102
Legionellosis	2	1	9	44	21	33
Leprosy	-	-	-	24	12	31
Leptospirosis	-	-	-	-	-	-
Listeriosis	-	-	1	42	33	40
Lyme Disease	-	-	4	16	20	58
Lymphogranlma Ven. ¹	-	-	-	1	5	5
Malaria	1	1	4	56	80	95

TABLE 1. Continued

Disease	Cases Reported for Period			Cases Reported to Date		
	1995	1994	1993	1995	1994	1993
Measles:						
Total	-	-	1	86	26	5
Indigenous	-	-	1	85	22	4
Imported	-	-	-	1	4	1
Meningitis, Viral	9	20	35	316	339	615
Meningococcal Inf.	9	44	7	178	191	149
Mumps	1	13	10	80	93	124
NGU ²	15	63	152	2,057	2,685	3,342
Pertussis	6	10	-	114	186	141
PID ²	10	25	39	804	723	1,031
Plague	-	-	-	1	1	-
Poliomyelitis	-	-	-	-	-	-
Psittacosis	-	-	-	6	2	1
Q Fever	-	-	-	-	2	1
Rabies:						
Animal	-	7	3	104	85	145
Human	-	-	-	-	-	-
Relapsing Fever	-	-	-	1	-	1
Reye Syndrome	-	-	-	-	4	-
Rheumatic Fever	-	-	1	3	4	10
Rocky Mtn. Spot. Fvr.	-	-	-	-	-	-
Rubella	-	-	-	11	14	15
Rubella, Congenital	-	-	-	3	2	2
Salmonellosis	54	71	114	1,729	1,640	2,085
Shigellosis:						
Total	47	43	71	1,105	1,167	1,245
Group A	-	-	3	14	17	16
Group B	12	17	25	451	445	489
Group C	2	1	-	21	15	25
Group D	27	12	27	460	507	535
Group Unspecified	6	13	16	159	183	180
Syphilis ¹ :						
Total	-	-	-	1,200	3,303	4,361
Primary	-	-	-	55	179	223
Secondary	-	-	-	90	192	309
Early Latent	-	-	-	329	884	1,320
Late and Late Ltn.	-	-	-	697	1,880	2,356
Congenital	-	-	-	29	168	153
Tetanus	-	-	-	2	1	1
Toxic Shock Syndrome	1	1	-	11	21	13
Trichinosis	1	-	-	2	10	1
Tuberculosis	18	74	26	1,203	1,818	1,643
Tularemia	-	-	-	-	-	1
Typhoid Fever	1	1	3	20	24	43
Typhus Fever	-	-	-	3	12	1
Vibrio Infections	-	-	-	7	7	3
Yellow Fever	-	-	-	-	-	-

¹ Reported monthly only. See monthly summary.

² Reports for San Francisco and Los Angeles updated monthly.

weeks prior to consumption despite a "perishable, keep refrigerated" label on the container. The bean dip was consumed by a single individual who claimed it "smelled bad." This individual was subsequently hospitalized and received antitoxin treatment. In both episodes, type A botulinal toxin was demonstrated in clinical specimens as well as in the left-over foods mentioned above.

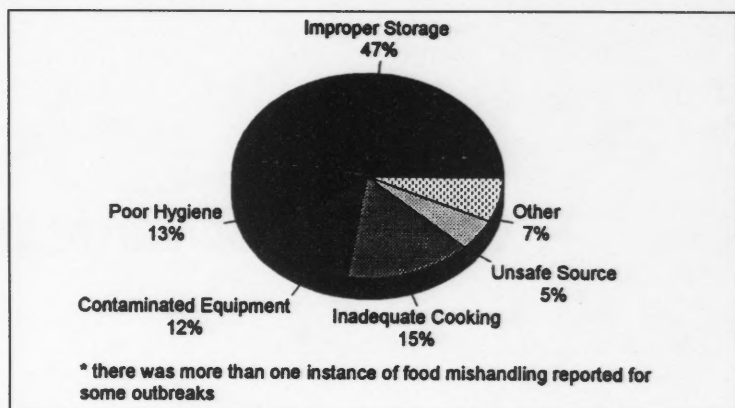
Specific food items acting as a vehicle were epidemiologically implicated in 75 of the 111 foodborne outbreaks. The most commonly implicated vehicles were fish and shellfish (13 outbreaks), followed closely by poultry (11 outbreaks) and beef (11 outbreaks), then Mexican food (8 outbreaks), eggs or dairy products (8 outbreaks), pork (5 outbreaks) and vegetables (2 outbreaks). One or more types of food mishandling were reported in 57 of the 111 foodborne outbreaks. The most frequently reported type of food mishandling, improper storage or holding temperature, was reported in 47 outbreaks, followed by inadequate cooking in 15 outbreaks, poor personal hygiene of food handlers in 13 outbreaks, contaminated equipment or working surfaces in 12 outbreaks, and an unsafe source in 5 outbreaks (Figure 4). The site of food preparation was reported for 110 of the 111 foodborne outbreaks. Most common were commercial settings such as restaurants, delicatessens, and cafeterias (79%), followed by homes (17%), and institutions such as schools, churches, and camps (4%).

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Editorial Note: A foodborne outbreak is defined by the Centers for Disease Control and Prevention as an incident in which two or more persons experience a similar illness following consumption of a common food item. The exceptions to this definition include single cases of botulism or chemical poisoning.

In California, local health departments are required to report information about foodborne outbreaks iden-

Figure 4. Reported mishandling of food in 57 foodborne outbreaks, California, 1993-94.



tified in their jurisdictions. This information is utilized at both the state and national level to monitor trends in foodborne illness, identify new vehicles and new etiologies, and target problem areas. Measures to control an outbreak can include product recall, temporary removal of infected food handlers, and correcting deficiencies in commercial processing.

Several of the outbreaks demonstrate how commercial food products can pose a hazard under certain conditions. For instance, two outbreaks of botulism occurred when commercial food products were not refrigerated properly. A fail-safe mechanism, such as acidification of the food product to \leq pH 4.6, would prevent elaboration of the botulinal toxin in the event that proper refrigeration was not maintained. Warning labels on the product packages could alert consumers to the health hazards of failing to refrigerate food items. The outbreak of *E. coli* O157:H7 resulting from contaminated salami reflects inadequacy of present processing methods to eliminate *E. coli* that may be present. Laboratory studies had previously demonstrated that *E. coli* O157:H7 can survive the fermentation, drying, and storage process used in making sausage (6). Some manufacturers now test for *E. coli* O157:H7 to ensure the safety of their product.

The three large *Salmonella* outbreaks which occurred among Laotian ethnic communities raise con-

cern about the hazard of some traditional foods. Using raw meat in such dishes as "lahb" conflicts with current guidelines for safe food preparation. Efforts have been made by local health departments to educate community members about the hazards of consuming raw or undercooked foods of animal origin. Constant reminders and education of the public at large about safe food-handling practices is important in reducing the incidence of foodborne illness.

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Will HACCP be Carrot or Stick?

Richard F. Stier and Michael M. Blumenthal, Ph.D.

For an old system, Hazard Analysis Critical Control Point (HACCP) programs have received a lot of attention recently. On Jan. 21, 1994, the Food and Drug Administration proposed rules that require the seafood industry to apply food safety practices based on HACCP principles. The agency will inspect those seafood processing plant records, too, to make sure the rules are being followed.

"This system of mandatory controls draws its strength from one simple principle: the notion that the best way to provide safe, high-quality food is to build safety in during processing," said F.D.A. Commissioner Dr. David A. Kessler.

No official regulatory description of HACCP has yet been published by F.D.A., nor has the agency suggested it will propose similar rules for other food processing industry segments. Yet the message is clear: We all have HACCP in our futures.

There are many baking and snack food companies who have successfully implemented HACCP and many more who are in the process of doing so. This article addresses the benefits of the HACCP system for the food industry.

HISTORY OF SUPPORT

What we know as HACCP today has its roots in a 1960s project to determine and control *Salmonella* risk in foods. Food poisoning posed an unacceptable risk to the fledgling

space program with its tiny flight capsules. Work done at the U.S. Army Laboratories in Natick, Mass., and at NASA1 taught food researchers that existing inspection systems based on testing of finished products would not provide the safety levels required.

The Pillsbury Company was the first to use HACCP-style practices to assure the safety of foods packed for the space program. This company also developed the first HACCP training manual, a manual that was used to educate F.D.A. investigators in HACCP principles.

HACCP received a big boost in 1985 from the National Academy of Sciences (N.A.S.) when it published *An Evaluation of the Role of Microbiological Criteria for Foods and Ingredients* (2). N.A.S. stated that HACCP "provides a more specific and critical approach to the control of microbiological hazards than that achievable by traditional inspection and quality control procedures."

And like the Natick and NASA scientists, the report also concluded that testing of finished products was not an effective means of protecting the consumer and assuring the foods were free of microorganisms of public health significance.

The United States National Advisory Committee on Microbiological Criteria for Foods (N.A.C.M.C.F.) developed and updated the HACCP system in 1989 (3). This updated system, as noted in Table 1, incorporates seven principles and has been endorsed by the regulatory agencies as

an "effective and rational approach to food safety."

Table 1

HACCP Principles (3)

1. Assess risk associated with growing, harvesting, raw materials and ingredients, processing, manufacturing, distribution, marketing, preparation and consumption of food.
2. Determine critical control points (CCPs) required to control the hazards.
3. Establish critical limits that must be met at each CCP.
4. Establish procedures to monitor CCPs.
5. Establish corrective actions to be taken when a deviation occurs.
6. Establish record-keeping protocols which document the system.
7. Verify that the system is working.

The Food Safety and Inspection Service (F.S.I.S.) of the U.S. Department of Agriculture has stated that it wishes to implement HACCP in all applicable meat and poultry activities and is actively pursuing that goal. Dr. Russell Cross of F.S.I.S. said, "We believe that the HACCP system coupled with strong risk assessment programs, is the food safety system of the future... And the future is now."

The National Marine Fisheries Services (N.M.F.S.) and the National Fisheries Institute have been developing HACCP models for different

seafood products, models which are available from the two organizations (4). Among the models which have already been developed include those for retail operations, lobster, scallops, molluscan shellfish processing, cooked shrimp, raw fish, imported products, cooked shrimp, breaded fish and specialty items, blue crab, breaded shrimp, West Coast crab and raw shrimp.

As noted, F.D.A. is very interested in HACCP (5). In addition to the seafood inspection program just proposed, the agency also created a HACCP branch in Washington with a HACCP Team Leader heading up the program. The Canadians also use a HACCP approach to food safety with their Quality Management program (6).

The bottom line is that the regulatory agencies in the United States and Canada that are responsible for assuring the production of a safe and wholesome food supply have all decided that HACCP is an excellent means to achieve this goal—a rational approach to food safety.

FOOD INDUSTRY IMPACT

So where does that leave food processors? Will HACCP become mandatory for all processors? If so, how will this be achieved? Where will the money and resources come from to implement the program? These are questions that the authors cannot answer. It is obvious, however, that the industry has and will remain under greater scrutiny and pressure to produce safe food. HACCP is one system that can help achieve that objective. The question is, can it be done economically?

This presentation is not aimed at answering these questions, but on showing how HACCP can benefit the food processor. Before moving onto the benefits, let us touch on some of the perceived "negatives," especially for the "little guy"—the small commercial baker or snack food manufacturer.

HACCP implementation and maintenance is not easy. It requires management commitment; an understanding of the system and its prin-

ciples; an understanding of potential biological, chemical and physical hazards; a commitment of resources to monitor the system and keep records; and a degree of technical sophistication which may not be present in some companies, especially a small operation. There may also be capital costs for equipment or equipment modifications. In other words, money will have to be spent. Implementing HACCP also takes time. Most experts estimate that development, installation and implementation of a HACCP system will take between six months and two years.

Everything costs. The question is: Do the benefits outweigh the costs?

There are two ways to look at the benefits of any system. These may be called negative and positive, or negative and positive reinforcement.

With negative reinforcement, the rationale is: "If you do not do this, bad things can happen." In other words, it is preventive. Proponents may be perceived as harbingers of doom or naysayers.

Positive reinforcement says: "If you do this, these are the good things that may happen." This is a better way to sell a system. It also encourages people to want to improve.

DEALING WITH "NEGATIVES"

Too many proponents of HACCP have been using negative reinforcement as a means to sell the system to the industry. The arguments which may be called negative reinforcement include:

- It will be mandated, so you better do it.
- The system minimizes the potential health risks of the food you produce.
- You can reduce consumer complaints.
- Recalls cost money, and HACCP will minimize that potential.
- Adverse publicity from a problem can damage your business and sales.
- A major problem could result in you being shut down.

Each of these reasons for implementing HACCP implies that you have

had or may have problems that HACCP could fix or minimize. On the "carrot vs. stick" scale, this is the stick: Do it or else. These reasons are valid, but they may not be the best way to sell a system. Let's look at these six reasons and examine their validity.

Mandated by the regulatory agencies—This is reality. At this time, HACCP is voluntary, and the agencies are encouraging participation. N.M.F.S. is especially active, and the F.D.A. proposal for seafood inspection was just announced. Consumer pressure, congressional pressure and adverse publicity may push this program from voluntary to mandatory. Many believe that is precisely the direction Congress is going, so the word is out to begin preparing to implement HACCP. Being told that you have to do something is no way to get wholehearted support for a program.

Minimizes health risks—HACCP is designed to reduce health risks from biological, chemical and physical hazards. This is the reason that N.A.S. endorsed the system and why N.A.C.M.C.F. modified the HACCP system. It is a common sense approach to food safety, but telling people that their products will be safer can be tantamount to telling them there is something wrong with what they are doing now. If a company has never had a problem with illnesses or injuries caused by their products, this may not be the right tack.

Reduction in consumer complaints—Consumer or buyer complaints provide producers with a "report from the field" on product performance—both good and bad. Not every food processor has a system to handle complaints, and many companies maintain no records of such incidents. Although this is listed as a "negative," the importance of having an effective consumer complaints network cannot be overlooked, as noted in Table 2. Complaints are an excellent index of product acceptance. It would behoove all companies to establish a system for dealing with complaints.

Table 2

The Hidden Costs of Consumer Complaints

§ Statistics show that for every customer who complains, 26 others remain silent.

§ The wronged customer will tell eight to 16 people of their problem; some may tell 20 or more.

§ 91% of unhappy customers never purchase goods or services from you again.

§ If an effort is made to remedy complaints, 82% to 95% will stay with you.

§ It costs five times as much to attract a new customer as retain an old one.

Expensive recalls—Recalls are expensive; there is no doubt about that. They are even more so if there is a potential health hazard. The losses include the packaging material; the product involved; the shipping and pickup costs; the hours lost to produce the product, collect it, evaluate it and dispose of it; the costs for testing; and the potential for lost customers.

Such savings are measured in potential terms, but they can be substantial. Once Pillsbury, a HACCP pioneer, had put its programs to work, it went 17 years without any Class I or II recalls (8).

Adverse publicity—Recalls or any of the issues noted here as "negative reinforcement" do generate adverse publicity. The bad press may come through trade publications such as *Food Chemical News*, which prints lists of all recalled or embargoed products, as well as investigative consumer media such as *CBS 60 Minutes*.

Plant closures—If a problem is bad enough, the plant may shut down, resulting in lost jobs, law suits and innumerable other problems. This happens very rarely, but it could. A functioning HACCP system can greatly reduce the chances for any of these great traumas to occur for a processor. They will not eliminate the concern, but the probabilities are significantly reduced. They are all valid reasons, but, again, show the potential HACCP user the stick.

REINFORCING POSITIVES

So, what are the carrots that HACCP can offer processors who implement the program? Among the potential carrots, or positive reinforcements, are:

- The operation can become a more desirable supplier or producer, particularly if you are a supplier to—or hope to supply—large clients.

- The operation can become a more desirable co-packer.

- Processors can influence their suppliers to adopt a similar approach to food (ingredient or raw materials) safety.

- There is the perceived sense of enhanced quality.

- There is the potential for actually improving quality.

- Operators gain a better understanding of their operations, which gives them better control of the operation (process optimization).

- Employee morale can improve because of an enhanced sense of ownership in the product and process.

- HACCP implementation, without regulatory pressure, can put you in a position where you are part of the rule-making process should it occur in the future.

- Finished product sampling, which destroys potentially salable goods, may be reduced.

- Waste can be reduced.

- You have better control of your products in the plant and after they leave.

- There is a potential for reduced product liability and other insurance.

In most operations, HACCP is coordinated by the quality control group, with input from all operating groups within the plant or company. The team approach is essential for HACCP to work effectively. The point the authors wish to make is this: A HACCP system can become a cost-savings center, or a means to make money, instead of a cost-raising operation.

More desirable supplier or producer—Companies who have implemented HACCP or other systems designed to assure the consistent production of high quality or safe ingredients or products have become very desirable.

There are many companies that require that all their suppliers have HACCP in place. One large buyer who comes to mind is McDonald's. Being a supplier to a company such as this is a sure road to success, provided you meet their standards.

A well-organized and documented HACCP plan allows a company to solicit clients with the promise that they can produce safe food. Operations with HACCP systems definitely make themselves more desirable to the safety and quality minded purchaser.

More desirable co-packer—Many food processors make a fair percentage of their money as contract packers. With HACCP in place, an operation is much more attractive to companies who use outside packers.

The nature of the HACCP system allows for expansion to other products, so adding new products shouldn't be a problem. If you are a contract packer, all you need to do is calculate the costs of downtime or lines not running. If implementing HACCP brings in other clients and allows you to go from a one- to a two-shift operation, or put an idle line into use, what is that worth in dollars and cents? This alone could pay for HACCP implementation and maintenance.

Influence your suppliers to adopt a similar approach to food (ingredient or raw materials) safety—Having a HACCP system in place can be used as a wedge to influence suppliers to adopt HACCP in their plants. Buying from suppliers that have HACCP in place can assure a steady supply of safe ingredients and raw materials, provide for easy troubleshooting if there is a problem and reduce or eliminate the need for destructive sampling of incoming materials. This kind of relationship can help a producer move to a just-in-time inventory system.

Perceived sense of enhanced safety and quality—Once HACCP is in place, workers and management begin to develop a sense that the foods they are producing are better, both from a quality and safety standpoint. This may come from an en-

hanced understanding of the operation or from increased worker involvement, both of which are inherent features of a HACCP system.

Potential for actually improving quality—Along this same line, there is a real potential to produce higher quality products. HACCP is a system to assure food safety, but once you begin monitoring CCPs and more attention is paid to the safety issues, your whole operation can be lifted.

How is this beneficial? Well, each operation first must define what quality is to them. An example might be adherence to specifications. Assume that out-of-spec product decreased from 6% to 3% with HACCP implementation. Because the out-of-spec product is sold for lower prices, a significant increase in revenues is now earned. Improved quality may also allow you to charge a bit more, which will again help pay for the system.

Better understanding of operations (process optimization)—When developing a HACCP plan, one of the first steps is to examine and understand the process flow. Each piece of equipment, each unit operation, how the employees work and do their jobs, how maintenance operations are conducted, how cleaning and sanitizing is done, the condition of the building, how raw product and ingredients are received, held and handled must be examined. In other words the whole operation is scrutinized.

The HACCP team, charged with developing the plan, should consist of individuals from throughout the operation, including quality control/quality assurance, production, warehousing, receiving and purchasing. The understanding gained by looking closely at a process or product and attempting to understand what makes it tick can lead to enhanced efficiencies.

For example, in the production of fried snacks, an understanding of the process, including frying oil chemistry and degradation rates, can allow systems to be implemented to improve oil life and, hence, usage. That's a cost savings that can be easily measured.

Employee morale—This is a benefit that is hard to evaluate. Since HACCP is a systems approach, one of the keys to making the program work is convincing staff of its value. They are the ones who will be involved in monitoring when it is implemented. So you must get labor, particularly in a unionized plant, involved in the planning. When people feel that they are part of a program, they develop a sense of ownership. With a sense of ownership, there is a sense of pride. And with the sense of pride comes a greater care in doing a job (9). All this leads to greater efficiencies.

Rule-making process—It has already been noted that the regulatory agencies are very interested in HACCP, and there is a good chance that it will become mandatory for food processors. If processors adopt HACCP now and get it going (or simply learn all they can about the program), they will be in a position to contribute intelligently and constructively to the regulatory process.

Finished product sampling—HACCP is a system that focuses attention on process control. CCPs throughout the process are monitored regularly, and records are maintained. Procedures are established for quick reaction to any deviations at the CCPs. If the system remains in control, the finished product should be safe and wholesome, and therefore, the need for finished product sampling is reduced, even eliminated in some cases. This can save money in several ways.

When finished products are tested, they are inevitably destroyed, and the costs involved in producing that item are lost. Quality staff must also be assigned to collect samples and do the analyses—another set of costs. By assuring safety during processing with HACCP, the resources expended looking at finished product can be devoted to process control and optimizing the process.

Waste reduction—Every food plant has waste, and waste means lost revenues. Waste can be product that falls on the floor, materials that are out-of-spec, product that is abused, loss from a trimmer or slicer not adjusted properly, product returned because of sensory or other quality

concerns, or product that becomes contaminated through insanitary operations. One expert (10) estimates that 20% to 25% of all sales dollars pay for what could be called "waste" stemming from failure to do things properly the first time around. The control and understanding of the process that HACCP provides can help to eliminate such losses.

Better control of your products—N.A.C.M.C.F. stated that HACCP, as a system, must be tailored to an individual company's production, processing, packaging, distribution and retail systems. This, as mentioned earlier, implies that processors must understand not only how their products are manufactured or handled in the plant but also what happens to them when they leave. This should provide better control of products throughout their production and distribution cycle.

Among the things that food processors could employ to ensure the safety (and quality) of their products are time-temperature indicators or shipping programs that require all trucks to carry functioning temperature recorders. This will provide control during distribution. Similar programs could be developed with suppliers. The bottom line is simple: Understanding equals control.

Reduced product liability and other insurance—In a litigious society like ours, insurance takes a large bite out of every company's revenues. Food processors, like every other business, must protect themselves. Having a HACCP program in place has the potential to reduce your insurance rates. In speaking with several processors and insurers about this issue, the authors found the processors all acknowledged that insurance rates could stand being reduced. The insurers stated that a system like HACCP could allow them to reduce liability and other insurance coverage. What would a 5% to 10% reduction in insurance rates save your company?

PUTTING HACCP TO WORK

The benefits and some disadvantages of HACCP have been laid out.

Let's assume that you have weighed these and decided that HACCP is for you. How do you go about making this system work?

The first thing that you need—and without this you are wasting your time—is support from top management: a commitment that they will provide the resources, both human and monetary, to make the system work. When Pillsbury first decided to implement HACCP, the C.E.O. publicly stated that all raises, promotion and evaluations would be based on developing and implementing this system to assure the production of safe food. That is a strong statement of support.

What everyone involved must realize is food safety is mandatory. It has to be top priority. By focusing on safety, progress on other issues, such as regulatory compliance and quality, will be carried forward, too.

Once management makes this commitment, a HACCP coordinator must be appointed. This person may be selected from quality control or quality assurance or another group, but most come from the quality group. He or she may require an education in HACCP. Be sure to provide it. Classes are one means of delivering the appropriate education. Another would be to engage a consultant.

Your team leader will be responsible for directing the program and building the HACCP team. Since this is a systems approach to safety, representatives from a variety of operating groups or divisions should be included. These selections should be made with management, so the individuals who are appointed understand that "the boss" is behind the program. Your team should be representative but not so large as to be unwieldy. Include persons from R&D, production, warehousing, engineering, purchasing, labor and distribution. The leader must then instruct his team on HACCP and what the role of the team is.

The team then begins the arduous task of developing the HACCP plan. The plan should follow the principles described earlier. This is not easy and will require a learning period for all involved. For this reason,

it is recommended that you begin by developing a program for one product or one line in a plant. Work the "bugs" out on a reduced scale before trying to impose a system on the whole operation. Should you be a producer of one of the commodities for which N.M.F.S. has developed a HACCP model, use that as a guideline.

The next step is for your team to take the plan to the individual groups in the plant who will be using it. Have them look over the program, and revise it appropriately. Finalize the plan, and have management sign off on it.

Next, train those persons who will be responsible for the plan: the line people and floor supervisors. If they have been consulted in the preliminary phases, they will know what's coming and will likely be more amenable to the program.

Once training has been completed, implement the plan for that line. Watch what is happening, and make whatever adjustments are needed. Get input from the staff. Finalize the plan, and put it to work. What you may find is that as time goes by, a review of the records may show that a point you deemed to be a CCP is not so. The records will provide the data for revisions of the system.

Once the starter line has been fine-tuned, move on to the other systems. The HACCP team should remain in place, however. They will need to evaluate all changes to the program. This includes proposed new suppliers, products, equipment and line changes. A risk assessment should be done any time a change is contemplated. Any change will involve a modification of the plan.

Is HACCP for you? Each company will have to make this decision at some time, unless the regulatory agencies mandate it. Implementing HACCP is not easy. It will take time, money and perseverance, but there are many potential benefits, both negative (aimed at preventing problems), as well as positive, leading to cost savings, increased efficiencies, enhanced product quality, increased revenues and reduced expenditures

in other areas. This system can be beneficial to both small and large processors. HACCP has been shown to work, and a functioning HACCP system is something each processor should be able to exploit to their advantage.

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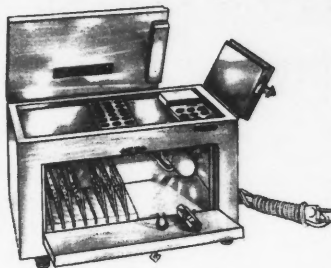
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* This reprint article has not been reviewed by the DFES Editorial Board.

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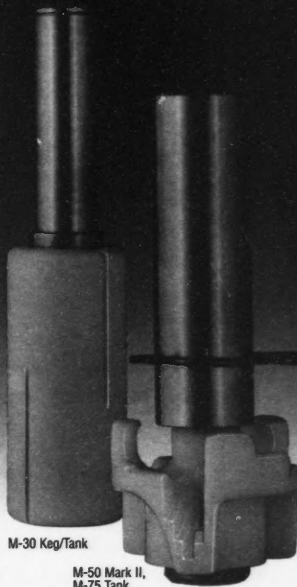
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Cryptosporidium—Guidance for People with Severely Weakened Immune Systems

INTRODUCTION

Cryptosporidium is a parasite commonly found in lakes and rivers, especially when the water is contaminated with sewage and animal wastes. *Cryptosporidium* is very resistant to disinfection, and even a well-operated water treatment system cannot ensure that drinking water will be completely free of this parasite. Current EPA drinking water safety standards were not explicitly designed to assure the removal or killing of *Cryptosporidium*. Efforts are now underway to resolve a number of scientific uncertainties that will enable EPA to set specific safety standards for this parasite in the future.

Cryptosporidium has recently caused several large waterborne disease outbreaks of gastrointestinal illness, with symptoms that include diarrhea, nausea, and/or stomach cramps. People with severely weakened immune systems (that is, severely immunocompromised) are likely to have more severe and more persistent symptoms than healthy individuals. Moreover, *Cryptosporidium* has been a contributing cause of death in some immunocompromised people. Individuals who are severely immunocompromised may include those who are infected with HIV/AIDS, cancer, transplant patients taking immunosuppressive drugs, and people born with a weakened immune system.

BACKGROUND

Data are not adequate to determine how most people become infected. For example, we do not know the importance of drinking water compared to other possible sources of *Cryptosporidium*, such as exposure to the feces of infected persons or animals, sex involving contact with feces, eating contaminated food, or accidentally swallowing contaminated recreational water.

Thus, in the absence of an outbreak, there are insufficient data to determine whether a severely immunocompromised individual is at a noticeably greater risk than the general public from waterborne cryptosporidiosis. Even a low level of *Cryptosporidium* in water, however, may be of concern for the severely immunocompromised, because the illness can be life-threatening. The risk of a severely immunocompromised person acquiring cryptosporidiosis from drinking water in the absence of an outbreak is likely to vary from city to city, depending on the quality of the city's water source and the quality of water treatment. Current risk data are not adequate to support a recommendation that severely immunocompromised persons in all U.S. cities boil or avoid drinking tap water.

In the absence of a recognized outbreak, this guidance has been developed for severely immunocompromised people who may wish to

take extra precautions to minimize their risk of infection from waterborne cryptosporidiosis. To be effective, the guidance must be followed consistently for all water used for drinking or for mixing beverages. Studies have found that during outbreaks of waterborne cryptosporidiosis people who used extra precautions only part of the time were just as likely to become ill as people who did not use them at all.

GUIDANCE

EPA and CDC have developed the following guidance for severely immunocompromised people who may wish to take extra precautions. Such individuals should consult their health care provider about what measures would be most appropriate and effective for reducing their overall risk from *Cryptosporidium* and other types of infection.

Although data are not sufficient for EPA/CDC to recommend that all severely immunocompromised persons take extra precautions with regard to their drinking water, individuals who wish to take extra measures to avoid waterborne cryptosporidiosis can bring their drinking water to a rolling boil for one minute. The boiling of water is the most effective approach for killing *Cryptosporidium*.

As an alternative to boiling water, people may use the following measures:

• A point-of-use (personal use, end-of-tap, under-sink) filter. Only point-of-use filters that remove particles one micrometer or less in diameter should be considered. Filters in this category that provide the greatest assurance of *Cryptosporidium* removal include those that use reverse osmosis, those labeled as "Absolute" one micrometer filters, or those labeled as certified by NSF International (National Sanitation Foundation) under Standard 53 for "Cyst Removal." The "Nominal" one micrometer filter rating is not standardized and many filters in this category may not remove *Cryptosporidium* reliably. As with all filters, people should follow the manufacturer's instructions for filter use and replacement. Water treated with a point-of-use filter that meets the above criteria may not necessarily be free of organisms smaller than *Cryptosporidium* that could pose a health hazard for severely immunocompromised individuals.

• Bottled water. Many, but not all, brands of bottled water may provide a reasonable alternative to boiling tap water. The origin of the source water, the types of microorganisms in that water, and the treatment of that water before it is bottled vary considerably among bottled water companies and even among brands of water produced by the same company. Therefore, individuals should not presume that all bottled waters are absolutely free of *Cryptosporidium*. Bottled waters derived

from protected well and protected spring water sources are less likely to be contaminated by *Cryptosporidium* than bottled waters containing municipal drinking water derived from less protected sources such as rivers and lakes. Any bottled water treated by distillation or reverse osmosis before bottling assures *Cryptosporidium* removal. Water passed through a commercial filter that meets the above criteria for a point-of-use device before bottling will provide nearly the same level of *Cryptosporidium* removal as distillation or reverse osmosis. Bottled waters meeting the above criteria may not necessarily be free of organisms other than *Cryptosporidium* that could pose a health hazard for severely immunocompromised individuals.

Neither EPA nor CDC maintains a list of point-of-use filters or bottled water brands that meet the above criteria. NSF International can provide a list of filters that meet the NSF criteria. The NSF address is 3475 Plymouth Road, P.O. Box 130140, Ann Arbor, Michigan 48113-0140; phone number (800)-NSF-8010. Individuals who contact bottlers or filter manufacturers for information should request data supporting claims that a brand of bottled water or filter can meet the above.

FURTHER INFORMATION

When an outbreak of waterborne cryptosporidiosis is recognized and is determined to be on-going, offi-

cials of the public health department and/or the water utility will normally issue a "boil water" notice to protect both the general public and the immunocompromised.

Current testing methods cannot determine with certainty whether *Cryptosporidium* detected in drinking waters is alive or whether it can infect humans. In addition, the current method often requires several days to get results, by which time the tested water has already been used by the public and is no longer in the community's water pipes.

Severely immunocompromised people may face a variety of health risks. Depending on their illness and circumstances, a response by such individuals that focuses too specifically on one health risk may decrease the amount of attention that should be given to other risks. Health care providers can assist severely immunocompromised persons in weighing these risks and applying this guidance.

Editor's note: Cryptosporidium in drinking water supplies has not been a problem in Mississippi since most cities and towns use water from sub-surface aquifers. The same may not be true for those obtaining water from rivers and lakes. Physicians requesting laboratory diagnosis for patients should specifically ask for *Cryptosporidium* since it is not identified by standard microscopic stool parasite examination.

Cryptosporidiosis is not reportable in Mississippi (except in outbreaks), so the actual number of cases is unknown.

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CALL FOR PAPERS

IAMFES
83rd Annual Meeting June 30-July 3, 1996
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Instructions to Prepare Abstracts

Procedure

- Type abstract in space provided on the abstract form. Abstracts must be double-spaced in a font size no small than 12 point. Left and right margins must be no less than 1/2 inch.
- Type in the title, CAPITALIZE the first letter of the first word and proper nouns.
- List the names of authors and institution(s). Capitalize first letters and initials.
- Give the name, title, mailing address and the office telephone number of the author who will present the paper.
- If the paper is to be presented by a student entered in the Developing Scientist Awards Competitions, check the box to indicate this and have the form signed by your Major Professor or Department Head.
- Check the most appropriate box to indicate the general subject area of the paper. Indicate subject if checking "other."

Mail two copies of the abstract before December 15, 1995 to:

Carol Mouchka
IAMFES
6200 Aurora Avenue
Suite 200W
Des Moines, IA 50322-2863

Enclose two self-addressed postcards. Two cards must be included with each abstract that is submitted. One will be returned to acknowledge receipt of the abstract and the other to notify the author of acceptance or rejection.

Content of the Abstract

The abstract should describe briefly: (a) the problem studied, (b) methods applied, (c) essential results, and (d) conclusions.

Presentation Format

Papers may be presented orally or by poster format at the discretion of the Program Committee. Oral presentations will be scheduled so a speaker has a maximum of 15 minutes, including a 2-4 minute discussion. Carousel projectors for 35 mm slides will be available.

Overhead projectors are not to be used and none will be available.

Subject Matter for Papers

Papers should report the results of applied research on: food, dairy and environmental sanitation; foodborne pathogens; food and dairy microbiology; food and dairy engineering; food and dairy chemistry; food additives and residues; food and dairy technology; food service and food administration; quality assurance/control; mastitis; environmental health; waste management and water quality.

Developing Scientist Awards Competitions

The **Oral Competition** is open to GRADUATE students enrolled at accredited universities or colleges whose research deals with problems related to environmental, food and/or dairy sanitation, protection and safety. Candidates cannot have graduated more than one (1) year prior to the deadline for submitting abstracts.

This year the Oral Competition will be limited to up to ten (10) finalists and awards will be given to the top three presenters. The papers should be approximately fifteen (15) minutes, including a 2-4 minute discussion.

The **Poster Competition** is open to UNDERGRADUATE and GRADUATE students enrolled at accredited universities or colleges whose research deals with problems related to environmental, food and/or dairy sanitation, protection and safety. Candidates cannot have graduated more than one (1) year prior to the deadline for submitting abstracts.

Up to 10 finalists will be selected for the Poster Competition. The presentation must be mounted on an 8' by 4' display board (provided at the meeting) for the entire duration of the Poster Session at the Annual Meeting. The presenter must be present at their poster for a specific time during the session. (For more information on the Developing Scientist Awards Competitions, see the following pages.)

All winners are presented and honored at the Annual Awards Banquet. The finalists will receive complimentary tickets and are expected to be present at the Banquet.

Additional Abstract Forms

Extra copies of the abstract forms may be obtained from the IAMFES office, or you may photocopy this one.

Membership in IAMFES

Membership in IAMFES is NOT a requirement for presenting a paper at the IAMFES Annual Meeting.

IAMFES Abstract Form

DEADLINE: DECEMBER 15, 1995

Title of Paper _____

Authors _____

Name and Title of Presenter _____

Institution and Address of Presenter _____

General Subject Area

- | | |
|--|---------------------------------------|
| <input type="checkbox"/> Quality Assurance/Control | <input type="checkbox"/> Food Service |
| <input type="checkbox"/> Food Microbiology | <input type="checkbox"/> Sanitation |
| <input type="checkbox"/> Dairy Microbiology | <input type="checkbox"/> Food Safety |
| <input type="checkbox"/> Waste Management | <input type="checkbox"/> Processing |
| <input type="checkbox"/> Lab Methods | <input type="checkbox"/> Epidemiology |
| <input type="checkbox"/> Foodborne Pathogens | <input type="checkbox"/> Other _____ |
| <input type="checkbox"/> Chemical Residues | _____ |
| <input type="checkbox"/> Environmental Health | _____ |

Office Phone Number (____) ____ - _____

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Developing Scientist Awards Competition Yes Oral Poster

Major Professor/Department Head approval (signature and date) _____

Selected presentations, with permission, will be recorded (audio or visual).

I authorize IAMFES to record my presentation.

Signature _____ Date: _____

I do not wish to be recorded.

Signature _____ Date: _____

Check the format you prefer.

- | | |
|--|--|
| <input type="checkbox"/> Oral | <input type="checkbox"/> Poster |
| <input type="checkbox"/> Video Theater | <input type="checkbox"/> No Preference |

Please TYPE abstract, DOUBLE-SPACED, in the space provided here.

Announcement:
Developing Scientist Awards Competitions
(Supported by Sustaining Members)

IAMFES is pleased to announce continued extension of its program to encourage and recognize the work of students in the field of food safety research. In addition to the Oral Developing Scientist Awards Competition, IAMFES will again offer a Poster Presentation Award Competition.

Purpose:

1. To encourage graduate and undergraduate students to present their original research at the IAMFES meeting.
2. To foster professionalism in students through contact with peers and professional members of IAMFES.
3. To encourage participation by students in IAMFES and its annual meeting.

Developing Scientist Oral Competition:

The Oral Competition is open to GRADUATE students enrolled in M.S. or Ph.D. programs at accredited universities or colleges whose research deals with problems related to environmental, food and/or dairy sanitation, protection and safety. Candidates cannot have graduated more than one (1) year prior to the deadline for submitting abstracts.

This year the Oral Competition will be limited to ten (10) finalists and awards will be given to the top three (3) presenters. The papers should be approximately fifteen (15) minutes long including a two to four (2-4) minute discussion.

Awards: First Place: \$500 and a Plaque; Second Place: \$300 and a certificate of merit; Third Place: \$100 and a certificate of merit. All of the winners will receive a one-year membership including both *Dairy, Food and Environmental Sanitation* and the *Journal of Food Protection*.

Developing Scientist Poster Competition:

The Poster Competition is open to UNDERGRADUATE and GRADUATE students enrolled at accredited universities or colleges whose research deals with problems related to environmental, food and/or dairy sanitation, protection and safety. Candidates cannot have graduated more than one (1) year prior to the deadline for submitting abstracts.

Up to ten (10) finalists will be selected for the Poster Competition. The presentation must be mounted on an 8' by 4' display board (provided at the meeting) for the entire duration of the Poster Session at the Annual Meeting. The presenter must be present at his/her poster for a specific time, approximately two hours, during the session.

Awards: First Place: \$500 and a Plaque; Second Place: \$300 and a certificate of merit; Third Place: \$100 and a certificate of merit. All of the winners will receive a one-year membership including both *Dairy, Food and Environmental Sanitation* and the *Journal of Food Protection*.

Instructions to Developing Scientist Awards Competitions Entrants (Oral and Poster):

***Note:** Abstracts must be submitted to the IAMFES office no later than December 15, 1995. No forms will be sent to entrants. Enclose two self-addressed postcards with your submitted abstracts. One will be used to notify author of receipt of abstract, the other to notify the author of acceptance or rejection.

1. One original and four copies of an abstract of the paper must be submitted on the abstract form found in the September or October issues of the IAMFES journals. Indicate on the abstract form whether the presentation is submitted for the Oral or Poster Competition.
2. The presentation and the student must be recommended and approved for the Competition by his/her Major Professor or Department Head, who must sign the abstract.
3. The work must represent original research done by the student and must be presented by the student.
4. Each student may enter only one (1) paper in either the Oral or Poster Competition.
5. All students will receive confirmation of acceptance of their presentations along with guidelines for preparing their Oral or Poster Presentations.
6. All students with accepted abstracts will receive a complimentary membership which includes their choice of *Dairy, Food and Environmental Sanitation* or the *Journal of Food Protection*.
7. Winners are announced at the Annual Awards Banquet. The finalists for the Oral Competition and the Poster Competition will receive complimentary tickets and are expected to be present at the banquet.

Judging Criteria for Developing Scientist Awards Competitions

Judging

The abstracts and presentations will be evaluated by an independent panel of judges. Selection of up to ten (10) finalists for both the Oral and Poster Competitions will be based on evaluations of the abstracts and the scientific quality of the work (see judging criteria). All entrants in the Developing Scientist Awards Competitions will be advised of the judges' decisions by March 31, 1996.

Only the ten (10) finalists in each category will be judged at the Annual Meeting and will be eligible for the final awards. All other entrants who submitted papers accepted by the IAMFES Program Committee will be expected to present their papers/posters as part of the regular Annual Meeting program, but their presentations will not be judged and they will not be eligible for awards.

Judging Criteria

ABSTRACT

Clarity, comprehensiveness, conciseness;

SCIENTIFIC QUALITY

Adequacy of experimental design;

Extent objectives were met;

Difficulty of research, depth;

Validity of conclusions based upon data;

Technical merit, contribution to science;

ORAL PRESENTATION or POSTER PRESENTATION

Organization: clarity of introduction, objectives, methods, results and conclusions;

Quality of visuals;

Quality and poise of presentation and in answering questions.

***NOTE: Your abstract must be submitted to the IAMFES office no later than December 15, 1995. No forms will be sent to entrants. Enclose two self-addressed postcards with your original abstract and four copies.**

Please read! If your paper or poster does not comply with the following IAMFES guidelines, it may not be approved for presentation or publication in the abstracts at the Annual Meeting. You will be notified by the Chair of the Program Advisory Committee (PAC) if any issues need to be addressed. You must communicate with your session chair or workshop or short course coordinator regarding the commercialism guidelines governing your particular session.

IAMFES POLICY ON COMMERCIALISM

1. INTRODUCTION

IAMFES technical sessions and symposia are not to be used as platforms for commercial sales or presentations. IAMFES enforces guidelines to restrict commercialism in technical manuscripts, poster presentations and symposia papers, so that scientific merit is not diluted by proprietary secrecy.

Excessive use of brand names, product names or logos, failure to substantiate performance claims and failure to objectively discuss alternative methods, processes and equipment are indicators of sales pitches. Restricting commercialism benefits both the presenters and the IAMFES attendees.

These guidelines have been written to serve as the basis for identifying commercialism in papers and graphics prepared for technical sessions, symposia and posters, as well as for all seminars, short courses and related presentations and discussions offered under the auspices of IAMFES.

2. TECHNICAL CONTENT OF PAPERS

2.1 Original Work

The presentation of new technical information is to be encouraged. Papers containing information that has been previously published and repeated tutorial presentations from IAMFES symposia, seminars and short courses will be evaluated on a case by case basis by the session chair, chair of the PAC and IAMFES staff before inclusion in the program.

2.2 Substantiating Data

Papers should present technical conclusions derived from technical data. If products or services are described, all reported capabilities, features or benefits and performance parameters must be substantiated by data or by an acceptable explanation as to why the data are unavailable. Only conclusions that might be reasonably drawn from the data may be presented. Claims of benefit not supported by the presented data are prohibited.

2.3 Trade Names

Excessive use of brand names, product names, trade names or trademarks is forbidden. A general guideline is to use proprietary names once and thereafter to use generic descriptors or neutral designations. Where this would make the paper significantly more difficult to understand, the PAC chair and session chair will judge whether the use of trade names etc. is necessary and acceptable.

2.4 "Industry Practice" Statements

It may be useful to report the extent of application of technologies, products or services; however, such statements should review the extent of application of all generically similar technologies, products or services in the field. Specific commercial installations may be cited to the extent that their data are discussed in the paper.

2.5 Ranking

Although general comparisons of products and services are prohibited, specific generic comparisons that are substantiated by the reported data are allowed.

2.6 Proprietary Information (see also 2.2)

Some information about products or services may be proprietary to the author's company or to the user and may not be publishable; however, their scientific principles and validation of performance parameters must be described. Conclusions and/or comparisons may only be made on the basis of reported data.

2.7 Capabilities

Discussion of corporate capabilities or experiences are prohibited unless they pertain to the specific presented data.

3. GRAPHICS

3.1 Definition

The term graphics refers to slides, photographs, videos, illustrations, art work and any other visual aids appearing with the printed text or used in the presentation.

3.2 Purpose

Graphics should be included only to clarify technical points. Graphics which primarily promote a product or service will not be allowed. (See 4.6)

3.3 Source

Graphics should relate specifically to the technical presentation. General graphics regularly shown in, or intended for, sales presentations cannot be used.

3.4 Company Identification

Names or logos of companies supplying the goods or services must not appear on the graphics, except on the first slide of the presentation. Slides showing products may not include predominant nameplates. Graphics with commercial names or logos added as background borders or corners are specifically forbidden.

3.5 Copies

Graphics that are not included in the preprint may be shown during the presentation only if they have been reviewed in advance by IAMFES staff and have been determined to comply with IAMFES' commercialism guidelines. Copies of these additional graphics must be available from the author on request by individual attendees. It is the responsibility of the session chair to verify that all graphics to be shown have been cleared by IAMFES staff, or other reviewers designated by the PAC chair.

4. INTERPRETATION AND ENFORCEMENT

4.1 Distribution

These guidelines will be sent to all authors of technical papers, posters, symposia workshops and all participants in panel discussions.

4.2 Assessment Process

Reviewers of papers will accept only those that comply with these guidelines. Drafts of papers shall be reviewed for commercialism concurrently by both IAMFES staff and technical reviewers selected by the PAC chair. All reviewer's comments shall be sent to and coordinated by either the PAC chair or the designated IAMFES staff. If manuscripts or graphics are found to violate IAMFES guidelines, authors will be informed and invited to resubmit their materials in revised form before the designated deadline.

4.3 Author Awareness

In addition to receiving a printed copy of these commercial guidelines, presenters of technical papers, posters, symposia etc., will be reminded about these guidelines by their session chair.

4.4 Monitoring

Session chairs are responsible for ensuring that presentations comply with these guidelines. If violations occur, the session chair will publicly request the author to stop and will notify the PAC chair of the action taken.

4.5 Enforcement

While both IAMFES staff and technical reviewers will check manuscripts and graphics for commercialism, ultimately it is the responsibility of the PAC chair to enforce the guidelines through the sessions chairs.

4.6 Penalties

If the author of a technical paper, poster or panel participant thoughtlessly violates these guidelines, the agency or company they represent will be notified in writing about the violation by the PAC chair. If gross violations or continued violations after a warning occur, IAMFES will have the right to ban the author's agency or company from making presentations at IAMFES conferences for a period of up to two years after the violations took place.

Book reviewed by: Christine M. Bruhn, Ph.D., University of California-Davis, Davis, California

Book Review



"Food Science" (5th edition)

Norman N. Potter & Joseph H. Hotchkiss
Chapman & Hill Publishers
One Penn Plaza
New York, NY 10119-0002

This text provides a comprehensive overview of food processing both as a science and a potential career. *Food Science* is clearly written and easy to follow, and the general outline is logically appealing. The introductory chapters, "Food Science as a Discipline" and "Characteristics of the Food Industry" acquaint the student with the many career options related to food production and provide an overview of the information contributed by various scientific disciplines. Potter and Hotchkiss next build the framework for food science by presenting the basics of food composition in "Constituents of Foods: Properties and Significance" and "Nutritive Aspects of Food Constituents," follow with chapters highlighting quality considerations in food processing, "Unit Operations in Food Processing," "Quality Factors in Foods," "Food Deterioration and its Control," and next detail food preservation methods in "Heat Preservations and Processing," "Cold Preservations and Processing," "Food Dehydration and Concentration," "Irradiation, Microwaves, and Ohmic Processing of Foods," and "Fermentation and Other Uses of Microorganisms." Numerous specific examples are provided to enhance understanding of the broad principles of food preservation.

Once this framework has been established, specific food products are presented. Chapters include, "Milk and Milk Products," "Meat, Poultry, and Eggs," "Seafoods," "Fats, Oils, and Related Products," "Cereal Grains, Legumes, and Oilseeds," "Vegetables and Fruits," and "Beverages, Confectionery and Chocolate Products." Product packaging is addressed in "Principles of Food Packaging," then the authors address wider issues of "Food Processing and the Environment," "Food Safety, Risks, and Hazards," "Governmental Regulation of Food and Nutrition Labeling," and "Hunger, Technology, and World Food Needs."

The text is clear and examples clarify the principles presented. Unfortunately, the authors don't always offer explanations for changes in food processing. For example, it is noted that batch pasteurization has given way to high-temperature-short time continuous pasteurization, but the reasons for the change is not given (p. 157). Some commodity discussions are not as complete as they might be, and statements don't appear to represent current conditions. For example, while various milks and milk products are described, no mention is made of the use of added solids to enhance the nutrient value and flavor of milk. Dairy production practices have improved

For copies of "Food Science":

Mail requests to: Michael J. Brown, UP, Editor-in-Chief, Chapman & Hill Publishers, One Penn Plaza, New York, NY 10119-0002.

over the years and the statement, "As for flavor, much milk is received that is not of top quality," (p. 283) does not reflect today's highly competitive modern dairy.

Some examples are presented without a historical context and may lead students to exaggerate the role of food in disease transmission. The authors point out that a number of viral infections may be contracted by man through contaminated food that has not been adequately processed or handled and include poliomyelitis as an example (p. 119). Poliomyelitis has not been associated with food since 1949 and is considered eradicated in the Americans. This discussion would be improved by mentioning the advances made in this area.

The public is concerned about veterinary drug residues in animal products. Unfortunately the authors have not included FDA Appendix N regulation which require that every tankard of Grade A milk be tested for bata lactans. The text states, "Under special circumstances, tests for detection of antibiotic residues from treated cows . . . may be done." (p. 283).

New nutritional labeling requirements are included, however marketplace changes resulting from this new

labeling are not reflected in the commodity chapters. For example, the ice cream composition table (p. 293), is taken from a 1986 text and therefore fails to include the reduced fat ice creams, formerly called *Ice Milk*.

The authors are to be commended for including new technologies in the text, but the treatment is not as comprehensive as it should be. When discussing rBST, no counter argument on the economic impact of the use of this product is presented. Although the text abounds with equipment diagrams, no diagram is presented to illustrate how food undergoes irradiation. Additionally the authors fail to note the early and on-going use of the process in the space program. While the cost of irradiation is presented, there is no reference to the balancing benefit of reducing costs associated with foodborne illness, material developed by the Economic Research Service.

Despite these shortcomings, *Food Science* provides a readable, informative overview of the food processing industry and the science of food. Instructors can augment the text with material on newer technologies and regulations.

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Federal Register

Indirect Food Additives: Paper and Paperboard Components

FDA is amending the food additive regulations to provide for the safe use of perfluoroalkyl substituted phosphate ester acids, ammonium salts formed by the reaction of 2, 2-bis [(y, w-perfluoroC₄-20alkylthio) methyl]-1, 3-propanediol, polyphosphoric acid and ammonium hydroxide as an oil and water repellent for paper and paperboard intended for use in contact with food. This action is in response to a petition filed by Ciba-Geigy Corp.

Indirect Food Additives: Adhesives and Components of Coatings

FDA is amending the food additive regulations to provide broadened specifications for

congealing point and oil content for synthetic paraffinic waxes produced by the Fisher-Tropsch process so that the specifications for synthetic paraffin waxes more closely resemble specifications for other synthetic waxes permitted for use in food packaging under other regulations. This action is in response to a petition filed by Shell Oil Co.

Indirect Food Additives: Adjuvants, Production Aids, and Sanitizers

FDA is amending the food additive regulations to provide for the safe use of 4-chloro-2-[[hydroxy-3-methyl-1-(3-sulfophenyl)-1H-pyrazol-4-yl]azo]-5-methylbenzenesulfonic acid, calcium salt (1:1) (C.I. Pigment Yellow 191) as a colorant for all polymers intended for use in contact with food. This action is in response

to a petition filed by Hoechst Celanese Corp.

Indirect Food Additives: Polymers

FDA is amending the food additive regulations to provide for the safe use of ethylene/hexene-1 copolymers containing a maximum of 20 percent by weight of polymer units derived from hexene-1 as components of articles intended for use in contact with food. This action is in response to a petition filed by Exxon Chemical Co.

Indirect Food Additives: Polymers

FDA is amending the food additive regulations to provide for the safe use of diisopropyl xanthogen polysulfide as a component of rubber articles intended for repeated use in contact with food. This action is in response to a petition filed by Robinson Brothers Ltd.

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UpDates

Jack In the Box® Restaurants Appoints New Director of International Expansion and Operations

Jack in the Box® restaurants, a division of Foodmaker, Inc., has appointed Tim Pickwell as director of international expansion and operations. In his role, he will be responsible for overseeing the growth of the Jack in the Box quick-service concept into international markets, as well as servicing and supporting an existing base of international franchisees in Asia and Latin America.

Among Pickwell's tasks he will be selecting master franchise candidates, establishing programs for the training and support of franchisees and managing ongoing relationships with international franchisees. Currently, Jack in the Box has franchised operations established in Mexico, Hong Kong and the Philippines, with restaurants scheduled to open in July in Cairo, Egypt, and Jakarta, Indonesia. Additional restaurants are scheduled to open later this year in Shanghai, China, and in Singapore.

Prior to joining Foodmaker, Pickwell was an attorney for Century 21 Real Estate Corp. in Irvine, CA specializing in international law and franchising. The Century 21 system, with more than 6000 offices in 14 countries, is the world's largest real estate franchise chain. During his tenure, Pickwell worked on the merger and acquisition of several foreign subsidiary corporations, as well as negotiated master franchise agreements in Asia, Europe and the South Pacific. He is a member of the California

bar and a graduate of the University of California, Hastings College of Law. He received his B.A. from the University of California, San Diego.

Dryden Engineering Moves Corporate Headquarters to Fremont, California

Dryden Engineering Company, Inc., a manufacturer of contamination control products and services for the semiconductor, optoelectronic, pharmaceutical, disk drive, laser, bio-technology and food processing industries, has moved its corporate headquarters to new, expanded facilities in Fremont, CA.

The new headquarters supports Dryden Engineering's branch offices in Los Angeles, Phoenix, Portland, Albuquerque, Austin and Dryden Engineering's agents in Asia, Southeast Asia, Europe and the Middle East. Included is Dryden's center for global certification, auditing/validation of cleanrooms and product testing. Testing capabilities include Class 10/100 cleanrooms for smoke studies and equipment cleaning and packaging and the only independent Class 1 cleanroom for PWP studies, equipment particle profiling and product testing.

The new facility also includes a hands-on demonstration area and training facilities. An expanded warehouse will provide considerable inventory of proprietary Dryden cleanroom supplies, wipers, adhesive mats, uniforms along with the unique Q III® Surface Particle Detector, the MAXIMUM™ Glove Washer/Dryer System and other innovative products from Dryden Engineering.

Andre Tchellistcheff Scholarship Recipients Announced

Known to many as the "winemaker's winemaker," Andre Tchellistcheff left his mark in the world of fine wine. Beginning in the 1930s with his work at Beallieu Vineyard, Napa Valley, CA he brought forth a plethora of winemaking innovations which have withstood the test of time. Although he passed away in 1994, Tchellistcheff's name and reputation are carried on in many ways, through the wines he had a hand in making, in the students to whom he passed on his knowledge, and through the recipients of the scholarship bearing his name.

A scholarship was established in 1987 to commemorate Tchellistcheff's remarkable contributions to the winemaking industry. The scholarship, which is administered by The Educational Foundation of the National Restaurant Association, has been made possible by the generosity of many various contributors.

FPM&SA Member Adam Anderson Serves on U.S.-Argentina Business Council

Adam Anderson, Vice President of International Sales for Marlen Research Corporation, Overland Park, Kansas, has been appointed a representative of the U.S. food processing and packaging industry on the U.S.-Argentina Business Development Council (BDC).

The first full meeting of the group was held June 29 in Denver,

Colorado with U.S. Department of Commerce Secretary Ron Brown and Argentine Minister of Economy Domingo Cavallo co-chairing the meeting. The Council's mission is to promote U.S.-Argentine commercial relations.

The entire board consists of three working groups: business promotion, infrastructure, and business climate. Anderson serves on the business promotion group which includes agribusiness, food processing, and food packaging. The council is comprised of 30 representatives each from the U.S. and Argentine private sectors.

In addition to his participation on the U.S.-Argentina BDC, Anderson serves as a board member of the International Marketing Council of the Food Processing Machinery & Supplies Association (FPM&SA) in Alexandria, VA. FPM&SA is an international trade association representing more than 500 suppliers of the food processing and packaging industry's machin-

ery, equipment, supplies, and services.

For more information contact: Donna Bolyard, Director of Communications, (703) 684-1080; fax (703) 548-6563

Klenzade Becomes Ecolab Food & Beverage Division

The Klenzade division of Ecolab is now Ecolab Inc., Food & Beverage Division. The new name and logo are part of a strategy being adopted throughout the company. The Food & Beverage Division serves the food and beverage processing, dairy processing and dairy farm (agribusiness) industries.

"Ecolab is the most trusted supplier of cleaning and sanitation products, systems and services in our markets. That's been possible because of our people, but also because of the tremendous research and development, technical expertise and depth of all corporate

resources behind the Food & Beverage Division," says William Mathison, Vice President and General Manager, Ecolab, Inc., Food & Beverage Division, North America. Beyond the logo, customers will not notice any change in the products, personnel, service and quality provided by the Food & Beverage Division.

"Bringing the Klenzade products under the Ecolab logo will allow our customers to purchase a full range of products and services under one Ecolab name. Whether they purchase cleaning and sanitation products, Pest Elimination or Water Care services, our customers who want to work with one proven provider will be able to do so," Mathison says.

Klenzade Products of Beloit, WI was purchased by Ecolab in 1961. Since then, the division has expanded from primary expertise in on-farm dairy production and dairy processing to food and beverage processing plant cleaning and sanitation.

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3-A Steering Committee Recommends Ceasing "Plastic List"

On May 22, 1995 the 3-A Steering Committee recommended publication of "The List of Plastics Certified to the 3-A Sanitary Standards Committees by the Manufacturers Thereof to Comply with the Criteria in 3-A Sanitary Standards for Multiple-Use Plastic Materials used as Product Contact Surfaces for Dairy Equipment, Number 20-17" be ceased. The 3-A Sanitary Standards for Multiple-Use Plastic Materials used as Product Contact Surfaces for Dairy Equipment, Number 20-17 as amended does remain in effect. 3-A 20-17 is being used for qualifying plastic materials for the dairy industry.

Compliance to all 3-A Sanitary Standards including 3-A 20-17 is by self-declaration. The fabricator or supplier of plastic components or materials wishing to demonstrate compliance with 3-A 20-17 may provide certification and supporting documentation directly to their customers and control authorities.

It's Even More Important to Wash Fruits and Vegetables

There's a good chance some of the fresh produce you buy in the grocery store comes from Mexico and Central America. And that makes it even more important to thoroughly wash these fruits and vegetables with tap water before eating them.

A thorough washing with tap water won't kill microorganisms—but it should dilute their numbers enough to reduce the potential for foodborne illness, says Joellen Feirtag, food safety specialist with the University of Minnesota's Extension Service. Don't use detergent, Feirtag says, since detergent residues that are not rinsed off the produce may make you ill.

The "new" American diet of more fresh fruits and vegetables



NEWS

with less meat and high-fat foods has changed the nature of foodborne diseases, according to the Minnesota Department of Health. Meeting the increased demand for fresh fruits and vegetables in the United States has required seasonal imports from Mexico, Central America and other tropical areas.

And this summer, there's apt to be more produce coming from these countries. Frost in Florida and floods in California and other states have reduced the domestic produce crop.

As less fresh produce comes to Minnesota from other states, more comes from south of the U.S. border. Fruits and vegetables from these sources are more apt to contain pathogens—in some cases new pathogens—that could cause foodborne illnesses. "We're seeing some new strains of *E. coli* that have not been previously tested for," says Feirtag.

Fresh produce that's grown in South America is trucked through Central American and Mexico to the U.S. Ice is used to keep the produce cool, but the ice may be made from water pumped from heavily polluted streams.

Seasonally, over 75 percent of fresh fruits and vegetables are harvested outside the U.S. and delivered within days to grocery stores and restaurants. During the

winter months, from 20 to 80 percent of cantaloupes, green onions, cucumbers and tomatoes purchased by consumers in the U.S. are harvested in Mexico.

And with the pending formation of a free trade zone (NAFTA) among Mexico, the U.S. and Canada, it's likely that produce imports from Mexico to the U.S. will increase substantially, according to Minnesota Department of Health scientists Craig Hedberg, Kristine MacDonald and Michael Osterholm.

"Competition between producers in the U.S. and in foreign countries may also result in cost-cutting measures in agricultural areas in the U.S. that already rely on low-paid migrant workers. These factors increase the potential for produce to become contaminated in the field, during packing or during distribution to retail markets," they wrote in an article titled, "Changing Epidemiology of Foodborne Disease: A Minnesota Perspective."

In what they called the "other side of Five-a-Day for Better Health" from the National Cancer Institute, they said one result of the increased consumption of fresh fruits and vegetables has been the recent occurrence of large outbreaks of hepatitis and salmonellosis due to the widespread distribution of fresh produce items.

"Given national trends toward consumption of fresh fruits and vegetables, these outbreaks are likely to occur more frequently in the future," they said.

However, Feirtag emphasizes that thoroughly washing fruits and vegetables with chlorinated tap water dilutes microorganism numbers and reduces the potential for foodborne illness.

Source: Joellen Feirtag (612) 624-3629; Writer: Jack Sperbeck (612) 625-1794; jsperbeck@mes.umn.edu.

This article is available electronically from the Minnesota Newspaper Foundation's NewsCurrent system. Call (612) 672-0948 for more information.

AFFI Calls for a Voluntary HACCP Program for Majority of Meat, Poultry Industry

Although the American Frozen Food Institute (AFFI) continues to support Hazard Analysis Critical Control Point (HACCP) programs as an effective way to produce safe food, AFFI urged the Food Safety and Inspection Service (FSIS) of the U.S. Department of Agriculture to implement the program on a *voluntary* basis for the vast majority of the food industry.

AFFI submitted comments to FSIS in response to an advance notice of proposed rulemaking regarding the development of HACCP programs as a method to regulate food safety for meat and poultry products, which are regulated by the agency.

In the comments, AFFI asserted that HACCP programs should be mandatory only for meat and poultry products that contain a sensitive ingredient which will not undergo further processing and for which substantial evidence exists, based on epidemiological, scientific and clinical data, that the food may present a significant risk to public health.

"Frozen entrees and mixed dishes which typically contain cooked meat or poultry and which go from the consumer's freezer directly to the oven and microwave do not represent a significant public health risk," said AFFI President Steven C. Anderson.

AFFI believes FSIS's adoption of a voluntary/mandatory regulatory agenda will maximize limited agency and industry resources, thus allowing the agency to focus on the most pressing raw meat and poultry safety concerns.

"A requirement of mandatory adoption of HACCP and the pathogen reduction program as suggested in FSIS's proposal would overwhelm the system with undertrained and inexperienced

persons, thereby undermining programs before they have even become implemented," said Anderson.

AFFI further urged USDA to allow low-risk meat and poultry operations approximately five years to develop and implement HACCP programs voluntarily. AFFI noted that a similar program established for nutrition labeling of raw vegetables and meats has been quite successful. This approach would provide USDA an opportunity to study and monitor the progress made by these companies, perhaps with the assistance of trade associations like AFFI.

In the comments, AFFI also said it is incumbent on FSIS to address the safeguarding of food because the agency's mandate is to protect public health.

"Most foodborne illness outbreaks are the result of mishandling or temperature abuse, either by the consumer at home or by foodservice operations. FSIS, therefore, should concentrate its efforts in these areas which present significant risk, where substantial education and monitoring could be of most benefit in the protection of public health," said Anderson.

AFFI also believes it is unclear whether mandatory HACCP, or other pathogen reduction activity requirements for low risk products such as frozen meat and poultry entrees and mixed dishes, advances the "protection of public health."

In effect, the mandatory requirement could undermine real progress companies are making to develop their own voluntary HACCP programs as the stigma of a "mandatory" program often results in companies carrying out the necessary "minimum" to comply with a regulation.

Other views stated by AFFI in the comments included:

- Modernization of existing regulations, directives and policies for food safety are sufficient for implementing HACCP—there is no need to develop new requirements;
- FSIS can improve food safety and reduce pathogens by quickly

approving irradiation for all meat and poultry products;

- FSIS must develop and promote methodologies to ensure consumers and foodservice employees are fully trained to handle meat and poultry products properly;

- Specific sanitation practices of the Standard Operating Procedures required by FSIS should not be mandated and must be designed with the individual facility in mind;

- FSIS should only have access to a company's records which are associated with its HACCP plan in order to protect proprietary information; and

- HACCP plans should be simple.

AFFI as an organization and AFFI member companies individually have a history of HACCP involvement dating back to Technical Service Bulletins published for companies engaged in the processing of frozen meats, poultry and vegetables in the early 1970s.

AFFI members always have endorsed voluntary implementation of HACCP principles in frozen food operations. A recent poll conducted by the Institute indicated over 90 percent of respondents have incorporated or are in the process of incorporating HACCP into operational plans.

The American Frozen Food Institute is the national trade association that has represented the interests of the frozen food industry for over 50 years. Its 540 corporate members account for more than 90 percent of frozen food production in the U.S.

Copesan Services—Illegal Pesticide Uses

By now you have read or heard about the pest control operator who substituted Dursban for Reldan and many millions of dollars of cereal product were disposed of. More recently, in Ohio, a person posing as a pest control company treated hundreds of homes with methyl parathion. This product is highly toxic and not

registered for indoor use. The state investigated the problem and found that the person was not even licensed in the state. The contaminated houses are now being cleaned up.

The bottom line is that you need to know with whom you are dealing. Virtually every state has a licensing and certification program. You can call the state regulatory agency to find out if the company is licensed. Many agencies will also indicate if the company in question has more than its share of violations.

Copesan members, of course, have been in business for many years and cannot become Copesan members unless they are known in the industry and their reputations are good. So when shopping for a pest control company, be as careful as you would be shopping for any other major investment. A pest control program may not be a major investment for some facilities, but the improper use of pesticide can cost you more money than you'd care to think about.

The proposed new wording passed by the Federal Subcommittee on Administrative Oversight and the Courts of the Senate Judiciary Committee states "Notwithstanding any other provision of law, no covered agency shall prohibit or refuse to approve a substance or product on the basis of safety where the substances or product present an insignificant human risk under the intended conditions of use." This proposed change to the Delany clause would permit additional chemicals to be used on food products if they meet the test. Currently, any chemical classified as a carcinogen may not be used on food.

Hopefully, additional useful chemicals will be able to be used to protect food products if the proposed verbiage is passed by the full Judiciary Committee.

Current information on preventative pest control and sanitation techniques, researched and prepared by C. Douglas Mampe, M.S., Ph.D.

Biomérieux Vitek Achieves ISO 9001 Certification

The bioMérieux Vitek facility in St. Louis has received ISO 9001 certification, recognizing that the company designs, develops, manufactures and services *in vitro* diagnostic (IVD) test kits and devices for the medical and industrial laboratories. The certification acknowledges the high standard of the quality system used in development and production at the bioMérieux Vitek St. Louis facility.

The ISO 9001 1994 standard requires that bioMérieux Vitek management work closely with employees at every level of the company to solve problems and work towards continual improvement in quality. Acceptance of the certification means employees pledge to "deliver products that meet or exceed the customer's requirements."

United States Filter Corporation Acquires Interlake Water Systems

United States Filter Corporation (U.S. Filter, NYSE/USF) announced that it has completed the acquisition of Interlake Water Systems (Broadview, IL). Interlake has 160 employees and had 1994 revenues exceeding \$21 million.

"Interlake's service network and regeneration facilities tie in well with U.S. Filter's existing network of more than 70 U.S. sales, service and regeneration facilities," said Richard J. Heckmann, U.S. Filter president and CEO.

Interlake provides a range of water treatment products and services. In fact, before the acquisition, Interlake was the largest franchise dealer of U.S. Filter's Continental water purification products. Founded 35 years ago by Bill Stockdale, Jr., a pioneer in the service deionization business, the

company has grown from a single Chicago location to a network of 14 sales and service locations across the Midwest; including state-of-the-art ion exchange resin regeneration facilities in Chicago and Detroit.

Call for Agriculture Research Award Proposals Announced by Salt Institute

The Salt Institute supports research into the role of salt and trace minerals in animal nutrition through the annual presentation of the \$1,500 TONY J. CUNHA AWARD. The award, provided since 1988, is given to the graduate-level animal nutrition student who submits the best research proposal involving salt and trace minerals.

"Over the years, the Salt Institute has actively sought to expand knowledge about the uses of salt and trace minerals in animal nutrition through its former agricultural consultants, Gustav H. Bohstedt and Tony J. Cunha, explained Salt Institute President Richard L. Hanneman. "For years we supported a "Gustav H. Bohstedt Award and, since Dr. Cunha's retirement, we now provide the Cunha Award in recognition of the continuing need for research in this important area."

Projects of past award recipients include: *Factors That Influence Trace Element Composition of Beef Cow Saliva; Salt and Trace Mineral Supplementation of Stocker Cattle Grazing Fescue; Interrelationships of Dietary Sodium, Potassium and Chlorine and Cation-Anion Difference in Lactation Rations; The Effects of Varying Levels of Feed Grade and Purified Sea Salt on the Performance of Broiler Chicks; The Utilization of Salt as a Carrier for DL-Methionine in Self-fed Salt Mineral Mixtures; Salt Deficiency in Early Age Broilers, and Sodium Chloride Supplementation During Heat Distress in Poultry.*

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Lumac BV

Lumac Introduces Biocounter M1800

LUMAC introduces a new instrument: the BIOCOUNTER M1800, a versatile instrument that can be used for a large number of applications. This semi-automated instrument is an ideal quality assurance tool, giving a fast and reliable answer to the microbiological status of products in food and beverage.

The work was initiated one year ago as a result from changing market requirements, application developments and Lumac's continuous program of instrument improvement. These improvements make the instruments even more user friendly. Design elements from the top of the range, the fully automated M 4000, have been incorporated into this simpler bench top instrument. For example the reagents are temperature controlled for even greater stability and the cuvettes are discarded automatically and collected in a convenient, easy to clean tray beneath the instrument.

This instrument is especially applicable for a sample throughput of 25-50 samples per day.

The BIOCOUNTER M1800 can be used for checking incoming raw

materials (e.g. raw milk, water, fruit concentrates), hygiene control as well as end product testing (UHT Dairy Products, Soups, Baby Foods, Fruit Juices...).

Easy-to-use kits are available to perform the rapid microbial tests. Results are available in minutes rather than days, giving the opportunity to take corrective actions immediately and thus saving TIME and MONEY.

LUMAC BV, Landgraaf,
The Netherlands

Reader Service No. 340

Sanitation Dispensing System Offers Lowest Cost per Cleaning Product Dispensed

Hydro's patented selector valves have been placed in systems with molded enclosures to provide proportioning systems with the lowest cost per product dispensed available. The new models are economical to purchase and to operate because the selector valve technology allows one dispensing valve to do the work of four: fewer system components lead to lower system cost, while still offering the ability to dilute and dispense up to four cleaning products. Also, the molded cabinet is lower cost, yet durable and easy to clean.

Select series systems are highly flexible. The space-saving, lightweight systems can be used in areas where larger, heavier units cannot be placed. Further, various combinations of product/dilution maximize versatility. For example, one cleaning concentrate may be dispensed at four dilutions, four concentrates may be dispensed at separate dilutions, or two concen-

trates may each be dispensed at two different dilutions, etc. Alternatively, one of the selector's positions may be used for dispensing clear water. Select series dispensers allow for growth: installations with just a couple of chemicals can be expanded with additional products later without the expense of providing additional dispensing equipment.

Streamline Selects are convenient for users, too. They operate only when the selector valve clicks into position, minimizing selection errors, and no handling of concentrates is required to change from one product to another.

Hydro Systems Company,
Cincinnati, OH

Reader Service No. 341

Compact UV Surface Sterilizer for Packaging Materials

Aquionics Inc., ultraviolet disinfection leader, now offers an affordable and compact ultraviolet surface disinfection system for packaging applications.

When used in extended shelf-life (ESL) filling machines, the CSS 400 destroys bacteria, yeast and molds commonly carried on packaging materials. The heat-free, chemical-free system is suitable for disinfection of most containers and foils.

The CSS 400 utilizes a 400 watt ultraviolet lamp and is water cooled. Optional automatic shutter mechanisms provide optimal safety for filling lines. Minimal maintenance is required.

Aquionics, Erlanger, KY

Reader Service No. 342

Labconco Introduces the NEW SteamScrubber™ Glassware Washer with Programmable Wash and Dry Cycle Times from 9 to 104 Minutes

Labconco Corporation introduces the NEW SteamScrubber Laboratory Washer, which is the ideal washer for cleaning beakers and other general purpose labware. Its touch-pad control panel allows the user to program washing cycles from 9-54 minutes and drying cycles from 0-40 minutes.

The SteamScrubber features redesigned top and bottom racks to accommodate a variety of accessory inserts and the broadest range of glassware. Accessory racks for specialized glassware such as BOD bottles, culture tubes and petri dishes are available in gray vinyl coated steel and stainless steel.

The SteamScrubber has a mirror bright Type 304 stainless steel tank construction which resists corrosion and repels contaminants to ensure long life. An aluminum backed sound deadening material is strategically placed throughout the washer to absorb noise. An insulation blanket surrounds the tank to optimize internal tank temperature while conserving energy.

The SteamScrubber has a steam generator that produces water vapor to penetrate and remove dried residue from glassware allowing detergent and hot water to work effectively. Dual heaters with 1450 watts of power boost water and glassware temperatures to enhance washing and drying results. No separate labware dryer or oven is needed.

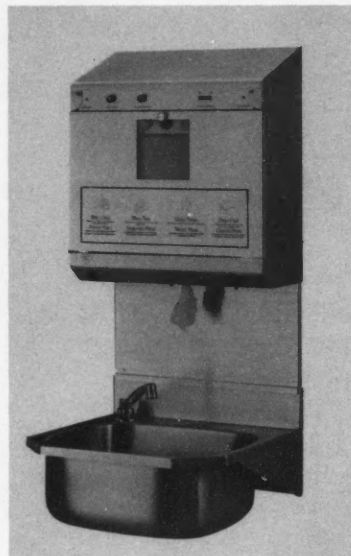
Other new features include a two stage detergent dispenser that holds dry or liquid detergent, a separate neutralizing rinse solution dispenser for eliminating alkaline

detergent carry over, and an elapsed cycle indicator that gives at-a-glance update of cycle status. The SteamScrubber is UL and ULC listed, and Labconco is ISO 9002 certified.

SteamScrubbers are available in undercounter, freestanding and mobile models, and are made in the USA.

Labconco, Kansas City, MO

Reader Service No. 343



World Dryer Corporation

Improve Food Safety with the World Wash Station

Employees from all aspects of commercial and non-commercial foodservice can improve food safety every time they use the Towel Dispensing Wash Station from World Dryer. Featuring a unique "logic system," the Wash Station has sensors that provide a complete soap and water wash, activating water only after soap has been applied, and preventing a "water only" wash. Once hands are rinsed, operators simply tear a paper towel from the easy access dispenser designed into the Wash

Station. Touchless features ensure sanitary cleansing with low risk of re-contamination. With hand-washing requirements posted right on the machine, food handlers can't make a mistake!

Additional value-added features on the Towel Dispensing Wash Station include a low-soap indicator light, an on-off switch for cleaning the fixture without triggering the sensors, a water over-ride, and a "no-use" warning light. The warning light, unique to this Wash Station Unit, alerts management if the wash station has not been used for over an hour.

The compact size of this unit enables it to fit into the same area required by dedicated hand sinks. It can be installed using existing water and electrical lines.

World Dryer Corporation
Berkeley, IL

Reader Service No. 344

Revolutionary New Electrolytic/Galvanic Effects Process Eliminates Scale, Corrosion, and Algae

A patented new electrolytic/galvanic process which guarantees to eliminate the formation, buildup, and retention of scale in water and steam systems, without the use of chemicals, reactive media or induced electric current, is now available from Scale Free Systems (SFS) of Fenton, MO.

Scale causes piping and heating installations to lose much of their efficiency, thereby increasing heating/cooling and steam production costs in factories, office buildings, and apartment houses. The U.S. Government estimates that a half-inch thickness of scale can add 70% to the cost of fuel to heat water.

The SF System is unique and unlike any other scale control method. It takes advantage of well

known, basic physical principles, but in a new and different way.

Ordinarily, scale deposition is enhanced by an electrolytic process. A kind of circuit is created between the water in the system and the metallic walls of valves, piping and equipment. This induces any scale-forming mineral ions which are dissolved in the water to attach to metallic surfaces in the form of scale, in a process similar to electroplating.

To prevent this from occurring, SFS inserts a grounded probe made of a special metallic alloy into the system, below the water line. Although the probe is not connected to any external power source, it sets up another circuit—between the probe and the water. This second circuit shorts out the first, and reapplies to ground, thus neutralizing and even reversing the plating action through electro-chemical processes related to Galvanism. In effect, a "battery" is created which stores electrical energy without an external power source.

This same SFS probe has also been shown to be effective in the control of growths such as green algae. A specific biocidal electrode, based on controlled ionization, is also available from SFS.

Before making the Scale Free System available for general application, it was tested successfully in scores of real life applications in all kinds of buildings: industrial, office and apartment complexes, military installations, and municipal operations. No matter what the application, it has **never failed** to remove existing scale and prevent the formation of new scale deposits, when properly installed and maintained.

SFS does not sell equipment or chemicals. Users need make no capital investment. After surveying the boiler, heat transfer, and chilling/cooling equipment, SFS installs the appropriate system and monitors its effectiveness.

Scale Free Systems, Inc.
Fenton, MO

Reader Service No. 345



Copan Diagnostics

Unique, Ready-To-Use "Swab-Rinse Kit" (SRK) for Routine Equipment and Environmental Monitoring and Hygiene Control in Food and Dairy Processing Establishments

Copan announces the launch of a new, convenient, ready-to-use surface sampling kit called SRK (Swab-Rinse Kit), for use in food and dairy manufacturing and processing establishments. The kit provides an important tool for detection and routine monitoring of bacteria and fungi on working surfaces, floors, walls and inside equipment. Designed to maximize the recovery of organisms, the kit employs a specially formulated isotonic rinse solution which

inactivates all commonly used disinfectants and sanitizing agents while at the same time contains components that will help resuscitate stressed and sub-lethally injured bacterial cells. A choice of sampling swabs are available, either an extra large rayon swab or a large alginate swab. Both swabs enable the uptake and release of much more sample volume than standard swabs, thus significantly improving the test analysis. In addition, the rinse solution contains sodium hexametaphosphate which completely dissolves alginate swabs allowing the accurate quantitative analysis of organisms in a sample. SRK is stable at room temperature and can be conveniently carried to and from tests sites. It offers many advantages plus additional information compared with solitary use of agar contact plates. Each SRK unit comprises of a sterile medical peel pouch inside of which there is a swab and screw capped tube containing 10ml of special rinse solution. Once a swab sample is placed in a SRK tube the rinse solution immediately begins working and gives up to 12 hours before subculture is necessary. To accompany SRK, Copan provides recommended 10 x 10 cm square sampling templates used to standardize the test area when flat surfaces are being examined. This improves the reliability and reproducibility of the technique.

Copan supplies a special modified version of SRK for laboratories using 3M Petri-Film for cultivation of samples. The modified SRK utilizes a smaller transport tube containing 3ml of rinse solution.

Copan Diagnostics, New York, NY

Reader Service No. 346

The publishers do not warrant, either expressly or by implication, the factual accuracy of the products or descriptions herein, nor do they so warrant any views or opinions offered by the manufacturer of said articles and products.

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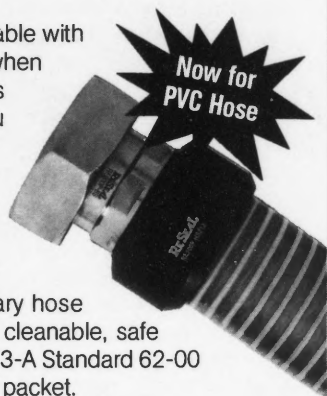


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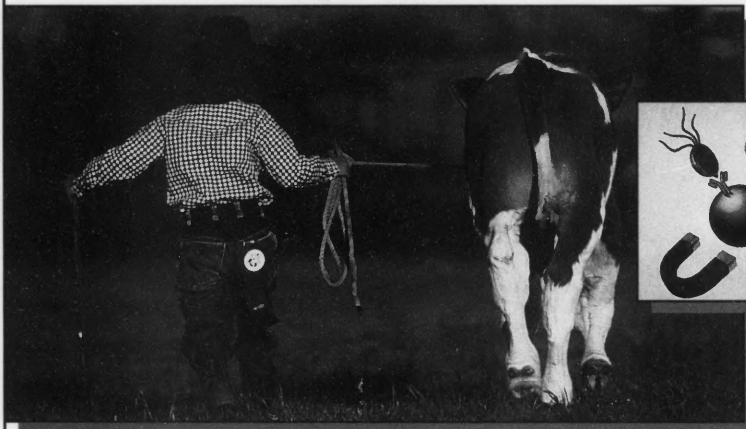
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* FDA Bacteriological Analytical Manual published by AOAC International (Arlington, Virginia).

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Reader Service No. 195

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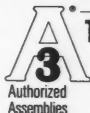
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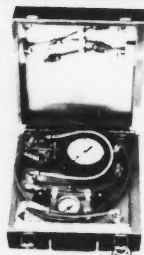
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Reader Service No. 124

ATTENTION AUTHORS

The Editors are seeking articles of general interest and applied research with an emphasis on food safety for publication in **Dairy, Food and Environmental Sanitation**

Submit your articles to:

EDITOR, Dairy, Food and Environmental Sanitation, c/o IAMFES, Inc., 6200 Aurora Ave., Suite 200W, Des Moines, Iowa 50322-2863

Please submit three copies of manuscripts along with a fourth copy on 3 1/2" computer disk.

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Employment Opportunities

Assistant Professor of Animal Science in Meat Science

Michigan State University is seeking applicants for a position of Assistant Professor of Animal Science in Meat Science. This is a 12 month, tenure tract appointment in teaching (60%)/research (40%) in the Departments of Animal Science and Food Science and Human Nutrition. Duties and responsibilities include teaching undergraduate and graduate meat science courses focused on applied meat animal science to include animal food safety (hazard analysis critical control points, meat microbiology) and fresh meat processing (meat animal evaluation, animal marketing/distribution technologies). Advising Animal Science undergraduate students who have an interest in the meat industry. Conducting research in an area of specialization which may encompass food safety of animal products, carcass composition and applied techniques in fresh meat processing. Applicants must have a Ph.D. in Animal Science, Food Science or closely related area. Candidate must have a strong record of applied independent research. Undergraduate teaching experience is desirable. Candidate should develop programs which will interact within pre and post mortem process methodologies, food safety/HACCP/toxicology of animal products, assessment of body composition, meat evaluation and quality characteristics to support the Michigan animal industry. Ability to communicate and work effectively with colleagues, students, producers and industry clientele is essential. Applicants should submit a detailed resume of their education, experience, qualifications, publications to: **Dr. M. G. Hogberg, Chairperson, Department of Animal Science, 102 Anthony Hall, Michigan State University, East Lansing, MI 48824.** Application deadline is January 1, 1996 or until position is filled.

Michigan State is an Equal Opportunity/Affirmative Action Employer and specially invites and encourages applications from qualified women and minorities.

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Amendments to 3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment, Number 20-17

Amendment 4-7

Formulated By
International Association of Milk, Food and Environmental Sanitarians
United States Public Health Service
The Dairy Industry Committee

It is the purpose of the IAMFES, USPHS, and DIC in connection with the development of the 3-A Sanitary Standards Program to allow and encourage full freedom for inventive genius or new developments. Multiple-Use Plastic Materials Used As Product Contact Surfaces for Dairy Equipment heretofore or hereafter developed which so differ in specifications or otherwise as not to conform to the following standards but which, in the fabricator's opinion, are equivalent or better, may be submitted for the joint consideration of the IAMFES, USPHS, and DIC at any time.

The 3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment, Number 20-17 are hereby further Amended as indicated in the following:

Section H Standards for Acceptability

Sub-paragraph (H2)—Generic Classes of Plastics (Make the following changes to Table 1)

Generic Classes of Plastics	Maximum Percent Weight Gain		
	Cleanability Response (Section E Regimen)	Product Treatment (Section F Regimen)	
		Solution I	Solution J
Amendment 4 Copolyether-ester Polybutylene Terephthalate Polytetrahydrofuron (PBT-PTHF) ¹	0.35	1.1	0.50
Amendment 5 Polytetromethylene Terephthalate ²	0.10	0.15	0.65
Amendment 6 Polyetherimide	No Change	No Change	0.75
Amendment 7 Polysulfone-PTFE (Alloy) ³	0.30	0.45	0.45

¹As covered by 21 CFR 177.2600.

²As covered by 21 CFR 177.1660.

³As covered by 21 CFR 177.1550 and 177.1655.

These 3-A Sanitary Standards Amendments shall become effective August 25, 1995.

Amendments to 3-A Sanitary Standards for Batch and Continuous Freezers for Ice Cream, Ices and Similarly Frozen Desserts, Number 19-04

Amendment 1

Formulated By
International Association of Milk, Food and Environmental Sanitarians
United States Public Health Service
The Dairy Industry Committee

It is the purpose of the IAMFES, USPHS, and DIC in connection with the development of the 3-A Sanitary Standards Program to allow and encourage full freedom for inventive genius or new developments. Batch and continuous freezers for ice cream, ices and similarly frozen desserts specifications heretofore or hereafter developed which so differ in specifications or otherwise as not to conform to the following standards but which, in the fabricator's opinion, are equivalent or better, may be submitted for the joint consideration of the IAMFES, USPHS, and DIC at any time. NOTE: Use current revisions or editions of all referenced documents cited herein.

Add: C1.12 Scraper blades, shafts, bearings, discharge gates and front heads for these freezers may also be made of a metal alloy or metal that is as corrosion resistant as AISI 300 Series Stainless Steel, and is nontoxic and nonabsorbent under the conditions of intended use as AISI 300 Series Stainless Steel. (See Appendix, Section H.)

Delete: C5.12 Optional metal alloy may be used for scraper blades, shafts, bearings, discharge gates and front heads of batch freezers but only in applications requiring manual cleaning. See Appendix, Section H, for the composition of an acceptable optional metal alloy.

Delete: C5.13 Optional metal alloy may be used for bearings in continuous freezers but only in applications requiring manual cleaning or in applications where mechanical cleaning regimens exclude the use of acid cleaning chemicals. See Appendix, Section H, for the composition of an acceptable optional metal alloy.

Delete: G1 CAUTION

Some product contact parts in this machine are made of chrome plated nickel. Acid cleaning compounds will cause serious corrosive damage to these parts. Consult your cleaning compound supplier for the selection of correct chemicals and procedures.

Delete: H OPTIONAL METAL ALLOY

An optional alloy metal having the following minimum and maximum composition is deemed to be in compliance with C1.1.

Zinc	- 8% maximum
Nickel	- 19 1/2% minimum
Tin	- 3 1/2% minimum
Lead	- 5% maximum
Iron	- 1 1/2% maximum
Copper	- the Balance

An alloy of the composition given above is properly designated "nickel silver" or according to ASTM B149-70, may be entitled, "leaded nickel bronze."

Add: H COMPOSITION OF OPTIONAL ALLOYS *

The following metal alloys or metals have been shown to be as corrosion resistant as AISI 300 Series Stainless Steel:

H1 Metal alloys or metals other than the above may be as corrosion resistant as 300 Series Stainless steel. This may be shown when metal alloys or metals are tested in accordance with ASTM G31 Laboratory Immersion Corrosion Testing of Metals and have a corrosion rate of less

than 20 mil per year. The test parameters such as the type of chemical(s), their concentration(s) and temperature(s) should be representative of cleaning and sanitizing conditions used in dairy equipment. Alloys containing lead, leachable copper or other toxic metals should not be used.

COMPOSITION OF OPTIONAL ALLOYS*

	UNS N08367	UNS S21800	UNS S20161	UNS N26055	UNS N26455	UNS S17400	UNS S15500	UNS S32900	UNS R20500	UNS R50400
	ASTM A743 Grade	ASTM A743 Grade		ASTM A494 Grade	ASTM A494 Grade	ASTM A747 Grade	ASTM A747 Grade		ASTM A560 Grade	ASTM B67 Grade
	CN-3MN	CF-10 SMnN		CY5SnBIM	CW-2M	CB7Cu-1	CB7Cu-2		50Cr-50Ni	C-2
C	0.03	0.10	0.15	0.05	0.02	0.07	0.07	0.20	0.10	0.10
Mn	2.00	7.00-9.00	4.00-6.00	1.50	1.00	0.70	0.70	1.00	0.30	
Si	1.00	3.50-4.50	3.00-4.00	0.50	0.80	1.00	1.00	0.75	1.00	
P	0.040	0.040	0.040	0.03	0.03	0.035	0.035	0.040	0.02	
S	0.010	0.030	0.040	0.03	0.03	0.03	0.03	0.030	0.02	
Cr	20.0-22.0	16.0-18.0	15.0-18.0	11.0-14.0	15.0-17.5	5.5-17.7	14.0-15.5	23.0-28.0	48.0-52.0	
Ni	23.5-25.5	8.00-9.00	4.00-6.00	Balance	Balance	3.60-4.60	4.50-5.50	2.50-5.00	Balance	
Mo	6.00-7.00			2.00-3.50	15.00-17.50			1.00-2.00		
Cb						0.15-0.35	0.15-0.35			
Cu	0.75					2.50-3.20	2.50-3.20			
N	0.18-0.26	0.08-0.18	0.08-0.20			0.05	0.05		0.30	
Fe	Balance	Balance	Balance	2.00	2.00	Balance	Balance	Balance	1.00	0.30
Sn				3.00-5.00						
Bi				3.00-5.00						
W					1.00					
Ti									0.50	Balance
Al									0.25	
Other										H = 0.015 N = 0.03 O = 0.25

* Percentage is maximum unless range is given.

This Amendment to 3-A Sanitary Standards for Batch and Continuous Freezers for Ice Cream, Ices and Similarly Frozen Desserts, Number 19-04 shall become effective on November 25, 1995.

Amendments to 3-A Sanitary Standards for Boot-Seal Type Valves for Milk and Milk Products, Number 55-00

Amendment 1

Formulated By
International Association of Milk, Food and Environmental Sanitarians
United States Public Health Service
The Dairy Industry Committee

It is the purpose of the IAMFES, USPHS, and DIC in connection with the development of the 3-A Sanitary Standards Program to allow and encourage full freedom for inventive genius or new developments. Boot-seal type valves specifications heretofore or hereafter developed which so differ in specifications or otherwise as not to conform to the following standards but which, in the fabricator's opinion, are equivalent or better, may be submitted for the joint consideration of the IAMFES, USPHS, and DIC at any time. NOTE: Use current revisions or editions of all referenced documents cited herein.

Delete: C1.1 Optional metal alloy may be used but only in applications requiring disassembly and manual cleaning. (See Appendix, Section G for the composition of an acceptable optional metal alloy.)

Zinc	- 8% maximum
Nickel	- 19 1/2% minimum
Tin	- 3 1/2% minimum
Lead	- 5% maximum
Iron	- 1 1/2% maximum
Copper	- the Balance

Delete: G **OPTIONAL METAL ALLOY**

An optional alloy metal having the following minimum and maximum composition is deemed to be in compliance with C1.1.

An alloy of the composition given above is properly designated "nickel silver" or according to ASTM B149-70, may be entitled, "leaded nickel bronze."

This Amendment to 3-A Sanitary Standards for Boot-Seal Type Valves for Milk and Milk Products, Number 55-00 shall become effective on November 25, 1995.

Amendments to 3-A Sanitary Standards for Diaphragm-Type Valves for Milk and Milk Products, Number 54-00

Amendment 3

Formulated By
International Association of Milk, Food and Environmental Sanitarians
United States Public Health Service
The Dairy Industry Committee

It is the purpose of the IAMFES, USPHS, and DIC in connection with the development of the 3-A Sanitary Standards Program to allow and encourage full freedom for inventive genius or new developments. Diaphragm-type valves specifications heretofore or hereafter developed which so differ in specifications or otherwise as not to conform to the following standards but which, in the fabricator's opinion, are equivalent or better, may be submitted for the joint consideration of the IAMFES, USPHS, and DIC at any time. NOTE: Use current revisions or editions of all referenced documents cited herein.

Delete: C1.1 Optional metal alloy may be used but only in applications requiring disassembly and manual cleaning. (See Appendix, Section G for the composition of an acceptable optional metal alloy.)

Delete: G **OPTIONAL METAL ALLOY**

An optional alloy metal having the following minimum and maximum composition is deemed to be in compliance with C1.1.

Zinc	- 8% maximum
Nickel	- 19 1/2% minimum
Tin	- 3 1/2% minimum
Lead	- 5% maximum
Iron	- 1 1/2% maximum
Copper	- the Balance

An alloy of the composition given above is properly designated "nickel silver" or according to ASTM B149-70, may be entitled, "leaded nickel bronze."

This Amendment to 3-A Sanitary Standards for Diaphragm-Type Valves for Milk and Milk Products, Number 54-00 shall become effective on November 25, 1995.

Amendments to 3-A Sanitary Standards for Centrifugal and Positive Rotary Pumps for Milk and Milk Products, Number 02-08

Amendment 1

Formulated By
International Association of Milk, Food and Environmental Sanitarians
United States Public Health Service
The Dairy Industry Committee

It is the purpose of the IAMFES, USPHS, and DIC in connection with the development of the 3-A Sanitary Standards Program to allow and encourage full freedom for inventive genius or new developments. Centrifugal and positive rotary pumps specifications heretofore or hereafter developed which so differ in specifications or otherwise as not to conform to the following standards but which, in the fabricator's opinion, are equivalent or better, may be submitted for the joint consideration of the IAMFES, USPHS, and DIC at any time. NOTE: Use current revisions or editions of all referenced documents cited herein.

Delete: C1.1 Optional metal alloy may be used but only in applications requiring disassembly and manual cleaning. (See Appendix, Section F for the composition of an acceptable optional metal alloy.)

Add: C1.1 Rotors, shafts, seals, rotor and impeller retaining devices and housings may also be made of an alloy or metal that is as corrosion resistant as AISI 300 Series Stainless Steel, and is nontoxic and nonabsorbent under the conditions of intended use as AISI 300 Series Stainless Steel. (See Appendix, Section F.)

Delete: F **OPTIONAL METAL ALLOY**

An optional alloy metal having the following minimum and maximum composition is deemed to be in compliance with C1.1.

Zinc	- 8% maximum
Nickel	- 19 1/2% minimum
Tin	- 3 1/2% minimum

Lead	- 5% maximum
Iron	- 1 1/2% maximum
Copper	- the Balance

An alloy of the composition given above is properly designated "nickel silver" or according to ASTM B149-70, may be entitled, "leaded nickel bronze."

Add: F **COMPOSITION OF OPTIONAL ALLOYS ***

The following metal alloys or metals have been shown to be as corrosion resistant as AISI 300 Series Stainless Steel:

F1 Metal alloys or metals other than the above may be as corrosion resistant as 300 Series Stainless steel. This may be shown when metal alloys or metals are tested in accordance with ASTM G31 Laboratory Immersion Corrosion Testing of Metals and have a corrosion rate of less than 20 mil per year. The test parameters such as the type of chemical(s), their concentration(s) and temperature(s) should be representative of cleaning and sanitizing conditions used in dairy equipment. Alloys containing lead, leachable copper or other toxic metals should not be used.

This Amendment to 3-A Sanitary Standards for Centrifugal and Positive Rotary Pumps for Milk and Milk Products, Number 02-08 shall become effective on November 25, 1995.

3-A Sanitary Standards for Flow Meters for Milk and Milk Products

Number 28-03

Formulated By
International Association of Milk, Food and Environmental Sanitarians
United States Public Health Service
The Dairy Industry Committee

It is the purpose of the IAMFES, USPHS, and DIC in connection with the development of the 3-A Sanitary Standards Program to allow and encourage full freedom for inventive genius or new developments. Flow meter specifications heretofore or hereafter developed which so differ in design, materials, and fabrication or otherwise as not to conform to the following standards but which, in the fabricator's opinion, are equivalent or better, may be submitted for the joint consideration of the IAMFES, USPHS, and DIC at any time. NOTE: Use current revisions or editions of all referenced documents cited herein.

A SCOPE

- A1 These standards cover the sanitary aspects of flow meters for milk and milk products and include that portion of any device integral with the meter such as strainers, temperature sensors and density sensors, which is in contact with the flowing product. It does not pertain to meters designed to measure the milk from an individual milking animal.
- A2 In order to conform with these 3-A Sanitary Standards, flow meters shall comply with the following design, material, and fabrication criteria.

B DEFINITIONS

- B1 *Flow Meter*: Shall mean a device to measure the flow of milk and milk products.
- B2 *Product*: Shall mean milk and milk products.
- B3 *Surfaces*
- B3.1 *Product Contact Surfaces*: Shall mean all surfaces which are exposed to the product and surfaces from which liquids may drain, drop, diffuse or be drawn into the product.
- B3.2 *Nonproduct Contact Surfaces*: Shall mean all other exposed surfaces.

B4 *Engineering Plating*: Shall mean plated to specific dimensions or processed to specified dimensions after plating.¹

B5 Cleaning

- B5.1 *Mechanical Cleaning or Mechanically Cleaned*: Shall mean cleaning solely by circulation and/or flowing chemical detergent solutions and water rinses onto and over the surfaces to be cleaned by mechanical means.

C MATERIALS

C1 Metals

- C1.1 Product contact surfaces shall be of stainless steel of the American Iron and Steel Institute (AISI) 300 Series² or corresponding Alloy Cast Institute³ (ACI) types (See Appendix, Section E.), or metal which under conditions of intended use is at least as corrosion resistant as stainless steel of the foregoing types, and is nontoxic and nonabsorbent, except that:
- C1.2 Rotors of turbine-type meters may also be made of nontoxic, corrosion-resistant stainless metal (400 Series Stainless Steel or equivalent) or these materials covered with an engineering plating of nickel or chromium.

C2 Nonmetals

- C2.1 Rubber and rubber-like materials may be used for gaskets, seals, meter bodies, meter body liners, magnet carriers, meter valve members, coatings, rotors, pistons, bearings, shafts and parts having the same functional purposes.
- C2.1.1 Rubber and rubber-like materials when used for the above specified application(s) shall conform with the applicable provisions of the 3-A Sanitary Standards for Multiple-Use Rubber and Rubber-Like Materials Used as Product Contact Surfaces in Dairy Equipment, Number 18-.
- C2.2 Plastic materials may be used for gaskets, seals, meter bodies, meter body liners, magnet carriers, meter valve members, coatings, rotors, pistons, bearings, shafts and parts having the same functional purposes.
- C2.2.1 Plastic materials when used for the above specified application(s) shall conform with the applicable provisions of the 3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment, Number 20-.
- C2.3 Rubber and rubber-like materials and plastic materials having product contact surfaces shall be of such composition as to retain their surface and conformational characteristics when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment.
- C2.4 Pistons and rotors may also be made of hard rubber (a vulcanized rubber having a ratio of combined sulfur to rubber hydrocarbon in excess of 15% and a Shore A Durometer value in excess of 90) that is nontoxic and relatively resistant to abrasion, will maintain its original characteristics such as form, shape and dimensions and will not affect the product and when subjected to the test regimen set forth in the 3-A Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment, Number 20-, shall (a) comply with the criteria in Section H (1) and Section H (3), (b) have maximum weight gains as set forth in Section H (2) of 0.30 in Cleanability Response, 0.30 in Product Treatment with Solution I and 0.30 in Product Treatment with Solution J.

- C2.5 Where materials having certain inherent functional purposes are required for specific applications, such as pistons, shafts, bearings, and rotary seals, carbon⁴, and/or ceramic materials may be used. Carbon and/or ceramic materials shall be inert, nonporous, nontoxic, nonabsorbent, insoluble, resistant to scratching, scoring, and distortion when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment.

C3 Bonded Material

- C3.1 The final bond and residual adhesive, if used, of bonded carbon and/or ceramic materials shall be nontoxic.⁵

C4 Nonproduct Contact Surfaces

- C4.1 All nonproduct contact surfaces shall be of corrosion-resistant material or material that is rendered corrosion resistant. If coated, the coating used shall adhere. All nonproduct contact surfaces shall be relatively nonabsorbent, durable, and cleanable. Parts removable for cleaning having both product contact and nonproduct contact surfaces shall not be painted.

D FABRICATION

D1 Surface Texture

- D1.1 All product contact surfaces shall have a finish at least as smooth as a No. 4 ground finish on stainless steel sheets and be free of imperfections such as pits, folds and crevices in the final fabricated form. (See Appendix, Section F.)

D2 Permanent Joints

- D2.1 All permanent joints in metallic product contact surfaces shall be continuously welded, except that:
- D2.1.1 In such cases where welding is impractical, press-fitting or shrink-fitting may be employed where necessary for essential functional reasons such as shafts to rotor assemblies and bushings to shafts. Any method utilized shall produce product contact surfaces which are at least as smooth as a No. 4 ground finish on stainless steel sheets and which are free of imperfections such as pits, folds and crevices. (See Appendix, Section H.)

D3 Coatings

- D3.2 The minimum thickness of engineering plating shall not be less than 0.0002 in. (0.005 mm) for all product contact parts

except when the parts that are to be plated are other than stainless steel, the minimum thickness of the engineering plating shall be 0.002 in.

D4 Cleaning and Inspectibility

D4.1 Meters that are to be mechanically cleaned shall be designed so that the product contact surfaces of the meter and all nonremovable appurtenances thereto can be mechanically cleaned and are accessible for inspection except that the product contact surfaces of flow meters designed to be mechanically cleaned do not have to be accessible for inspection if the flow meter surfaces are on continuous tube of the same size.

D4.2 Product contact surfaces of meters not designed to be mechanically cleaned shall be easily accessible for cleaning and inspection either when in an assembled position or when removed. Removable parts shall be readily demountable.

D5 Draining

D5.1 All product contact surfaces to be mechanically cleaned shall be self-draining except for normal clingage.

D5.2 Product contact surfaces which are not self-draining shall be constructed so that they can be readily and easily opened and drained without complete disassembly.

D6 Fittings

D6.1 Threaded, clamped or flange type connections shall conform with the applicable provisions of the 3-A Sanitary Standards for Sanitary Fittings for Milk and Milk Products, Number 63.

D7 Sanitary Tubing

D7.1 All metal tubing to be used in meters shall conform with the applicable provisions of the 3-A Sanitary Standards for Polished Metal Tubing for Dairy Products, Number 33.

D8 Radii

D8.1 All internal angles of less than 135° on product contact surfaces, shall have radii of not less than 1/4 in. (6.35 mm) except that:

D8.1.1 Where for space or functional reasons it is impossible to have a radius of 1/4 in. (6.35 mm). When for functional reasons the radius

must be less than 1/32 in. (0.794 mm) in such applications as flat sealing surfaces, the product contact surface of this internal angle must be readily accessible for cleaning and inspection.

D8.2 The radii in gasket grooves, gasket retaining grooves, or grooves in gaskets, shall be not less than 1/8 in. (3.18 mm) except for those standard, 1/4 in. (6.35 mm) and smaller O-rings shall not be less than 1/8 in. (3.18 mm).

D8.3 The radii in grooves for standard 1/4 in. (6.35 mm) O-rings shall not be less than 3/32 in. (2.38 mm) and for standard 1/8 in. (3.18 mm) O-rings shall be not less than 1/32 in. (0.794 mm).

D9 Gaskets

D9.1 Gaskets having a product contact surface shall be removable.

D10 Threads

D10.1 There shall be no threads on product contact surfaces.

D11 Supports

D11.1 The means of supporting flow meters shall be one of the following:

D11.1.1 If legs are used they shall be adjustable, smooth with rounded ends and have no exposed threads. Legs made of hollow stock shall be sealed. Legs shall be sufficient length to provide a clearance between the lowest part of the base, flow meter and floor of no less than:

D11.1.1.1 Four in. on meters with legs designed to be fixed to the floor or flow meters having a horizontal base area of more than one square foot.

D11.1.1.2 Two in. on flow meters having a horizontal base area of not more than one square foot and not designed to be fixed to the floor.

D11.1.2 If mounted on a slab or island the base of the flow meter shall be designed for sealing to the slab or island surface. (See Appendix, Section G.)

D11.1.3 If mounted on a wall or column, the flow meter shall be such that it may be sealed to the mounting surface.

D12 Nonproduct Contact Surfaces

D12.1 Nonproduct contact surfaces shall be readily cleanable and have a smooth

finish, free of pockets and crevices, except those created on the face of a register at the window, ticket slots, pick-off coils, auto stop buttons, reset handles, totalizer holes and similar places.

- D12.2 Nonproduct contact surfaces to be coated shall be effectively prepared for coating.

APPENDIX

E STAINLESS STEEL MATERIALS

Stainless steel conforming to the applicable composition ranges established by AISI for wrought products, or by ACI for cast products, should be considered in compliance with the requirements of Section C1 herein. Where welding is involved, the carbon content of the stainless steel should not exceed 0.08%. The first reference cited in C1 sets forth the chemical ranges and limits of acceptable stainless steel of the 300 Series. Cast grades of stainless steel corresponding to types 303, 304, and 316 are designated CF-16F, CF-8, and CF-8M, respectively. The chemical compositions of these cast grades are covered by ASTM specifications⁵ A351/A351M, A743/A743M and A744/A744M.

F PRODUCT CONTACT SURFACE FINISH

Surface finish equivalent to 150 grit or better as obtained with silicon carbide, properly applied on stainless steel sheets, is considered in compliance with the requirements of Section D1 herein. A maximum Ra of 32 $\mu\text{in.}$ (0.80 μm), when measured according to the recommendations in American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME)⁷ B46.1 - Surface Texture, is considered to be equivalent to a No. 4 finish.

G SLABS OR ISLANDS

When the flow meter is designed to be installed on a slab or an island, the dimensions of the slab or island

should be such that the base of the flow meter will extend beyond the slab or island at least 1 in. (25.4 mm) in all horizontal directions. The slab or island should be of sufficient height that the bottom of all product connections are not less than 4 in. (101.6 mm) above the floor. The surface of the slab or island should be coated with a thick layer of water proof mastic material, which will harden without cracking. The junction of the flow meter base and upper edges slab or island should be sealed.

H PRESS-FITS AND SHRINK-FITS

Press-fits or shrink-fits may be used to produce crevice free permanent joints in metallic product contact surfaces when neither welding nor soldering is practical. Joints of these types may only be used to assemble parts having circular cross sections, free of shoulders or relieved areas. For example: they may be used to assemble round pins or round bushings into round holes. In both types of fits, the outside diameter of the part being inserted is greater than the inside diameter of the hole. In the case of the press-fit the parts are forced together by applying pressure. The pressure required is dependent upon the diameter of the parts, the amount of interference and the distance the inner member is forced in.

In shrink-fits, the diameter of the inner member is reduced by chilling it to a low temperature. Dry ice is commonly used to shrink the inner member. Heat may also be applied to the outer member of the press-fit. Less assembly force is required for this type of fit.

The design of these fits depends on a variety of factors. The designer should follow recommended practices to assure that a crevice-free joint is produced. A recognized authoritative reference is Machinery's Handbook published by Industrial Press Inc., 200 Madison Avenue, New York, NY 10157.

¹ QQ-C-320b Federal Specification for Chromium Plating (Electrodeposited), June 7, 1985. Available from the General Services Administration, Federal Supply Services Bureau, Specification Section, 470 East L'Enfant Plaza, Suite 8100, Washington, D.C. 20407 (202) 755-0325.

² The data for this series are contained in the *AISI Steel Products Manual, Stainless & Heat Resisting Steels*, November 1990, Table 2-1, pp. 17-20. Available from the American Iron and Steel Society, 410 Commonwealth Drive, Warrendale, PA 15086 (412) 776-1535.

³ Steel Founders Society of America, Cast Metal Federation Building, 455 State Street, Des Plaines, IL 60016 (708) 299-9160.

⁴ Carbon which is specifically in compliance with the Food, Drug and Cosmetic Act, as amended, is that which is included in "V Fillers" in the food additive regulations for rubber articles intended for repeated use, 177.2600 of Subpart F, Code of Federal Regulations, Title 21—Food and Drugs.

⁵ Adhesives shall comply with 21 CFR 175—Indirect Food Additives: Adhesives and Components of Coatings. Document for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402; (202) 783-3238.

⁶ Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187 (215) 299-5400.

⁷ Available from the American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017-2392 (212) 705-7722.

These revised standards are effective November 25, 1995 at which time the 3-A Sanitary Standards for Flow Meters for Milk and Milk Products, Number 28-02 are rescinded and become null and void.

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UNITED STATES POSTAL SERVICE Statement of Ownership, Management, and Circulation (Required by 39 U.S.C. 3685)

1. Publication Title: Dairy, Food and Environmental Sanitation

2. Issue Date: 9/13/95

3. Issue Frequency: Monthly

4. Issue Number: 12

5. Annual Subscription Price: \$95

6. Number of Issues Published Annually: 12

7. Complete Mailing Address of Known Office of Publication (Street, City, County, State, and ZIP+4): 6200 Aurora Ave., Suite 200N, Des Moines, Polk, IA 50322-2663

8. Complete Mailing Address of Headquarters or General Business Office of Publisher (Not Printer): 6200 Aurora Ave., Suite 200N, Des Moines, IA 50322-2663

9. Full Names and Complete Mailing Addresses of Publisher, Editor, and Managing Editor: David M. Tharp, International Association of Milk, Food and Environmental Sanitarians, Inc., 6200 Aurora Ave., Suite 200N, Des Moines, IA 50322-2663

10. Owner: International Association of Milk, Food and Environmental Sanitarians, Inc., 6200 Aurora Ave., Suite 200N, Des Moines, IA 50322-2663

11. Known Bondholders, Mortgagees, and Other Security Holders Owning or Holding 1 Percent or More of Total Amount of Bonds, Mortgages, or Other Securities: None

12. Publication Title: Dairy, Food and Environmental Sanitation

13. Issue Date: 9/13/95

14. Issue Frequency: Monthly

15. Issue Number: 12

16. Annual Subscription Price: \$95

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24. Issue Date: 9/13/95

25. Issue Frequency: Monthly

26. Issue Number: 12

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33. Known Bondholders, Mortgagees, and Other Security Holders Owning or Holding 1 Percent or More of Total Amount of Bonds, Mortgages, or Other Securities: None

14. Issue Date for Circulation Data Below: September 1995

15. Issue Frequency: Monthly

16. Issue Number: 12

17. Annual Subscription Price: \$95

18. Number of Issues Published Annually: 12

19. Complete Mailing Address of Known Office of Publication (Street, City, County, State, and ZIP+4): 6200 Aurora Ave., Suite 200N, Des Moines, Polk, IA 50322-2663

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25. Issue Date: 9/13/95

26. Issue Frequency: Monthly

27. Issue Number: 12

28. Annual Subscription Price: \$95

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Coming Events

OCTOBER

• **25-27, Fifteenth—Food Microbiology Symposium and Workshop**, at The University of Wisconsin, River Falls. A symposium entitled "Current Concepts in Foodborne Pathogens and Rapid and Automated Methods in Food Microbiology" will be held. A Rapid Methods in Food Microbiology workshop designed to provide practical demonstrations and discussions of various tests and instruments available for rapid detection, isolation and characterization of foodborne pathogens and toxins as well as prediction of shelf-life and checking hygiene and sanitation in food processing facilities is also scheduled. For additional information and registration, contact Dr. Purnendu C. Vasavada, Animal and Food Science Dept., Univ. of Wisconsin-River Falls, River Falls, WI 54022; telephone (715) 425-3150; fax (715) 425-3785; Internet: Purnendu.c.Vasavada@uwrf.edu.

NOVEMBER

• **1, AIMFES Fall Annual Meeting**, at the Carlisle, in Lombard, IL. A buffet luncheon will be held during the annual meeting. For further information, contact Robert Crombie at (815) 726-1683.

• **2-3, Understanding HACCP**, Bedford Park, IL (Chicago area). This introductory short course covers the principles and support programs important in developing a HACCP plan. Attendees will work through examples of HACCP plans. For more information, contact David Gombas, National Center for Food Safety and Technology; telephone (708) 563-1576; fax (708) 563-1873.

• **4-6, 6th Egyptian Conference of Dairy Science and Technology**, Cairo, Egypt. Organized by The Egyptian

Soc. of Dairy Science. For more information, contact Dr. M. H. Abd El-Salam, National Research Center, Dokki, Cairo, Egypt; telephone (20-2-625 026) or fax (20-2-700 931).

• **4-7, MegaShow Food & Dairy EXPO and IIEFP**, Chicago, IL. Other than being an incredible trade show, MegaShow will be the central activity of a tremendous educational effort. Pre-Megashow Workshop on High Temperature Short Time (HTST) Pasteurization Techniques planned for Friday and Saturday, Nov. 3 and 4, 1995; Workshop on Stainless Steels for Dairy, Food and Biotech Industries offered on Friday, November 3, 1995. For more information contact: Tom Gilmore, DFISA's Technical Director, at (703) 761-2600; fax (703) 761-4334.

• **5-9, Anuga FoodTec International Food Technology Fair**, Anuga FoodTec will be an extensive multi-industry food technology trade fair, but will also allow individual product categories to present themselves independently. Anuga FoodTec guarantees a comprehensive overview of the food processing and packaging technology sectors. For further information, contact Cologne International Trade Fairs, Inc., 40 West 57th St., 31st Floor, New York, NY 10019; telephone (212) 974-8836.

• **5-9, American Association of Cereal Chemists 80th Annual Meeting**, The world's largest gathering of cereal industry professionals will convene their 80th Annual Meeting in San Antonio, Texas at the Henry B. Gonzales Convention Center. AACC Annual Meeting registration materials are available after July 1, 1995, from AACC Headquarters, 3340 Pilot Knob Road, St. Paul, MN 55121-

2097 U.S.A.; telephone (612) 454-7250; fax (612) 454-0766.

• **8-9, Food Plant Sanitation Workshop**, Specific subjects will include basic principles of HACCP, sanitary design standards, updates on pesticide concerns, and control strategies. For further information, contact Registrar, American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502; or call (913) 537-4750 or (800) 633-5137.

• **9-10, Getting Started with Hazard Analysis and Critical Control Point (HACCP) System**. For more information, contact the AACC Short Course Dept., 3340 Pilot Knob Road, St. Paul, MN 55121-2097; telephone (612) 454-7250 or fax (612) 454-0766; e-mail aacc@scisoc.org.

• **13, Tennessee Association of Milk, Water, Food Protection**, fall meeting at Ellington Agricultural Center, Nashville, TN.

• **13-16, Better Process Control School**. The school is designed for operating supervisors of commercial food canning operations, but is open to employees from high-acid food canneries, retort operators, and seam closure operators. To request a complete brochure or to enroll call toll free (800) 752-0881. For further information contact UC Davis, phone (916) 757-8777.

• **15, Ontario Food Protection Association Annual Meeting**, will focus on proposed changes to the Canadian Food Inspection System and its impact on government agencies, the food industry and food service establishments. The meeting will be held at the Ontario Ministry of Health Central Laboratory. For more information, please contact Dr. Linda Harris, University of Guelph; phone (519) 824-4120 ext. 3497; fax (519) 824-6631.

• **15-18, AWT Water Technologies '95**, Phoenix, Arizona. In addition to the sessions, a major exhibition will feature the newest products and services offered by key suppliers to small- and medium-sized companies. For more information, contact Cathleen Connolly at the Association Headquarters: (703) 524-0905.

• **29-Dec. 1, Designing a Modern Milking Center**, Rochester, New York. Parlors, Milking Systems, Management, and Economics. Will provide the information necessary to plan, design, finance, construct, and manage an efficient, profitable milking center. For further information phone (607) 255-7654; fax (607) 255-4080; e-mail: nraes@cornell.edu.

DECEMBER

• **6-8, Institute of Food Technologists Introduction to Quality Management in the Food Industry Workshop**, Statler Hotel, Ithaca, NY. Short course co-sponsored by the IFT Continuing Education Committee, IFT Quality Assurance Division, Cornell University Institute of Food Science, and Cornell Cooperative Extension. For more information, contact Dean Duxbury, IFT's Director of Professional Development, 221 N. LaSalle St., Suite 300, Chicago, IL 60601; telephone (312) 782-8424; fax (312) 782-8348.

• **7-8, Institute of Food Technologists Small Business Management Workshop**, Benton Convention Center, Winston-Salem, NC. 1-1/2 day short course co-sponsored by IFT Continuing Education Committee and Carolina-Virginia Section IFT in conjunction with Carolina-Virginia Section IFT Suppliers Night. For more information, contact Dean Duxbury, IFT's Director of Professional Development, 221 N. LaSalle St., Suite 300, Chicago, IL 60601; telephone (312) 782-8424; fax (312) 782-8348.

• **7-8, Managing Dairy Farms Into the 21st Century**, a dairy management symposium sponsored by Penn State's College of Agricultural Sciences and Monsanto, Inc., will address topics vital to the dairy industry's future. For more information, contact Michael O'Connor at (814) 863-3913.

JANUARY 1996

• **3-5, American Association of Cereal Chemists**, will sponsor the following educational event, Milling for Cereal Chemists, in Manhattan, Kansas. For more information contact the AACC Short Course Dept., 3340 Pilot Knob Rd., St. Paul, MN 55121-2097; phone (612) 454-7250; fax (612) 454-0766; e-mail aacc@scisoc.org.

• **10-12, American Association of Cereal Chemists**, will sponsor the following educational event, Fundamentals of Food Engineering

in Orlando, Florida. For more information contact the AACC Short Course Dept., 3340 Pilot Knob Rd., St. Paul, MN 55121-2097; phone (612) 454-7250; fax (612) 454-0766; e-mail aacc@scisoc.org.

• **10-12, Calves, Heifers and Dairy Profitability: Facilities, Nutrition, and Health** will be a multidisciplinary conference that covers alternatives for the planning and operation of profitable and efficient replacement programs. Programs that result in calving at 20-22 months will be highlighted. For further information, contact NRAES, 152 Riley-Robb Hall, Ithaca, NY 14853-5701; telephone (607) 255-7654; fax (607) 255-4080; e-mail: nraes@cornell.edu.

FEBRUARY

• **13-15, Institute of Food Technologists Low-Calorie Food Product Development**, Grosvenor Resort, Orlando, FL. Course co-sponsored by the IFT Continuing Education Committee and American Association of Cereal Chemists. For more information, contact Dean Duxbury, IFT's Director of Professional Development, 221 N. LaSalle St., Suite 300, Chicago, IL 60601; telephone (312) 782-8424; fax (312) 782-8348.

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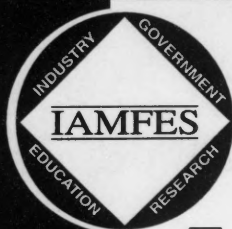
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