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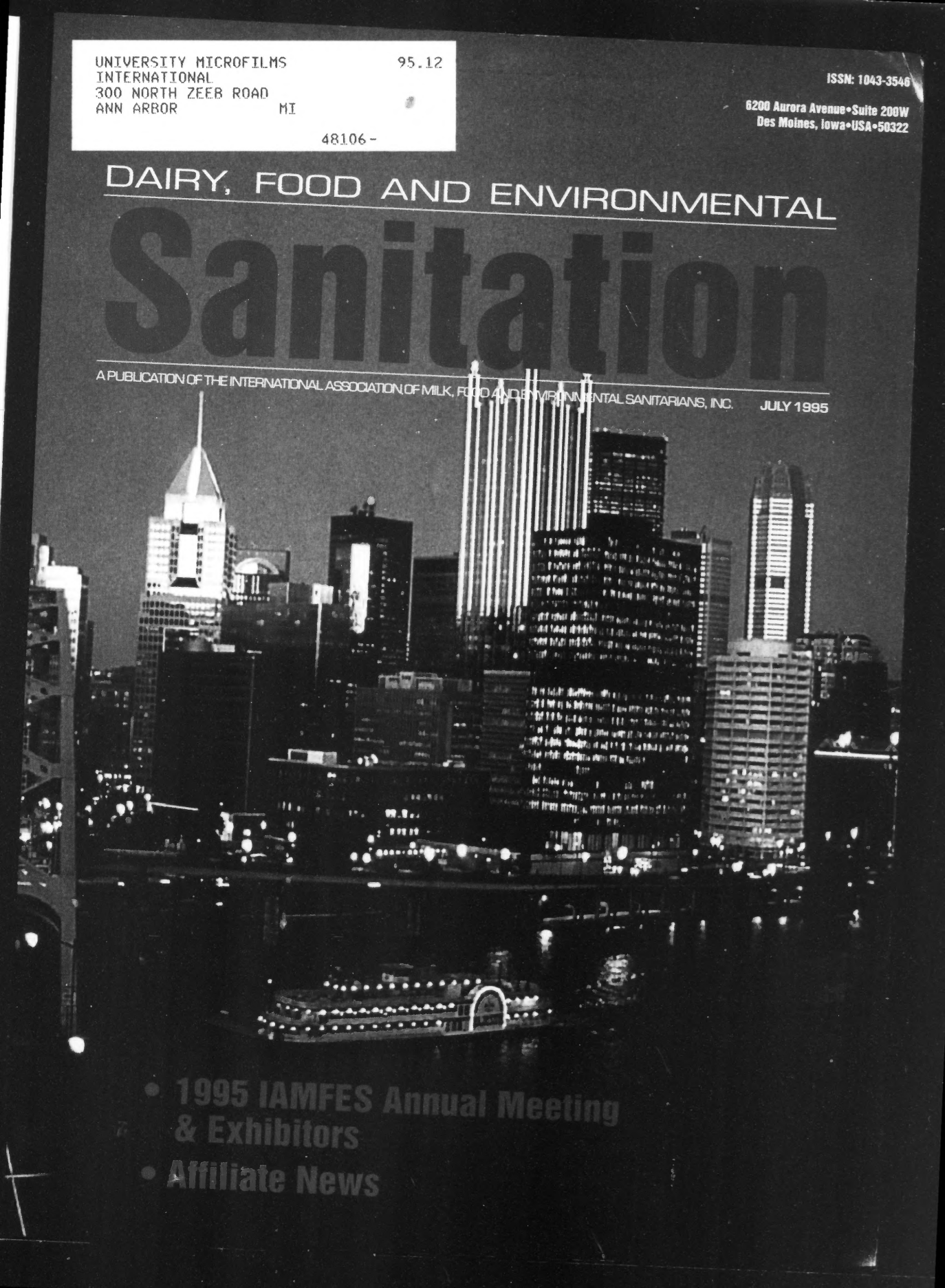
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DAIRY, FOOD AND ENVIRONMENTAL

# Sanitation

A PUBLICATION OF THE INTERNATIONAL ASSOCIATION OF MILK, FOOD AND ENVIRONMENTAL SANITARIANS, INC.

JULY 1995

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- 1995 IAMFES Annual Meeting & Exhibitors
  - Affiliate News

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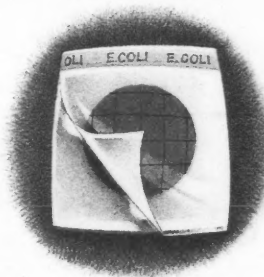
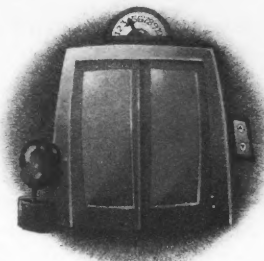
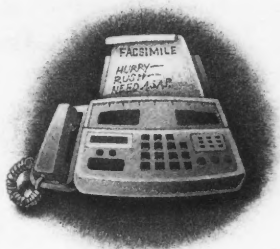
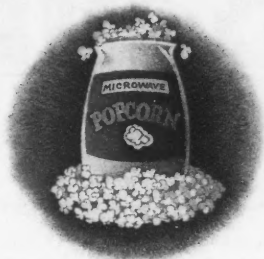
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# Sanitation

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## ARTICLES

- Botulism from Potato Salad** ..... 420  
*J. Brent, H. Gomez, F. Judson, K. Miller, A. Rossi-Davis, P. Shillam, C. Hatheway, L. McCroskey, E. Mintz, K. Kallander, C. McKee, J. Romer, E. Singleton, J. Yager, and J. Sofos*
- Implementation of Food Safety and HACCP Training for Small Food Processors: A Pilot Study in Nebraska** ..... 424  
*Susan S. Sumner and Julie A. Albrecht*
- Microbial Contamination of Condensates Formed on Superstructures of Wood and Other Materials in Meat Plants** ..... 430  
*R. C. Worfel, J. N. Sofos, G. C. Smith, J. B. Morgan and G. R. Schmidt*
- The Quest for Quality in the Dairy Industry** ..... 435  
*Thomas Fuhrmann, Dairy Services of Arizona*
- Technical Committee Meets in the UK to Set International Standards** ..... 439  
*Tom Gilmore, 3-A Secretary/Technical Director*
- A Book Review – "Introduction to Food-borne Fungi"** ..... 441  
*Robert A. Samson, Ellen S. Hoekstra, Jens C. Frisvad and Ole Filtenborg*

## ASSOCIATION NEWS

- Sustaining Members ..... 415
- Thoughts From the President ..... 416
- On My Mind ..... 418
- New IAMFES Members ..... 444

## DEPARTMENTS

- Federal Register ..... 443
- Updates ..... 446
- News ..... 448
- Affiliate News ..... 450
- Industry Products ..... 452
- Business Exchange ..... 459
- Coming Events ..... 463
- Advertising Index ..... 468

## EXTRAS

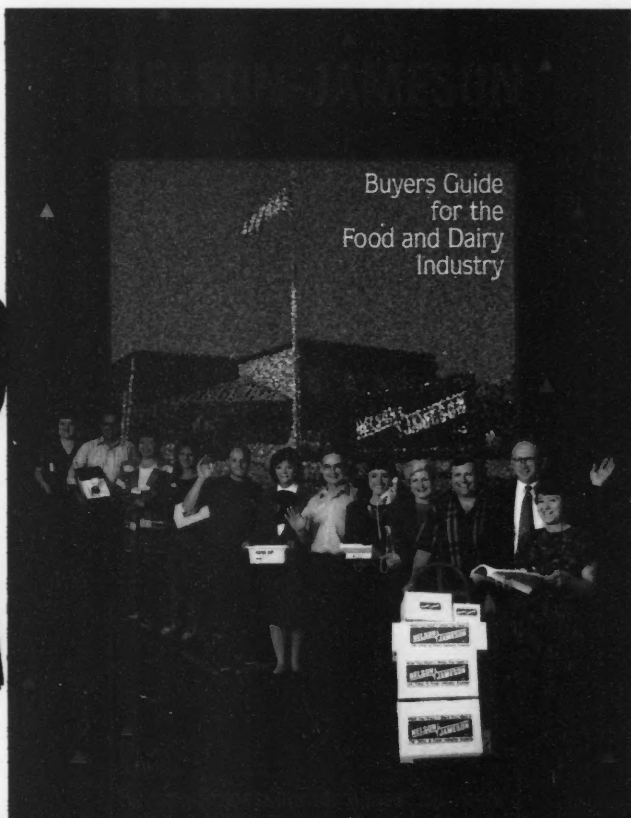
- IAMFES 82nd Annual Meeting Exhibitors ..... 461
- IAMFES Membership Application ..... 471
- IAMFES Booklet Form ..... 472

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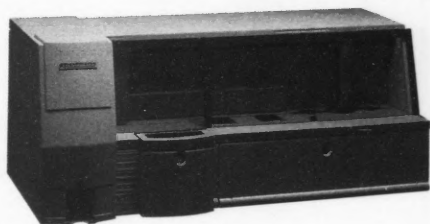
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# THOUGHTS

## FROM THE PRESIDENT



By C. DEE CLINGMAN,  
IAMFES President

### “The end is in sight”

Each year the current IAMFES President writes 12 monthly columns for the journal. Each issue is a challenge to develop interesting content for the membership. But the last column is the most difficult.

This year has certainly been a year of change. While a number of Des Moines headquarter's staff positions changed, the net result is that we have some outstanding people to lead our Association into the future. Our strength in membership services, marketing, advertising, and publications has never been stronger. We have an excellent foundation to build upon as we execute our Association's Long Range Plan in future years.

My year as President began with major problems in producing consistent quality publications. The entire IAMFES team of officers, staff, scientific editors, publications committee members, and others worked together to take our publica-

tions to a higher level—not just to fix the problems. In January we unveiled a new look for the *Journal of Food Protection*. It sprouted a new cover design and color format. But the major change for the future was the use of a perfect binding process instead of a stapled format. This enables *JFP* to print to any size each month and not be limited to the length of a staple. Theoretically you could print to the size of a telephone directory if needed. In addition, this will benefit those who submit papers or articles to the journal since more articles can be published quicker. Great news for all!

*Dairy, Food and Environmental Sanitation* also got a new cover design that made it more vivid, contemporary, and enhanced the visual appeal significantly. The inside of *DFES* also received a major overhaul. A new graphic and layout design was created to give it a 90's look and the vibrant appearance gives articles a “read me” look. Wow, what a great change!

This spring our members received a new look in our Annual Meeting publication announcement. We put together in one booklet everything you wanted to know about the upcoming conference in Pittsburgh. It included information on pre-conference workshops, symposia, spouse tours, registration forms, etc. This not only cut down on the printing of numerous documents as in previous years but minimized the costs of stuffing envelopes, and the errors associated with such a process. One mailing piece at a uniform postage rate instantly became a winner. Special credit goes to our IAMFES staff who put together an attractive annual meeting brochure that also encouraged more advertisers and had our exhibit space filling up in record speed. I think we learned well from the marketers of consumer products that “packaging” will make or break you.

Taking our good idea from the all-in-one conference announcement booklet at this year's Annual Meeting we will have one program booklet that will contain all conference information, so attendees won't have to fumble through numerous booklets and loose papers. Our sustaining member, 3M Microbiology Products, has also provided a professional looking conference portfolio for this year's conference attendees in Pittsburgh. A special thank you goes to our friends at 3M in assisting us in taking our Annual Meeting to a higher level.

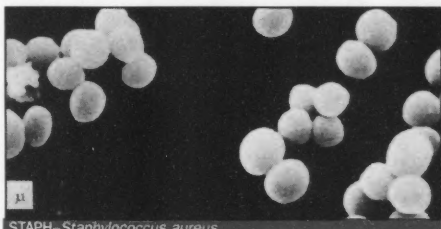
The Communicable Disease Affecting Man Committee chaired by Dr. Frank Bryan hopes to premier its new accomplishment at this year's Annual Meeting. The group recently revised and updated its waterborne illness book. Its revision and publication is extremely timely with recent major waterborne illness outbreaks in our nation's leading municipal water supplies.

Many other IAMFES committees, task forces and professional development groups have been busy and productive this year. The Food Sanitation PDG will debut its new publication on maintaining food safety controls during and after a disaster at the Pittsburgh meeting. The Dairy Quality and Safety PDG has been on the leading edge in developing acceptance systems for ISO-9000 programs in the worldwide dairy industry.

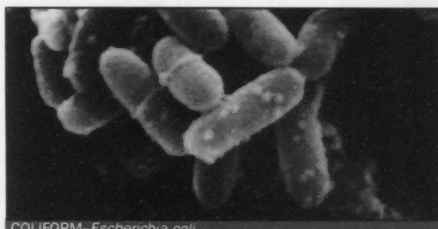
Perhaps, that is what the future will result from... Pride. Pride in what we do each day, pride in the quality way in which we do it, and pride in seeing the benefit or success of our work.

In closing for the last time, I would like to thank each of you for giving me the opportunity to serve as your President. It was a once in a lifetime opportunity to represent all IAMFES members. I hope you have been as pleased with my leadership as I have been so delighted in representing you. I have that pride!

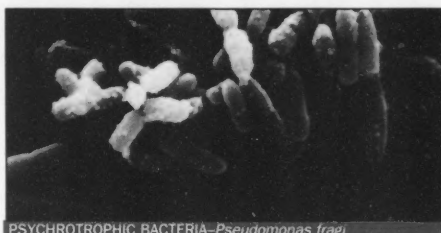
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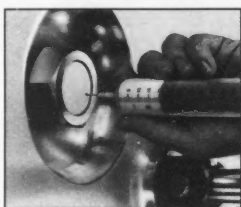
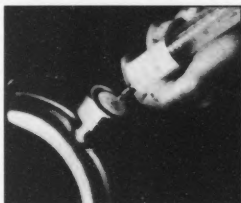


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## On My MIND...



By STEVEN K. HALSTEAD, CAE  
IAMFES Executive Manager

**“Tougher choices and more choices. That’s what makes this meeting so unique and wonderful.”**

**...“is the annual meeting.”**

I just returned from a “just one more time to go through everything” meeting with the Pennsylvania Local Arrangements Committee (LAC). We met at the Pittsburgh Hilton and literally reviewed every aspect of the meeting.

Paul Hoge, LAC chairperson has done a marvelous job of organizing and orchestrating the committee. Committee chairs Chuck Turner, Wally Jackson, Pat McKenty, Tom Angstad, Pete Schaffer, Don Briener, Mike John, Gene Fry and Bob Manning have put in a tremendous effort to make everything go smoothly and seemingly effortlessly.

The dairy products are donated, the “welcome bags” (“goodie bags” somehow just doesn’t seem very professional!) are procured and everything from Hershey bars to pretzels—including a carton of aseptically processed milk—is ready to go into the bags. The Pennsylvania Association of Milk, Food and Environmental Sanitarians (PAMFES) has over sixty (60!) volunteers lined up to help out. I’m told they will be very visible in their color coordinated “uniforms!”

It has been such a pleasure working with this group. They know how to work hard and get the job done, but they also have a lot of fun doing it. They clearly respect one another and truly enjoy working together.

I would like to remind you of the opening general session on Sunday night. I don’t have to tell you who Dr. James Jay is—you probably cursed him repeatedly as you struggled through your first course in food microbiology. But by now, you have surely come to appreciate the excellence of his text **Modern Food Microbiology**. Dr. Jay will present the 1995 Ivan

Parkin Lecture entitled “Is Our Food Supply Too Safe?”

Immediately following the Ivan Parkin Lecture, the 1995 Educational Exhibits will officially open and become the site for a reception. Although there was local sentiment for a “beer and kielbasa” reception following in the footsteps of last year’s “nachos and margaritas,” in the end the traditional wine and cheese won out. You’ll have to wait for the gala on Monday night for your beer and kielbasa.

Exhibits Manager, Rick McAtee tells me that all exhibit space is now sold and that he is developing a waiting list in case there are any last minute cancellations. We will be adding a “literature display” area for the first time. We hope to be able to display the latest in books and periodicals for your inspection.

One late addition to our program that I would very much like to call to your attention is the speech by Michael Taylor, Acting Under Secretary for Food Safety in the U.S. Department of Agriculture. Mr. Taylor will join Ian Kirk, Associate Director of Meat and Poultry Products for Agriculture and Agri-Food Canada; Laurentina Pedrosa, Director of Quality for Portugal; and Jerry Kozak, Senior Vice-President of the International Dairy Food Association in a discussion of the “Equivalency of Inspection—Impact of NAFTA and GATT.” As they say in the entertainment business, “that alone should be worth the price of admission.”

A note to those of you who have complained about having to make a choice from among three, concurrent sessions in the past: This year there will be FOUR concurrent sessions. Tougher choices and more choices. That’s what makes this meeting so unique and wonderful.

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IAMFES Sustaining Member

## Botulism from Potato Salad

J. Brent,<sup>1</sup> H. Gomez,<sup>1</sup> F. Judson,<sup>1</sup> K. Miller,<sup>1</sup> A. Rossi-Davis,<sup>1</sup> P. Shillam,<sup>2</sup> C. Hatheway,<sup>3</sup> L. McCroskey,<sup>3</sup> E. Mintz,<sup>3</sup> K. Kallander,<sup>4</sup> C. McKee,<sup>4</sup> J. Romer,<sup>4</sup> E. Singleton,<sup>4\*</sup> J. Yager,<sup>4\*</sup> and J. Sofos<sup>5</sup>

### ABSTRACT

Two cases of food-borne botulism were investigated in Denver, Colorado; the results of laboratory analysis indicated that the food involved was potato salad which was temperature abused in the home of the patients. No commercial foods were involved in the illness. Type A toxin as well as toxin-producing cultures were isolated from the potato salad, and barbecued ribs were probably cross-contaminated from the potato salad.

### Introduction

Although rare, botulism outbreaks of food-borne illness are important because they often involve home-processed foods and if undetected or untreated, they can lead to death (2, 5). Foods are contaminated with spores of the pathogen *Clostridium botulinum* in the environment where they grow or during handling and processing. Spores may then germinate and eventually produce deadly neurotoxin, if environmental conditions such as the temperature of storage permit their proliferation (5).

Although traditionally many botulism outbreaks have been associated with underprocessed home-canned foods, in recent years several outbreaks have involved certain unusual products prepared and sold in food-service establishments (2). One outbreak involving type B toxin affected at least 37 persons at a restaurant and the incriminated product was garlic-

in-oil stored at room temperature for several months (2). Twenty-eight customers of another restaurant were intoxicated with type A botulinum toxin which was present in sauteed onions (3). At least three reported outbreaks of type A botulism have been associated with consumption of potato salad (2). In two of the outbreaks, the potato salad was prepared with leftover, aluminum-foil-wrapped, baked potatoes which had been kept at room temperature after baking and before preparation of the salad (4, 6). Baked potatoes were also the cause of a single botulism case that occurred at a restaurant in 1984 (2). One of the outbreaks involving potato salad occurred in Colorado in November of 1978 (4). According to the FDA, baked or boiled potatoes are "potentially hazardous food products" and should be held at  $\leq 7^{\circ}\text{C}$  or  $\geq 60^{\circ}\text{C}$  (2).

The objective of this paper is to describe an epidemiologic investigation and laboratory analysis of a botulism outbreak in Denver, Colorado, involving consumption of potato salad at home.

### Epidemiologic Investigation

In February of 1992, the Director of the Public Health Department of Denver, Colorado, was notified by its Rocky Mountain Poison Control Center of a suspected botulism case. The Colorado Department of Health was also notified by the Poison Control Center in its attempt to locate botulism antitoxin, which was then

shipped from a U.S. Quarantine Station to Denver General Hospital. The information received was that a 29-year-old male patient had been admitted to Denver General Hospital with a presumptive diagnosis of botulism. It was also indicated that the patient went first to another hospital complaining of nausea, where he was treated with an antiemetic and discharged. The same night, after symptoms had progressed, the patient was reevaluated at the Denver General Hospital emergency department, and was found to have difficulty focusing the eyes, difficulty swallowing, and slurred speech. The patient developed a standard descending proximal muscle weakness, difficulty in breathing, and was placed on respiratory support and botulism antitoxin was administered. The patient's mother was still at home and was experiencing milder symptoms suggestive of botulinum intoxication (ptosis, dysphagia). A decision was made to visit the house and investigate further by a team from Denver Health Department, which included clinical toxicologists from the Poison Control Center and investigators from Consumer Protection and Disease Control from the Colorado Department of Health. During the house visit, the team obtained a medical history from the mother and inspected the kitchen, which revealed unsanitary conditions and yielded several food samples not properly refrigerated. The medical personnel decided



to admit the mother to the Denver General Hospital.

### Laboratory analyses

Each food sample collected at the house was split, one half being sent to the Colorado Department of Health for transfer to the Centers for Disease Control (CDC) in Atlanta, and the other half being taken to the Denver Public Health Department and sent for analysis by the Food and Drug Administration (FDA) laboratory at the Denver District Office. The food samples, clinical specimens, and bacterial cultures of foods and specimens were analyzed for botulinum toxicity by the CDC and the FDA District Laboratory according to procedures described in the *Bacteriological Analytical Manual* (1).

### Potato salad

Mouse tests for preformed toxin in extracts of the potato salad performed at the FDA laboratory resulted in typical symptoms of botulism and mouse deaths from the untrypsinized and trypsinized extracts at 1:2, 1:10, and 1:100 dilutions, with no deaths from the 1:2 heated control dilution. The volume of extract used was 0.5 mL per mouse. Type A and poly A-F antitoxins were protective, while types B, E and F antitoxins did not protect the mice. The product had a normal odor and appearance and its pH was 4.85. Direct smears of the product showed 20 to 40 mixed rods and 2 to 4 cocci per field at 1,000X. Two clostridial forms were observed. Culturing in cooked meat medium (CM) and trypticase-peptone-glucose-yeast extract broth with trypsin (TPGYT) yielded growth with typical clostridial cells. Both CM and TPGYT 12-day-old cultures of potato salad were screened for toxin, and typical symptoms and mouse deaths were observed with the 1:1,000 and 1:10,000 dilutions, with no deaths from the 1:2 heated control dilution. Neutralization tests performed on 5-day-old CM cultures of 10 isolates previously found to be toxic at 1:10,000 dilution showed that the toxicity was due to *C. botulinum*

type A toxin. Analysis of potato salad by the CDC laboratory also detected preformed botulin type A toxin, and *C. botulinum* type A was isolated from toxic cultures of the sample.

### Barbecued ribs

As performed by the FDA, testing for preformed toxin showed typical *C. botulinum* toxicity symptoms and deaths of mice from the untrypsinized portion only, at the 1:2 and 1:10 dilutions, and no deaths from the 1:2 heated control dilution. Type A and poly A-F antitoxins were protective. These tests gave a presumptive indication of the presence of very low levels of type A toxin in the ribs, which had a normal odor, and the appearance of well-cooked (darkened and dry) barbecued meat. Direct smears of the product showed no clostridial forms, but culturing on CM and TPGYT yielded growth and typical clostridial cells. Both CM and TPGYT 12-day-old original product cultures were screened for cultural toxin and showed typical symptoms and mouse deaths at 1:1,000 and 1:10,000 dilutions, with no deaths from the 1:2 heated control dilution. Toxicity screening of 5-day-old CM cultures of 8 isolates showed 7 causing typical symptoms and mouse deaths at 1:10,000 dilution. Toxin neutralization testing of 5-day-old CM cultures of 2 isolates, previously found to be toxic at 1:10,000 dilution, showed *C. botulinum* type A toxin. Analysis of the barbecued ribs by the CDC laboratory also indicated the presence of botulin toxin; signs of botulism were observed in some mice, but type A antitoxin gave only partial protection, no doubt due to other toxicity in addition to botulin toxin. Type A toxin was identified in cultures of the sample, and *C. botulinum* was isolated.

### Other foods

Of the other foods (raw potatoes, ham hock and greens, neck bones, green beans and chitterlings) collected from the house of the patients, none showed the presence of preformed botulin toxin, as ana-

lyzed by the CDC. However, *C. botulinum* type A was isolated from all these food samples, with the exception of the green beans and the chitterlings.

### Clinical specimens

As analyzed by the CDC laboratory, the serum, gastric contents, and stools of the male patient were found to be positive for preformed type A toxin, and *C. botulinum* type A was isolated from toxic cultures of the gastric and stool specimens. No preformed toxin was detected in the serum and stools of the female patient, but *C. botulinum* type A was isolated from the stools.

### Discussion

In general, it was determined that no commercial food product was involved in the illness. When the mother returned home from the hospital, she and a home health aid discarded all old food. The other patient was severely ill for several weeks, but recovered and was released after remaining in the hospital until May, 1992.

These results indicate that, although several raw food items were contaminated with *C. botulinum* type A, preformed toxin was found only in the potato salad, and to a lesser extent in the barbecued ribs. The barbecued ribs were probably cross-contaminated with preformed toxin from the potato salad during the meal by the patients. This is indicated by the low toxin titer detected in the ribs by the FDA laboratory and the weak toxicity detected during the CDC analysis.

Potato salad has also been involved in botulism outbreaks in the past (4) and the public should be educated to prepare and handle it as a perishable and sensitive food, by keeping it refrigerated. In the present situation, the potato salad was left unrefrigerated in a sealed screw-cap mayonnaise jar. Another point of interest is that, as in the past, *C. botulinum* may form toxin in a food before overt spoilage develops, which may be the case with the potato salad. Spores of *C. botulinum* on the sur-

face of raw potatoes can survive baking and can germinate and produce toxin in the cooked potatoes held at room temperature before preparing the potato salad (4). Thus, although rare, botulism is still a threat to human health and the public should be made aware of its consequences, and potential for development, and of the means of prevention.

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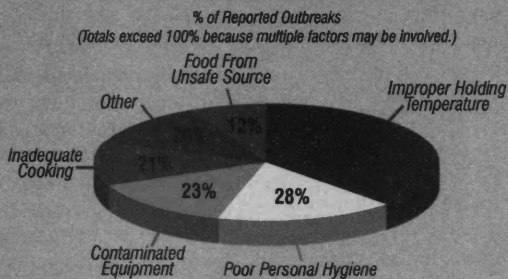
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<sup>1</sup>Denver, Department of Public Health, Denver, CO; <sup>2</sup>Colorado Department of Health, Denver, CO; <sup>3</sup>Centers for Disease Control and Prevention, Atlanta, GA; <sup>4</sup>Food and Drug Administration, Denver District Laboratory, P.O. Box 25087, Denver, Colorado 80225-0087 USA and <sup>5</sup>Colorado State University, Fort Collins, CO.

### Factors Contributing to Foodborne Disease Outbreaks



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# Implementation of Food Safety and HACCP Training for Small Food Processors: A Pilot Study in Nebraska

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## ABSTRACT

A model food safety and Hazard Analysis Critical Control Point (HACCP) program was developed and piloted in Nebraska. This program was conducted through five workshops which covered information on food microbiology, sanitation, food laws and regulations, and HACCP. The target audience was small food processors, which were defined as companies with fewer than 20 employees. Companies without a defined quality-assurance program were specifically recruited (targeted) for the program. The workshop reached 15% of all food processors in Nebraska and 20% of small processors. Each processor was given individual assistance with a food safety program for its processing facility. The audio-visuals and notebook developed for the workshops can easily be adopted by extension specialists in other states to be utilized to train additional small food processors.

## Introduction

Food safety concerns have reached an all-time high among the public, regulators and food processors. Consumers are concerned about the environment, pesticides, food-borne disease microorganisms, and many other issues. The food industry is currently taking steps in its quality-assurance programs to address these concerns.

Food safety programs have been developed by the extension services at various universities: see the publications Food Safety & You (Cornell, 1990), Food Safety Manual (Virginia Polytechnic Institute & State University, 1990), Consumer Confidence in the Food Supply: Risk vs. Benefit (University of Georgia, 1990), and Plate it Safe (Kansas State University, 1990). The USDA Food Safety and Inspection Service (FSIS) developed A Margin of Safety: The HACCP Approach to Food Safety Education. These programs address food safety for consumers. The National Restaurant Association has developed HACCP materials for food-service operations. The National Food Processors Association has developed HACCP training materials also. However, educational materials and programs to minimize the presence of pathogenic microbes and other hazards in production environments of small food processors have not been fully developed.

The HACCP concept is a systematic approach to hazard identification, assessment, and control which can be used to ensure safe food. This approach is just one aspect of a quality-assurance program. The HACCP approach was initially quickly adopted for use in the manufacture of low-acid canned foods (4). Currently, there are model HACCP programs for the seafood industry, and the meat and

poultry industries are moving toward HACCP. Moberg (7) discussed probable critical-control points in the production of refrigerated foods. Bryan (3) outlined a HACCP program for retail food and restaurant operations. There have been several excellent reviews on HACCP (2, 5, 9-12); therefore, we will not review the HACCP principles but will focus on the application of HACCP to small and medium processors.

Managers of food-processing businesses assume moral and legal obligations for the processing of wholesome and safe food products for human consumption (6). It is critical that food processors understand these obligations and adopt practices and procedures which allow them to fulfill these responsibilities.

The HACCP system has been endorsed by industry and regulators for the assurance of safe food processing. The development of regulations mandating HACCP appears to be a high priority for the FSIS and state meat inspection agencies. The Food and Drug Administration (FDA) recently conducted a week-long HACCP video conference and has called for companies to volunteer for model HACCP programs. Regulations from the FSIS for meat processors to implement HACCP should be completed by early 1995. One meat-industry trade association has implemented

HACCP training for its membership. However, reaching the small-and medium-sized businesses on a national level is yet to be accomplished.

Small food processors, defined for this program as companies with fewer than 20 employees are different from large processing operations when training for HACCP is considered. Small processors often employ a small number of employees, do not have a defined quality assurance program, produce a relatively large number of products, or specialize in one product. All of these aspects can provide unique challenges in the implementation of HACCP. It is often difficult to get small food processors to take time off and attend a seminar. The relatively large number of small processors and the regional diversity of these operations points to the need for implementation of HACCP training that can occur on a state or local level.

#### Materials and Methods

To help integrate a HACCP program easily in the workplace, five one-day food-safety and HACCP workshops were held across the state of Nebraska. Workshops were held in Scottsbluff, Norfolk, Kearney, Lincoln, and Omaha. A food safety and HACCP notebook developed by food microbiologists and food scientists at the University of Nebraska—Lincoln was used for this project. The notebook contained five sections: food microbiology, food-plant sanitation, food laws and regulations, HACCP, and a food safety and HACCP section written specifically for each food processor. The HACCP section followed the NACMCF (National Advisory Committee on Microbiological Criteria for Foods) HACCP guidelines (8).

Although model HACCP programs have been developed for food processors of low-acid canned foods, seafood, and a few other foods, these educational materials must be adopted for small food processors. Thus, the overall objective of this project was to provide food safety and HACCP educational training to small-scale food processors. The specific objectives of the project were to: (1) to develop a HACCP educational program which included infor-

mation on food-borne bacteria, food-borne illnesses, food-plant sanitation, food laws and regulations, and HACCP principles; (2) to develop visual aids to be used for HACCP education and training programs; and (3) to conduct a series of workshops.

#### Education Program

Because of the critical need for safe food processing by small-and-medium-sized processors, the authors developed and conducted an educational program with several groups of food processors. The program targeted techniques for improved safe-food handling and HACCP. The educational program included experiential activities, slide presentations on food microbiology, food sanitation, food laws and regulations and HACCP, and support materials for implementing HACCP into food-processing facilities.

The program included the development of the following materials:

1. A modular slide set which included basic information on food microbiology, food sanitation, laws and regulations and HACCP.
2. Educational experiential activities; use of pH meter and water activity ( $a_w$ ) meter to demonstrate the importance of pH and  $a_w$  in the growth of microorganisms; and use of a Glo-Germ® Kit (1) to demonstrate the importance of handwashing.
3. A food safety quiz to measure participants' knowledge of food safety as they entered the course.
4. A food-microbiology extension circular and a sanitation extension circular were developed which can be used as reference materials.
5. A poster for placement in the food-processing facility which demonstrates proper handwashing techniques.

#### Program Evaluation

The evaluation of the food safety and HACCP program identified the impact of the program on small food processors. A three-phase time-series

assessment focused on the processors to identify (a) knowledge gained about food safety and HACCP; (b) changes in opinions about food safety; and (c) practice changes relative to food safety and HACCP.

At the end of the educational program, participants provided an immediate evaluation. Follow-up impact evaluation was conducted in the following manner: at the end of the educational session, participants were asked, "As a further service, we would like to give you a call in three months to discuss any concerns you may have regarding HACCP; when would be an appropriate time to contact you?" Participants were contacted by phone three months after the training session to measure the impact of the program. Questions addressed implementation of food safety techniques covered in the educational program. This educational program was designed to develop training materials for small-scale and nontraditional food processors. This is a group of food processors for which little HACCP training material is available.

#### Results

There are 350 food processors in the state of Nebraska who prepare food for retail sale (grocery store) or for the food service trade. The series of five workshops across the state of Nebraska attracted 101 participants from 59 companies (Table 1). The workshops reached 15% of all the food processors in Nebraska and 20% of the small processors. Each participant was asked to indicate whether they represented a large, medium or small business, an entrepreneur or the state or university. No restrictions or definitions were given for small, medium, or large. The participants based their choices on the number of employees at their facility and/or on the sales volume for their company.

Participants in the workshops represented many different product categories (Table 1). As would be expected for Nebraska, most of the companies who attended were meat, poultry, and/or egg producers. The next largest product categories were food service and sauces and spreads.

Table 1. Demographic data of workshop participants

Number of participants	101
Number of food processors represented	59
Size of company	
large	6
medium	11
small	21
entrepreneur	6
other	10
Product produced by processor	
bakery	3
consultants	2
dairy	3
fish	3
food service	7
groin/pasta	5
meat/poultry/eggs	16
sauces/spreads	6
vegetable	4
state/university	10

The participants from the latter category fit into the entrepreneur group. The workshops also attracted state and USDA inspectors who were seeking additional HACCP information.

A food safety quiz was given to participants before the educational program was conducted. The questions measured the participants' knowledge of pH,  $a_w$ , and food safety handling practices. The quiz had 13 multiple choice questions and 2 true/false questions. Responses to the questions (Table 2) indicate that several unsafe practices may be occurring in food-processing facilities. Seventy percent of the participants did not know that iodine is the preferred sanitizer for worker's hands. Most of the participants identified chlorine, which is too harsh to be used on the skin.

The quiz contained three questions that dealt with pH. Sixty-eight percent of the participants did not know that *Clostridium botulinum* cannot grow below pH 4.6. The participants did have some prior knowledge of pH, although for the most part the participants had no knowledge of  $a_w$ . The participants did have an understanding of many of the personal-hygiene principles that were asked on the quiz. The correct responses ranged from 34 to 100% for the six questions dealing with personal hygiene practices.

Proper procedures for determining pH and  $a_w$  and handwashing were covered in the educational program. The participants were given the opportunity to measure the  $a_w$  and the pH of food products with different types of pH meters and the  $a_w$  of numerous products.

Responses to the end-of-meeting evaluation (Table 3) indicate that the food safety and HACCP workshops reinforced good manufacturing practices for 90% of the participants. Seventy-five percent of the participants learned new food-handling techniques by attending the workshop.

#### Follow-up Evaluation

One participant from each of the 59 food processors was available for the three-month follow-up evaluation. The follow-up evaluations (Table 4) with the participants indicate that 76% of the participants have plans to implement HACCP and monitor critical control points. Information received at the workshop (manual, hand-outs) was shared by 87% of the participants with other people in their companies. In some instances the manual was given to other employees for self-training. The food safety manual has been used 2 to 10 times since the workshop by 52% of the participants. This evaluation indicated that the manual is often used as a resource.

Based on their end-of-meeting evaluation forms and three-month telephone follow-up interview, five food processors were identified who desired additional food safety and HACCP training. On-site visits were made to an aquaculture farm, dairy plant, bakery, meat processor, and poultry processor. The processors are in various stages of implementing HACCP, with seafood and meat processors taking the lead.

#### Implications

The food safety and HACCP program was designed for easy application to other state programs. The manual contains sections on food microbiology, food sanitation, laws and regulations, HACCP, and individual material for each processor. A new laws and regulation section can be easily substituted for a different state. Each section of the manual contains reference tables of important information.

#### Conclusions

From results of our workshop evaluations, we recommend the following for educational food safety and HACCP workshops for small-scale food processors:

1. Involve participants in experiential activities and demonstrations of HACCP principles.
2. Give specific examples of food safety principles via a slide presentation.
3. Provide support material such as hand-outs and model flow diagrams for participants.
4. In workshops where there are participants from many different food processing industries, provide an opportunity for one-on-one consultation.

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**Table 2. Assessment of food processors' knowledge of food safety and sanitation principles**

Food Safety Question (Concept)	Correct Answer	% Correct	% Incorrect
<b>Sanitizers</b>			
1. Which sanitizer is the best to use for sanitizing worker's hands? Chlorine, iodine, weak acid solutions	Iodine	30	70
2. Sanitation can be accomplished by using (check all that apply) heat, chlorine, iodine, none of the above	Heat, chlorine, iodine	91	9
3. Sanitizer effectiveness should be checked: once in the morning, frequently with test kits, once in the morning and once in the afternoon	Frequently with test kits	60	40
<b>pH</b>			
4. The pH of your product mixture is 3.8. Which of the following thermal heat processes is the most appropriate? Hot fill hold, water both conning, steam conning	Hot fill hold water both	40	60
5. The finished equilibrium pH of food products is most often determined by using a pH meter. Which of the following can affect pH? Barometric pressure, water activity, temperature	Temperature	40	60
6. <i>Clostridium botulinum</i> will not grow in foods with a pH below 7.0, 5.6, 4.6	4.6	32	68
<b>Water activity</b>			
7. A 12 percent (1 lb of salt in 1 gallon water) salt solution has a water activity value of: 0.80, 0.85, 0.97, 0.92	.92	5	95
8. Your product has a water activity of 0.90. What organism (s) could grow in the product? <i>C. botulinum</i> , <i>Salmonella</i> , molds, <i>S. aureus</i>	Mold <i>S. aureus</i>	25	75
9. Which ingredient has a water activity value of 0.60? Flour, processed cheese, dried beef, milk	Flour	11	89
<b>Personal hygiene questions</b>			
10. Which food is a potentially hazardous food? Flour, raw eggs, honey	Raw eggs	89	11
11. Wooden cutting boards or tables are safe to use in a food processing facility. True/false	False	100	0
12. It is recommended that hands should be washed with warm soapy water for: 60 sec., 40 sec., 20 sec.	20	34	66
13. The temperature of your refrigerator should be at or below: 50°F, 45°F, 40°F, 20°F	40°F	85	15
14. Persons who have a cold should not prepare foods. True/false	True	76	24
15. Which of the following is considered proper attire in a food processing facility? Hair restraint; earrings, necklace; shoes that are worn outside the facility; plastic gloves	Hair restraint, plastic gloves	93	7

**Table 3. End-of-meeting evaluation**

Questions Asked	Percent of Responses
1. What changes do you think you will make in food-handling practices after today's session?	
Tighten up sanitation	30
Personal hygiene training	19
HACCP	13
2. Did you learn any new food-handling practices from attending today's session?	
Yes	77
No	23
Please identify what you learned.	
Plant sanitation procedures	14
Processing factors (pH, $a_w$ )	26
HACCP	6
3. Did today's session make you aware of safe food-handling practices that you already do?	
Yes	96
No	4
Please identify what practices you feel you need to maintain or improve.	
HACCP/monitor CCPs	36
Plant sanitation	11
Sanitize surfaces (measure concentration)	7

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**Table 4. Summary of follow-up evaluations**

Questions	Percent of Responses	
	No	Yes
Did you post the handwashing diagram?	42	58
Do you have plans to implement HACCP?	24	76
Have you determined the CCPs for your processing facility?	24	76
Did you share this information with others?	13	87
After attending the Workshop Food Safety/Food Sanitation, did you change anything about the way food handling is done in your facility?	23	77
How often have you used the manual since the workshop?	Percent of Responses	
Once	14	
2 to 10	52	
10 or more	14	
Not at all	20	

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# Microbial Contamination of Condensates Formed on Superstructures of Wood and Other Materials in Meat Plants

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## ABSTRACT

Studies conducted in a beef slaughter and fabrication plant and in a cured-meat-processing plant examined levels of total aerobic mesophilic bacterial counts present in condensates formed on wooden and other superstructure surfaces in different parts of each plant. The results indicated significant differences ( $P < 0.05$ ) in microbial counts among different locations of the beef slaughter plant. Locations with condensates containing the highest microbial contamination in the slaughter plant were near the hide removal and included the head inspection and evisceration areas. The lowest microbial counts were present in condensates formed in some of the carcass chillers. Microbial counts recovered from condensates formed on superstructures made of different materials (i.e., wood, iron, plastic, glazed brick, concrete, and stainless steel) were generally not significantly different ( $P > 0.05$ ). Condensates formed on surfaces of materials such as concrete and iron, however, sometimes had higher bacterial counts than wood surfaces.

## INTRODUCTION

Sanitation of food contact surfaces is important in the food industry because such surfaces spread microbiological contamination in meat

products and other foods. Ease and efficacy of sanitation of food contact surfaces depends, among other factors, on the materials used in their manufacture. Sanitation of stainless steel surfaces should be easier than it is for plastic and especially wooden materials (5, 6).

Some recent studies compared survival of bacteria on cutting boards made from different types of wood and plastic. Recovery of applied bacteria was generally less from wooden than plastic blocks (1, 2). It has also been reported that recovery of bacteria from wood surfaces required destructive procedures (4, 6). Ak et al. (2) concluded, however, that with reasonable cleaning effort, wooden cutting boards can be used safely in home kitchens and are unlikely to create undue risks of cross-contamination. But the latter researchers (2) expressed uncertainty as to whether these findings were applicable to the use of wooden cutting boards in food-service kitchens, retail meat-cutting establishments, and meat-/and poultry-processing plants.

Cutting-board surfaces of any material that is originally smooth can change in structure as a result of wear and tear. Cuts, cracks, and crevices reduce the success of adequately cleaning a surface prior to disinfection. Inadequate cleaning allows build-up of residues of particles of flesh, fat, and dirt which bind and

inactivate sanitizers, thus permitting the survival of microorganisms, and may also serve as sources of nutrients for multiplication of microorganisms. Tebbutt (7) assessed cleaning and sampling methods for food contact surfaces and concluded that wood and polypropylene were particularly difficult to clean and that scrubbing with a nylon brush was necessary to achieve cleanliness of these two kinds of surfaces. Forty of 47 wood surfaces remained heavily contaminated after cleaning, compared to 39 of 72 polypropylene pads, but the pads had larger numbers of bacteria on them. Based on these results, Tebbutt recommended that use of wooden cutting boards be avoided.

The "General Report on Problems Found During European Community (EC) Inspections of U.S. Fresh Bovine and Porcine Meat Establishments" (3) indicated—as a defect—the "use of wood" (beams, equipment, pallets, etc.) in slaughtering, fabricating and processing facilities of the U.S. Reviewing the scientific literature, however, we found no information identifying wooden surfaces not in contact with food as creating health risks. Therefore, studies were undertaken to determine bacterial populations existing on structural surfaces made of wood and other types of construction materials in slaughter rooms, fabrication rooms, coolers, and processing rooms of meat

plants. These studies examined the extent of microbial contamination in moisture build-up on surfaces of wood and other materials that may function as microenvironments for bacterial growth and which may eventually drip onto equipment and meat products.

## MATERIALS AND METHODS

### Slaughter and fabrication facility

One meat plant (Plant 1) evaluated was a beef slaughter and carcass fabrication facility. Total aerobic mesophilic microbial populations found in condensates throughout the plant were evaluated. Sampling sites were selected to include points in the process from hide removal from the carcass to final packaging of the product. All 18 sampling sites consisted of overhead iron—and other metal, such as stainless steel—structures which accumulated condensate. A template (9 cm<sup>2</sup>) was placed over visible condensate deposits and a sterile cotton swab on a 7.5-cm-long wooden handle (Puritan, Guilford, ME) was used to absorb the condensate. The swab, held at a 30° angle, was carefully rotated over the condensate three times, reversing direction between strokes, and was then rolled around the inside border of the template. An average of 20 swab samples were taken at each site 4 to 6 hours after the start of full production, on two different days during the month of November, 1992. Each swab was broken off into a test tube containing 10 ml of sterile Lethen broth (Difco Laboratories, Detroit, MI). The contents of the tubes were shaken for 20 s and chilled (4°C). Twelve hours later, the tubes were shaken again for 30 s and 1 ml of the solution was plated onto aerobic count Petrifilm™ (3M Microbiology Products, St. Paul, MN) plates, which were incubated for 48 h at 35°C, and the colonies were then enumerated. An analysis of variance was used to compare differences in microbial counts between sampling sites located in various rooms, including the slaughter room, the chill-cooler, and the fabrication room, as well as among sampling sites.

Table 1. Aerobic bacterial counts (colony-forming units (CFU) per cm<sup>2</sup>) detected in condensates of superstructures in an animal slaughter and meat-fabrication facility (Plant 1)

Sampling site	Site description	Aerobic bacterial count (log <sub>10</sub> CFU/cm <sup>2</sup> ) Mean ± SD
1	Slaughter room near hide puller	1.96 ± 0.58
2	Slaughter room over prerinse	2.80 ± 0.86
3	Slaughter room near head inspection	>3.40
4	Slaughter room at end of eviscerating area	>3.40
5	Slaughter room at plastic condensation trap	>3.40
6	Carcass entrance into chiller	2.66 ± 1.05 <sup>a</sup>
7	Worker entrance into chiller	2.22 ± 0.69 <sup>a</sup>
8	Chiller - 1	0.54 ± 0.52
9	Chiller - 2	0.96 ± 0.58
10	Chiller - 3	0.39 ± 0.56
11	Chiller - 4	0.24 ± 0.34
12	Chiller - 5	1.64 ± 0.43 <sup>b</sup>
13	Chiller - 6	1.19 ± 1.02
14	Exit from chiller into fabrication	1.02 ± 0.94
15	Fabrication room overhead cooling units	1.07 ± 1.02 <sup>c</sup>
16	Fabrication room upper-level work area	1.06 ± 1.01
17	Fabrication overhead of packaging	1.57 ± 0.81
18	Fabrication from concrete ceiling	2.42 ± 1.68

<sup>a</sup>Condensates from entrances into the chiller had higher ( $P < 0.05$ ) bacterial counts than within the chiller boxes.

<sup>b</sup>Chiller box 5 had higher ( $P < 0.05$ ) bacterial counts than chiller box 4.

<sup>c</sup>The fabrication room had higher ( $P < 0.05$ ) bacterial counts than the chillers.

### Meat-processing facility

The second plant (Plant 2) evaluated was a meat-processing facility in which no slaughtering or carcass fabrication took place. Fresh meat cuts were received chilled or frozen in stainless steel tubs or plastic-lined reinforced cardboard containers placed on wooden pallets. Swabbing in the meat-processing plant (Plant 2) was performed on superstructures (overhead supports, beams and walls) constructed of different materials (i.e., wood, iron, plastic, concrete, and glazed brick) and within close proximity to each other. These superstructures were found in different rooms (e.g., receiving, bacon belly processing, mixing, sausage processing, heating/smoking, packaging, and cooler storage). Templates (9 cm<sup>2</sup>), cotton swabs, and swabbing techniques were identical to those used in Plant 1.

Each swab was immediately broken off into 10 ml of sterile phosphate buffer solution (pH 7.2). Duplicate samples were taken at each site daily over a period of 3 days in the months of July and August, 1992. Each tube was shaken for approximately 20 s followed by pipetting 1 ml of the solution onto aerobic count Petrifilm™ plates which were incubated at 35°C for 48 h, and colonies were then enumerated. The surfaces were swabbed immediately after production, but prior to cleaning, as well as during clean-up of the facility at the end of each day. Duplicate swabs were taken from each sampling site on two different occasions of production. An analysis of variance was used to compare microbial counts from different surfaces.

In addition to direct swabbing of surfaces, the presence of microor-

**Table 2.** Average aerobic bacterial counts (colony-forming units (CFU) per cm<sup>2</sup>) in condensates formed on wood and other surfaces throughout a meat-processing plant and collected immediately after production but before clean-up (Plant 2)

Surface type	Aerobic bacterial counts (CFU/cm <sup>2</sup> )		Level of significance (P) compared to wood
	Mean ± SD		
Wood	20.7 ± 13.4		—
Iron	64.9 ± 33.5		0.195 <sup>a</sup>
Plastic	3.0 ± 0.8		0.192 <sup>a</sup>
Glazed brick	2.6 ± 0.9		0.183 <sup>a</sup>
Concrete	373.1 ± 107.0		0.000 <sup>b</sup>
Stainless steel	1.4 ± 0.2		0.411 <sup>a</sup>

<sup>a</sup> Counts in condensates from this type of surface and wood surfaces were not significantly different ( $P > 0.05$ ).

<sup>b</sup> Counts in condensates from stainless steel surfaces compared to those from wood surfaces were significantly different ( $P < 0.05$ ).

**Table 3.** Average aerobic bacterial counts (colony-forming units (CFU) per cm<sup>2</sup>) in condensates formed on different non-food-contact superstructure surfaces located in the same room of a meat-processing plant and collected immediately after production but before clean-up (Plant 2)

Room	Aerobic bacterial counts (CFU/cm <sup>2</sup> )			
	Wood Mean ± SD	Iron Mean ± SD	Stainless steel Mean ± SD	Glazed brick Mean ± SD
1	2.2 ± 0.8 <sup>a</sup>	19.3 ± 11.9 <sup>a</sup>	—	—
3	2.2 ± 0.1 <sup>a</sup>	96.9 ± 39.0 <sup>b</sup>	—	—
6	116.4 ± 77.4 <sup>a</sup>	185.0 ± 162.0 <sup>a</sup>	—	—
7	1.2 ± 0.1 <sup>a</sup>	—	1.4 ± 0.2 <sup>a</sup>	2.3 ± 0.8 <sup>a</sup>
8	1.5 ± 0.3 <sup>a</sup>	4.9 ± 3.1 <sup>a</sup>	—	—
9	1.5 ± 0.2 <sup>a</sup>	18.3 ± 12.5 <sup>a</sup>	—	—

<sup>a</sup> No significant difference between counts in condensates from this type of surface and wood surfaces ( $P > 0.05$ ).

<sup>b</sup> A significant difference between counts in condensates from this type of surface and wood surfaces ( $P < 0.05$ ).

ganisms in condensate from non-food-contact surfaces in the meat-processing facility was evaluated through the use of two other methods.

**Method 1.** Sterile aluminum pans with a collecting surface of 889 cm<sup>2</sup> were hung at a distance of 20 to 30 cm from superstructures constructed of

iron, stainless steel, and wood to collect dripping condensate. The pans were hung prior to production and removed immediately after production for that shift had been completed. A phosphate buffer solution (100 ml) was used to rinse the collecting surfaces of the pans and then 1 ml of the

solution was pipetted onto Petrifilm™ plates which were incubated for 48 h at 35°C, and colonies were enumerated.

**Method 2.** This method involved hanging aluminum pans at a distance of 4 to 10 cm from metal and wood structures throughout the plant and leaving them in place for a period of 4 days to collect dripping condensate. All sample locations were at least 2.5 meters above normal work areas. At the end of the fourth day, the same procedures as for Method 1 were used for plating.

## RESULTS AND DISCUSSION

### Slaughter and fabrication plant

As expected, the highest bacterial counts were recovered from condensates forming in areas of the slaughtering room located after, but near, the site of removal of the hide from the carcass, such as the head inspection and evisceration areas (Table 1). The entrances leading into the chill-coolers (both the carcass entrance and the worker entrance) had more observable buildup of condensate than other sampling sites and the condensates were observed dripping onto carcasses and carcass contact surfaces. The condensates sampled at the chill-cooler (hereafter referred to as "chiller") entrances (sites 6 and 7) had significantly higher ( $P < 0.05$ ) microbial populations than sites inside the chillers. Microbial counts were higher ( $P < 0.05$ ) for chiller 5 than for chiller 4 (sites 12 and 11) which could be due to the fact that chiller 5 (site 12) was the first chiller that the hot carcasses entered. When a carcass entered chiller 5, the doorway was opened and that allowed the entry of bioaerosols from the slaughtering room. Microbial counts in condensates collected in the fabrication rooms (sites 15 to 18) were higher ( $P < 0.05$ ) than those in condensates from the chillers (sites 8 to 13). Condensate samples taken from the concrete ceiling of the fabrication room contained higher microbial numbers (mean log<sub>10</sub> 2.42 colony-forming units (CFU)/cm<sup>2</sup>) than did condensates obtained from other sites (Table 1).

**Table 4. Average aerobic bacterial counts (colony-forming units (CFU) per cm<sup>2</sup>) in condensate formed on different non-food-contact superstructure surfaces located in the same room of a meat-processing plant and collected during clean-up at the end of the day (Plant 2)**

Surface type	Aerobic bacterial counts (CFU/cm <sup>2</sup> )	Level of significance ( <i>P</i> ) compared to wood
	Mean ± SD	
Wood	168.7 ± 94.4	—
Stainless steel	31.7 ± 20.9	0.277
Iron	82.8 ± 39.1	0.322
Other <sup>a</sup>	1.1 ± 0.0	0.149

<sup>a</sup>Other materials consisted of various plastics and glazed bricks.

**Table 5. Average aerobic bacterial counts (colony-forming units (CFU) per cm<sup>2</sup>) in condensates collected (Method 1) under different types of construction materials in a meat-processing plant (Plant 2)**

Surface type	Aerobic bacterial counts (CFU/ml)	Level of significance ( <i>P</i> ) compared to wood
	Mean ± SD	
Wood <sup>a</sup>	3.2 ± 1.7	—
Stainless steel <sup>a</sup>	0.4 ± 0.1	0.17
Iron <sup>a</sup>	8.1 ± 6.2	0.39

<sup>a</sup>Numbers of samples (pans located under) wood supports (*n* = 16), stainless steel (*n* = 12), iron supports (*n* = 12).

**Table 6. Average aerobic bacterial counts (colony-forming units (CFU) per cm<sup>2</sup>) in condensates collected (Method 2) under different construction materials in a meat-processing plant (Plant 2)**

Surface type	Amount of fluid collected (g)	Aerobic bacterial counts (CFU/ml)
		Mean ± SD
Wood <sup>a</sup>	53	165.9 ± 18.9 <sup>b</sup>
Metal <sup>a</sup>	101	597.0 ± 314.0 <sup>b</sup>

<sup>a</sup>Numbers of samples (pans located under) wood (*n* = 5), metal (*n* = 5).

<sup>b</sup>Counts in condensates from the two surfaces were not significantly different (*P* > 0.05).

Plant 1 had only one area where wood was being used as a superstructure. The overhead horizontal portion of the door frame at the carcass entrance to the chiller (site 6) was constructed of wood and iron. It was observed that more condensate accumulated on the iron than on the wood. Samples of condensate were taken from both types of surfaces, but a statistical comparison of the microbial counts recovered was not possible because all Petrifilm™ plates had colony densities too numerous to count, irrespective of superstructure material. Plates from both types of surfaces appeared to be comparably contaminated with bacteria.

### Meat-processing plant

Overall, the results indicated that condensates that formed on concrete and iron surfaces and that were sampled immediately after production were more heavily contaminated with bacteria than was condensate found on wood, while condensates from wood surfaces were more heavily contaminated than were condensates from surfaces of plastic, glazed brick, and stainless steel (Table 2). Most of the latter differences in microbial counts were not significant (*P* > 0.05) because variation among counts for condensates from a given surface was high. Comparing (Table 3) contamination in condensates collected immediately after production from different surfaces in the same room, it appears again that wood attracted less contamination than iron surfaces. When surface condensates were sampled during clean-up of the plant, wood surfaces had higher contamination but the differences between counts from condensates on wood compared to other surfaces were not significantly (*P* > 0.05) different (Table 4).

Method 1 for evaluating the presence of microorganisms in dripping condensate proved to be inadequate because the quantity of condensate that occurred was so limited that it apparently evaporated prior to the end of daily production. Since there was no measurable moisture present in the pans, numbers of microbial colony-forming units in the buffer

used to rinse the pans were very small (Table 5).

Use of Method 2, which allowed the pans to remain in place for several days, resulted in collection of condensate and splash water that occurred during clean-up times. Although the amount of fluid collected and the microbial counts were higher under metal surfaces than under wood surfaces, the differences were not statistically ( $P > 0.05$ ) significant (Table 6).

On the basis of these results, there was no significant ( $P > 0.05$ ) difference between total populations of mesophilic aerobic bacteria found in condensates (not in contact with the food) from surfaces of wood structures and from structures constructed of other materials used in these two meat-processing plants. Thus, when

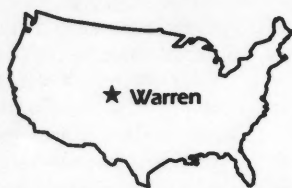
not in contact with the food, the material used in superstructures of plants is not as important as avoiding formation of condensates, provided that cleaning of the surfaces is not hindered by the type of superstructure material.

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## The Quest for Quality in the Dairy Industry

Thomas Fuhrmann, Dairy Services of Arizona, Tempe, Arizona

### Introduction

Total Quality Management (TQM) is a relatively new and different way to do business. It's a basic management philosophy through which small and large companies produce goods and services of higher quality at lower costs. TQM is responsible for catapulting Japan to the manufacturing colossus it has become; it's the management system that has saved American companies like Motorola, Harley-Davidson and Federal Express from financial disaster and repositioned them as the quality leaders in their fields. TQM is the business management of the '90's; it works in today's competitive business climate.

A wide variety of books, articles and audio-visual materials describe quality management systems (a short list is presented at the end of this paper); however most references describe TQM as it relates to manufacturing and service companies. Does TQM work in agriculture? The dairy and beef industries have implemented "Quality Assurance Programs" which address very specific quality problems in their industries, but these do not incorporate the broader spectrum that TQM addresses in other sectors of the business world. One company does offer quality management consulting services to the food and agricultural industries. This paper will describe how the principles of total quality management can be implemented in agri-business enterprises to improve profitability

and the quality of goods and services produced.

### Defining "Quality"

TQM is not a step-by-step formula for improvement; rather it is an organizational and management philosophy. Understanding TQM begins with defining "quality".

Quality is defined by the customer. For those of us in agriculture, learning to focus on customers is the first hurdle to cross in understanding TQM. The ultimate customer of course is the consumer of meat, milk and other agricultural products. But identifying the precise customer who is the direct beneficiary of goods and services produced is the key. For dairymen, that may be the milk marketing cooperative, the calf-buyer, the local auctioneer, the grain mill, the meat packing plant and so on. All goods and services are produced for a specific customer, some of whom are inside the enterprise/company... e.g. the purchasing department generates shipping invoices for their customer, the accounting department.

The customer wants quality defined by his/her requirements... "quality is conformance to requirements." For example, many milk marketing cooperatives have quality premium programs which pay producers more for high quality milk... milk with a specific bacteria and somatic cell counts, milk without antibiotic residues or added water... milk that meets specific requirements. To illustrate further, which is the quality automo-

bile, a cadillac or a volkswagen? Again, it depends on the customer's needs. While a cadillac is a fine luxury car, it could be inappropriate if the customer wants low cost, efficient transportation, ease of parking, reliability and low maintenance.

With focus on the customer, TQM is the system for producing quality products for maximum profit... profit through quality. Total quality management is not "pie-in-the-sky" ideology; companies have successfully implemented TQM out of economic need or desperation and they became profitable. Increasing profit occurs in only two ways: increasing income or decreasing expenses. The TQM philosophy of profit through quality influences both. The dairy farmer who increases profitability by improving the quality of his calf-raising program illustrates the point. To increase income, the dairy farmer makes strategic changes in the way he manages his calves to:

- reduce death loss resulting in more live calves to sell,
- improve weight gain to produce a heavier calf to sell,
- reduce health problems to sell a healthier, thrifter calf,
- change the sick animal treatment program to eliminate antibiotic residues.

The result is more income from increased calf sales to a much more satisfied calf-buyer.

At the same time the dairy farmer makes strategic changes to reduce expenses by:

- reorganizing his colostrum program to guarantee a higher

- percent of calves receive protective antibodies through a system which is more efficient for workers to accomplish,
- improving feeding programs to increase rate-of-gain with least-cost rations,
- changing the vaccination program to improve calf health with cost effective vaccines,
- modifying antibiotic use to reduce treatment costs and eliminate antibiotic residues.

Income increases to the dairy farmer from this part of his business because he satisfies a customer with more of a higher quality product; at the same time the dairy farmer reduces expenses while improving efficiency ... profit through quality.

### The Logic of Quality

Implementing the philosophy of profit through quality within an enterprise requires commitment through three levels of management. These include:

1. Management Leadership Activities
2. Work Force Activities
3. Organizational and Personal Commitment

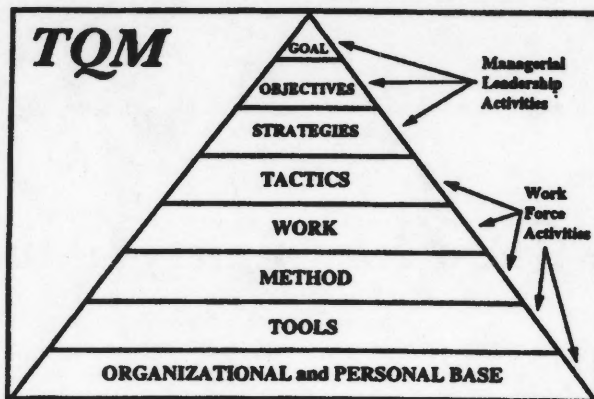
*The pyramid to the right provides a diagram of the concept for TQM.*

#### 1. Organizational and Personnel Commitment

The foundation of the pyramid is a principle-centered base which aligns the company's organization of workers and managers to a common goal of quality output. Owners, managers, workers and support staff "eat, sleep and live" the concept of quality. Departments may need to be realigned, job responsibilities clarified and communication improved to provide organizational framework for changes to produce quality output. Quality not only becomes a goal, a buzz word, but a total commitment for the existence of the company.

Through communication and commitment to a common goal, workers and managers develop mutual understanding and trust in each other. The dynamics of working toward the goal of improved quality output per-

The pyramid below diagrams the basic concept for TQM.



meate the entire company. The caliber of workers who participate in quality production is crucial as is their attitude of commitment to excellence. As an illustration, the owner of a dairy farm with three employees (some of which may be family members) may have to re-evaluate and restate his/her commitment to change goals. There needs to be a commitment of time and effort to plan for that change and to elicit the cooperation of workers. Accepting change to improve quality as a way of doing business is the first key to understanding the logic of quality.

#### 2. Management Leadership Activities

Once competent people are committed and the philosophy of change for quality is accepted, owner/managers decide on objectives and strategies to implement quality principles.

The objective of change may be to improve customer satisfaction (increase income) or improve work processors (reduce expenses). Specific strategies must be planned to provide the opportunity for workers to accomplish the objectives. To continue the illustration of the dairy farmer committed to quality management, the owner/manager may:

- institutionalize procedures on the dairy (e.g. establish a specific method to collect colos-

trum) which guarantees high antibody levels and low bacterial contamination to ensure constant quality output,

- focus on prevention rather than reaction (e.g. modify the vaccination program to prevent disease rather than treat it) through improved health management,
- instill the concept of continuous improvement by installing record systems to monitor performance (e.g. monitor death loss and treatment of calves monthly to evaluate progress of management and health practices) and,
- develop teamwork among employees through improved communication (e.g. explain to both the milkers and calf feeder the "how" and "why" of an exact procedure to collect colostrum from fresh cows).

#### 3. Work Force Activities

Workers play a crucial role in changing the way work is done to improve both efficiency and quality output. Teamwork is a key, and when the "study of work" is given priority by management, teams of workers become responsible for recommending work routine changes from the grass roots level.

Workers examine the tactics of their work ... how to find, reduce and remove "non-value added activities"



and work that is non-productive. Workers become responsible for simplifying their work, standardizing it, eliminating wasted effort and automating procedures whenever possible. Referring again to the dairy farm illustration, the three employees may recommend milking fresh cows twice daily, processing colostrum and storing it in a refrigerator, then specifying exactly how, who and when the colostrum is fed to newborns. As the change to total quality management is implemented in agri-business enterprises, every person in the company becomes integrally involved and responsible for improvement within the system.

### Organizing Work

Total quality management is all about "organizing work." When managers and workers plan together for efficiency and improved results, increased profit through quality results. It's crucial to understand work and how to manipulate it for improvement.

#### 1. Work has Structure

All work has structure; how this structure is organized is crucial to its results. Organizing work is described as:

- a series of related tasks is a process,
- a group of related processes is a system,
- the system generates results.

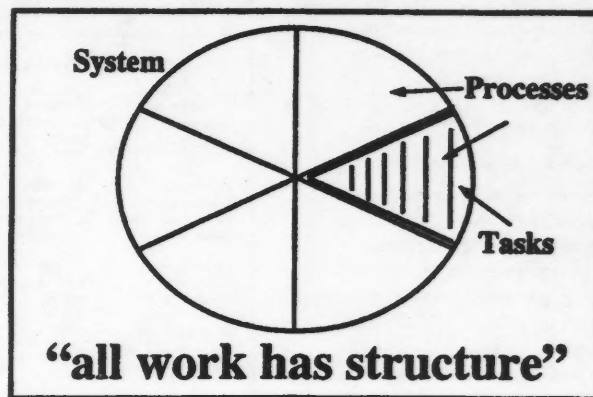
*The work structure is depicted diagrammatically in the figure to the top right.*

The key word is "process." A process is grouping in sequence all the tasks directed at accomplishing one particular outcome. Better processes mean better quality, which means better productivity. A "system" is integrating a group of related processes to accomplish a larger outcome.

#### 2. Customers and Suppliers of the Process

While a process is a series of related tasks, every process has a supplier and a customer. The supplier is the provider of process activity input. This person may be internal (e.g. the milker who supplies colostrum from milking fresh cows to the calf feeder) or external (e.g. the

The work structure is depicted diagrammatically below:



To illustrate with the work of raising calves on a dairy farm:

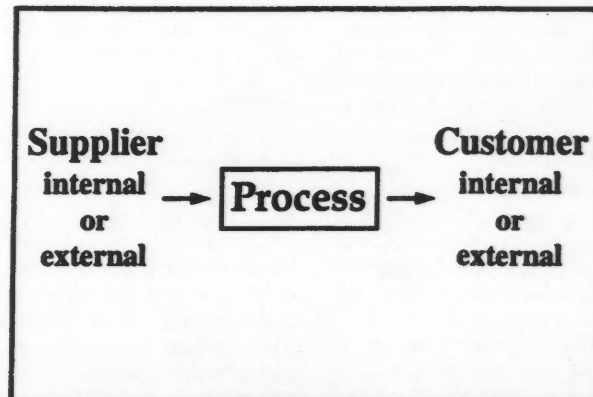
### System:

- Program to manage calves to weaning

### Processes:

- Colostrum delivery program
- Milk/ milk replacer feeding program
- Concentrate feeding program
- Vaccination/ treatment program
- Housing environment management

The supplier/process/customer relationship may be clarified in the following diagram:



salesperson who sells a colostrum substitute product to the dairy farm). The customer is the user of the process or activity output and also may be internal (e.g. calf-raiser) or external (e.g. calf-buyer).

### 3. Processes Begin and End

Processes have distinct beginnings and endings; this is crucial to defining the limits of processes. An example is the process of aviation flight time. Flight time in commercial airline travel is defined as the activities occurring between the beginning of wheel movement away from the gate of one terminal to the end of wheel movement at the arriving terminal gate. By contrast, flight time by military standards is the activities beginning from the time the airplane wheel leaves the ground to the time when the wheel again touches the ground. One definition is not "more correct" than another. Rather, the tasks defined within each process are slightly different and defined by different end points.

### 4. Processes Can be Communicated by Flow Charts

Flow charts are an orderly description of the tasks comprising a process; and the orderly arrangement of processes defining the system. They are a diagram of structured work. Two flow charts of colostrum delivery processes are illustrated below. Compare and contrast the differences in the style of each flow chart (top-down vs continuous flow) and the differences in the beginning and ending of the processes.

Structuring work is crucial; communicating the structure and responsibility to workers becomes the challenge. The use of flow charts encourages attention to detail in planning work. It is also a tool to communicate that structure and detail to workers.

### 5. Teamwork is Crucial to Process Implementation

Each worker plays an integral role in executing structured work to accomplish the quality objective. The larger the agri-business enterprise the more important is the need to encourage teamwork.

Building teamwork starts at the time of restructuring work. Soliciting input from each worker early on gen-

erates a greater variety of input than when only management or a few employers study work. Employees feel part of the process change and take ownership of the modified process or system. This ensures success in implementing the new process or system because no one wants his/her idea or contribution to fail. Building teamwork instills an attitude of working for "results" rather than for "activity."

### Summary

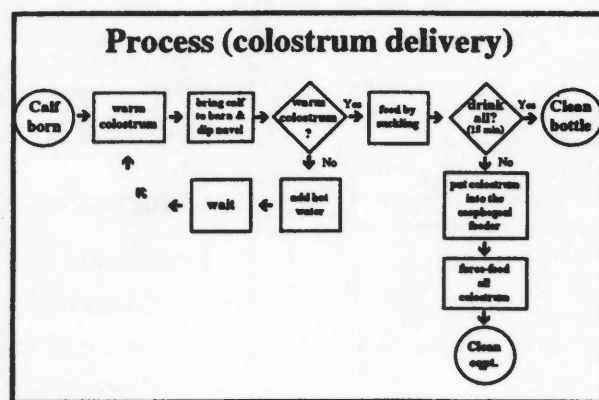
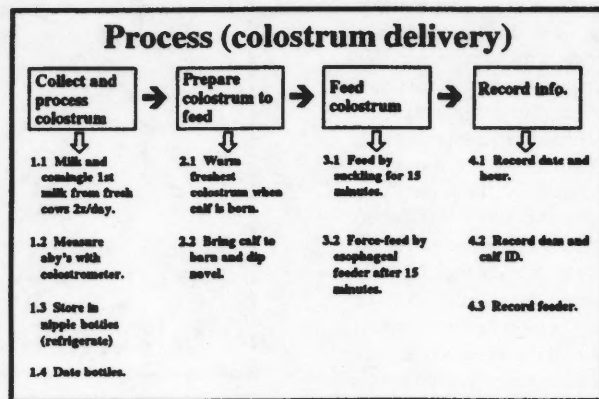
"Quality isn't expensive, it's priceless." It takes as much time, money and effort to do something incorrectly as it does to do it correctly. Agri-business faces the same challenges of competition, demand for efficiency and improved quality as do manufacturing and service industries. Implementing total quality management principles can result in increased profit through quality for agriculture.

### Selected References

This listing of reference material is intended for those who are getting started in understanding the TQM concept. A more extensive reference list is available.\*

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\*Food Agri International, 5660 Greenwood Plaza Blvd., Englewood, Co 80111.



## Technical Committee Meets in the UK to Set International Standards

Tom Gilmore, 3-A Secretary/Technical Director  
Dairy & Food Industries Supply Assn., McLean, VA

**I**SO Technical Committee 199 Working Group Two (ISO TC 199/WG2) on the Safety of Machinery-Hygiene had its first meeting at the British Standards Institution on January 19-20, 1995. There were four experts representing the United Kingdom including the convener Dr. John T. Holah from Campden and Chorleywood Food and Research Association, two from Germany, one each from the Netherlands, France and Sweden. The USA was well represented by Richard Smith (KGF), Everett Johnson (Wisconsin Department of Agriculture), Vincent Mills (International Paper/Evergreen Packaging Equipment), John F. Bloodgood (head of TAG-CGSC) and myself, Tom Gilmore (3-A Secretary).

The first day's work focused on the title of the working group (which officially is Safety of Machinery), hygiene requirements for the design of machinery, the scope of activity, plan and schedule work, and the scope and outline of the basedocument. These items were brought to closure. On several other items, such as what are the hazards and risk assessment and risk analysis, consensus was not reached. These items were tabled for the next meeting.

The ISO TC 199 working group came to closure on the following items:

- There is a need to treat both open and closed machinery. To

produce a single standard covering hygiene requirements for all types of machinery which process products for human consumption (pharmaceuticals, food processing, food service and cosmetics).

- To complete the Committee Draft within the next 12 months.

The scope and outline of the base document was the major discussion point for the remainder of the first day. The proposed scope is:

"This international standard applied to all machines and associated equipment [Editor's note: valves, fittings, tubing, etc.] used in all processing applications where hygienic risks to the consumer of the product can occur. The requirements are to be applied by designers and manufacturers who in turn are to provide guidance to the users for the intended use of these machines and equipment. Excluded from this standard are requirements for the egress of microbiological agents from the machine."

The USA experts are nearly in agreement with the above scope but would like it to be expanded to cover users of the equipment. We will make this comment at the April meeting. The remaining outline of the base document is:

- An introduction to be prepared by the convener.

- Normative references such as other ISO or CEN documents on machinery safety.
- Definitions.
- List of hazards.
- Hygienic requirements, measures and strategy for selecting them.
- Compliance verification methods, e.g. test methods.
- Information on cleaning, maintenance and installation.
- Additional precautions such as limitations of use.

The second day's activities focused on hygienic requirements for materials and design. Two contributions for this were received by the convener prior to the meeting. The pr EN 1672-2: European draft standard on safety and hygiene requirements which is a product of CEN/TC 153 on machinery safety, and a proposal from the United States experts. To our delight, the U.S. proposal was used for discussion purposes which was based on 3-A principles. Our proposal was modified because of the broad scope of this proposed ISO standard. It is, however, important to note that the materials and design criteria proposed for this B-level ISO standard would not prevent the use of 3-A standards at the C-level. C-level standards are applied to specific equipment types. ■

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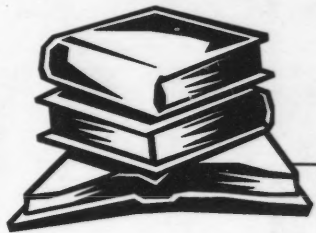
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Book reviewed by: Larry R. Beuchat, Ph.D., Dept. of Food Science & Technology,  
University of Georgia, Griffin, Georgia

# Book Review



## "Introduction to Food-borne Fungi"

Robert A. Samson, Ellen S. Hoekstra, Jens C. Frisvad and Ole Filtenborg,  
Centraalbureau voor Schimmelcultures,  
P.O. Box 273, 3740 AG Baarn,  
The Netherlands, 322 pages, 1995. (ISBN 90-70351-27-7)

**T**he fourth revised edition of *Introduction to Food-borne Fungi* continues to provide an excellent source of practical information on detrimental and beneficial food-borne fungi. Information has been updated by a team of internationally recognized food mycologists. The book's value as a guide for identifying food-borne fungi is particularly notable. The first chapter consists of 234 pages devoted to identification of food-borne fungi. The taxonomy and nomenclature of some food-borne fungi, e.g., some *Fusarium* and *Penicillium* species, have been revised. Keys for identifying fungi are accompanied by numerous excellent figures and photomicrographs.

Chapter 2 summarizes methods for detection and isolation of food-borne fungi, while the occurrence of fungi in foods is discussed in Chapter 3. Mycotoxin production and analysis is covered in the following two chapters. Screening methods for secondary metabolites produced in pure cultures are summarized in Chapter 6.

Food-spoilage fungi in industrially processed foods are discussed in a new chapter, and Chapters

8 and 9 are devoted to the use of preservatives to control food-borne fungi and the role of fungi in food fermentation and processing.

A glossary of terms used in mycology and formulas for media used to detect, enumerate and identify food-borne fungi are presented in an Appendix.

*Introduction to Food-borne Fungi* contains a large amount of information useful to anyone interested in or concerned with fungi that may be associated with foods. The book will provide an excellent reference text for identifying common food-borne fungi. I highly recommend this book for anyone in the food industry involved in microbiological quality assurance and in regulatory agencies monitoring the mycological quality of raw and processed foods. The book will also be an invaluable source of information to professors of food microbiology and to the students under their tutelage. Value is also delivered in terms of cost—about \$34 by current exchange rates. This kind of bargain is rare in today's reference and text book market. ■

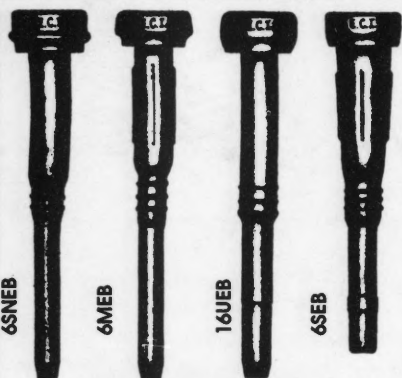
### Read any good books lately?

If you have recently read or heard about an interesting and informative book relative to food science or safety, and would like to recommend it for review, please contact: Editor, *Dairy, Food and Environmental Sanitation*, 6200 Aurora Avenue, Suite 200W, Des Moines, Iowa 50322-2838; telephone (515) 276-3344 or (800) 369-6337; fax (515) 276-8655.

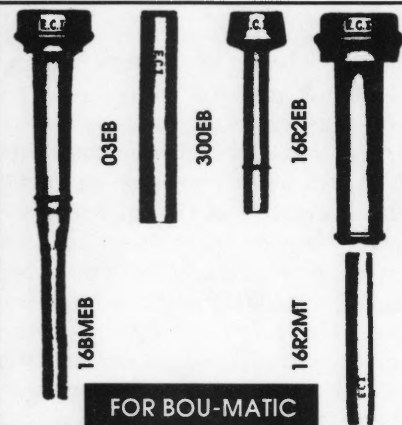
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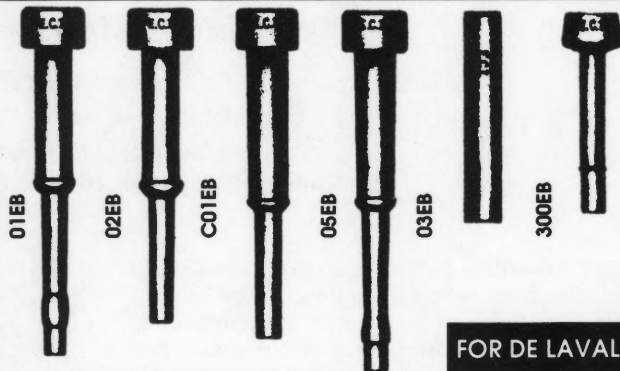


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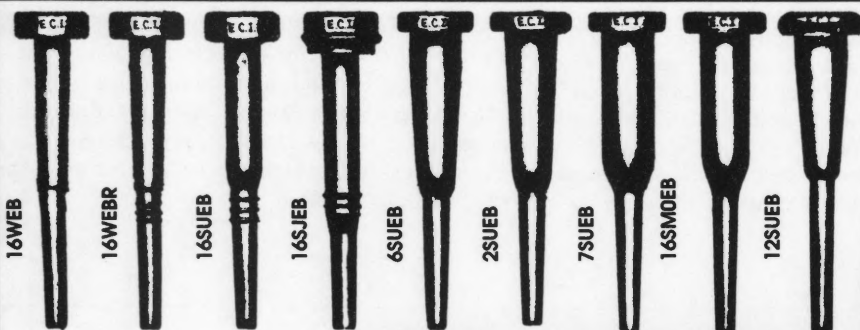
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# Federal Register

DEPARTMENT OF HEALTH AND  
HUMAN SERVICES

Food and Drug Administration

21 CFR Part 135

[Docket No. 88P-0251]

## **Frozen Desserts: Removal of Standards of Identity for Ice Milk and Goat's Milk Ice Milk; Amendment of Standards of Identity for Ice Cream and Frozen Custard and Goat's Milk Ice Cream; Confirmation of Effective Date**

**Agency:** Food and Drug Administration, HHS.

**Action:** Final rule, confirmation of effective date.

**Summary:** The Food and Drug Administration (FDA) is confirming the effective date of September 14, 1995, for compliance with the final rule that appeared in the Federal Register of September 14, 1994 (59 FR 47072), that amended the frozen desserts standards of identity. Among other things, the amendments removed the standard of identity for ice milk and amended the standard of identity for ice cream and frozen custard to provide for the use, in these foods, of safe and suitable sweeten-

ers; skim milk that may be concentrated, and from which part or all of the lactose has been removed by a safe and suitable procedure; and hydrolyzed milk proteins as stabilizers. This rule also removed the standard of identity for goat's milk ice milk and made comparable changes in the standard of identity for goat's milk ice cream, which cross-references the standard of identity for ice cream and frozen custard. The rule also required that all sweeteners other than nutritive carbohydrate sweeteners used in ice cream and frozen custards be declared as part of the name of the food until September 14, 1998.

**Dates:** Effective September 14, 1995, for all products initially introduced or initially delivered for introduction into interstate commerce on or after this date. Compliance with this rule may have begun on September 14, 1994. All sweeteners other than nutritive carbohydrate sweeteners used in ice cream and frozen custards products must be declared as part of the name of the food until September 14, 1998.

**For further information contact:**

Nannie H. Rainey, Center for Food Safety and Applied Nutrition (HFS-158), Food and Drug Administration, 200 C St. SW., Washington, DC 20204-0002, (202) 205-5099.

**Supplementary Information:**

In the Federal Register of September 14, 1994 (59 FR 47072), FDA

amended the standards of identity for frozen desserts: (1) To remove the standards of identity for ice milk (§135.120 (21 CFR 135.120)) and goat's milk ice milk (§135.125 (21 CFR 135.125)); and (2) to amend the standards of identity for ice cream and frozen custard (§135.110 (21 CFR 135.110)), and, by cross-reference, goat's milk ice cream (§135.115 (21 CFR 135.115)), to provide for the use in these foods, of safe and suitable sweeteners and to allow for the use of skim milk that may be concentrated, and from which part or all of the lactose has been removed by a safe and suitable procedure, in the food. FDA also amended the standard of identity for ice cream and frozen custard to provide for the optional use of hydrolyzed milk proteins as stabilizers in the food at a level not to exceed 3 percent by weight to ice cream mix containing not less than 20 percent total milk solids, provided that any whey and modified whey products used contribute, singly or in combination, not more than 25 percent by weight of the total nonfat milk solids content of the finished food.

FDA also amended the standard of identity for ice cream and frozen custard (§135.110) to provide for the use of sweeteners other than nutritive carbohydrate sweeteners. When such sweeteners are used in the food, their presence must be declared as part of the name of the food until September 14.

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C. Joseph Worsley  
M & M Mars, Burr Ridge

## INDIANA

Stephen Pfaff  
Norris Food Service, Inc.  
Indianapolis

## IOWA

Zoraida Defreitas  
Iowa State University, Ames

## MARYLAND

Jill A. Snowden  
SGA Associates, Silver Spring

## MASSACHUSETTS

Rajendra S. Lialak  
H. P. Hood, Agawam

## MEXICO

Ulises R. Castro  
Juárez Veterinary Services Co.  
Cortazar

Rosario Leon-Nevares  
Instituto Tecnológico De Durango  
Durango

## MICHIGAN

Dike O. Ukuku  
Wayne State University, Detroit

Janet Lawrence  
Michigan State University Student  
Sunfield

## MINNESOTA

Dwain Finkenbiner  
Hormel Foods Corp., Austin

Mike Flotty  
Northern Star Co., Minneapolis

Bill Lundeen  
Lincoln Process System, Rogers

Barry Vermilyea  
Land O'Lakes, Arden Hills

## MISSOURI

Walt Jones  
Ralston Analytical Laboratories  
St. Louis

Mark Lamartina  
Food Safety Consultants, St. Louis

## NEBRASKA

Kristine J. Richert  
University of Nebraska-Lincoln  
Utica

## NEW JERSEY

David C. Sliwoski  
Doskock Specialty Brands  
Glassboro

## NEW YORK

Casey McCur  
Lowville Producers Dairy Coop.  
Lowville

Carol Whaley  
Jamaica

## NORTH CAROLINA

Dr. Lee Ann Jaykus  
North Carolina State University  
Raleigh

April J. Pontius  
North Carolina State University  
Raleigh



**OHIO**

**David M. Brassard**  
Dexus Labs, Twinsburg

**T. Wenderoth**  
City of Cleveland, Cleveland

**OKLAHOMA**

**Jack Freund**  
Protein Technologies International  
Pryor

**ORIGON**

**Gary Speerstra**  
Savolite, Inc., Beaverton

**PENNSYLVANIA**

**Jean Anderson**  
Penn State University, University Park

**Pina Fratamico**  
USDA, ARS, ERRC, Philadelphia

**Larry Iback**  
Turkey Hill Dairy, Conestoga

**Stacy Kimmel**  
Penn State University  
University Park

**Ernie Pinckney**  
Turkey Hill Dairy, Conestoga

**Stanley P. Shively**  
U.S. Army Veterinary Corp.  
Carlisle

**Mark Swartz**  
Ask Foods, Palmyra

**Terry Wertz**  
Keystone Foods, Folcroft

**RHODE ISLAND**

**Martha Patnuad**  
University of Rhode Island  
Kingston

**Ahmad Tahajod**  
Univ. of Rhode Island, W. Kingston

**SWITZERLAND**

**Rudolf Schmitt**  
Ingenieurschule Wallis, Sion

**TEXAS**

**Christopher S. Boyd**  
Pale Foods/ Div. of Campbells Soup  
San Antonio

**Dr. Richard Shafer**  
Tarrant Co. Health Dept. Lab  
Fort Worth

**VIRGINIA**

**Custy Fernandes**  
Virginia Tech, Blacksburg

**Franklin B. Scherra**  
Supply & Services Division, DOL  
Fort Lee

**Paul M. Uhler**  
U.S.D.A., Falls Church

**WISCONSIN**

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LaPorte Biochem International  
Milwaukee

**Gwen Hazen**  
Northland Laboratories, Green Bay

**Joe Meyer**  
Oscar Mayer Foods Corp., Madison

**Carol Rollins**  
Ho-Chunk Health, Black River Falls

---

**New IAMFES Sustaining Members**

**Kevin Husted**  
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Bentonville, AR 72712

**Noel Segal**  
Compliance Control, Inc.  
8012 Fernham Lane  
Forestville, MD 20747

**Larry Walker**  
Steritech Environmental Services  
7600 Little Ave.  
Charlotte, NC 28226

# UpDates

## **Educational Foundation Names Michael P. Glavich Senior Director of Sales and Development**

The Educational Foundation of the National Restaurant Association announces that Michael P. Glavich has been promoted to the new position of Senior Director of Sales and Development.

Formerly the Senior Director of Development, Glavich now assumes responsibility for The Educational Foundation's sales activities, as well as fundraising and development efforts. The Foundation's customer constituency includes more than 600 academic institutions, 200 corporations, 40 state and allied associations, and several international partners. Glavich will continue to oversee the efforts of the development area, which secures sponsors and funds for The Educational Foundation's programs, events, and scholarships, as well as for The Foundation's Endowment Fund.

Prior to joining The Educational Foundation in 1993, Glavich was the Vice President of Corporate Affairs Department for the National Easter Seal Society, based in Chicago. In this role, he structured the corporate affairs department to create, develop and manage cause-related marketing promotions, special events, media events, public relations/educational campaigns and all other corporate related activities aimed at gaining corporate support for this national charitable organization.

Other positions Glavich has held in his more than 16-year sales and marketing career include Vice President/Director of Business Development, A. C. Nielsen, Northbrook, IL; Divisional Manager

National Accounts, National Accounts/District Manager and National Account Manager, Revlon, Inc., Chicago; and Regional Sales Development Manager—Central Division, Pepsi-Cola Company.

Glavich has a bachelor's degree in communications from the University of Central Florida, Orlando. In each of his positions, he has brought strong sales and marketing experience, innovative promotional program development and execution, and management and training skills. As a result, he has received recognition for his many achievements, which include Sales Representative of the Year for Johnson & Johnson, Top Producer of the Year for the Pepsi-Cola Company, Circle of Excellence award from A.C. Nielsen, and District Manager of the Year for Revlon, Inc.

The Educational Foundation of the National Restaurant Association, a nonprofit organization based in Chicago, is dedicated to enhancing the professionalism of the food service industry through education and training.

## **Zeiss Strengthens Electron Microscopy Sales Efforts**

Carl Zeiss, Inc. has put the full resources of its microscopy sales and marketing organization behind its electron microscopy products. Electron microscopy, formerly a separate division, will now operate as a focused group within the larger Microscope Division.

Jim Sharp, President of the Microscope Division, is now the new General Manager of the Electron Optics group. Jim has had many years of experience with Zeiss electron microscopes, and he

is committed to enhancing the sales, marketing and service support for the Zeiss electron optics product line. Frank Coccia will continue as Electron Optics National Sales Manager, reporting to Jim Sharp.

## **The Dairy & Food Industries Supply Association Selects Interbake's Bill Bock for Board Position**

John Martin, President of the Dairy & Food Industries Supply Association (DFISA) announced today that Bill Bock, Vice President and General Manager of Interbake Dairy Ingredients, has been elected to its Board of Directors.

"We are fortunate to have someone of Bill's caliber serve on our Board," said Martin. "He is a highly talented manager and leader, and his marketing expertise and skill will be invaluable as we move forward."

Bock's position on the DFISA Board of Directors has a 3-year tenure.

Bock has been with Interbake Dairy Ingredients, a division of Interbake Foods, for 6 years. Interbake Foods is North America's largest industrial baker using cookie and cracker technology.

Prior to joining Interbake, Bock was a Manager of Sales Operations and Associate Director of the Custom Products Group at Keebler.

In addition to serving on the DFISA's Board of Directors, Bock is also Chairman of DFISA's Annual Conference Committee, and a member of the International Food & Dairy Show Governing Committee.

## Elgin Dairy Foods Names Poole to Quality Lab Staff

Elgin Dairy Foods, Inc., the Chicago-based manufacturer of dairy and non-dairy mixes, toppings and proprietary food products, has appointed microbiologist Steve Poole to the staff of its Quality Lab. Poole, who holds a B.S. degree in Food Science and Nutrition from the University of Missouri at Columbia, will be responsible for micro plating, product functionality testing, activity testing and sensory evaluation of Elgin products.

Elgin manufactures a wide range of soft serve, shake and ice cream mixes, dairy and non-dairy whipped toppings, sour cream and creamers. It also produces propri-

etary mixes and ingredient formulations used by the food service and food processing industries.

Elgin sells its products to food processors and food service operators throughout the Midwest and is capable of producing more than 300,000 gallons of dairy products weekly sold under the Elgin label and as private label or co-packed brands.

## ADPI Presents Honorary Lifetime Director Awards

The American Dairy Products Institute (ADPI) announced the selection of **William F. Dietrich**, Dietrich Milk Products, Reading, PA, **A. Jerry Good**, formerly of the Pickerington Creamery, Inc., Pickerington, OH, and **Lyle Brenne**,

formerly of Ellsworth Cooperative Creamery, Ellsworth, WI, as recipients of its **1995 Honorary Lifetime Director Award**. The announcement was made during ADPI's Annual Meeting on April 23-25 at the Chicago O'Hare Marriott Hotel in Chicago, Illinois.

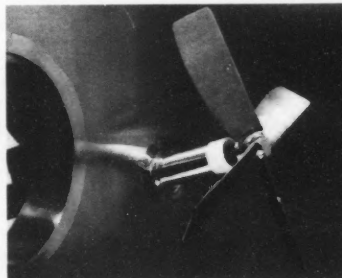
**Honorary Lifetime Director Awards** were established by the Institute in 1993 to recognize individuals for their outstanding, untiring and long-time service on the Board of Directors of the Institute and its predecessor organizations of the American Dry Milk Institute and the Whey Product Institute. Honorees Dietrich and Good each served 17 years as Institute Directors, and Brenne served as Director for 16 years.



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*Just a reminder...*

Time is running out to register for the IAMFES 1995 Annual Meeting in Pittsburgh, PA.

For more information, refer to the Annual Meeting section in the *June Dairy, Food and Environmental Sanitation* issue, or call Julie Heim at (515) 276-3344, or (800) 369-6337.

## DFISA Moves Headquarters to McLean, VA

**T**he Dairy and Food Industries Supply Association, Inc., (DFISA) is pleased to announce that it has recently moved its headquarters here from Rockville, Maryland.

"We looked in several areas in Maryland and Virginia, and believe that this location, in such close proximity to the District of Columbia, National and Dulles Airports to be ideal," said John M. Martin, DFISA's President. "We were slowly out-growing our former facilities and were looking for a location that would accommodate our seventeen employees, Board of Directors' and member meetings, and serve as a long-term investment, as well."

DFISA is an international trade association of more than 700 equipment, ingredient, service and supply companies serving the dairy, food, beverage, pharmaceutical and related processing industries.

For more information contact: DFISA, 1451 Dolley Madison Boulevard, McLean, VA, 22101-3850, (703) 761-2600 or fax (703) 761-4334.

## Dairy Processors and Consumer Group Ask FDA to Change Name of 2% Lowfat Milk

**M**ilk Industry Foundation and CSPI Petition would make milk labeling consistent with other foods.

In an unprecedented joint effort, the Milk Industry Foundation (MIF), the organization representing the nation's fluid milk processors, and the consumer group Center for Science in the Public Interest (CSPI) have together filed a petition with the Food and Drug Administration (FDA) requesting that the Agency revoke the standards of identity for lowfat milk and skim milk, leaving just one standard of identity, milk. As a result, the



# NEWS

new Nutrition Labeling and Education Act (NLEA) descriptors ("reduced fat," "light," "nonfat," or "fat-free") would then be used where appropriate with the term "milk" to describe the lower fat and fat-free versions of milk.

"2% lowfat milk"—the current FDA-approved and required name for milk containing 2% milkfat and 5 grams of fat per serving—currently does not meet the new NLEA definition of lowfat, which is described as containing 3 grams or less of fat per serving. If the FDA approves the MIF/CSPI petition, the name for 2% lowfat milk would be changed to "2% reduced fat milk." In accordance with the new rules for descriptors, the product's label will be required to state the percentage reduction in fat as well as the actual amount of the reduction. 1% and 1/2% milks would still be termed "lowfat," since those products are already in compliance with the NLEA definition of lowfat. Milk that contains less than .5 grams of fat per serving would be termed "nonfat" or "fat-free" milk.

"By making this voluntary change, the term lowfat when applied to milk will have the same meaning as when applied to all other foods," said E. Linwood Tipton, president and CEO of the MIF. "We are extremely pleased that we have been able to work

with CSPI to help clarify the term "lowfat" and to assist consumers in making their food selections."

"These changes will make it easier for consumers to shop for reduced, lowfat and fat free milk products," stated Bruce Silverglade, CSPI legal director. "We congratulate the MIF on this effort."

The MIF Board of Directors had voted as its January 1995 Board of Directors meeting to move forward with the petition to the FDA.

At the time the Nutrition Labeling and Education Act took effect, FDA had already established a number of food product standards of identity that included a nutrient content claim as part of the legal name of the food. "Lowfat milk" and "skim (nonfat) milk" are two of those standards. To avoid consumer confusion during the initial implementation of the NLEA regulations, Congress exempted nutrient content claims contained in existing standards from the new labeling requirement.

"It was unclear at the time whether or how the NLEA definitions would differ from the standards of identity for lowfat and skim milks, as well as other foods. Therefore, Congress granted the exemption in order to allow time to see how these products would be able to comply under the new regulations. Now that the new definitions have been established, we want to bring our products into conformity through this petition," Tipton said.

Elimination of the two standards must be accomplished through FDA's formal rule-making procedures. Both MIF and CSPI are hopeful for an expeditious review by the Agency.

## Fractionating Milkfat's Multiple Personalities

**B**utter will be in for a wild ride when the milkfat fractionation plant goes on-line at the University of Wisconsin-Madison's Center for Dairy Re-

search. The plant will give food scientists at the College of Agricultural and Life Sciences the raw materials for research on milk-fat applications, as well as providing milkfat fractions for researchers in the U.S. food industry.

"We have received considerable interest in milkfat fractions as food ingredients from the U.S. food industry, especially the chocolate, bakery, and flavor industries. Many of these companies are interested in using milkfat fractions in their products as soon as they are commercially available in the United States," according to CDR researcher Kerry Kaylegian.

The fractionation equipment heats butter oil, then cools and filters it into fractions that have different chemical and physical properties. These properties make the fractions behave differently in various foods.

Milkfat fractions with high melting points reduce fat bloom (a whitish discoloration) on chocolate. The fractions cost less than cocoa butter, and produce chocolate that tastes just as good. Kaylegian estimates that manufacturers could use milkfat at up to 3 percent of the chocolate's weight. High-melting fractions could also improve the chocolate-flavored coatings on ice-cream bars and other frozen confections.

If you've been to Europe, you probably noticed that European croissants and puff pastries were flakier and tastier than their U.S. counterparts. European bakers have used milkfat fractions in their "laminated" doughs for about 20 years, thanks to European Community-subsidized research on uses for milkfat. Regular butter mixes with dough, so layers become less distinct; high meltpoint fractions keep the dough layers distinct while retaining butter flavor. U.S.

pastry makers use either vegetable shortening, which preserves the layers but lacks buttery flavor, or butter, which produces less distinct layers.

Milkfat fractions can provide a concentrated source of butter and dairy flavors for "flavor houses" (manufacturers of food flavorings).

For sandwich lovers tired of torn bread, fractions with low melting points can produce butter that's spreadable straight from the refrigerator.

Milkfat fractions might be used in sucrose polyesters (zero-calorie fat substitutes) and medium-chain triglycerides (which show promise as dietary supplements for premature infants). Fractions can also be used to make edible films that separate pizza sauce from pizza crust, thus preventing soggy pizzas. "We could be ahead of the Europeans on this one," Kaylegian notes.

Manufacturers seek consistency in their ingredients—something that processed vegetable oils can provide. Regular butter is too variable for many manufacturing uses, but milkfat fractions sidestep consistency problems, Kaylegian says.

The Wisconsin Milk Marketing Board will pay for the pilot fractionation plant, which will cost about \$300,000. The hardware consists of a control panel, a stainless steel jacketed crystallizer, a tank to hold cooling medium, a membrane filter press, and assorted pumps, lines, fittings and so forth.

WMMB has funded milkfat fractionation work at UW-Madison for about 10 years. The plant, due to start up in fall 1995, will be the only milkfat fractionation plant in the United States. It will manufacture small quantities (less than 200 pounds) of samples for industry and university research, and provide access to the equipment for university and industry scientists.

## Food-borne illnesses

It has been estimated that 24 to 81 million cases of food-borne diarrheal disease occur annually in the U.S. Most food scientists and health experts agree that illnesses caused by food-borne pathogenic microorganisms present the most serious food safety problem today. Yet, many consumers and others who handle food on a regular basis seem to take a casual approach to microbiological causes of food-borne illnesses. Both in-home and commercially prepared foods contribute to food-borne illness incidents. Food processing errors also contribute occasionally to outbreaks of disease.

Just a few years ago, food-borne illnesses were typically attributed to one of four bacteria: *Salmonella*, *Staphylococcus aureus*, *Clostridium perfringens* or *Clostridium botulinum*. Today it is known that many other microorganisms can cause food-borne illness. The new emerging pathogens are *Campylobacter jejuni*, *Listeria monocytogenes*, *Escherichia coli*, *Yersinia enterocolitica*, *Vibrio cholera* and *Vibrio parahaemolyticus*.

The leading factors contributing to food-borne illness outbreaks are:

- Improper storage of holding temperatures.
- Poor personal hygiene of food handlers.
- Inadequate cooking.
- Contaminated equipment.
- Food obtained from unsafe sources.

Pest management also plays a role in preventing the transmission of some of these organisms to food and food preparation surfaces by aiding in the control of the pests which carry them.

*Reprinted from Copesan Services, 2nd Quarter 1995.*

# Affiliate News

## New York State Association Presents Awards

### Emmet R. Gauhn Memorial Award

The Emmet R. Gauhn Memorial Award is the Association's highest honor and is given in memory of the Association's first President whose foresight, diligence and devotion to the cause of progressive milk sanitation served as an inspiration and guide to the members of the Association. This year it was awarded to Robert J. Ryan.

Mr. Gauhn was one of the founders of the New York State Milk and Food Sanitarians serving as the first President during the years 1922-26. His outstanding career as Chief of the Rochester Milk and Food Section and later as Commissioner of the Rochester Welfare Department is well documented. He also served as Chairman of the New York State Youth Commission. History reveals that his foresight and leadership were an inspiration to all that knew him.

This year's recipient Robert J. Ryan is a native New Yorker and graduate of Cornell University where he majored in Dairy Science. After serving in the U.S. Army where he did such things as inspect sugar plants, Mr. Ryan accepted a position in the Regional Health Department in Oneonta, subsequently moved to the Albany headquarters and finally transferred to the Department of Agriculture and Markets, where he plays a key role in administration of the Division of Milk Control responsibilities for the New York Milk Control Program. Some of his responsibilities have included the orchestration in excess of 120 certified industry milk inspector programs and some 30 processing plant superintendent seminars.

Bob resides with his wife Betsy and daughter Joanne in Niskayuna, where he gardens and tends a hive of honey bees.

### Dr. Theodore H. Reich Memorial Award

Kathy Thode was presented with the 23rd Annual Theodore H. Reich Memorial Award at the 71st Annual Conference of New York State Association of Milk and Food Sanitarians. She received the award for outstanding service in the field of Milk Sanitation and Quality Control.

Kathy grew up on a farm in Saskatchewan, Canada and went on to study at Kelsey Institute for Applied Sciences in Saskatoon, Saskatchewan. She graduated with a degree in Biological Science Technology in 1973. Shortly after graduation, Kathy worked as an anesthetist in the Veterinary School at the University of Saskatchewan and later worked at the Vet College at Cornell University.

In 1977, she began her work in the dairy industry when she was hired as a field representative for Empire Cheese in Skaneateles, New York. Within a short time Kathy was promoted to field supervisor for Empire with the overall responsibility for milk quality and farm sanitation. She was then hired as a membership supervisor for Agri-Mark in 1990, and currently coordinates member services and milk quality for Agri-Mark in Central New York.

Kathy is a long time member of New York State Association of Milk and Food Sanitarians; currently serving on the Farm Methods Committee. She also worked on the 1994 Program Committee.

Her hobbies include horseback riding and she is very active in dressage, a specialized equestrian event.

Kathy and her husband Bill have one son named Andrew and reside in Moravia, New York.

### Dr. Paul B. Brooks Memorial Award

The Association's Paul B. Brooks Award was "proudly" accepted by recipient Michael S. Bezanilla. The award was presented by Eric J. Dutton. Both are employed by New York State Department of Agriculture and Markets, Division of Milk Control.

Michael S. Bezanilla, Senior Dairy Products Specialist for New York State Department of Agriculture and Markets was the honored recipient of the 36th Annual Dr. Paul B. Brooks Memorial Award at the 71st Annual Conference of New York State Association of Milk and Food Sanitarians. He was presented with the award in recognition of his outstanding contribution to the welfare and progress of the Affiliates of the Association.

Mr. Bezanilla has been a very active member of the Ontario Sanitarians Association for at least the past 20 years. He has served on many committees and has held various offices within the affiliate. His contributions to Ontario Sanitarians have been many and it is unquestionably in part through his efforts that this affiliate group is still very active. Mike is also a member of long standing with New York State Association of Milk and Food Sanitarians and currently is a member of the Farm Methods Committee.

Mike is a very highly regarded Senior Dairy Products Specialist who conducts his duties in a most professional and knowledgeable manner. He has earned the respect of industry personnel who work with him and would attest that Mike uses good judgement in the administration of his assigned duties.

### **William V. Hickey Memorial Award**

The Hickey Award is given in memory of William V. Hickey who was a dedicated sanitarian devoted to improving the safety and quality of foods and was the first Chairman of this Association's Food Protection Committee. The award is given to an individual in recognition of outstanding service in the field of food sanitation.

This year's recipient, Dr. Donald F. Splittstoesser, is a member of both New York State Association of Milk and Food Sanitarians and International Association of Milk, Food and Environmental Sanitarians and has made several presentations to both organizations. He has over 150 technical publications as well as 18 book chapters and has been the co-editor of three books. In addition, he is a member of the Subcommittee on Microbiological Criteria, Committee on Food Protection, National Research Council and the National Academy Press.

Dr. Splittstoesser is Professor of Food Microbiology in the Department of Food Science and Technology, Cornell University.

### **Howard B. Marlatt Memorial Award**

Donna K. Converse was presented with the 23rd Annual Howard B. Marlatt Memorial Award at the 71st Annual Conference of New York State Association of Milk and Food Sanitarians. She received the award for outstanding service and leadership in the field of Laboratory Technology.

This year's recipient is a native of Watertown, NY area. She attended Cazinovia College and graduated from Jefferson Community College in 1978 with a degree in Science Laboratory Technology.

Donna was employed at Borden, Inc. in Watertown as a laboratory technician shortly after graduation until 1980. In 1981, she and her husband David, purchased a small dairy laboratory and in 1982 moved to their present location. She currently is Laboratory Director of Converse Laboratories, Inc., a dairy and environmental lab employing 10 full time employees.

Very active with the local Ontario Sanitarians affiliate, Donna has served as secretary of the group for a number of years. She was very instrumental in establishing their scholarship program. Also, Donna has been an active member of New York State Association of Milk and Food Sanitarians and is currently a member and secretary of the Laboratory Practices Committee.

Donna spends her spare time raising 3 children and is an avid sports enthusiast. She is currently a member of the Board of Directors of the Watertown Womens Bowling Association and President of the Watertown Women.

### **WAMFS Honors Buss as Laboratorian of the Year**

Fritz Buss, Technical Director and Senior Product Manager at Nelson-Jameson, Inc. was named recipient of the 1994 Joseph Mitayas Laboratorian of the Year award on September 8, 1994. The award, presented at the Wisconsin Laboratory Assn. (WLA) meeting in Waukesha, is given for significant contributions to laboratory science and is the highest award given by the Association.

The award was presented by Prof. George Nelson, UW-Stout. In his remarks, Prof. Nelson noted that Buss has been a valuable resource to laboratory professionals and has promoted education for laboratory personnel.

The WLA was founded in 1976 by laboratorians committed to promoting professionalism and in furthering education in disciplines such as water, wastewater, dairy, food, public health, hazardous wastes, cosmetics and paper. The late Mr. Mitayas was a leader in these efforts.

Fritz Buss is WAMFS current President.

## **Upcoming IAMFES Affiliate Meetings**

### **AUGUST**

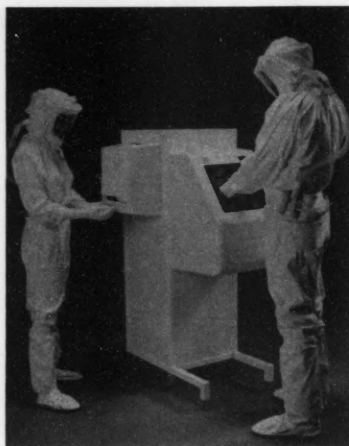
• 23, Connecticut Association of Dairy and Food Sanitarians Annual Outing and Conference, Wallingford. For more information, contact Lester Hankin, 88 Charlton Hill Rd., Hamden, CT 06518.



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Address to:  
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# IndustryProducts



Dryden Engineering Company, Inc.

## Glove Washer and Dryer System Assures Clean Gloves in Less than 60 Seconds

Dryden Engineering Company, Inc. has introduced a new and improved version of the MAXIMUM™ Automatic Glove Washer (Model DE415GW) and the MAXIMUM™ Filtered Glove/Hand Dryer (Model DE1010FDU), a total glove washer and dryer system that assures clean gloves in less than 60 seconds.

"For industries that must utilize cleanroom technology, such as the pharmaceutical, medical devices and semiconductor industries, dirty gloves mean a dirty product," said Gene Sullivan, President of Dryden Engineering. "The MAXIMUM™ Glove Washer/Dryer System lets workers reuse gloves for substantial savings, while minimizing contamination."

Designed for use in the most sophisticated cleanrooms, the MAXIMUM™ Automatic Glove Washer, is a compact, precision

molded and DI-compatible system that cleans gloves and extends glove life. When used in conjunction with the MAXIMUM™ Filtered Glove/Hand Dryer, the total cycle time from dirty/dry gloves to clean/dry gloves is less than 60 seconds.

The easy-to-use MAXIMUM™ Automatic Glove Washer, which is activated when hands are inserted into the wash bay, has a unique Air Knife System, for efficient removal of excess water. The washer has colored function lights, easy maintenance access and is available in wall or floor mount models.

The MAXIMUM™ Filtered Glove/Hand Dryer is a state-of-the-art ULPA dryer designed to quickly dry gloves/hands with heated, super-clean air. The dryer features a unique heating system located upstream of the filter, new fan technology and photocell-activated operation. The dryer has solid state controls, variable dry cycle and a filtration efficiency of 99.999% at 0.12 micron.

Dryden Engineering Co.,  
Fremont, CA

Reader Service No. 301

## SANIFAB Offers Hard to Find Stainless Parts

SANIFAB is a ready source for stainless steel components that can sometimes be difficult to locate. The company maintains a large supply of parts ranging from small brackets, cover plates and pipe hangers to large vessels, transfer panels, HTST equipment, decking, catwalks and other components used in process flow systems.

SANIFAB can also supply tubing, with polished interior and exterior surfaces, in any size from 6 to 12 inches O.D. SANIFAB

maintains strict quality control over all components, which are fabricated in the company's central Wisconsin assembly facility.

The company is a nationwide leader in the design and manufacture of stainless steel process flow systems for the dairy, food, beverage, cosmetic and pharmaceutical industries.

SANIFAB, Stratford, WI

Reader Service No. 302

## High Accuracy Model TJE Now Features Expanded Pressure Range

SENSOTEC's popular Model TJE pressure transducers now deliver their 0.1% F.S. accuracy over an even wider pressure range from 1 to 60,000 psi. The TJE features all-welded stainless steel construction and exhibits excellent long term stability over an operating temperature from -100° to 325° F. TJE's are designed for rugged industrial applications, and are available with a wide variety of options including compensated temperature ranges, pressure ports, and electrical terminations. An intrinsically safe internal amplifier (FM and CENELEC approved) is also available.

Gage pressure units are built using SENSOTEC's proprietary "True Gage" design utilizing a second welded diaphragm which hermetically seals the strain gage circuitry while allowing the transducer to reference atmospheric pressure. The absolute pressure units have an internally sealed 0 psia reference. Many ranges are stocked and offer immediate delivery.

SENSOTEC, Inc. Columbus, OH

Reader Service No. 303



## Accurate Whole Grain Analysis in as Little as 30 Seconds with the Zeltex ZX 800 Grain Analyzer



Zeltex Inc.

The Zeltex ZX 800 Grain Analyzer offers fast, accurate analysis of wheat, barley, corn, soybeans, rice, and other whole grains at a price that is less than half of some whole grain analyzers. With simple one button operation, protein, moisture, and oil content of grains and seeds is measured in as little as 30 seconds without damaging the sample.

No sample preparation is needed, eliminating grinding, mixing, weighing, chemicals, hazardous dust and other by-products. The ZX 800 analyzes samples over a wide range of temperatures from -20° to +50°C while automatically compensating for sample temperature variations. Consequently, the ZX 800 can be used at grain elevators and terminals anywhere.

Zeltex Inc., Hagerstown, MD

Reader Service No. 304

## Economical Panel-Mount Temperature Meter

NEWPORT Electronics, Inc., a leader in digital instrumentation, announces the new IDT 4-digit display, economical digital panel meter for use with thermocouples J, K, T, E, R, S, N or DIN J.

The Model IDT has simple front-panel programming, allowing selection of MAX or MIN (peak or valley) temperatures. A single button offers °C or °F selection. Connections for thermocouple input, power or external display hold switch are made possible with plug-in screw terminal connectors. The IDT features a compact depth of only 104 mm (4.10"), allowing for mounting in areas with limited panel depth. The display is available in red or green and an optional blank lens and NEMA-4 lens cover offer versatility for different applications. A 19-inch anodized aluminum panel is also available for mounting the meter into an existing rack.

NEWPORT Electronics, Inc.,  
Santa Ana, CA

Reader Service No. 305

## Carl Zeiss and Cell Robotics Join Forces to Bring LaserTweezers and LaserScissors into the Laboratory

Carl Zeiss, Inc., Thornwood, NY, and Cell Robotics, Inc. of Albuquerque, New Mexico, have joined forces to sell new microscope accessories that change an inverted microscope into a micro-robotic laboratory. Zeiss is now the exclusive North American distributor for Cell Robotics' LaserTweezers™, LaserScissors™, and related products. Cell Robotics will

also continue to sell their technology directly.

Cell Robotics, Inc. holds the exclusive worldwide license on AT&T's patented optical trapping technology which was developed by Arthur Ashkin and others at AT&T's Bell Laboratory. The products include the LaserTweezers 2000, LaserScissors 2000, Cell Selector™, "C" Stage and Smart-Stage™. In addition, the agreement will include offering the newest Cell Robotics product, the LaserTweezers 100, a complete optical trapping system including a motorized stage for under \$10,000.

Optical trapping is increasingly being used by innovators in science to perform pathfinding research. (See covers of *Science*, 5/6/94 and *American Laboratory*, 10/94.) The LaserTweezers allows micro-manipulation of cells, chromosomes, and DNA molecules within a totally enclosed sterile environment. The optical trap is strong enough to hold even highly motile human sperm and tightly focused enough to manipulate organelles within cells and other living organisms. The LaserScissors 2000 is a microdissection light scalpel for submicron incisions in cells, neurites, chromosomes and organelles, or total ablation of unwanted cells. The Cell Selector is a compact, remotely-controlled syringe pump with precision in/out fluid control at the picoliter level. Automatic of many tasks for an upright microscope is possible with the SmartStage. The on-board controller can be configured using either a hand terminal or any personal computer.

These products are being used in such diverse areas as cell and molecular biology, immunology, cancer research, neurobiology, and *in vitro* fertilization.

Carl Zeiss, Inc., Albuquerque, NM

Reader Service No. 306

## Membrane Air Dryer Offers an Economical, Efficient, Reliable Alternative to Pressure Swing Adsorption or Refrigerant Dryer Technologies

The new Balston® Membrane Air Dryer now available from Whatman, Inc. will provide pure, dry compressed air and offer an economical, efficient alternative to pressure swing and refrigerant dryer technologies.

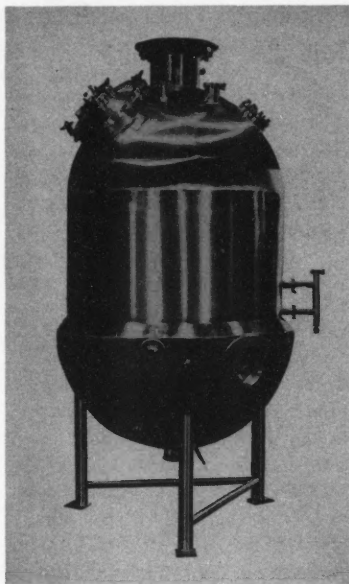
The Balston® Membrane Air Dryer will dry compressed air to dewpoints as low as -40°F at flow rates of up to 25 SCFM. As the Balston® Membrane Air Dryer has no moving parts, it operates reliably and efficiently without operator attention. Since the Balston® Membrane Air Dryer has no moving parts, maintenance is minimal.

Dry air is achieved by returning a small portion of the dry product air to sweep out moisture, which preferentially passes through the membranes. The degree of drying is controlled by varying the compressed air throughput. The moisture laden sweep gas is vented to the atmosphere, eliminating potential liquid-handling and freezing problems.

Since the Balston® Membrane Air Dryer is compact and lightweight, it can be easily mounted in an existing pipeline. Coalescing prefiltration is employed immediately upstream of the membranes to protect them from pipe scale, other particulate, and liquids. The Balston® Membrane Air Dryer requires no electrical connections, which makes it ideal for remote and point-of-use installations or for flammable and explosive applications.

Whatman Inc., Haverhill, MA

Reader Service No. 307



Lee Productions, Inc.

## Lee Vacuum Pans

Lee Vacuum Pans are used extensively throughout the industry for processing jams, jellies, tomato pastes, and concentrates such as beef and chicken broths. By operating under a vacuum, evaporation is accomplished at a highly efficient rate without subjecting delicate products to damage caused by higher temperature atmospheric boiling.

Vacuum pans are available in numerous sizes and various top/bottom head configurations. Options include conventional or Lee Uniflow jackets, internal booster coils, agitators, precondensers, refractometers, product samplers, and control panels.

Lee can provide an entire processing system from initial preheat and premix vessels to vacuum pans including all pumps and piping. Equipment is available from laboratory sized R&D units to full scale production units.

Lee Industries, Inc.,  
Philipsburg, PA

Reader Service No. 308

## Salmonella Test Kit for Feed and Grain Released

Neogen Corporation has begun marketing a new diagnostic test for the detection of pathogenic salmonellas which may be found in feed, grain and grain products.

The simple, one-step test has been in field studies and test marketing for several months. Part of the studies included ongoing validation conducted by the U.S. Department of Agriculture—Food Safety Inspection Service (USDA-FSIS). Neogen's test for the detection of pathogenic salmonellas uses the same format as the company's *E. coli* O157:H7 test that is currently being used by the USDA-FSIS.

Marketed under the name Micro-Screen™ for *Salmonella*, the test is based on state-of-the-art technology that allows rapid screening of feed and grain samples without tedious and expensive laboratory procedures. Following a standard enrichment period, the test takes less than 15 minutes.

"Our preliminary market studies indicate that over one million tests for *Salmonella* are run annually by the feed and grain industries," said James Herbert, Neogen president. "We believe that our rapid Micro-Screen tests will find strong acceptance in this growing market where Neogen already sells 10 other test kits."

The detection of *Salmonella* in the nation's food supply is receiving accelerated attention from both the USDA-FSIS and the Food and Drug Administration. Feed and grain companies are stepping up efforts to exclude this harmful microorganism from food-based products for human and animal consumption.

According to the Centers for Disease Control and Prevention, contaminated grain products contribute to the United States 80 million cases of food-borne illness and 10,000 deaths each year.

Recent national media coverage concerning food-borne pathogens has focused even more public attention on the issues of food safety.

Neogen Corp., Lansing, MI

Reader Service No. 309

## IDEXX Launches Snap™ Tetracycline Test

IDEXX Laboratories, Inc. announces the release of a tetracycline screening test in the SNAP™ format. The SNAP™ Tetracycline test is an enzyme-linked, immunoassay for detecting tetracyclines in bovine milk. The test is capable of delivering results either visually or

printed, with use of the SNAP Image Reader.

SNAP uses a simple three step method, yielding a color comparison result. The test is fast, easy, convenient, accurate and fits in the palm of your hand. No pre-mixing or pre-measuring of reagents is needed to run the test. The presence of tetracyclines, oxytetracycline or chlortetracyclines is indicated in less than 10 minutes.

The testing procedure does not require the use of large instrumentation or extensive equipment. The compact size and portability make it convenient for use in tanker-side testing, field testing as well as laboratory testing. The speed of the test allows for dairy farmers and

dairy processing plants to determine milk quality.

To use the test, simply add a small amount of raw whole bovine milk to the sample tube provided and heat along with the SNAP device for two minutes. Pour the heated milk sample into the well of the SNAP device. Next, activate or "snap" the device, allow the reaction to occur. Results can then be read in the result's window within 7 minutes. If hard copies of results are required, a SNAP Image Reader is available to facilitate the reading and recording of results.

IDEXX Laboratories, Inc.  
Westbrook, MA

Reader Service No. 310

See us at the 1995 IAMFES Annual Meeting, Booth No. 56

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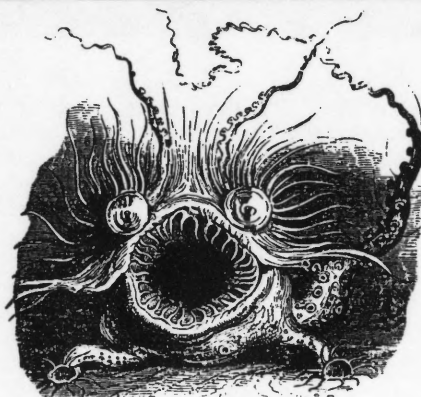
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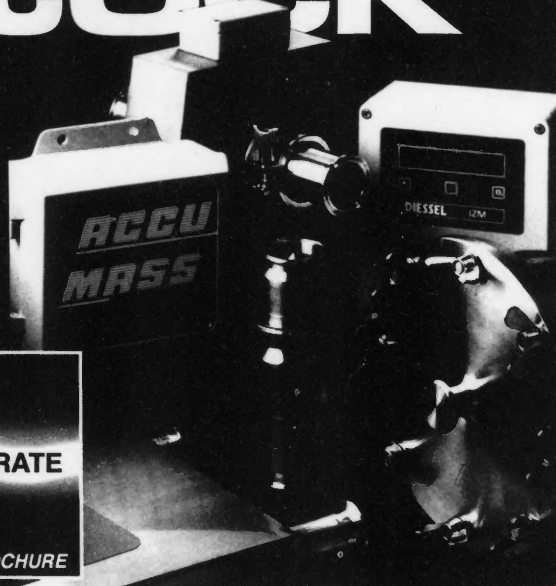


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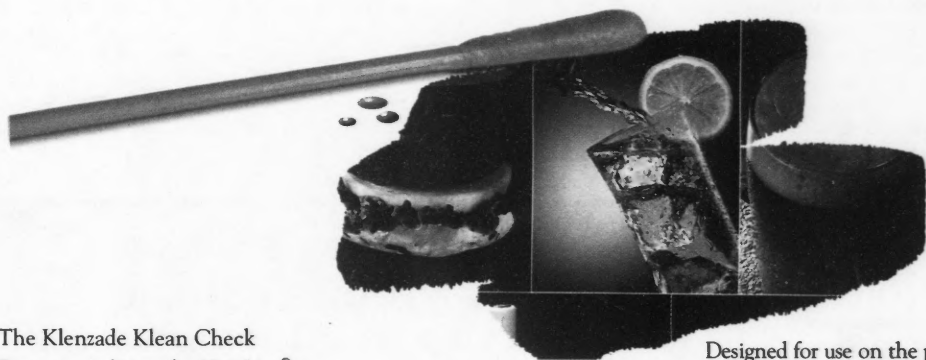
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456 Dairy, Food and Environmental Sanitation — JULY 1995

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IAMFES Sustaining Member

JULY 1995 – Dairy, Food and Environmental Sanitation 457



**Robert E. Brackett**

## **Brackett Elected Secretary**

Frank Busta, Chairperson of the IAMFES Teller's Committee has announced that Robert E. Brackett has been elected incoming Secretary of the Association. Dr. Brackett will take office following the Awards Banquet at the 1995 Annual Meeting and will succeed through the chairs, serving as the Association's President in 1998-1999.

Robert E. Brackett is Professor of Food Safety at the University of Georgia's Center for Food Safety and Quality Enhancement. He has been on faculty there since 1984. Prior to that, he spent three years as Assistant Professor/Extension Food Safety Specialist at North Carolina State University. Bob did his academic preparation at the University of Wisconsin (Madison) where he received his B.S. in Bacteriology and his M.S. and Ph.D. in Food Microbiology.

Bob is an active researcher in the general area of food microbiology, specializing in the microbial safety of foods. His research focuses on the effects of processing and packag-

ing on the growth and survival of food-borne pathogens, development of methods for the enumeration of food-borne pathogens, behavior of psychrotrophic pathogens, the microbiology of fruits and vegetables, and the microbial detoxification of aflatoxin. Bob has researched a number of food-borne pathogens including *Listeria monocytogenes*, *Yersinia enterocolitica*, *Salmonella*, *Clostridium botulinum*, and *Escherichia coli* O157:H7.

Bob first became a member of IAMFES in 1976 and is a founding member of the Georgia Association of Food and Environmental Sanitarians. He served as President of GAFES as well as chaired several committees. He has served on the IAMFES Program Advisory Committee and was Co-chairperson of the Local Arrangements Committee for the 1993 IAMFES Annual Meeting in Atlanta.

Bob is also a member of numerous other professional organizations and honorary societies including the Institute of Food Technologists, American Society for Microbiology, Sigma Xi and Phi Tau Sigma and the Dixie Chapter of IFT. He has served as a Councilor for the Food Microbiology Division of IFT as well as chairing or serving on various other committees in IFT and ASM. Bob also currently serves as Chair of the Mycotoxin Group and as a member of the Microbiological Safety of Raw, Pasteurized Milk and Milk Products Group, of the United States National Committee Groups of Experts of the International Milk Federation. He is a member of the Editorial Boards of the *Journal of Food Protection* and *Applied and Environmental Microbiology* and routinely reviews manuscripts for several other food safety and food science related journals including *Journal of Food Science*, *Food Microbiology*, *Journal of the Science of Food and Agriculture*, and *Journal of Agriculture and Food Chemistry*.

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# 1995 IAMFES

## Annual Meeting Exhibitors

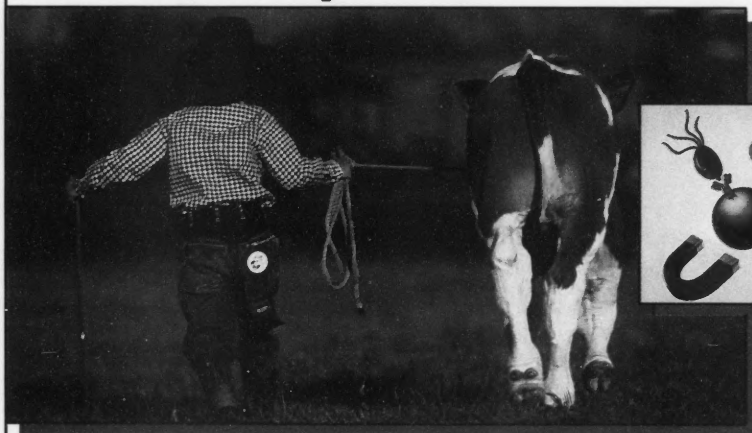
(as of 6/15/95)

Exhibiting Company	City	State	Booth #
3-A Sanitary Standards Symbol Council	Columbia	SC	12
3M Microbiology Products	St. Paul	MN	52
ABC Research Corporation	Gainesville	FL	37
Advanced Instruments, Inc.	Norwood	MA	2
Aquionics, Inc.	Erlanger	KY	41
Atkins Technical, Inc.	Gainesville	FL	62
Becton Dickinson Microbiology Systems	Cockeysville	MD	15
Bentley Instruments, Inc.	Chaska	MN	46
BioControl Systems, Inc.	Bothell	WA	17
BioMerieux Vitek	Hazelwood	MO	3-4
Bioscience International, Inc.	Rockville	MD	40
Biotrace, Inc.	Plainsboro	NJ	19
Capitol Vial, Inc.	Tucson	AZ	1
Cargill Analytical Services	Cedar Rapids	IA	66
Charles Felix Associates	Leesburg	VA	45
Charm Sciences, Inc.	Malden	MA	26
Chem Station International	Dayton	OH	8
Compliance Control	Forestville	MD	44
Dairy & Food Labs, Inc.	San Ramon	CA	53
Decagon Devices, Inc.	Pullman	WA	28
Difco Laboratories	Detroit	MI	18
Diversey Corp.	Livonia	MI	65
DQCI Services, Inc.	Mounds View	MN	47
DuPont Company	Wilmington	DE	29-30
Dynal, Inc.	Lake Success	NY	36
Electro-Steam Generator Corporation	Alexandria	VA	67
Foss Food Tech	Eden Prairie	MN	23-24
G & H Products Corp.	Kenosha	WI	54
Gardex Chemicals, Ltd.	Etobicoke	ONT	32
GigaROM Inc.	Littleton	CO	11
Gist-brocades	Menomonee Falls	WI	61
Idetek, Inc.	Sunnyvale	CA	6-7
IDEXX Laboratories	Westbrook	ME	34-35
Integrated Biosolutions, Inc.	Monmouth Junction	NJ	51
International Bioproducts, Inc.	Redmond	WA	57-58
Klenzade, Ecolab, Inc.	St. Paul	MN	13-14
LaMotte Company	Chestertown	MD	60
Michelson Laboratories, Inc.	Commerce	CA	5
Microbac Labs	Pittsburgh	PA	10
NASCO	Fort Atkinson	WI	25
National Restaurant Association	Chicago	IL	39

## 1995 IAMFES Annual Meeting Exhibitors, continued

Exhibiting Company	City	State	Booth #
Nelson-Jameson	Marshfield	WI	20
Organon Teknika	Durham	NC	27
Pfizer Animal Health	Exton	PA	9
Prism	Miami	FL	48
Q C Inc.	Southampton	PA	38
Q Laboratories, Inc.	Cincinnati	OH	64
R-Tech	Minneapolis	MN	33
Raven Biological Labs	Omaha	NE	56
Remel	Lenexa	KS	68
Sienna Biotech, Inc.	Columbia	MD	63
Silliker Laboratories Group	Homewood	IL	31
Spiral Biotech	Bethesda	MD	49
Starplex Scientific	Etobicoke	ONT	55
Steritech Environmental Services	Charlotte	NC	8
Troy Biologicals, Inc.	Troy	MI	42
Unipath	Nepean	ONT	21-22
Warren Analytical Laboratory	Greeley	CO	50
Weber Scientific	Hamilton	NJ	16
Zep Manufacturing Company	Atlanta	GA	43

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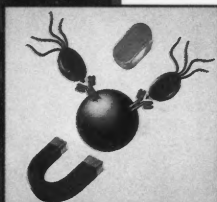


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# Coming Events

## AUGUST

• **2-3, 4-State Applied Nutrition and Management Conference**, Sponsored by 4-State (IA, IL, MN and WI) Extension. For registration, contact CALS Conference Office, UW-Madison; telephone (608) 263-1672.

• **7-11, Contracting Pharmaceutical Operations**, This course deals with the contracting of pharmaceutical operations (including manufacturing, packaging and laboratory work) from the time which the customer i.e., the requestor of the services first considers having work performed by a supplier through to the production of an acceptable product by the supplier. For more information, please contact Registrar, The Center for Professional Advancement, PO Box 1052, East Brunswick, NJ 08816; telephone (908) 613-4500; fax (908) 238-9113.

• **8-9, Process and Product Troubleshooting Seminar**, Quebec, Canada. The course shows how to use specifications, flow charts, and scoring to detect potential manufacturing problems. Those involved with the manufacture, development, or quality assurance of grain-based foods will find the course valuable. Cost of the course is \$395 per participant. For more information, write American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502; telephone (913) 537-4750; fax (913) 537-1493.

• **14-18, AIB Hearth Breads Seminar Addresses Growing Market Segment**, Rapid growth and consumer demands for European-style breads and for breads made without additives makes this seminar a must for bakers. Participants will learn hands-on using recently donated state-of-the-art oven designed especially for the purpose. For a brochure describing the seminar in detail, or to enroll, contact American Institute of Baking, 1213 Bakers Way, Manhat-

tan, KS; telephone (913) 537-4750; fax (913) 537-1493.

• **21-23, Current Good Manufacturing Practice (cGMP) for the Pharmaceutical and Allied Industries**, Chicago, IL. Topics covered will include not only the legal requirements for cGMP in the Federal Food, Drug, and Cosmetic Act but primarily the practical "how to" of purchasing, manufacturing, packaging, labeling and QA/QC, as well as training production personnel in cGMP. For more information, please contact Registrar, The Center for Professional Advancement, PO Box 1052, East Brunswick, NJ 08816; telephone (908) 613-4500; fax (908) 238-9113.

• **21-25, AIB's Bagel Seminar**, This seminar has grown every year as the consuming public has made the former ethnic food one of the country's fastest selling products. This year the seminar is divided into two segments requiring separate enrollments. For more information or to enroll write, American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502; telephone (913) 537-4750; fax (913) 537-1493.

• **29-30, Producing Safe Dairy Foods**, Sponsored by the Wisconsin Center for Dairy Research. For registration information, call (608) 263-1672. For program information, call Sarah Quinones, (608) 262-2217.

## SEPTEMBER

• **4-5, Symposium on Advances in Membrane Technology for Better Dairy Products**, Budapest (Hungary). The main purpose of the Symposium is to update the most current knowledge and to bring the work of the IDF group of experts to the attention of dairy technologists, industrial scientists, process engineers and researchers. For more information contact IDF Secretariat, 41 Square

Vergote, B-1040 Brussels, Belgium; telephone (+32 2 733 98 88); fax (+32 2 733 04 13).

• **6-8, Symposium on Heat Treatments and Alternative Methods**, The purpose of the Symposium is to provide a forum of exchange of information on processing technologies and their product-related effects as well as the methodology and criteria of measurement of these effects. For more information, contact IDF Secretariat, 41, Square Vergote, B-1040 Brussels, Belgium; telephone (+32 2 733 98 88); fax (+32 2 733 04 13).

• **8-9, 1995 Annual Conference of the Wisconsin Laboratory Association**, The overall theme for this year's conference is Analytical Precision. On Thursday, Sept. 9, Dr. Michael L. H. Brodsky, Ontario Minister of Health, will keynote the general session with a presentation on Quality Assurance in the Laboratory, entitled "What is this thing called QA?" For more information, write to WLA, PO Box 28045, Green Bay, WI 54324; or call George Nelson at (715) 232-2560.

• **11-13, Food Microbiology Course**, This course assumes some minimal prior knowledge relation to microbiology or biology and will provide the participant with up-to-date concepts, facts and details which will be useful in making decisions about product safety and stability. The participant should also gain greater awareness of the utility and limitations of microbial capabilities within the corporation. For more information, contact Registrar, The Center for Professional Advancement, PO Box 1052, East Brunswick, NJ 08816; telephone (908) 613-4500; fax (908) 238-9113.

• **20-21, OSMO® RO/UF Equipment Operation and Maintenance Seminar**, "Equipment Operation and Maintenance" is oriented specifically

for operators of RO/UF equipment used for water treatment, pollution control and process applications. This seminar will provide operators a complete background necessary to operate and maintain RO/UF equipment at peak performance year-in and year-out. For more information, contact Ms. Bette Nelson, Travel & Seminar Coordinator, 5951 Clearwater Dr., Minnetonka, MN 55343-8990; telephone (612) 933-2277.

• **20-22, The 2nd International Conference on Nutrition and Aging**, Tokyo, Japan. The conference will focus on the eating habits and societal and psychological eating attitudes of the elderly, as well as their nutritional status and the effects of nutrition on physiological changes associated with aging. For more information, please contact ILSI Japan, Conference Secretariat, Koike Building, 9-11-403, 2 Chome Umezato, Suginami-ku, Toyko 166, Japan; telephone (81-33-318-9663), fax; (81-33-318-9554).

• **25-29, The 12th European Symposium on the Quality of Poultry Meat and the 6th European Symposium on the Quality of Eggs and Egg Products**, Zaragoza, Spain., Auditorium/Congress Palace. Working languages will be English, Spanish and French. Simultaneous translations will be organized in plenary sessions. For more information, please contact the Symposia Secretariat, Ricardo Cepero Briz, Veterinary Faculty, Miguel Servet 177, 50013 Zaragoza SPAIN.

• **26-29, The 1st International Conference on East-West Perspectives on Functional Foods**, Singapore. Overview of the concept from the Eastern and Western viewpoints, including historical and cultural background, and the perceived role in disease prevention and health promotion. For more information contact Conference Secretariat/Official Travel Agent, Conference & Travel Management Associates Pte Ltd, 425A Race Course Road, Singapore 0821;

phone (65) 299-8992; fax (65) 299-8983.

• **27-28, SD State Dairy Association & Dairy Fieldmen's Association Joint Annual Convention**. For more information, call John Parsons, Dairy Science Department; telephone (605) 688-4116.

• **27-30, Healthcare Food Service Management National Training Conference**, The National Society for Healthcare Food service announced the details of its 1995 National Training Conference at La Quinta Resort in Palm Desert, CA. For the first time HFM will also sponsor four pre-conference workshops. For registration information, contact HFM at (202) 546-7236.

• **28-29, Wisconsin 16th Annual Joint Conference, A Dairy, Food and Environmental Health Symposium**, The Wisconsin Association of Milk and Food Sanitarians (WAMFS), Wisconsin Environmental Health Association (WEHA), Wisconsin Association of Dairy Plant Field Representatives (WADPFR), joint conference at the Paper Valley Inn in Appleton, WI. Each group is planning separate programs at the conference that would be of interest of all groups. For more information, please contact Neil Vassau, Dept. of Agriculture, Trade, & Consumer Protection, Bureau of Laboratory Services, PO Box 7883, Madison, WI 53707; telephone (608) 267-3504.

## OCTOBER

• **4-5, Crossflow Membrane Technology Workshop**, The workshop will cover the fundamentals of reverse osmosis, nanofiltration, ultrafiltration and microfiltration, total system design considerations, pilot testing of new applications, and the "zero discharge" approach to pollution control. Hands-on operation of bench-top, pilot and full-scale equipment will be included both days of the workshop. For more information, contact Ms. Bette Nelson, Travel &

Seminar Coordinator, OSMONICS, 5951 Clearwater Dr., Minnetonka, MN 55343; (612) 933-2277.

## NOVEMBER

• **1-3, Designing a Modern Milking Center Conference**, During this conference, the audience will learn methods for planning and operating an efficient milking center, including parlor selection, milking center layout, materials and equipment selection, cow handling, labor management, financing and economics. For further information, contact Northeast Regional Agricultural Engineering Services, 152 Riley-Robb Hall, Ithaca, NY; telephone (607) 255-7654; fax (607) 255-4080.

• **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).

• **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.

# Now it's *your* turn.

1995 has meant a year of change for *Dairy, Food and Environmental Sanitation*. We, the publication staff, have made some adjustments regarding the layout and design of the journal, resulting in an entirely new "look." This new look was created in an attempt to make the articles easier to read, the department columns more appealing, and to give the journal an overall update.

But, as anyone knows, looks aren't everything. Maybe we've missed something you, as readers and subscribers, have noticed, and would like us to change. Or, maybe you like what you see and are as pleased and excited about the changes as we have been.

Well, now is your chance to let us know exactly what you think. We are asking that you write, call or even fax us a message with your comments, criticisms, and suggestions.

We've even made it simple for you by including the form below. Please take a moment to fill it out and return it to us. After all, as members, the journal is your tool for communication with the rest of the association. Why not take advantage of this opportunity to let your opinions be heard? Your brief answers could help make *Dairy, Food and Environmental Sanitation* even better!



## ★ ★ YOUR OPINION COUNTS! ★ ★

Name: \_\_\_\_\_ No. Years as an IAMFES Member: \_\_\_\_\_

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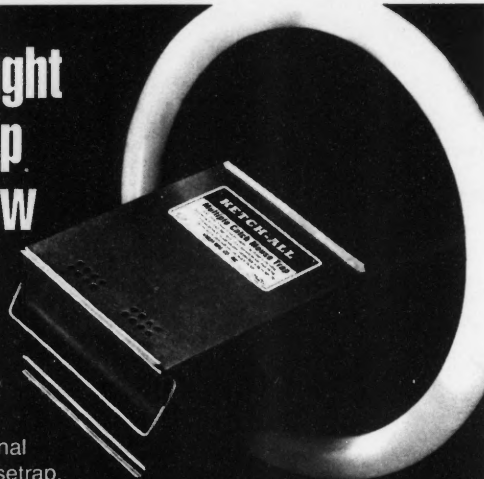
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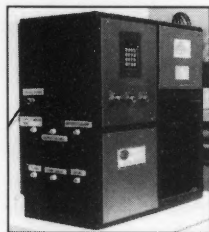
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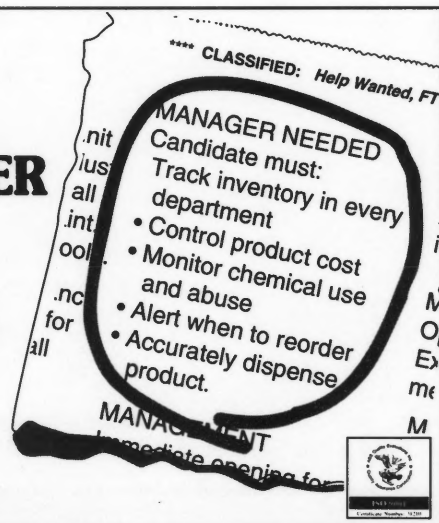
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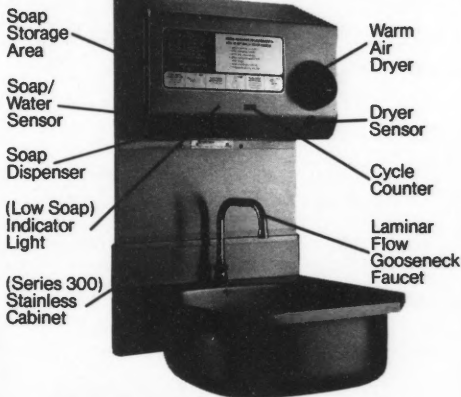
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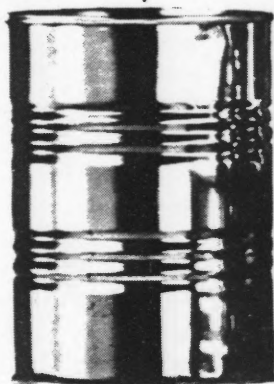
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# Advertising Index

<b>ADVERTISER</b>	<b>Page No.</b>
3-M Microbiology .....	409
Acculab Inc. ....	456
Accurate Metering Systems, Inc. ....	456
Applied Research Institute .....	434
B & J Repair .....	460
Bentley Instruments, Inc. ....	429
L. J. Bianco .....	459
Bio-cide International, Inc. ....	456
Capitol Vial, Inc. ....	458
Charm Sciences Inc. ....	459, Back Cover
DQCI Services, Inc. ....	459
DuPont Company .....	413
Dynal .....	462
EC Industries, Inc. ....	442, 460
The Educational Foundation .....	423
Environmental Systems Service, LTD. ....	459
Food & Dairy Quality Management, Inc. (QMI) .....	417
Food Analytics Inc. ....	467
Food Processors Institute .....	467
Foss Food Technology .....	419
Gardex Chemicals, Ltd. ....	429
Gist-brocades .....	Inside Back Cover
IDEX Laboratories, Inc. ....	Inside Front Cover
Ingman Labs, Inc. ....	459
Klenzade, Division of Ecolab .....	457
Kness Mfg. Co., Inc. ....	466
McGlaughlin Oil Co. ....	419
Meritech, Inc. ....	422
Michelson Laboratories, Inc. ....	460
Nelson-Jameson, Inc. ....	411
New Jersey Laboratories .....	467
Northland Laboratories .....	455
Prism/PCO .....	440
R-TECH .....	428
Raven Biological Laboratories, Inc. ....	455
Seiberling Associates, Inc. ....	440
Walker Stainless Equipment .....	447
Warren Analytical Laboratory .....	434
West Agro Industrial Sales Group .....	440
World Dryer .....	467
Zep Manufacturing Co. ....	466



## IAMFES Offers the Dairy Practices Council "Guidelines for the Dairy Industry"

IAMFES has agreed with the Dairy Practice Council to distribute their "Guidelines for the Dairy Industry." DPC is a non-profit organization of education, industry and regulatory personnel concerned with milk quality and sanitation throughout 15 north-eastern/mid-Atlantic states. However, its membership and subscriber rosters list individuals and organizations throughout the United States, Canada and Japan.

For the past 25 years, DPC's primary mission has been the development and distribution of educational guidelines directed to proper and improved sanitation practices in the production, processing, and distribution of high quality fluid milk and manufactured dairy products.

The DPC Guidelines are written by professionals who comprise five permanent Task Forces. Prior to distribution, every Guideline is submitted for approval to the key milk control sanitarian in each of the 15 states which are now active participants in the DPC process. Should any official have an exception to a section of a proposed guideline, that exception is noted in the final document.

The Guidelines are renowned for their common sense and useful approach to proper and improved sanitation practices. We think that they will be a valuable addition to your professional reading library.

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### The entire set consists of 48 guidelines including:

- |   |   |
|---|---|
| 1 Dairy Cow Free Stall Housing  | 32 Fat Test Variations in Raw Milk  |
| 2 Effective Installation, Cleaning and Sanitizing of Milking Systems                            | 33 Brucellosis and Some Other Milkborne Diseases                                  |
| 3 Selected Personnel in Milk Sanitation   | 34 Butterfat Determinations of Various Dairy Products                             |
| 7 Sampling Fluid Milk   | 35 Dairy Plant Waste Management   |
| 8 NE Ext. Publ., Conferences, Short Courses, Correspondence Courses and Visual Aids in Dairying | 36 Dairy Farm Inspection  |
| 9 Fundamentals of Cleaning and Sanitizing Farm Milk Handling Equipment                          | 37 Planning Dairy Stall Barns   |
| 10 Fluid Milk Shelf-Life  | 38 Preventing Off-flavors in Milk   |
| 11 Sediment Testing and Producing Clean Milk  | 39 Grade A Fluid Milk Plant Inspection  |
| 13 Environmental Air Control & Quality for Dairy Food Plants                                    | 40 Controlling Fluid Milk Volume and Fat Losses                                   |
| 14 Clean Room Technology  | 41 Milkrooms and Bulk Tank Installation   |
| 16 Handling Dairy Products From Processing to Consumption                                       | 42 Stray Voltage on Dairy Farms   |
| 17 Causes of Added Water in Milk  | 43 Farm Tank Calibrating and Checking   |
| 18 Abnormal Milk--Fieldman's Approach   | 44 Troubleshooting Dairy Barn Ventilation Systems                                 |
| 21 Raw Milk Quality Tests   | 45 Gravity Flow Gutters for Manure Removal in Milking Barns                       |
| 22 Control of Antibacterial Drugs and Growth Inhibitors in Milk and Milk Products               | 46 Dairy Odor Control   |
| 23 Preventing Rancid Flavors in Milk  | 47 Naturally Ventilated Dairy Cattle Housing                                      |
| 24 Troubleshooting High Bacteria Counts of Raw Milk   | 48 Cooling Milk on the Farm   |
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| 30 Potable Water on Dairy Farms   | 52 Emergency Action Plan for Outbreak of Milkborne Illness in the Northeast       |
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If purchased individually, the entire set would cost \$174. We are offering the set, packaged in three loose leaf binders for \$125 plus \$9 shipping and handling (outside the U.S., \$21 for shipping and handling).

Information on how to receive new and updated Guidelines will be included with your order.

To purchase this important source of information, complete the order form below and mail or FAX (515-276-8655) to IAMFES.

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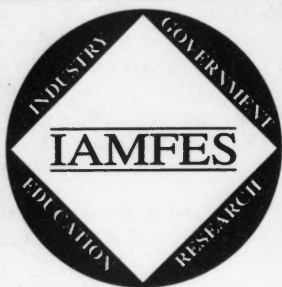
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# This is Your Personal Invitation to Join

The International Association of Milk, Food and Environmental Sanitarians, founded in 1911, is a non-profit educational association of food protection professionals. The IAMFES is dedicated to the education and service of its members, specifically, as well as industry personnel in general. Through membership in the Association, IAMFES members are able to keep informed of the latest scientific, technical and practical developments in food protection. IAMFES provides its members with an information network and forum for professional improvement through its two scientific journals, educational annual meeting and interaction with other food safety professionals.

## Who are IAMFES Members?

The Association is comprised of a diverse membership of over 3,500 from 75 nations. IAMFES members belong to all facets of the food protection arena. The main groups of Association members fall into three categories: Industry Personnel, Government Officials and Academia.

## Why are They IAMFES Members?

The diversity of its membership indicates that IAMFES has something to offer everyone involved in food protection and public health.

## Your Benefits as an IAMFES Member

**Dairy, Food and Environmental Sanitation** — Published monthly, this is the official journal of IAMFES. Its purpose is the disseminating of current information of interest to the general IAMFES membership. Each issue contains three to five informational applied research or general interest articles, industry news and events, association news, columns on food safety and environmental hazards to health, a food and dairy industry related products section, and a calendar of upcoming meetings, seminars and workshops. All regular IAMFES members receive this publication as part of their membership.

**Journal of Food Protection** — A refereed monthly publication of scientific research and authoritative review articles. Each issue contains 19 to 25 technical research manuscripts and one to five articles reporting a wide variety of microbiological research pertaining to food safety and quality. The *Journal of Food Protection* is internationally recognized as the leading publication in the food and dairy microbiology field. This journal is available to all individuals with the Member Plus option.

**The IAMFES Annual Meeting** — Held in a different city each year, the IAMFES Annual Meeting is a unique educational event. Three days of technical sessions, scientific symposia and commercial exhibits provide members and other industry personnel with over 200 presentations on the most current topics in food protection. It offers the opportunity to discuss new technologies and innovations with leading authorities in various fields concerned with food safety. IAMFES members receive a substantially reduced registration fee.

## To Find Out More...

To learn more about IAMFES and the many other benefits and opportunities available to you as a member, please call (515) 276-3344.

*"The mission of IAMFES is to provide food safety professionals worldwide with a forum to exchange information on protecting the food supply"*


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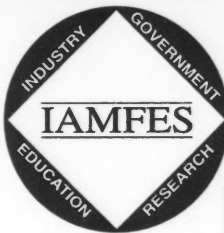
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101	116	131	146	162	176	191	206	221	236	251	266	281	296	311	326	341	356	371	386
102	117	132	147	163	177	192	207	222	237	252	267	282	297	312	327	342	357	372	387
103	118	133	148	164	178	193	208	223	238	253	268	283	298	313	328	343	358	373	388
104	119	134	149	165	179	194	209	224	239	254	269	284	299	314	329	344	359	374	389
105	120	135	150	166	180	195	210	225	240	255	270	285	300	315	330	345	360	375	390
106	121	136	151	167	181	196	211	226	241	256	271	286	301	316	331	346	361	376	391
107	122	137	152	168	182	197	212	227	242	257	272	287	302	317	332	347	362	377	392
108	123	138	153	169	183	198	213	228	243	258	273	288	303	318	333	348	363	378	393
109	124	139	154	170	184	199	214	229	244	259	274	289	304	319	334	349	364	379	394
110	125	140	155	171	185	200	215	230	245	260	275	290	305	320	335	350	365	380	395
111	126	141	156	172	186	201	216	231	246	261	276	291	306	321	336	351	366	381	396
112	127	142	157	172	187	202	217	232	247	262	277	292	307	322	337	352	367	382	397
113	128	143	158	173	188	203	218	233	248	263	278	293	308	323	338	353	368	383	398
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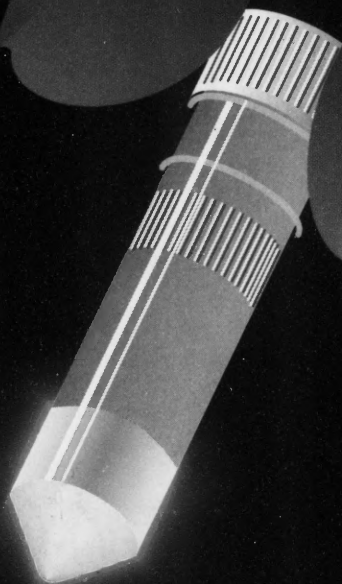
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