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DAIRY, FOOD AND ENVIRONMENTAL

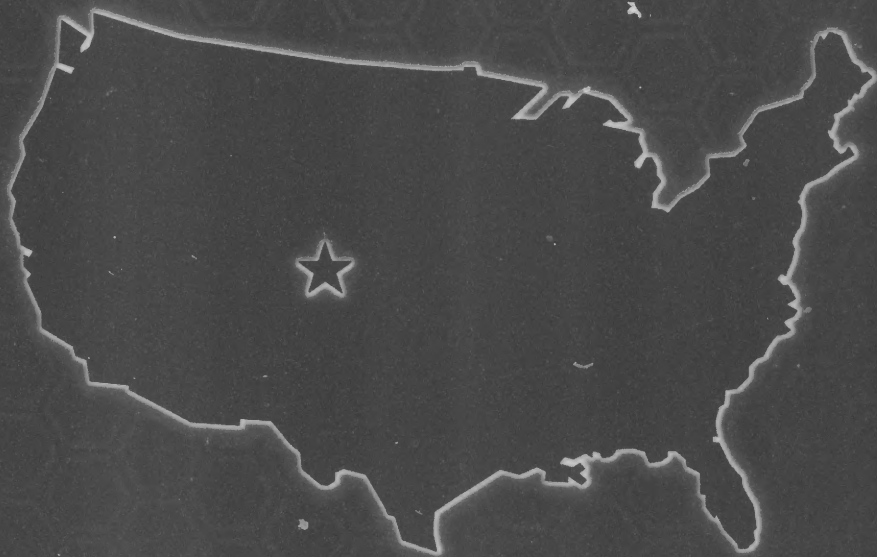
# Sanitation

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

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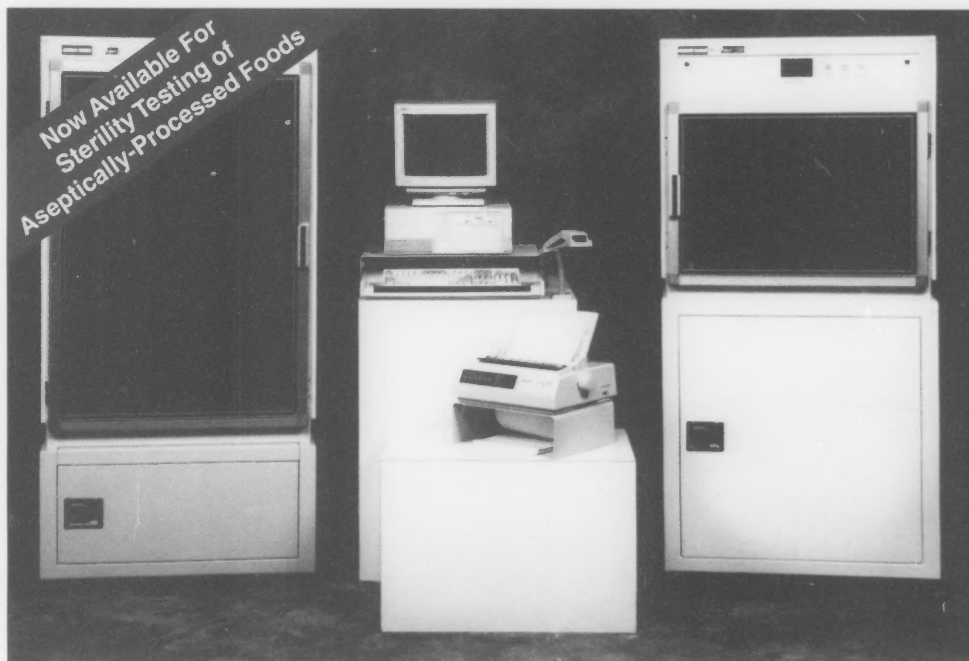
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## Editor's Note:

In the October, 1996 DFES issue on page 628, the article "Sifting Sense from Nonsense with Science," by Joseph Schwarcz attributed the manufacturing of Life Cereal to General Mills. The actual manufacturer of Life Cereal is Quaker Oats Co.

In the December 1996 DFES issue on page 807, the photograph was courtesy of Sea World, Inc.

We apologize for these errors.

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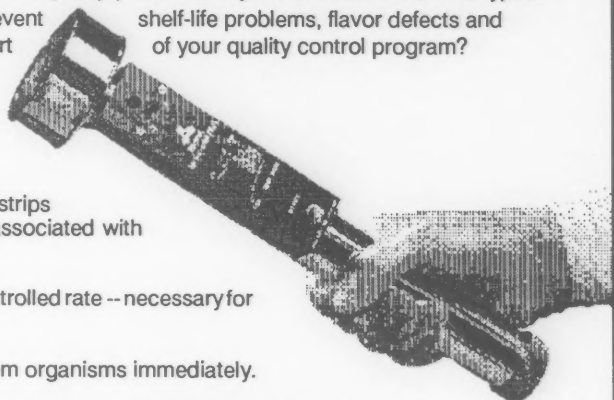
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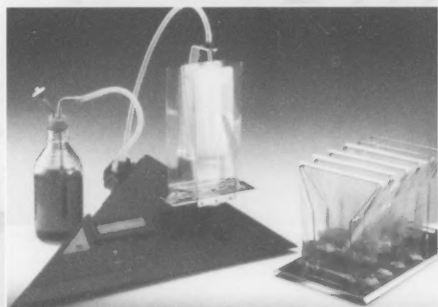


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DAIRY, FOOD AND ENVIRONMENTAL

# Sanitation

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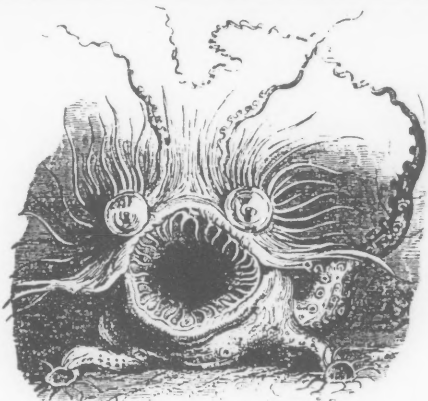
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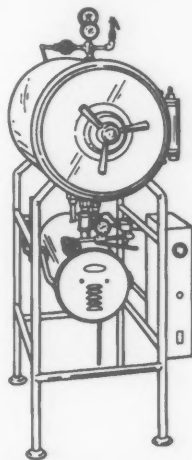
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# OFF THE TOP

## FROM THE PRESIDENT



By MICHAEL H. BRODSKY,  
IAMFES President

### “A rose by any other name”

Since I started submitting my President's column “Off the Top” to *DFES* in July 1996, I have received many comments and suggestions from our membership. I thought that this might be a good time for me to share these thoughts and suggestions with other members of IAMFES. My column was even cited in *Food Chemical News*! But contrary to what you might have read in *Food Chemical News*, we have just been audited and IAMFES is in good financial shape.

All members who contacted me received a personal response and where appropriate, their opinions were shared with the Executive Board. Many of you just wanted to wish me well and let me know that you do read my column. For that I thank you. Others were interested in

becoming more actively involved in IAMFES. Their names were forwarded to the Executive Director for follow-up.

Right off the bat I heard from a member who wanted to become involved with a committee or professional development group which shared her area of interest. We were able to direct her to the appropriate Professional Development Group (PDG). This inquiry also prompted me to recommend that our membership application include a designation which could be related to a specific PDG or committee to which the applicant could be directed and hence establish an immediate link. Our Executive Director, Dave Merrifield, recently wrote a column devoted on how to get more involved with IAMFES. I hope everyone who has thought about playing a more active role in IAMFES reads this column and takes action. Everyone who wants to become more active will be afforded every opportunity to do so. Just let us know.

A number of you were concerned with the increases in membership dues. This issue was also addressed in a column by Dave Merrifield. Dues increases are necessary, however, to offset increased costs for publications and allow IAMFES to maintain the quality that you have come to expect from *Dairy, Food and Environmental Sanitation* and the *Journal of Food Protection*.

Similarly, the cost for registration at the annual meeting was also a concern expressed by a number of our members. A poll of related organizations indicates that our fees are well within those charged by others of similar size. We are aware of the financial burden that is absorbed by our members and their sponsoring organizations who attend our annual meeting and are always looking for

ways to conserve expenses and minimize registration costs. Our negotiations with hotels are predicated on our ability to get the best location/facility for the most reasonable cost, including the cost of accommodation. One member wants IAMFES to initiate a corporately sponsored golf tournament as a possible fund-raising activity. What do you think?

Another member suggested that we need to focus our attention on college undergraduates as well as those in graduate programs. We need to make them aware of and involved with IAMFES before they get into the workforce. This concept has been referred to Rick McAtee, Director of Membership Services and Marketing to be included as part of our marketing plan for increasing and retaining membership. If you would like to get involved in this aspect of student membership, I'm sure Rick would like to hear from you. A number of you also wanted to see increased member services, such as a web site, greater access to the IAMFES Lending Library and other IAMFES resource materials, etc. Action to implement these enhanced services for our membership is also part of our renewed strategic plan.

A number of you have suggested that the designation “Sanitarian” is inappropriate and a name you do not subscribe to in your profession. While I don't want to resurrect a debate on changing the name of the organization, how do you feel about keeping the acronym IAMFES with the following name, INTERNATIONAL ASSOCIATION FOR MILK, FOOD AND ENVIRONMENTAL SAFETY? We'll have to continue this debate at another time as well as address other issues of concern.

I can be reached by mail, e-mail (brodskm@gov.on.ca), fax (416-235-5951) or telephone (416-235-5717).



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**\* Registration forms are available on pages 52 and 53.**

# PERSPECTIVES...

From the Executive Director



By DAVID M. MERRIFIELD,  
IAMFES Executive Director

## “Membership is the lifeblood of IAMFES”

On several occasions, I've talked about how consistent IAMFES membership has been over the years. For example, from October 31, 1994 to October 31, 1996, total membership fluctuated only 1%, or about 30 members. Now this is both good news and bad news. The good news is that membership is not dropping. The bad news is that we aren't growing. It's a credit to the leadership and staff that the number of members remain relatively constant, but that's not enough... we also need solid recruitment to achieve steady growth which in turn will enable us to better accomplish our mission.

Most association executives will agree that the best recruiters are those most enthused about their association. Although membership committees, marketing plans, and membership drives are important, they can't take the place of a satisfied and enthusiastic member personally talking to a potential member. Enthusiasm breeds enthusiasm and before long, a new member is recruited who will pass on that enthusiasm to another potential member. If you were talking with a potential new member, what would you have to say about IAMFES? What would you be able to tell them about the association and its benefits? Other than the journal you are now looking at, what information could you give someone to tell them about joining IAMFES? How much do you really know and could pass on about the association? Try answering the following questions about IAMFES without looking them up:

1. What is the stated mission?
2. What are the various categories of membership?
3. What are the dues for each category of membership?
4. What are the two IAMFES journals and the frequency that they are published?
5. What kinds of articles and materials are generally published in each of the journals?
6. What other publications does IAMFES have in addition to the journals?
7. Where do people work that join IAMFES?
8. What kind of work are the various members engaged in?
9. About how many nations are represented by IAMFES membership?
10. Where and when is the next IAMFES Annual Meeting going to be held?
11. What are the other benefits of belonging to IAMFES?
12. How does a person become a member of IAMFES?

How did you do? If you were talking to a potential member, would you be able to answer these questions and others they might ask? Would you be able to tell them about the association and possibly convince them to join?

Membership is the lifeblood of IAMFES. It can't exist without it so we must all do our part to ensure its continued growth. We at the central office have a great deal of knowledge about the association and try to pass on as much as possible to the membership. But we can only be as successful as the degree to which a person will access and use what we provide. Every journal we publish contains a great deal of valuable information about the association. Do you share that information with a co-worker or colleague? Every journal we produce has an application to join IAMFES. Does yours get filed or thrown away, rarely or never to be read again, or do you make an effort to pass it along to others? Do you know the IAMFES central office and board members' phone numbers, fax numbers, or e-mail addresses in the event a potential new member would like more information or assistance in joining?

Each of you belong to IAMFES because you like what you get for your membership. So, take the next step and get someone else enthused about belonging, because when you do, everyone wins.

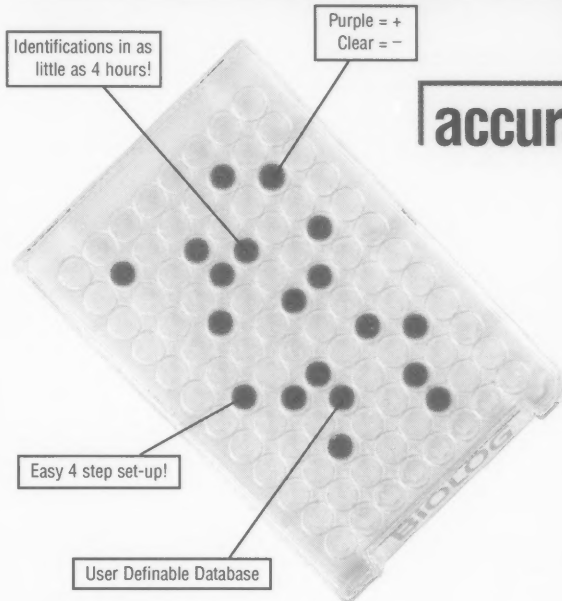
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## Just a reminder...

It's time to start thinking ahead to the IAMFES 1997 Annual Meeting in Orlando, FL, - July 6-9.

For more details, refer to the Annual Meeting section in future issues of *DFES*, or call: Julie Cattanach at (515) 276-3344, or (800) 369-6337. Registration forms available on pages 52 & 53.



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# Case History of a *Salmonella enteritidis* Outbreak Associated with Komodo Dragons

Michael Sangaline<sup>1</sup> and O. Peter Snyder, Jr.<sup>2</sup>

## SUMMARY

When a *Salmonella* outbreak occurred in Jefferson County, near Denver, Colorado, the Jefferson County Department of Health and Environment began investigating. As officials ruled out dissimilar factors, the Denver Zoo (in Denver County) seemed to be the source of contamination; in particular, a Komodo Dragon exhibit was suspect. This exhibit was displayed so that zoo visitors could be very close to the animals. Their tails, particularly, were accessible to touching.

Once the zoo was implicated, The Denver Department of Health and Hospitals and the Colorado Department of Public Health and Environment played active roles in this case. *Salmonella enteritidis* was the confirmed contaminant and illness-causing agent. Further research indicated that touching the barrier between the Dragons and the visitors, followed by lack of hand washing, or not washing hands before consuming food, was common to most of the people who became ill. The zoo changed its display procedures to prevent any direct human contact with the exhibit.

A *Salmonella enteritidis* outbreak in Jefferson County, Colorado, and later in the metro Denver area, was traced to a Komodo Dragon exhibit at the Denver Zoo.

## Reports

22 January 1996. Beginning 22 January, the Jefferson County Department of Health and Environment (Jeffco) received reports from local hospitals and laboratories of confirmed cases of *Salmonella* infection clustered in the northeast and southeast areas of the county, which are areas west of Denver. Most affected were children, ages 5 months, 7 months, 6 years, 7 years, 10 years, and 11 years; one adult was also ill.

## Report analysis

As these reports were received, Jeffco's Communicable Disease Nurse and Consumer Protection Supervisor reviewed the known facts up to that point, including the age group of those who were ill, common sites or events they had frequented, and their eating patterns.



- The people involved in the cases were eating at some of the same restaurants.
- Two children in a child-care center were involved.
- Symptoms appeared circa 18 January.
- The ages of the patients ranged from 5 months to adult, but most were 6 to 12 years of age.
- There was no known common event in which those affected had participated, such as a banquet, sporting activity, stock show, or school activity, but there was some indication that a common element among patients was visiting the Denver Zoo, in Denver County.
- There seemed to be no common food supply such as a particular restaurant or school, or food groups (e.g., chickens, eggs, certain meats) that are typically associated with *Salmonella* infection.
- Some zoo visitors did not buy anything to eat while at the zoo, but some brought a lunch or meal.

School foodservice procedures were also reviewed. It was found that one bakery supplies all schools in the Jefferson County School District. Some central kitchens are used to supply food to other schools. The schools also have contracts with certain commercial establishments to supply foods such as pizza, burritos, and chicken products.

Although some officials in the Colorado Department of Public Health and Environment (CDPHE) felt that a foodborne agent was the cause of the outbreak, there were other factors that suggested otherwise. Since the restaurants under the Jeffco's jurisdiction are involved in a Food Safety Program that emphasizes training and education, other officials believed that, while possible, it was unlikely that one of

the restaurants in Jefferson County was the source of the salmonellae that were causing the outbreak.

#### Analysis of probable source

26 January 1996. On 26 January, the Consumer Protection Supervisor pursued the possibility that the Denver Zoo was the possible source of the *Salmonella* infection. A Denver Department of Health and Hospitals official was contacted to find out:

- About restaurants, concessions, or other food sources available to people visiting the zoo.
- Whether there were any open cases or complaints regarding foodborne illness associated with this area.
- If there was a particular part of the zoo that young people might frequent such as a petting zoo, specifically of reptiles, since various reptiles are known *Salmonella* carriers.

A state veterinarian was also questioned about current cases. A likely scenario emerged, involving children, particularly children 6 to 12 years old, who could infect the infants; contaminated reptile(s); and lack of hand washing.

#### More questions

By the afternoon, the known cases had not yet been serotyped. Regardless, one state official was particularly concerned about the southeast and northwest areas of the county. Why were the cases clustered in only two regions of Jefferson County? If the zoo was implicated, it is reasonable to speculate that the outbreak would have spread to the entire Denver metro area.

A Jeffco official continued to consider the zoo as a likely source of contamination and subsequent illness. However, the state was convinced that a food source in Jefferson County caused the foodborne illnesses, because no

other county in the Denver metropolitan area had reported any cases.

#### More information

The incubation period for *Salmonella* infection is 8 to 72 hours. By this time, CDPHE had confirmed the serotype as *S. enteritidis*. Since confirmed cases began appearing approximately 18 January, the infection time could have been 13 and 14 January, a weekend, and 15 January, a holiday. Questions arose regarding what would entice Jefferson County residents to visit the zoo, aside from the weekend, the holiday, and the fact that the weather was pleasant during that time. Did the zoo or any Jefferson County industry sponsor special events or offer incentives such as bus passes or attendance passes to businesses?

As the day continued, more cases were confirmed throughout the Denver metro area. The outbreak appeared to be more widespread than Jefferson County, and it now seemed that, indeed, the zoo might be involved.

#### Publicity, public inquiry

A late-night television news broadcast reported that Komodo Dragons at the zoo's Tropical Discovery exhibit might be implicated in the outbreak, but that this had not been confirmed. A local newspaper the following morning carried a story possibly implicating the Komodo Dragons at the zoo.

Jeffco officials wanted to know if samples from the Komodo Dragons had been cultured to substantiate the outbreak, and if not, why not. They were also concerned about the possible consequences if this outbreak's cause was not promptly determined and the outbreak itself not halted. These concerns included:

- Hundreds, maybe thousands, of Colorado residents and tourists being exposed.

- If the Komodo Dragons are a part of a traveling special exhibit, there is the potential for exposure across the U.S. and maybe worldwide.
- The public could become mistrustful of public health officials and the foodservice industry.
- There would be an economic impact affecting doctors, lawyers, and public budgets.
- Illness, suffering, and death of those who became, or will become, ill.
- Adverse impact on, and public image of, zoo operations and other reptile displays, since there could be other zoos exhibiting Komodo Dragons and other reptiles.

#### Specific information

**27 January 1996.** Specimens from the Komodo Dragons were submitted to the CDPHE laboratory. CDPHE confirmed that specimens from one of the Dragons yielded *Salmonella enteritidis*.

**29 January 1996.** By 29 January, there was still no information about microbiological testing to confirm the outbreak. However, CDPHE learned that there was a special zoo exhibit from 13 to 21 January called "Dragon Days," with a private special showing on 11

January. Approximately 25,000 to 26,000 people may have attended the zoo during the Dragon exhibit.

#### The Dragons

Two Komodo Dragons were part of the exhibit. Komodo Dragons are native to Indonesia, but these two were residents of the zoo. One Dragon was a 2-year-old, 4 1/2 feet long, and the other, a 4-year-old, 6 feet long. The tail makes up about half of the Dragon's length. This animal's underbelly and tail would normally touch or drag on the ground, thus creating the potential for fecal contamination.

Even though there was a 2-foot barrier and the handler, who exhibited the animals approximately at lunch time, held the Dragons, spectators were still able to touch the tail, bedding materials, and barrier, which were possible contamination sources. In fact, *Salmonella enteritidis* was found on the barrier 2 weeks after the barrier was dismantled. It is likely that pathogenic fecal contamination from the Komodo Dragons easily could have been transmitted to and among humans. The lack of proper hand washing after touching the animals and the exhibit surroundings, followed by eating, holding the hands of siblings, and other

contact would contribute to this contamination.

**30 January 1996.** By 30 January, 15 cases had been confirmed, and a local radio station and newspaper reported that there were now 24 confirmed cases. One paper also reported that lab tests matched the same *Salmonella* bacterial serotype that was in a culture taken from one of the Dragons. The Denver Zoo suspended all activity that allowed visitors to touch and pet animals, and changed its display procedures to prevent any direct human contact with the exhibits.

#### Questions and considerations

The case history of this outbreak raises the question of whether or not zoo visitors should be allowed to touch zoo animals or to come into close contact with animal exhibits. In addition, the general public and public officials, especially public health officials, should consider limiting private possession of reptiles and other exotic and wild animals.

#### AUTHOR INFORMATION

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# Automation and Evolution of a Retail Food-Protection Program

Brian Collins

## SUMMARY

In 1990, the City of Plano Environmental Health Department Retail Food Protection Program provided nominal protection against potential foodborne illness. Foodservice-establishment inspections were less than adequate in frequency and effectiveness. Lack of personnel, training, and funding compromised quality.

Instead of reducing services to compensate for deficiencies, the Department committed to re-engineering the program. Plans evolved to include a risk-based foodservice evaluation program in 1990, incorporation of the Food and Drug Administration Electronic Inspection System in 1993, and in 1995, use of Australia's HACCP MASTER™ software. As a result, the Food Protection Program was able to "do more with less." This philosophy paved the way to increased rapport with the foodservice industry and to increased funding. Eventually, success parlayed into staffing, training and technology. Today the Department enjoys a cooperative science- and technology-based relationship with the foodservice industry and is providing responsible, cost-efficient service.

## PROGRAM SUMMARY

### Demography

Plano, Texas, is a city of 186,000 located 20 miles north of Dallas. Over 70 square miles of contiguous residential, retail, industrial, and agricultural land has been integrated into a diverse economy that supports a growing cosmopolitan atmosphere.

The City of Plano Environmental Health Department is a division of Development Services. The Department employs 39 individuals in five subdivisions: Consumer and Environmental Health, which includes the Food Protection Program and oversight of more than 700 foodservice establishments, Water Quality and Zoning Administration, Animal Services,

Neighborhood Revitalization, and Community Development.

### Problem

In 1990, the City of Plano Environmental Health Department Retail Food Protection Program provided nominal public health protection against potential foodborne illness. Foodservice establishment inspections were less than adequate in frequency and effectiveness (0.8 inspections per establishment per year) using a standard 44 item system, and no long-term goals or objectives were defined for the program.

Instead of remaining complacent with the status quo or reducing services to compensate for deficiencies, the Department committed to re-engineering the program.

### Goals and Objectives

The Department determined that a "work smarter and more efficiently" philosophy was mandatory in order to deal effectively with "do more with less" pressures. A new direction was outlined that made the Retail Food Protection Program paramount. The new map embraced industry cooperation, education, and science and technology as integral program compo-

nents. The goal was to minimize the risk of foodborne illness by redirecting personnel resources and implementing new technology.

Objectives in achieving the goal included implementing a formal Risk-Based Foodservice Establishment Evaluation System that set priorities for inspection frequency and type on the basis of foodborne illness potential. An additional objective recognized that technology, in the form of laptop computers for field staff, would be integral in achieving short and long-term goals. Finally, the face of food-service inspection protocols was changing, and a compelling objective was to implement new and innovative evaluation techniques. Risk orientation, hazard analysis critical control point (HACCP) evaluations and new hardware and software applications were all evaluated.

## EVOLUTION

### Risk-based food-service establishment evaluation system

The number of inspections conducted annually at each establishment, as well as the type of establishment evaluation, have been determined by Risk (Priority) Assessment since the 1990-1991 fiscal year. A Foodservice Establishment Priority Analysis Survey is conducted in every establishment each October and answers to survey questions are correlated to specific food risk or specific behavioral risk on a Priority Analysis Form. The documents provide a simple numerical relationship that categorizes an establishment as being high, moderate, or low risk for potential foodborne illness. Results of surveys and analyses are compiled in January of each year and every establishment is assigned a risk category. On the basis of the risk assignment, inspection type and frequency is determined for each establishment.

### The U.S. Food and Drug Administration Electronic Inspection System

Acquisition of laptop computers for field staff in 1993 facilitated evaluation of software that would allow comprehensive, legible, and consistent results to be obtained in the field. Plano requested participation in the FDA Electronic Inspection System (EIS) Beta Testing Program and was accepted as one of six participating cities in the country on the basis of access to technology, internal management support and desire to participate.

After 2 years of testing, modification, and persistent work with the Food and Drug Administration, EIS is now the benchmark for application of Foodservice Inspection in Plano. The Office System maintains data management, reports, codes, and libraries, and allows contact with other state and federal agencies via modem. The program is menu driven and easy to learn. The Field System stores inspection information, generates reports on portable printers, and can provide comprehensive reference library information at the touch of a key (FDA codes, state codes and local ordinances can all be maintained in a database for field reference). Both systems can be modified or adapted to specific needs and have been flexibly designed to accommodate future needs.

### HACCP MASTER™ software

Throughout evolution of the Plano Food Protection Program, impetus for change has been derived from the principles and concepts of hazard analysis and critical control point (HACCP) evaluations. In 1995, purchase of the Australian software HACCP MASTER™ created by Envirohealth, (P.O. Box 6093, Rockhampton Mail Centre 4702, Queensland, Australia; phone 61-79-28 4657; fax 61-79-28 8135) assisted transition from manual, time-consuming application of HACCP data to user-friendly

and time-efficient automated applications. The menu-driven program automatically evaluates recipes and food preparation procedures and provides complete flow diagrams for each product or item that is entered. Critical control points are designated and explained with corrective remedies if food-safety parameters are violated. This information is further supported with time-temperature graphs and peripheral information important to maintaining safe and consistent food products.

## RESULTS

Since implementation of risk assessment, the relative number of high-risk establishments has been reduced more than 27%, even though new restaurant openings have exceeded 40 establishments per year the last 4 years. Additionally, while the net number of establishments increased 15.4% (from 581 in 1991 to 687 in 1995), the averaged number of complaints for the same time did not increase. In fact, the number of complaints dropped 10% (57 complaints) from 1994 to 1995. All complaints (foodborne illness, sanitation and hygiene) are investigated. More tangible results were realized when the number of critical violations on inspections and evaluations dropped from a monthly average of 255 in 1992 to 102 in 1995 (a 60% decrease). Other factors that contributed to the relative reduction in high-risk establishments and complaint numbers were staff and owner education and cooperation, menu modification, procedure modification, HACCP planning, and increased rapport with industry.

Also, due to risk orientation, the Department was able to increase internal and external training, revise the City code, establish a new, cooperative relationship with industry, and most importantly, place staff in establishments where risk for foodborne illness was greatest. As a passive benefit to risk

orientation, industry operators in high- and moderate-risk establishments saw Health Specialists more often and realized advantage from educational efforts. Thus, when permit fee increases were proposed in 1993, little resistance occurred. The resultant revenue increase (\$89,500 in 1991 to \$179,500 in 1993 and \$224,500 in 1995) allowed addition of three new Environmental Health Specialists and acquisition of laptop computers for all field staff.

Acquisition of hardware provided an advantage in selection as a Beta Test site for the FDA Electronic Inspection System software. The start-up time for learning EIS and creating a database for a city code was moderate, and it has since paid great dividends. Reduced inspection time, greater legibility, less redundancy, less paper, and immediate field access to large reference databases have enabled greater consistency and credibility. In turn, a newfound rapport with industry evolved after the Department changed from a regulatory, enforcement-based agency to a cooperative, educational, and science- and technology-driven team. EIS has been greeted warmly by industry in that reports are easy to read, are generated on-site, and provide verbatim code explanations and remedies for violations. Previously, hand-written

reports were hard to read and code interpretations were inconsistent among Health Specialists. EIS is now used on all routine, investigative, or follow-up inspections.

Future applications may include incorporation of digitized, cellular-modem technology that will relay information to and from the field and access national, state, or local bulletin boards. This will enable immediate information conveyance and retrieval directly from the field.

The use of HACCP MASTER™ software has been an added luxury that has further reduced manual input and design of HACCP data in creating reports for industry. When combined with EIS, HACCP MASTER™ provides a comprehensive overview of operations that is understandable and flexible enough to be applied easily by operators, so that self-monitoring and regulation result in reduced risk to the public. Brinker International (Chili's Bar and Grill, Grady's American Grill, On the Border, and Romano's Italian Kitchen) executives recently commented that they "have received positive feedback from Plano store managers because they are being trained in HACCP" and that "the program allows them to provide input and work together" with Health Specialists. Further, they indicated "We knew very little about HACCP until the City of Plano came to conduct a HACCP

review. It was an exchange of ideas and recommendations that helped solve problems."

Eleven HACCP MASTER™ evaluations have been conducted since acquisition of the software program in June 1995. The program will become a cornerstone for all future HACCP evaluations. Previously, all HACCP evaluations (data collation) were labor-intense manual write-ups. (Note: All high-risk establishments are targeted for HACCP evaluation annually.)

## CONCLUSION

Risk orientation, implementation of the FDA Electronic Inspection System and integration of the HACCP MASTER™ software have combined to make the City of Plano Environmental Health Department Retail Food Protection Program efficient, educational, and proactively responsive to citizen and industry needs while minimizing the risk to public health from potential foodborne illness.

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# Bacteriological Survey of Used Cellulose Sponges and Cotton Dishcloths from Domestic Kitchens

Carlos E. Enriquez,<sup>1\*</sup> Ricardo Enriquez-Gordillo,<sup>1</sup> Denise I. Kennedy,<sup>1</sup> and Charles P. Gerba<sup>1,2</sup>

## SUMMARY

Bacterial contamination in the kitchen often occurs during processing of raw foods. Soiled cleaning utensils have been associated with the transfer of organisms to food in sufficient numbers to represent a potential health hazard. In this study 325 sponges and 75 cotton dishcloths were collected from households in four major cities in the USA. Total and fecal coliform bacteria from these cleaning materials were enumerated using the spread plate technique on mEndo and mFC agar, respectively. Identification of selected bacterial colonies was carried out by the Biolog<sup>®</sup> procedure and of *Staphylococcus aureus* on mannitol salt agar. The geometric mean of total and fecal coliform bacteria in the cellulose sponges was  $1.15 \times 10^5$  and  $4.46 \times 10^2$  CFU/ml respectively of liquid samples wrung from the sponges and  $1.31 \times 10^5$  CFU total coliforms and  $2.03 \times 10^3$  CFU fecal coliforms per ml of liquid from the dishcloths. Using the Biolog<sup>®</sup> method, a total of 23 different bacterial species were identified from 140 cellulose sponges and 13 from 56 dishcloths. Most identified species belonged to the *Enterobacteriaceae*, *Pseudomonas* spp. and *Burkholderia* spp. groups. *Salmonella* spp. was identified in 15.4% (13 of 84) and 13.8% (4 of 29) of the cellulose sponges and dishcloths, respectively; *Staphylococcus aureus* was present in 20% (65 of 325) of the cellulose sponges, and in 18.6% (14 of 75) of dishcloths. No definite identification could be obtained from 82 isolated colonies (24 from dishcloths and 58 from cellulose sponges). These results suggest that cellulose sponges and dishcloths may be an important source of bacterial contamination of surfaces, hands, and foods in the environment in domestic kitchens.

## INTRODUCTION

It has been estimated that each year the cost of foodborne bacterial illness in the USA is of approximately \$4 to \$6 billion (8), and that the number of gastroenteritis cases related to foodborne pathogens is 6.5 million, leading to 9,000 deaths. In a review study including more than 1,000 outbreaks of food poisoning (6), it was shown that the source of the highest percentage of cases (19.7%) was family homes, followed by restaurants (17.1%) and banquets (12.2%).

An important source of contamination in the food-processing environment is the transfer of pathogens to foods by the food handler (11). This can occur either directly, or by cross-contamination through hands, surfaces, utensils, and equipment insufficiently cleaned or disinfected between handling of different foods (2, 7). It was reported (3) that *Escherichia coli*, possibly introduced on meat and poultry, was the bacterium most commonly isolated in the kitchen. Although enterobacteria do not survive well under dry conditions (5, 12), the kitchen environment provides constant wet

environments in which they may survive and replicate.

Foods of animal origin are the primary source of many foodborne pathogens. It has been reported (10) that contamination of kitchen surfaces may lead to foodborne salmonellosis. Survival of pathogens on surfaces may be prolonged. *Salmonella typhimurium* was isolated from a cutting board on which a contaminated turkey associated with a gastroenteritis outbreak had been carved 12 days earlier (10). The interior of egg's may become contaminated during laying, and milk directly from the milking animal, or indirectly from the environment or equipment. Fruits and vegetables may be contaminated with a variety of soil organisms, or by organisms present in irrigation water (7).

In a study on microbial contamination in 200 homes, *E. coli* represented the most common isolate (64.5%) among the *Enterobacteriaceae* (12). The highest isolation rates of enterobacteria (*E. coli*, *Citrobacter freundii*, *Klebsiella pneumoniae*, and *Enterobacter cloacae*) in the kitchen area were from wet sites such as sinks, draining boards, and dishcloths; in that study 15% of *E. coli* isolates were identified as potential pathogenic strains. *Pseudomonads* were found in 91% of the households, in both wet and dry areas. It was pointed out that contaminated cleaning materials may serve not only as reservoirs, but also as disseminators of bacterial contamination in the kitchen (12).

The objectives of this study were to determine the number of total and fecal coliform bacteria in household kitchen cleaning materials (cellulose sponges and cotton dishcloths) and to determine the types of bacteria colonizing them.

## MATERIALS AND METHODS

Four hundred cleaning tools (325 cellulose sponges and 75 cotton dishcloths) were collected in sealable plastic bags from

households in four major cities in the USA. Within 72 h these cleaning materials were sent under refrigeration to the University of Arizona for bacteriological analysis.

Upon arrival, liquid samples from the cleaning materials were extracted by manual compression in sealable bags. When the cleaning materials were dry or no sample could be extracted by wringing, sterile Tris-buffered saline (Sigma Chemical, St. Louis, MO) was added at approximately 0.1 ml/cm<sup>2</sup> of external surface). The extracted samples were serially diluted 10-fold in sterile Tris-buffered saline, and 0.1-ml volumes were inoculated into different types of culture media by the spread plate technique. Selective mEndo, mFC, and mannitol salt (MSA) agar media (Difco Laboratories, Detroit, Michigan) were used to enumerate total coliform bacteria, fecal coliform bacteria, and *Staphylococcus aureus*, respectively. Incubation of mEndo and mFC plates was carried out for 24 h at 35 and 44.5°C, respectively, and MSA plates were incubated at 35°C for 48 h.

Bacterial enumeration was carried out with a colony counter (New Brunswick Scientific, New Brunswick, NJ). Red colonies with a metallic surface sheen were counted as total coliforms on mEndo agar, and blue colonies on mFC agar as fecal coliforms. Presumptive *S. aureus* was counted as yellow colonies on MSA.

Bacterial identification was carried out with samples from 145 cellulose sponges and 55 dishcloths by plating colonies isolated from mEndo plates into Trypticase soy agar (TSA); and incubating at 35°C for 24 h. Bacterial cells were harvested, suspended in sterile saline, and inoculated onto Biolog GN MicroPlates™ (Biolog Inc., Hayward, CA). Incubation was conducted at 35°C for 24 h and plates were read at 6 and 24 h. The results were entered into a personal computer manually and interpreted by the computer

program and database Microlog 1, release 3.50 (Biolog Inc., Hayward, CA). Positive controls of *E. coli* and *Salmonella typhimurium* were included in the identification assays. Statistical analysis of the coliform bacteria data was carried out by the z-test (13).

## RESULTS

Bacterial identification and frequency of occurrence in the domestic kitchen cleaning materials are shown in Table 1. Biolog™ identification showed that *Pseudomonas* spp. were the organisms found most frequently in cellulose sponges (35.7%) and dishcloths (31%), with *P. putida* as the predominant species (20.2% in cellulose sponges and 24% in dishcloths). Among the *Enterobacteriaceae*, *Salmonella* spp. were the most commonly found organisms in both cellulose sponges (15.4%) and dishcloths (13.8%), followed by several coliform species, among which *Enterobacter* spp., *Klebsiella* spp., and *Serratia* spp. were the most abundant. *Enterobacter* spp. were found in 14.3% of cellulose sponges and 20.7% of dishcloths; *Klebsiella* spp. was isolated from 8.3% of cellulose sponges and from 6.9% of dishcloths; and *Serratia* spp. were present in 7.1% of cellulose sponges and 3.4% of dishcloths. *Rhanelia aquatilis* was isolated from 1.2% of cellulose sponges and from 6.9% of dishcloths, and *Leclercia adecarboxylata* from 1.2 and 3.4% of cellulose sponges and dishcloths, respectively. *Cedesea lapagei* and *Shewanella putrefaciens* were isolated only from dishcloths (3.4 and 6.9%, respectively), whereas *Xantomonas maltophilia* and *Acinetobacter johnsoni* were isolated only from cellulose sponges (2.4 and 1.2%, respectively). Presumptive *S. aureus* was isolated on MSA from 20% of cellulose sponges and from 18.6% of dishcloths. No definite Biolog™ identification could be obtained from colonies isolated from 24

**TABLE 1. Bacterial identification and frequency of occurrence in cleaning materials from domestic kitchens**

Bacterial species	Frequency of occurrence of species			
		Cellulose sponges (%) (No. positive/tested)		Dishcloths (%) (No. positive/tested)
<i>Pseudamanas putida</i>	20.2	(17/84)	24	(7/29)
<i>Pseudamanas aeruginosa</i>	4.7	(4/84)	0.0	(0/29)
<i>Pseudamanas fragi</i>	4.7	(4/84)	3.4	(1/29)
<i>Pseudomonas tsutzeri</i>	2.4	(2/84)	0.0	(0/29)
<i>Pseudamanas fluorescens</i>	3.6	(3/84)	0.0	(0/29)
<i>Pseudomonas mendacina</i>	0.0	(0/84)	3.4	(1/29)
<i>Pseudamanas agglomerans</i>	2.4	(2/84)	0.0	(0/29)
<i>Xantamanas maltaphila</i>	2.4	(2/84)	0.0	(0/29)
<i>Salmonella</i> spp.	15.4	(13/84)	13.8	(4/29)
<i>Serratia marcescens</i>	1.2	(1/84)	0.0	(0/29)
<i>Serratia odorifera</i>	2.4	(2/84)	3.4	(1/29)
<i>Serratia liquefaciens</i>	3.6	(3/84)	0.0	(0/29)
<i>Klebsiella pneumoniae</i>	4.7	(4/84)	6.7	(2/29)
<i>Klebsiella planticola</i>	3.6	(3/84)	0.0	(0/29)
<i>Enterobacter cloacae</i>	8.3	(7/84)	13.8	(4/29)
<i>Enterobacter gergoviae</i>	5.6	(5/84)	6.7	(2/29)
<i>Acinetobacter calcoaceticus</i>	5.6	(5/84)	0.0	(0/29)
<i>Acinetobacter johnsonii</i>	1.2	(1/84)	0.0	(0/29)
<i>Acinetobacter radiresistens</i>	1.2	(1/84)	0.0	(0/29)
<i>Rhanella aquatilis</i>	1.2	(1/84)	6.7	(2/29)
<i>Alcaligenes eutrophus</i>	1.2	(1/84)	0.0	(0/29)
<i>Alcaligenes xyloxydans</i>	0.0	(0/84)	3.4	(1/29)
<i>Citrobacter freundii</i>	1.2	(1/84)	0.0	(0/29)
<i>Shewanella putrefaciens</i>	0.0	(0/84)	6.7	(2/29)
<i>Leclercia adecarboxylata</i>	1.2	(1/84)	3.4	(1/29)
<i>Cedosea lapagei</i>	0.0	(0/84)	3.4	(1/29)
<i>Flavobacterium breve</i>	1.2	(1/84)	0.0	(0/29)
<i>Staphylococcus aureus</i> <sup>a</sup>	20	(65/325)	18.6	(14/75)

<sup>a</sup>Determined by growth on mannitol salt agar (MSA).



dishcloths and from 58 cellulose sponges.

The geometric means of CFU of both total and fecal coliform bacteria per milliliter of sample liquid were greater in dishcloths than in cellulose sponges. The geometric means of total coliform bacteria in cellulose sponges and dishcloths were  $1.15 \times 10^5$  and  $1.31 \times 10^5$  CFU/ml, respectively, while the geometric means of fecal coliform bacteria in cellulose sponges and dishcloths were  $4.46 \times 10^2$  and  $2.03 \times 10^3$  CFU/ml, respectively. Although the average of total coliform bacteria was higher in dishcloths than in cellulose sponges, the difference was not statistically significant. In contrast, the higher concentration of fecal coliform bacteria in dishcloths in comparison to cellulose sponges was significant at the 0.001 level (z-test).

## DISCUSSION

Our results showed that cleaning materials such as sponges and dishcloths from domestic kitchens can harbor large numbers of both total and fecal coliform bacteria and a variety of other bacterial species. In this study, *Pseudomonas* spp. were the most commonly identified bacteria. This was expected, as these organisms are ubiquitous in the environment, due to their remarkable ability to utilize many different carbohydrates as carbon sources (4). *Pseudomonas aeruginosa*, which is the most important human pathogen among species of the genus *Pseudomonas* (4), was isolated from 4.7% of cellulose sponges, but was not recovered from any of the dishcloths analyzed. This result might have been related to the lower number of dishcloths (29 dishcloths versus 84 cellulose sponges) used for bacterial identification, rather than to characteristics of the cleaning materials.

The origin of *Pseudomonas* spp. in the kitchen environment is difficult to trace, as these organisms

are commonly found in water, soil, and plants, including fruits and vegetables (4). In this study, *Pseudomonas* spp. were present in 35.7% of cellulose sponges and 31% of dishcloths. Similar results in which *Pseudomonas* spp. were found in 21% of 186 dishcloths in a household environment have been published (12). However, another investigation (14) reported a much lower frequency of isolation of *Pseudomonas* spp. (3.8%) from 52 dishcloths, from which *Pseudomonas aeruginosa* was the only isolate. These results may have been associated with the type of selective medium used for *Pseudomonas* spp. isolation (C-N), which is more selective for *P. aeruginosa* (14), and could have been too harsh for other *Pseudomonas* species, in particular injured organisms. Although the majority of *Pseudomonas* species isolated in this investigation, with the exception of *Pseudomonas aeruginosa*, are infrequently associated with infection in humans, *P. putida*, which was isolated from 20.2% of cellulose sponges and from 24% of dishrags, has been a cause of bacteremia in cancer patients (4).

As determined by typical growth on mannitol salt agar, presumptive *Staphylococcus aureus* was isolated with a similar frequency from both cellulose sponges (20%) and dishcloths (18.6%). These numbers are higher than other figures reported earlier (12). In that investigation, *S. aureus* was isolated on DNase agar only from 3.2% of 168 dishcloths. Although the study did not describe sampling procedures nor the handling of samples, different sampling techniques or isolation media, or both, might have contributed to this difference. In another study (14), the recovery of *Staphylococcus* spp. from dishcloths was 42.3%. These organisms were found in several kitchen areas such as sinks (36.6%), draining boards (36.2%), and cutting boards (38.9%), among several other sites. It was suggested that once introduced into the kitchen environ-

ment, *Staphylococcus* spp. are probably dispersed to different areas by the use of cleaning and drying kitchen materials (14). One of the main sources of food poisoning by *S. aureus* is too much food handling during preparation (7). Therefore, the use of contaminated cleaning materials in the kitchen may increase the risk of *S. aureus* foodborne infection.

Although we did not expect to isolate *Salmonella* spp. using mEndo agar, it was identified in 15.4% of cellulose sponges and 13.8% of dishcloths. This was unexpected, as other studies (12, 13) have failed to isolate *Salmonella* spp. from kitchen cleaning materials. Our recovery of *Salmonella* spp. may be associated to the use of mEndo agar as the selective bacteriological medium, in which some *Salmonella* such as *S. typhi* grow very well (1). Furthermore, *S. typhimurium* and *S. enteritidis* have been grown efficiently on mEndo agar in our laboratory. The identity of 23.5% (4 of 17) of randomly selected isolates of *Salmonella* spp. was confirmed by serologic analysis (Polyvalent antiserum group A-E, Becton Dickinson Microbiology Systems, Cockeysville, MD). The relatively common occurrence of *Salmonella* spp. in kitchen cleaning materials is of concern as approximately 2 to 4 million cases of salmonellosis occur in the U.S. each year, many of those as household cases (6), with an estimated cost of \$1.2 billion (9, 15).

Our results showed that both total and fecal coliform bacteria are present in large numbers in contaminated cleaning materials, sometimes reaching values of more than several hundred million CFU per milliliter of a liquid sample (data not shown). While the geometric mean of total coliform bacteria was similar in both cellulose sponges and cotton dishcloths, the number of fecal coliform bacteria was greater in dishcloths (statistically significant at the 0.001 level). The reason for this difference is unclear, but we observed

that cellulose sponges tended to arrive at the laboratory dryer than cotton dishcloths. As desiccation is detrimental to bacterial survival in the environment (5, 12), this may in part explain the larger number of fecal coliform bacteria found in dishcloths.

As in any other microenvironment, that of kitchen cleaning materials must be very complex. In our study no definite identification could be obtained for 82 isolated colonies (24 from dishcloths and 58 from cellulose sponges). This result may be related to methodology limitations, but also to the presence of uncommon or yet to be identified microorganisms.

In summary, it was shown that cleaning cloths and sponges may be a significant source of pathogenic and opportunistic pathogenic bacteria in the domestic kitchen environment. Therefore, it is important to make the general public aware of the risks associated with contaminated cleaning materials and to provide basic education on hygiene practices and food handling, including the availability of antimicrobial cleaning materials and products for the kitchen. Recently, it was shown (2) that the use of "self-disinfecting" sponges in a household-kitchen environment significantly reduced the level of total and fecal coliform bacteria within the sponges, and greatly reduced the transfer of such bacteria to surfaces and fingers.

The largest percentage of food poisoning outbreaks occurs in the household environment (6), which underscores the need for public education on ways to minimize the risk associated with contaminated cleaning materials.

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## AUTHOR INFORMATION

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# Reduction of Numbers of Bacteria in Vacuum-Packed Sliced Sausage by Means of Microwave Heating

Barbara Schalch, H. Eisgruber, and A. Stolle\*

## SUMMARY

The purpose of this study was to test the ability of microwave heating to reduce microbial numbers in vacuum-packed sliced cooked sausage. The study was conducted utilizing eight gram-negative and eight gram-positive test strains. Two-hundred-gram portions of cooked sliced sausage were artificially contaminated with one of the test strains, vacuum packed, and heated by an intermittent microwave treatment. The controls were inoculated, but not microwave heated. After a storage period of 7 days at 7°C the microwave-heated portions of sausage and the controls were assayed for numbers of bacteria and compared. A significant reduction in numbers of bacteria was observed in all eight gram-negative test strains and in *Staphylococcus aureus*. The numbers of cells of these strains were reduced by 4 log cycles. *Micrococcus luteus*, *Candida albicans*, and the vegetative forms of *Clostridium perfringens* cell numbers were diminished by 3 to 4 log cycles. The average cell numbers of the test strains *Lactobacillus alimentarius* and *Listeria monocytogenes* showed a large standard deviation, but CFU were decreased. No satisfactory reduction was achieved with *Lactobacillus viridescens* and *Enterococcus faecalis*. These results indicated that important gram-negative pathogenic and spoilage-causing microorganisms could be inactivated by the microwave treatment. Further modifications should be studied to improve capability of microwave heating for decreasing the number of gram-positive microorganisms.

## INTRODUCTION

The market for prepacked meat products has been expanding in response to consumers' preference for self-service shopping. However, the shelf life of vacuum-packed meat products can vary considerably. Reports of shelf life range between 6 and 14 days at temperatures of 0°C to 6°C (9, 14, 21, 23).

While heat treatment during production initially guarantees a low microbial load of the finished product, slicing and packaging procedures may reintroduce hygienic hazards. According to many authors, several pathogenic and spoilage-causing species are frequently isolated from sliced cooked sausages: e.g., coliforms, *Enterobacteriaceae*, staphylococci, *Listeria monocytogenes*, lactobacilli, micrococci, enterococci, and yeasts (2, 3, 16, 20). The bacteria-reducing effect of microwave heating has been demonstrated in foods for *Staphylococcus aureus* (12, 13, 18), *Listeria monocytogenes* (10), *Salmonella* serovars (4, 19), coliforms (8), *Clostridium perfringens* (1), and others. However, there is little information on the microbiocidal effect of microwave heating in meat products.

This study was carried out to test the suitability of microwave heating for decreasing the number of pathogens and spoilage microorganisms in vacuum-packed cold cuts of cooked sausage.

## MATERIALS AND METHODS

### Sausage, preparation and packaging

Cooked finely ground German sausage made of beef and pork with a diameter of 105 mm and a length of 400 mm was produced in the Institute of Hygiene and Technology of Food of Animal Origin, Faculty of Veterinary Medicine, Ludwig-Maximilian-University, Munich, and stored at -18°C until being thawed for use.

Each quantity produced, which consisted of 10 sausages, was subjected to microbiological and sensorial analysis. The sausage was sliced and divided into 200-g portions with a diameter of 105 mm, a slice thickness of 2 mm, and a total height of 35 mm.

Heat-resistant polyamide 6.6 (Naturin-Werk, Weinheim, Germany) was used as packaging material. This material has a permeation coefficient for oxygen of  $5.6 \text{ N cm}^3 (\text{m}^2 \text{ day bar})^{-1}$  and for water vapor of  $12 \text{ g} (\text{m}^2 \text{ day})^{-1}$  at 23°C and 100  $\mu\text{m}$  thickness (11).

### Microorganisms and sources

The tests were performed with eight gram-negative and eight gram-positive strains chosen because of their relevance to food hygiene. Species marked (LMU) were from our culture collection. The strains used were *Candida albicans* ATCC 10231, *Clostridium perfringens* DSM 576, *Enterobacter sakazakii* (LMU) isolated from cooked sausage, *Enterococcus faecium* DSM 2918, *Escherichia coli* FIS 1599 isolated from meat (Institute of Meat Hygiene, Free University Berlin), *Escherichia coli* DSM 1103, *Lactobacillus viridescens* R 61 S (Reuter, Institute of Meat Hygiene, Free University Berlin), *Lactobacillus alimentarius* DSM 20249,

*Listeria monocytogenes* serovar 4 b SLCC 4013, *Micrococcus luteus* (LMU), *Pseudomonas fluorescens* DSM 50090, *Salmonella enteritidis* (LMU) isolated from poultry, *Salmonella senftenberg* (LMU), *Salmonella typhimurium* (LMU) isolated from poultry, *Serratia liquefaciens* (LMU), isolated from cooked sausage, and *Staphylococcus aureus* (LMU) 10275.

These microorganisms were cultured on plate count or Columbia agar at 28°C (*P. fluorescens*), at 30°C (*C. albicans*, *L. viridescens*, *L. alimentarius*) and at 37°C (*C. perfringens*, *E. sakazakii*, *E. faecium*, *E. coli*, *L. monocytogenes*, *M. luteus*, *Salmonella* serovars, *S. liquefaciens*, *S. aureus*) for 24 to 48 h. Several pure colonies of each microorganism were picked and diluted in sterile physiological saline to a density of  $1.0\text{E}+06 = 1.0 \times 10^6$  to  $1.0\text{E}+08 = 1.0 \times 10^8$  CFU/ml. The suspension was immediately used for the inoculation of the sausage portions. The purity of the suspension was verified by culturing samples of it.

### Procedure

Each experiment was carried out with one strain. Each of five 200-g portions of sliced cooked sausage was inoculated with 5 ml of the defined suspension of one test strain. The controlled inoculation was performed using a sterile pipette. The suspension was distributed equally on the surface and between the slices of each sausage portion. The portions were then vacuum-sealed in polyamide 6.6. One portion of sausage (control) was stored immediately at 7°C for 7 days and 4 portions were subjected to the intermittent microwave treatment before being stored for 7 days at 7°C. All gram-negative strains and *C. perfringens*, *M. luteus*, *L. viridescens*, *E. faecium*, and *C. albicans* were tested in duplicate. Thus, for each strain of microorganism, there were eight samples counted after microwave heating to be compared with the microbial counts of two controls. Triplicate experiments were carried out with *L. monocytogenes*, *L. alimentarius*, and *S. aureus*, so

that 12 results after microwave treatment could be compared with three controls. The results with each test strain were expressed as log CFU/g and arithmetic mean and standard deviation of these values were calculated. When the results were below the detection limit ( $2.3 \text{ log CFU/g}$ ), this value was used as the result.

### Microwave long-term treatment (MLT)

The contaminated and vacuum-packed sausage portions were heated in a household microwave oven Sensor M 742 (Philips-Whirlpool, Nürnberg, Germany) with a frequency of  $2,450 \pm 25$  MHz. The objective of the microwave treatment was to obtain an even temperature distribution in the samples, avoiding hot and cold spots in order to guarantee sensory and hygienic quality.

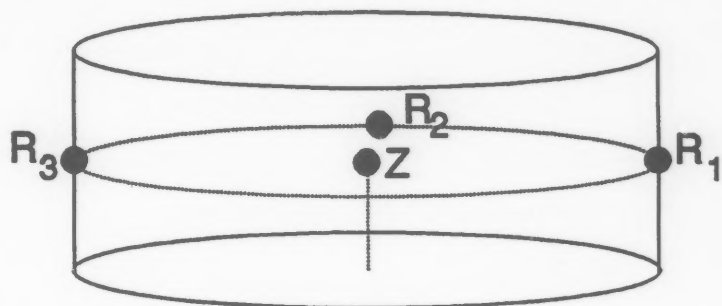
First, preliminary heating sessions were carried out which initially led to an uneven temperature distribution in the sausage portions. This caused overheating in the product's marginal zone or burst the packages. Therefore, an intermittent treatment had to be used to avoid points of high temperature in the product caused by heat conduction. Therefore the heating process consisted of 15 single 750-W heating sessions with defined interruptions called "breaks" (Table 1).

The microwave long-term treatment (MLT) took 66 min for each portion of sausage. The temperature in the sausage was measured with a fiber-optic temperature-measuring device, Sensylux (Sensycon, Carlsbad, VA, USA) at four points (Figure 1). Point Z was in the center; R<sub>1</sub>, R<sub>2</sub>, and R<sub>3</sub> were defined in the marginal zone of the portions. The temperature measurement was carried out with five 200-g cold cut portions.

### Microbiological analysis

All five packages of each test set were examined simultaneously after the storage period of 7 days. Ten grams of each 200-g portion were taken aseptically, diluted, and

Figure 1. Locations of temperature measurements in the cooked sausage cold cut portions.



homogenized according to the requirements of the International Organization for Standardization (ISO 3100-2:1988 and ISO 6887:1983). The following culture conditions were used for *C. perfringens*, pour plates of sulfite-cycloserine-azide selective medium as modified by Eisgruber and Reuter (7), incubated 48 h anaerobically at 37°C; for lactobacilli, De Man, Rogosa, Sharp agar (Oxoid, Basingstoke, UK) in spread plates incubated anaerobically at 30°C for 72 h; for yeast, spread plates of malt extract agar (Oxoid), at 25°C for 48 to 72 h; for *S. aureus*, spread plates of Baird-Parker agar medium according to ISO 6888-1; for micrococci, spread plates of furazolidon agar in the modification of von Rheinbaben and Hadlok (18) incubated at 35°C for 48 h; citrate-azide-Tween-carbonate agar (Merck, Darmstadt, Germany) for the enumeration of enterococci at 37°C for 24 to 48 h; for *L. monocytogenes*, the procedure according to ISO 11290-2; *Pseudomonas-Aeromonas* selective agar according to Kielwein (Merck) in spread plates was incubated at 25°C for 72 h; *Enterobacteriaceae* were detected by the pour-plate technique with violet red bile glucose agar and overlayer according to ISO 5552; and salmonellae according to ISO 3565.

#### Sensorial examination

Ten 200-g portions of the cold cut sausage without any artificial contamination were packed in

polyamide 6.6 and vacuum sealed. Five were first subjected to the MLT and then stored at 7°C for 7 days, and five were stored under the same conditions without prior microwave heating. Two members of the official panel for sensory evaluations of meat products (German Agricultural Society, Frankfurt) performed the sensory test, comparing color, exudation, consistency, odor, and taste of the microwave-treated portions and the untreated samples.

## RESULTS AND DISCUSSION

### Temperature curve

As the arithmetic means and standard deviations of the temperature curve (Table 1) of the 200-g portions show, the microwave heating combined with the defined breaks resulted in relatively even temperature distribution by the end of the heating procedure. Thus hot and cold spots in the portions were avoided to a large extent.

### Sensorial evaluations

Microwave heating caused minor exudation of approximately 3 ml per 200g of liquid. An adhesion of the slices was apparent which was not observed in the control packages. Color, consistency, odor, and taste did not exhibit any deviations compared with the nonmicrowaved portions.

### Microbial count reduction

After the microwave treatment, eleven test strains were reduced below the method's detection limit in all replications. This is demonstrated in Figures 2 and 3. Only five strains still gave results above the detection limit after the microwave treatment. Comparing the populations of the test strains with and without microwave heating, the figures show that the bacterial count decrease exceeded 4 log units for all eight gram-negative test strains. This is a remarkable result, as gram-negative bacteria are cited as an important cause of spoilage in vacuum-packed sliced cooked sausage (2, 3, 17, 22).

The reduction of *S. aureus* cells exceeded 4 log cycles. Comparable results have been reported by others (12). The arithmetic means of bacterial counts following the MLT for *L. alimentarius* and *L. monocytogenes* showed a decrease of more than 4 log cycles. However, the large standard deviations suggest that the MLT did not cause a reliable reduction in the populations of these species. This result is in keeping with the findings of other authors for *L. monocytogenes* (10, 15). The MLT caused a microbial count decrease of 3 to 4 log cycles with *M. luteus*, *C. albicans*, and *C. perfringens*.

In contrast to those findings a considerably higher resistance to microwave heating was observed with *L. viridescens* and *E. faecium* where reduction rates were between 1 and 2 log cycles, but with large standard deviations. Several reasons can be assumed for the large standard deviations: an absence of uniform microorganism distribution in the sausage homogenate, errors relating to pipetting during seeding of culture media, an uneven temperature distribution in the sausage portions, different metabolic status of the microorganisms in the sausage; or another approach to a time-temperature combination which would show a reliable reduction of microbial counts may be needed.

TABLE 1. Parameters of the microwave long-term treatment (MLT) and of the resulting temperature in the portions of cooked sausage cold cuts during the MLT

Heating sessions	Duration (s)	Break <sup>a</sup> (min)	Arithmetic mean of the temperature (°C) and standard deviation (n = 5)							
			Z <sup>b</sup>	SD	R <sub>1</sub> <sup>b</sup>	SD	R <sub>2</sub> <sup>b</sup>	SD	R <sub>3</sub> <sup>b</sup>	SD
I	20	3	13.3	3.8	29.0	4.4	28.4	3.6	25.3	3.2
II	20	3	18.2	2.1	48.4	5.2	46.8	6.3	40.8	5.2
III	20	3	24.7	2.8	65.2	2.7	56.9	4.2	57.5	3.4
IV	10	3	29.3	2.9	61.8	1.9	53.7	4.6	58.9	2.5
V	10	3	32.2	2.7	62.3	1.7	56.5	3.0	60.0	3.4
VI	10	3	36.7	2.8	60.2	3.3	56.1	3.0	60.8	1.7
VII	10	3	40.2	2.7	62.2	1.1	58.1	1.5	61.7	1.8
VIII	10	3	43.9	3.3	63.4	1.6	58.8	1.1	62.2	2.3
IX	10	3	47.0	2.6	63.5	1.5	60.7	1.1	64.3	2.3
X	10	6	51.1	2.2	64.4	1.9	61.6	1.8	65.5	2.1
XI	10	6	55.2	2.4	62.7	1.2	61.5	2.9	63.7	1.2
XII	10	6	56.5	1.8	60.6	0.9	60.3	2.0	63.0	2.1
XIII	10	6	57.5	1.7	60.3	1.5	60.4	1.9	61.5	1.2
XIV	10	6	58.3	1.3	60.6	2.0	59.6	3.3	61.1	0.9
XV	10	6	59.2	1.3	60.1	2.6	59.7	2.1	61.6	1.6

<sup>a</sup> Interruption after each heating session.

<sup>b</sup> Z, R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>: location of the temperature measurement; see Figure 1.

The latter seems to be likely because inoculation, microwave heating, storage, and microbiological examinations were strictly standardized. But further modifications of the MLT should be carried out to clarify this question.

*L. viridescens* and *E. faecium* never reached population densities below the method's detection limit after the MLT. The high heat resistance of these strains in aqueous media and various foods has been reported previously by others (5, 6).

Summarizing, the MLT was adequate for the reduction of CFU per gram of sausage eight gram-negative and four gram-positive test strains. It is therefore possible to assume its suitability for remarkably reducing gram-negative pathogenic and spoilage-causing bacteria in vacuum-packed sliced cooked sausages.

Despite the good population reduction of some of the gram-positive microorganisms tested, the inconsistent results for *Listeria monocytogenes* and *Lactobacillus alimentarius* and the failure to

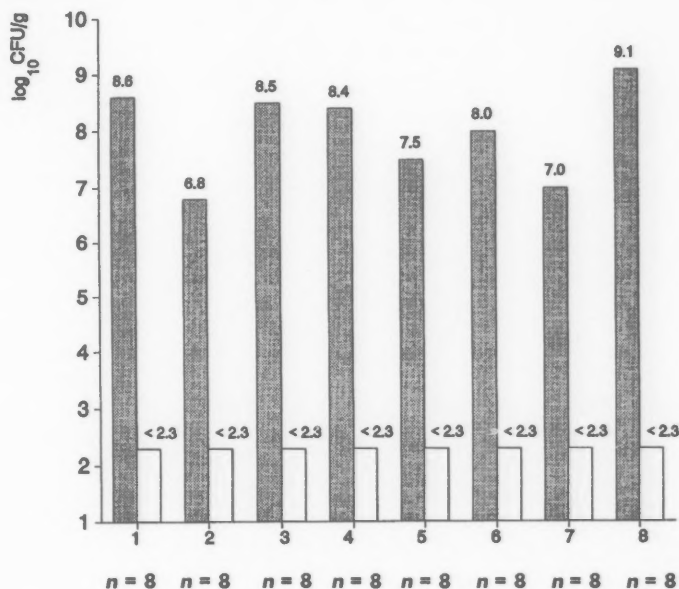
affect *Lactobacillus viridescens* and *Enterococcus faecium* show the present limits of the MLT. The MLT used in this study should be either prolonged or supported by another technique to exhibit an improved germicidal efficacy.

As the results show, the microwave technique could provide a means of quality assurance in the meat industry. Microwave heating could be a helpful tool to improve the hygienic quality and extend the shelf life of vacuum-packed meat products.

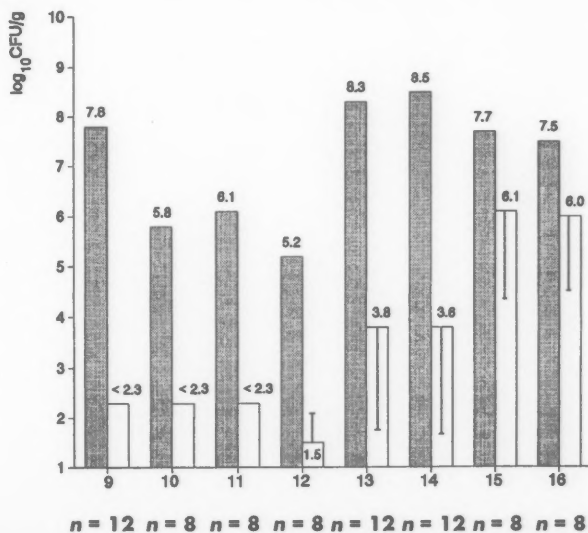
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**Figure 2.** Arithmetic mean of the log CFU per gram of the sausage cold cut portions without (■) and with (□) MLT. Cold cuts contaminated with: 1, *E. coli* FIS 1599; 2, *E. coli* DSM 1103; 3, *Serratia liquefaciens*; 4, *Salmonella senftenberg*; 5, *Salmonella typhimurium*; 6, *Salmonella enteritidis*; 7, *Pseudomonas fluorescens*; 8, *Enterobacter sakazakii*; n = number of contaminated and microwave-heated cold cut portions tested.



**Figure 3.** Arithmetic mean of the log CFU per gram of the sausage cold cut portions without (■) and with (□) MLT. The standard deviations (±) are given where they could be calculated. Cold cuts contaminated with: 9, *Staphylococcus aureus*; 10, *Micrococcus luteus*; 11, *Candida albicans*; 12, *Clostridium perfringens*; 13, *Lactobacillus alimentarius*; 14, *Listeria monocytogenes*; 15, *Lactobacillus viridescens*; 16, *Enterococcus faecium*; n = number of contaminated and microwave-heated cold cut portions.



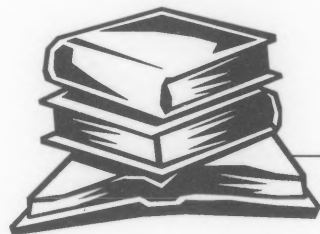
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# Book Review



## "Food Safety Management & Compliance"

Authors:

Martin D. Mick and James L. Budd

**F**ood Safety Management & Compliance is a publication of the Food Safety Institute, which provides food safety information, products, training, certification, and consultative services to food service organizations, related trade associations, regulatory authorities, and the general public. The material contained in *Food Safety Management & Compliance* is intended for use by operators of food establishments in the formulation of their own food safety practices and programs.

The text consists of fifteen chapters of which chapters two to eight are a "plain language" of the FDA's *Food Code 1995*. The remaining chapters deal with information/topics such as professional hygiene, elementary HACCP, complaint handling, foodborne illness prevention, future regulations, how to estimate

equipment needs, and numerous checklists and forms. The text also includes a software disc which replicates chapters two to eight.

In the authors' words (both are longtime veterans of the food industry) they "took complex regulations and translated them into plain language, eliminated cross references, and put the information into standard operating procedures format."

*Food Safety Management and Compliance* is a practical, easy-to-use guide capable of complimenting any operating procedures manual. The text attempts to simplify the process of understanding sound food safety practices for operators of food establishments. In this effort, that goal is accomplished.

*Food Safety Management and Compliance* is now available nationwide at a cost of \$245.

### For copies of "Food Safety Management & Compliance":

Mail requests to: Food Safety Institute, P. O. Box 697, Madison, WI 07940



# Dairy, Food and Environmental Sanitation

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*Dairy, Food and Environmental Sanitation (DFES)* is a monthly publication of the International Association of Milk, Food and Environmental Sanitarians, Inc. (IAMFES). It is targeted for persons working in industry, regulatory agencies or teaching in milk, food and environmental protection.

The major emphases include:

- practical articles in milk, food and environmental protection;
- new product information;
- news from activities and individuals in the field;
- news of IAMFES affiliate groups and their members;
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Correspondence regarding subscriptions or membership in IAMFES should be sent to Julie Cattanaach, Membership Coordinator, at the above address.

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### Book by author(s)

Minor, T. E. and E. H. Marth. 1976. *Staphylococci and their significance in foods*. Elsevier Scientific Publishing Co., Amsterdam.

### Book by editor(s)

Vanderzant, C. and D. F. Splittstoesser. (eds.). 1992. *Compendium of methods for the microbiological examination of foods*. 3rd ed. American Public Health Association, Washington, D.C.

### Patent

Hussong, R. V., E. H. Marth and D. G. Vakaleris. 1964. *Manufacture of cottage cheese*. U.S. Pat. 3,117,870. Jan. 14.

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Anonymous. 1977. *Thermally processed low-acid foods in hermetically sealed containers*. Code of Federal Regulations No. 21, U.S. Government Printing Office, Washington, D.C.

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References should follow the text, tables should follow references, and figures should follow tables in manuscript organization. Placement of each should be indicated in the text.

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Submission of photographs, graphics or drawings to illustrate the article will help the article. The nature of *DFES* allows liberal use of such illustrations, and interesting photographs and drawings often increase the number of persons who are attracted to and read the article.

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For a complete listing of expressions to avoid in scientific writing, see pages 93-98 in O'Connor, M. and F. P. Woodford. 1976. *Writing Scientific Papers in English*. Elsevier, Amsterdam. Also, *How to Write a Scientific Paper*, by Day, Robert A., 3rd ed. 1988. Oryx Press, Phoenix, AZ.

Authors may also contact the editor if they are not sure about acceptable abbreviations.

## In Memory of...

### *Paul Arthur Hartman*

Paul Arthur Hartman, Distinguished Professor Emeritus of the Department of Microbiology at Iowa State University, died August 13, 1996 at the age of 69.

Paul received a bachelor's degree from the University of Illinois in 1949, a master's degree from the University of Alabama in 1951 and a doctorate from Purdue University in 1954. Dr. Hartman was a faculty member of the Department of Microbiology from 1954 until his retirement August 31, 1990. He served as acting chairman and chairman of the department from 1974 to 1981. Dr. Hartman was named Distinguished Professor in Sciences and Humanities in 1972.

Paul Hartman taught a variety of courses at Iowa State University. These included

General Bacteriology, Advanced General Bacteriology, Applied Microbiology, Applied Microbial Biotechnology, Bacterial Physiology, Food Microbiology and Advanced Food Microbiology among others. He conducted an active research program resulting in more than 150 publications that involved graduate students. Forty-two M.S. students and 25 Ph.D. students successfully completed their programs under Dr. Hartman's direction. Recognition for his research expertise came in the form of serving on numerous review panels, editorial boards, receiving invitations for research presentations and through consulting activities.

Dr. Hartman became a member of IAMFES in 1958 and served on the editorial board of *Journal of Food Protection and Dairy, Food and Environmental Sanitation* for many years. He was a valued member of IAMFES and will be greatly missed.

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# IAMFES Secretary Candidates



*Virginia N. Scott*

Virginia Scott began her career as a research specialist for the Food Research Institute at the University of Wisconsin before joining the National Food Processors Association (NFPA) as a senior microbiologist in 1980. During her sixteen years with NFPA she has held several positions including her current promotion to senior director, Office of Food Safety Programs.

As senior director, Virginia assists in the coordination of food safety issues at NFPA, including legislative, regulatory and international aspects. She also provides expertise in microbiology, HACCP, ISO 9000, risk assessment and other areas to NFPA members and staff as well as serves as staff secretary to the Microbiology and Food Safety Committee.

Virginia is an active member of IAMFES participating on the Program Advisory Committee, Nominating Committee, Meat Safety and Quality Professional Development Group, Risk Assessment Professional Development Group, as well as convening several technical sessions and symposia at the Annual Meeting. Other affiliations she has are with the Institute of Food Technologists, American Society for Food Microbiology, Association of Official Analytical Chemists, US Delegation, Codex Committee on Food Hygiene and International Life Sciences Institute, Committee on Food Microbiology.

Throughout her career Virginia has shown dedication to her profession and has been honored with various awards including the 1987 Bill Williams Award for Scientific Excellence presented by Campbell Soup Company, Institute of Food Technologists Scientific Lecturer 1990-1992, and American Society for Microbiology Lecturer 1991-1992.

Virginia received her undergraduate degree in Biology/Psychology from Wellesley College. She received a Master of Science in Bacteriology from the University of Wisconsin and a Master of Science in Food Science from the University of Maryland. She is currently working on her Doctorate in Food Science at the University of Maryland as well.



*John Marcello*

After working for ten years with his parents in a full-service restaurant, John Marcello spent fifteen years as a registered sanitarian, and later as training officer for the Dupage County Health Department in Wheaton, IL.

Since 1992, he has served as the manager of technical education for the Educational Foundation of the National Restaurant Association, assisting industry and regulatory organizations in the development and implementation of foodservice risk management educational programs. John is a member of the management team responsible for the administration of the Industry Council on Food Safety, a coalition of all segments of the foodservice industry that encourages and promotes food safety education throughout the industry and with the public.

John has worked on several federal and state level food safety education incentives. He presented the HACCP curriculum to regulatory and industry food safety professionals who participated in the 1992 FDA Foodservice Seafood HACCP pilot program and participated in the FDA HACCP teleconference, *Charting a Safer Course*. In cooperation with FDA's State Training Branch, John developed workshops for joint training of regulatory and industry professionals, designed to blend the HACCP theory with practical application. He has also helped develop and deliver several food safety training programs through the USDA's Cooperative Extension Service.

John became a member of IAMFES in 1988. He has presented and moderated educational sessions at the IAMFES Annual Meeting and has served on the IAMFES Foodservice Committee. For the past four years, he has directed the selection and presentation of the Educational Foundation's Norbert F. Sherman Award, presented at the IAMFES Annual Meeting Awards Banquet.

John serves as a board member for the International Meat and Poultry HACCP Alliance and as the vice chair of the Council II, Administration, Education and Certification, within the Conference for Food Protection. He received the Illinois Environmental Health Sanitarian of the Year Award in 1994 and the National Environmental Health Association's Industry Award in 1996.

# Federal Register

## Forty-Five 'Obsolete' Proposed Rules Withdrawn by FSIS

A notice issued by FSIS withdrawing some 45 proposed rules declared them either "obsolete" or "superseded" by other rules.

The Nov. 18 notice officially withdrew the following proposed regulations, published between 1969 and 1993:

1. "Inedible Animal Fats—Federal Meat Inspection Regulation"
2. "Retail Meat Stores and Restaurants in the District of Columbia"
3. "Reinspection and Preparation of Product"
4. "Labels of Meat Food Products—Proper Use of the Term 'FARM' or Similar Terms"
5. "Inspection of Poultry Products"
6. "Reinspection and Preparation of Products"
7. "Meat Cuts and Chopped Meat Products—Injection or Mixing of Water Base Solutions"
8. "Overtime or Holiday Inspection Service—Proposed Schedules of Operations"
9. "Inspection of Foreign Canned or Packaged Products"
10. "Definition of Importation"
11. "Requirements for Meat Patties and Meat Patty Mixes and Similar Articles"
12. "Official Inspection Marks"
13. "Meatballs and Similar Products"
14. "Labeling Policy for Cured Products"
15. "Federally Inspected Poultry Products—Labeling and Official Marks"
16. "Certain Products with Meat Ingredients"
17. "Meat Plant Quality Control Programs"
18. "Poultry Plant Quality Control Programs"
19. "Information Panel and Nutrition Labeling"
20. "Dry Milk Products Intended for Use as Ingredients of Poultry Food Products"
21. "Interpretation of term 'Meat'"
22. "Representations Regarding Geographical Origin"
23. "Oreo Stock and Edible Tallow"
24. "Standards for Cooked Poultry Sausages"
25. "Exemptions Based on Religious Dietary Laws"
26. "Canning of Meat and Poultry Products"
27. "Water in Poultry Chillers"
28. "Charges for Inspection for Export Certification"
29. "Procedures for Prior Label Approval"
30. "Bacon Made with Drug Curing Materials"
31. "Net Weight Labeling"
32. "Sale, Transportation, and Marking of Meat and Meat Food Products"
33. "Reimbursement for Preparation and Cleanup Time"
34. "Definitions and Standards of Identity or Composition for Misc. Pork Products and Misc. Beef Products"
35. "Labeling for Meat and Poultry Products with Cheese Substitutes; Revised Pizza Standard"
36. "Transportation of Inedible Product for Use as Animal Food"
37. "New Line Speed Inspection System for Broilers and Cornish Hens"
38. "Total Plant Quality Control for Labeling"
39. "Disposal of Livestock Carcasses and Parts Condemned for Biological Residues"
40. "Control of added Substances and Labeling Requirements for Turkey Ham Products"
41. "Additional Methods for Destroying Trichinae"
42. "Ante-Mortem Inspection of Disabled Animals and Other Animals Unable to Move on Transport Vehicles"
43. "Preventing Cross-Contamination of Meat Products Heat-Processed to 130 Degrees F. or Higher and Poultry Products Processed to 155 Degrees F. or Higher by Other Products not Similarly Heat Processed"
44. "Streamlined Inspection System—Cattle and Staffing Standards," and
45. "Policy for Differentiating Between Calves and Adult Cattle"

## FDA Announces Receipt of Animal Feed Additive Petition, Withdrawal of Seafood Processing Solution Petition

FDA announced Nov. 20 that Milwhite, Inc. filed a petition proposing to amend Part 573, Food Additives Permitted in Feed and Drinking Water of Animals, to provide for the safe use of hydrated sodium calcium aluminosilicate as a binder for aflatoxins in feeds.

The potential environmental impact of the action is being reviewed, FDA said, adding that comments on the petitioner's environmental assessment are due by Jan. 21, 1997.

In a Nov. 22 notice, FDA announced the withdrawal, without prejudice to a future filing, of a petition to amend Part 173, Secondary Direct Food Additives Permitted in Food for Human Consumption, to provide for the safe use of acidified sodium chlorite solutions in processing water and ice which directly contact seafood such as finfish, shellfish and crustaceans for the control of naturally occurring spoilage microorganisms to increase shelf life and to enhance seafood product freshness.

Bio-Cide International, Inc. had petitioned the agency for the regulation, FDA announced May 9.

### FSIS to Permit Use of Corn, Glucose Syrups as Meat Product Flavoring Agents

USDA's Food Safety and Inspection Service Nov. 19 published a direct final rule amending §318.7, approval of substances for use in the preparation of products, to permit the use of corn syrup, corn syrup solids and glucose syrup as flavoring agents in meat products "at an amount sufficient for that purpose." Unless it receives any adverse written comments by Dec. 19, the rule will take effect Jan. 21, 1997, the agency said.

Federal meat inspection regulations currently permit the use of corn syrup solids, corn syrup and glucose syrup as flavoring agents in sausage, hamburger, meat loaf, luncheon meat, chopped or pressed ham at a level of 2.0%, individually or collectively, calculated on a dry basis, FSIS said. Poultry inspection regulations permit the use of these syrup materials as flavoring agents at an amount sufficient for that purpose, and FDA permits the use of corn syrup in food with no limitation other than current good manufacturing practice, FSIS noted.

### AMS Submits Egg, Egg Product Information Requirements to OMB

USDA's Agricultural Marketing Service published requirements Nov. 22 for regulations pertaining to the inspection of eggs and egg products. The information is collected to register shell egg handlers and hatcheries, request importation of shell eggs and egg products into the U.S., and to report and document findings during surveillance inspections of shell egg handlers and hatcheries.

### FDA Clears Biocide for Use in Manufacture of Food-Contact Rubber Articles

In a final rule issued Nov. 29, the Food and Drug Administration amended §177.2600, rubber articles intended for repeated use, to provide for the safe use of 1,2-benzisothiazolin-3-one (CAS Reg. No. 2634-33-5) as a biocide in uncured liquid rubber latex not to exceed 0.02% by weight of the latex solids, where the total of all items listed does not exceed 5% of the rubber product, for use in the manufacture of rubber articles intended for repeated use in contact with food. Reichhold Chemical, Inc. filed a petition for the regulation, FDA announced Feb. 8 (See FOOD CHEMICAL NEWS, Feb. 12, Page 20).

FDA reviewed the safety of the additive itself as well as that of the chemical impurities that may be present in the additive resulting from the manufacturing process. The agency said that although the additive itself has not been shown to cause cancer, it has been found to contain "minute amounts" of carcinogenic polychlorinated dibenzo-*p*-dioxins and dibenzofurans as residual impurities in 1,2-benzisothiazolin-3-one. These are "commonly found as contaminants in chemical products, including food additives," FDA added. Accord-

ing to FDA, the actual lifetime average individual exposure to polychlorinated dibenzo-*p*-dioxins and dibenzo-furans is expected to be "substantially less" than the estimated worst case exposure. The agency concluded, therefore, that the calculated upper-bound limits of risk of cancer ( $5.9 \times 10^{-10}$ ) from the proposed use of the additive would be "less," resulting in a reasonable certainty that "no harm" from exposure would result.

### Nuflor Patent Extension Regulatory Review Period Determined

FDA issued a notice Nov. 26 announcing the agency's determination of the regulatory review period for a patent extension for the animal drug product Nuflor.

Under the Drug Price Competition and Patent Term Restoration Act of 1984 and the Generic Animal Drug and Patent Term Restoration Act, a patent may be extended for up to five years as long as the patented item is subject to an FDA regulatory review prior to marketing, the agency said. This regulatory review period consists of a testing and approval phase.

FDA said Nuflor (florfenicol) was approved May 31 for marketing to treat bovine respiratory disease associated with *Pasteurella haemolytica*, *P. multocida* and *Haemophilus somnus*. The agency has determined the product's regulatory review period to be 4,209 days, a number derived from:

- the Nov. 23, 1984 date on which the investigational new animal drug application became effective;

- the May 28, 1996 date on which the new animal drug application was initially submitted, and
- the May 31, 1996 approval date.

Anyone with knowledge that any of these dates is incorrect should notify FDA on or before Jan. 27, 1997.

# New Members

## CANADA

**Marc Caillé**  
Pellemon Inc.  
Montréal, Québec

**Phil E. Dubois**  
Pride in Personnel Inc.  
North York, Ontario

**Glen Hudgin**  
Hastings & Prince Edward Cos.  
Health Unit,  
Belleville, Ontario

**Donald E. Lacey**  
Pepsi-Cola Canada Beverages  
Toronto, Ontario

## GERMANY

**Mr. Dangendorf**  
Hygiene-Institut, Bonn

## JAPAN

**Kaori Seo**  
Tokachi Federation of Agriculture  
Cooperatives, Obihiro, Hokkaido

## KOREA

**Seung-Shi Ham**  
Kangwon National University  
Chunchon, Kangwondo

## TAIWAN

**Jin-Jia Fan**  
Chia Nan College of Pharmacy  
and Science, Tainan

## UNITED STATES

### ARIZONA

**Brock Harlin**  
Arizona Dept. of Health Services  
Phoenix

### CALIFORNIA

**Peter Esko**  
HCDEH, Eureka

**Greg Stanton**  
Carl Karcher Enterprises  
Shingle Springs

### CONNECTICUT

**Martin J. Dempsey**  
Country Home Bakers  
Bridgeport

**Veronika Di Meo**  
New Haven Health Dept., Hamden

### FLORIDA

**Randy Griner**  
Colorado Boxed Beef Cord  
Auburndale

**Rob E. Ludicke**  
Micro-Ambient, Pompano Beach

### ILLINOIS

**Marlita Burford**  
Quaker Oaks, Barrington

**Armando Melendez**  
Entenmann's Inc., North Lake

**Tsz-Ching J. Yuan**  
American Air Liquide  
Countryside

### INDIANA

**Robert N. Steele**  
Indianapolis Fruit Co., Inc.  
Indianapolis

### KANSAS

**Agnes Olal**  
Tony's Pizza Service, Salina

### MICHIGAN

**Jon Lauer**  
MI Dept. Ag-Dairy Division  
Lansing

### MINNESOTA

**Jean E. Anderson**  
The Pillsbury Co., Minneapolis

**Gene Danilenko**  
Ecolab, Inc., St. Paul

### MISSISSIPPI

**R. J. Prescott**  
Mississippi State Department  
of Health, Jackson

### NEW YORK

**Ellwood Bearss**  
Rich Products Corp., Buffalo

### NORTH CAROLINA

**Paris Renae**  
Leggett, Raleigh

### OHIO

**Rick Coonce**  
Swagelok, Hudson

**Tim Lawlis**  
Bob Evans Farms, Columbus



## PENNSYLVANIA

**Anna Johnson-Entsuh**  
Montgomery Co. Health Dept.  
Norristown

**Tracy Mosteller**  
Germantown Mfg. Co., Broomall

**Joseph Strug**  
Dalare Assoc. Inc., Philadelphia

## SOUTH CAROLINA

**M. H. Bainbridge**  
W R Grace & Co., Duncan

## TENNESSEE

**Rodney J. Myrick**  
Pictsweet Frozen Foods Inc., Bells

## TEXAS

**Alison Bevans**  
Garland Health Dept., Garland

## WASHINGTON

**Shelley Lankford**  
State of Washington Dept.  
of Health Food Lab  
Seattle

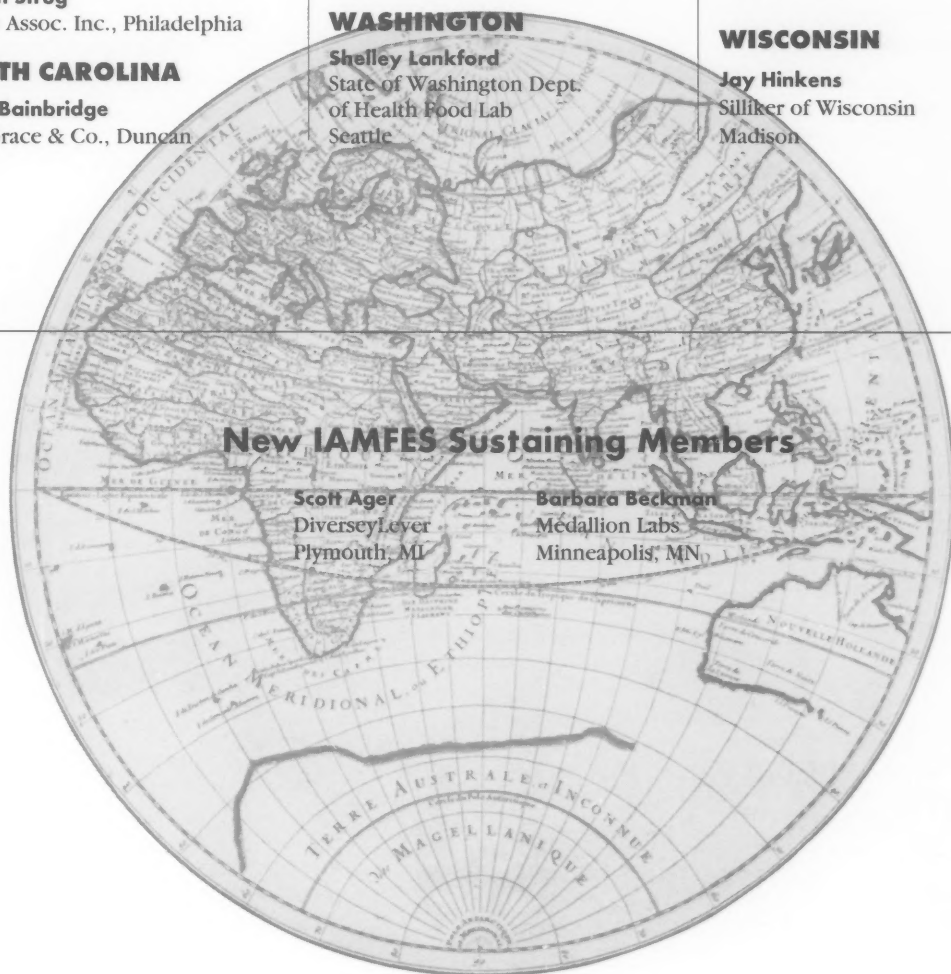
**Mark Upkike**  
Vancouver

## WEST VIRGINIA

**Rajesh Nayak**  
West Virginia University  
Morgantown

## WISCONSIN

**Jay Hinkens**  
Silliker of Wisconsin  
Madison



### New IAMFES Sustaining Members

**Scott Ager**  
DiverseyLever  
Plymouth, MI

**Barbara Beckman**  
Medallion Labs  
Minneapolis, MN

# UpDates

## **DiverseyLever. A New Name...A New World Force in Plant Cleaning and Sanitation**

**D**iverseyLever, a new Unilever Business Group, is a merger of equals in the plant cleaning and sanitation industry. As such, this newly formed international supplier offers global resources at the local level.

DiverseyLever is committed to providing sustained, high-quality products and services, as well as the innovation, support, and environmental responsibility that customers demand in a sanitation provider. The company's aim is to exceed all customer expectations, by developing and marketing the best in-plant cleaning and hygiene systems in the world. This level of support to its customers also includes sanitation audits, user training, and even software which helps users to schedule operations for the best results at the lowest possible cost.

DiverseyLever customers range across many industries such as dairies, breweries and micro-breweries, food processors, beverage processing, meat and poultry processing and further processing. As the new world force in in-plant cleaning and sanitation, DiverseyLever brings the markets it serves all the benefits of the Unilever commitment to high quality standards, stability and progressive management.

## **Martha Y. Villasenor Joins Fristam Pumps**

**F**ristam Pumps, Inc. is pleased to announce Martha Y. Villasenor has joined the company as Applications Engineer. Bilingual, Martha's

responsibilities include providing technical guidance and customer support to Spanish and English speaking customers.

Martha holds a Bachelor of Chemical Engineering degree from the University of Chihuahua-Mexico and a Master of Science degree in Agricultural Economics from New Mexico State University.

Fristam Pumps, Inc. is a manufacturer of sanitary centrifugal and positive displacement pumps sold to the food, dairy, beverage, and pharmaceutical/biotech industries.

## **Manfred Kroger Named Fellow by Professional Society**

**M**anfred Kroger, professor of food science, was named a Fellow of the Institute of Food Technologists at the group's annual meeting, held in June in New Orleans. Kroger was cited as "a master teacher at Penn State, a researcher with lifelong devotion to fermented milk products and an outstanding science communicator for the Institute of Food Technologists."

He has been a science communicator for the institute since 1980 and has served as associate scientific editor of the *Journal of Food Science* since 1990. Kroger has been active on numerous committees for the institute and is a charter member of the Food Laws and Regulations Division and the Dairy Foods Division. He is the secretary-treasurer of the Dairy Foods Division.

Kroger, who joined the Penn State faculty in 1963, has co-authored five books and dozens of scientific publications. His research

interests include pesticide residues in food and automation procedures to determine fat and protein content of milk and food products. He also is an expert on fermented milk products, particularly yogurt and kefir, a fermented beverage made from cow's milk.

## **Two Join A & B**

**A** & B Process Systems Corp. has added a mechanical engineer and a director of information resources. Arvind M. Shah, a mechanical engineer, has a comprehensive knowledge of design and fabrication of pressure vessels, with a strong background in ASME and TEMA code calculations. His hiring will expand the fabrication capabilities of SANIFAB®, the equipment fabrication division of A & B.

A native of India, Shah holds bachelor's and master's degrees in Mechanical Engineering from M.S. University of Baroda in Baroda, Gujarat, India. Shah will be responsible for engineering, design and estimation of coded and noncoded vessels. He will also administer and direct the corporate certification process for the fabrication of ASME coded tanks and vessels.

Dale H. Vilbaum serves as Director of Information Resources at A & B. He comes to the company from Georgia Pacific's Corporate Data Center in Port Edwards, WI, where he was a technical analyst/Local Area Network (LAN) administrator. In addition, Vilbaum has held other positions as a data communications specialist and communications analyst. He holds a bachelor's degree in Business Administration from Cardinal Stritch College, Milwaukee. Vilbaum will administrate the

direction and maintenance of A & B's corporate information systems, including data and voice communications for the corporate offices in Stratford and Milwaukee, WI, as well as both manufacturing facilities in Stratford.

### **Osmonics Appoints Patrick Kelly General Manager of Phoenix Operations**

**D**ean Spatz, Chairman and CEO of Osmonics, Inc. (NYSE/OSM) announces the appointment of Patrick C. Kelly to the position of General Manager and Chief Operating Officer of the Phoenix, Arizona, operations, manufacturing site of OREC Ozone Systems, Lakewood Instruments and the Company's inorganic membrane products.

Kelly most recently served as vice-president of manufacturing for an Ohio-based manufacturer of gears and transmissions for the

aerospace market. He holds a bachelor's degree in mechanical engineering from Louisiana Tech University and an MBA from the University of Phoenix.

Osmonics is a manufacturer and worldwide marketer of high technology water purification and fluid filtration, fluid separation, and fluid transfer equipment, as well as the replaceable components used in purification, filtration, and separation equipment.

### **Milan Peters Named Western Region U.S. Sales Manager and Terry L. Chapman Named Eastern Regional Sales Manager**

**S**parta Brush Company, Division of Carlisle Companies of Syracuse, NY has announced the appointment of Milan Peters to Western Regional Sales Manager

with overall sales responsibilities for all states west of the Mississippi River.

Peters joined Sparta in 1983 and most recently has been Eastern Regional Sales Manager.

Dan Nalipinski, Director of Sales & Marketing for Sparta Brush Company has announced the appointment of Terry L. Chapman as Eastern Regional Sales Manager. Chapman, based in Atlanta, Georgia has responsibility for overall Sparta Brush sales in all states east of the Mississippi River.

Prior to joining Sparta, Chapman spent 11 years with Daskocil Specialty Brands, most recently as National Deli Manager. Prior to Daskocil, Chapman was with Armour Food Company as a Direct Sales Manager.

Sparta Brush is a manufacturer of specialty brushes used in the food processing, food service, dairy, janitorial and recreational marine industries.

### **3-A Sanitary Standards**

A complete set of 3-A Dairy & Egg Standards with Five-Year Update Service Available from IAMFES

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## John Farquharson, FMP, President of the Industry Council on Food Safety Regarding Center for Science in the Public Interest Food Safety Report

**T**he foodservice industry takes food safety seriously and is committed to training foodservice workers in safe food handling and preparation. For more than 20 years, the National Restaurant Association's SERVSAFE® Serving Safe Food has certified nearly 700,000 managers and trained millions of foodservice workers. SERVSAFE meets or exceeds the standards of more than 95 percent of the U.S. regulatory jurisdictions that require training or certification.

In 1993, the National Restaurant Association and its Educational Foundation formed the Industry Council on Food Safety, a coalition of foodservice operators, manufacturers and suppliers, and allied associations, committed to and supporting food safety education. To be eligible to participate, foodservice operations must have at least one manager who is trained and certified in food safety. Participating establishments display Industry Council decals on their doors to demonstrate to their customers their commitment to serving safe food. To date, more than 15,000 restaurants and foodservice establishments are enrolled in the Industry Council, and thousands more already meet the eligibility requirements. The Council sponsors National Food Safety Education Month each September to focus attention on safe food handling and preparation.

The Industry Council on Food Safety and the Center for Science in the Public Interest (CSPI) are working toward the same goal—to heighten awareness of the importance of food safety education. The foodservice industry has already undertaken most of the initiatives



# NEWS

recommended in CSPI's report, particularly in education and recognition of industry efforts. Regardless of state or local regulations or adoption of FDA guidelines, the foodservice industry has set and maintained standards that meet or exceed those recommended in the FDA Model Code. We are committed to safe food practices that protect our customers.

## The Educational Foundation Helps Make New Technology Usable

**T**he foodservice industry is constantly faced with the challenge of spending money wisely on the latest, most usable computer technology available that will help streamline operations without breaking the bank. The Educational Foundation of the National Restaurant Association, in an effort to help operators use the new technology effectively at the unit level, has developed two new training tools designed to put the new technology to good use: the *Serving Safe Food CD ROM* and the *SERVSAFE Interactive Employee Guide*.

The *CD-ROM* is a turnkey tool that covers all critical areas of food safety. Using narration, graphics and full-motion video, this tool

provides an interactive learning experience for all foodservice employees.

In addition to the *CD-ROM*, The Foundation has also developed an *Interactive Employee Guide*, a computer-based tool that helps employees learn the necessary elements of food safety. Featuring the same information as The Foundation's written *Employee Guide*, the computer-based version comes on three 3.5-inch floppy disks and includes assessment software that managers can use to track employee training information and a final quiz with immediate feedback.

For more information on these new computer training tools and how they can help make the newest computer technology usable, call (800) 765-2122.

## Animal Wastes a Growing Environmental Issue

**T**he estimated usable amount of manure produced by confined animals in the United States is more than 61 million tons per year. According to a recent report by the Council for Agricultural Science and Technology (CAST) this figure is increasing. As animal concentration and farm proximity to residential areas also increase, concerns will grow about the management of such waste.

"If it's properly distributed and used on productive cropland, manure could decrease commercial fertilizer costs significantly and help industry grow in many parts of the country," states Dr. Alan L. Sutton of the Purdue University Department of Animal Science, and co-chair of the CAST task force report *Integrated Animal Waste Management*. "Total potential manure fertilizer value from all livestock and poultry production nationally would be around \$3.4 billion per year."

On a nationwide basis, an average of 15% of nitrogen, an essential plant nutrient usually

purchased as commercial fertilizer, could be replaced through the use of animal manure. Approximately 42% of crop phosphorus also could be supplied in this way.

#### Ground Water Concerns

The primary ground water pollutant associated with livestock manure management is nitrate-nitrogen. But this will not reach ground water if earthen feedlots are managed properly. A complete seal beneath the feedlot results from the excretion of salts in manure and from compaction by livestock hooves.

"If, however, the feedlot is abandoned or grossly understocked," warns report co-chair Dr. Jim F. Power of the University of Nebraska USDA-ARS, "Nitrate production and leaching to ground water can occur. To prevent such leaching from lagoons and pits, many states now require impermeable structures incorporating concrete, plastic liners, bentonite sealers, or other sources of clay."

#### Animal Feed Concerns

The feeding of animal manures as a source of low-cost nutrients is not a new practice. Early farmers allowed swine access to cattleyards. But the FDA has challenged scientists to demonstrate both the safety of feeding animals processed manures and the safety of the food product derived from these animals.

It has been shown that processing methods like heat, acid treatment, fermentation, and chemical additions can eliminate from feedstuffs derived from animal excreta all the biological agents of concern. Antibiotics pose no health hazards to animals consuming the processed excreta or to humans consuming the products of animals subject to a 15-day withdrawal. And pesticides do not accumulate in manure.

To ensure safe feeding of processed manures, feeding management guidelines have been developed. In the United States, the only documented incidence of a health hazard to animals fed processed manures occurred in

sheep, which are especially sensitive to copper in the diet. No hazard to humans has been recorded.

#### Regulatory and Research Recommendations

According to the CAST report, water-quality research, particularly that focusing on agriculture's effect on watersheds, and air-quality (odor) research both are critical. But manure management research funding from all sectors has decreased significantly since the early 1970s.

The CAST report lists six research areas likely to yield positive environmental benefits. These areas are (1) modification of animal diets, (2) development or improvement of manure treatment processes, (3) nutrient control and utilization of manures in soil-cropping systems, (4) reduction and control of odor, (5) economic analyses of manure systems alternatives, and (6) development of and economic incentives for new technologies using processed manures and further processed products.

## FDA Publishes Final Rule on Extralabel Drug Use in Animals

**I**n the November 7, 1996 *Federal Register*, FDA published a final rule to allow veterinarians to prescribe extralabel uses of certain approved animal drugs and approved human drugs for animals under certain conditions. This action implements the Animal Drug Use Clarification Act of 1994 (AMDUCA). This regulation provides veterinarians with greater flexibility in the use of approved drugs in animals. These regulations put AMDUCA into effect on December 9, 1996.

The notice of proposed rulemaking published in the *Federal Register* on May 17, 1996. FDA received and considered approximately 110 comments in preparing the final rule.

Prior to the enactment of AMDUCA, the Federal Food, Drug, and Cosmetic Act (the Act) required users of approved new animal drug products to follow the exact directions on the labeling of the drug. This extralabel use restriction precluded use of an approved drug in species or for indications (disease or other conditions) not listed in the labeling, use of an approved drug at dosage levels higher than those stated on the label, and other extralabel purposes. In addition, the Act did not provide for the use of human drugs for treating animals.

Because of AMDUCA, the Federal Food, Drug, and Cosmetic Act will now permit veterinarians, like physicians, to prescribe extralabel uses of approved drugs for their patients. Although certain restrictions have been placed on veterinarians prescribing animal and human drugs in an extralabel manner, these restrictions generally apply only to the use of drugs extralabelly in food-producing animals. The key constraints are that any extralabel use must not result in violative residues in food-producing animals, the use must be by or on the order of a veterinarian within the context of a veterinarian-client-patient relationship, and the use must be in conformance with the new regulations.

AMDUCA includes a number of provisions that permit the Agency to restrict extralabel use in certain circumstances. For example, if there is a finding that there is a reasonable probability that an extralabel use may present a risk to public health from drug residues in animal-derived food, the Agency may establish a safe level for a residue for such extralabel use by regulation or order and may require the development of analytical methods for residue detection. If, after affording an opportunity for public comment, FDA finds that an extralabel animal drug use presents a risk to public health or that no analytical method has been developed and submitted, the Agency may prohibit such extralabel use.

The following prohibitions currently apply to the uses of drugs in food-producing animals: Chloramphenicol, Clenbuterol, Diethylstilbestrol (DES), Dimetridazole, Iprnidazole, other nitroimidazoles, Furazolidone (except for approved topical use), Nitrofurazone (except for approved topical use), Sulfonamide drugs in lactating dairy cattle (except approved use of sulfadimethoxine, sulfabromomethazine and sulfaethoxyypyridazine).

Neither AMDUCA nor the implementing regulations are intended to lessen the responsibility of the manufacturer, the veterinarian, or the food producer with regard to drug residues. Under AMDUCA, any amount of residue resulting from an extralabel use would constitute a violation of the Act if a safe level or tolerance has not been established.

Title 21 of the *Code of Federal Regulations* is now amended to add a new part 530, titled "Extralabel Drug Use in Animals." A link to the text of the rule is available for review or downloading on CVM's Internet Website at <http://www.cvm.fda.gov/>. The document as it appears in the *Federal Register* is also available in PDF format from the U.S. Government Printing Office's Access search screen at: [http://www.access.gpo.gov/su\\_docs/aces/aces140.html](http://www.access.gpo.gov/su_docs/aces/aces140.html) (Search on extralabel).

Additional information is available from Richard L. Arkin, Regulatory Counsel, Center for Veterinary Medicine (HFV-238), Food and Drug Administration, 7500 Standish Place, Rockville, MD 20855, (301) 594-1737.

## Study Finds Safest Way to Zap a Burger

**H**ow well do *E. coli* bacteria survive microwave cooking? After conducting the most exhaustive study of this question, University of Minnesota food safety

expert Ed Zottola says, "Our results clearly show that the power of the microwave oven and the configuration of the heating pattern markedly affect the thermal destruction properties." Zottola offers this advice to consumers: For safety's sake, "base your cooking on the time it takes in the coldest spot in your oven."

This advice may seem backward. Wouldn't the hottest part of the microwave oven get the cooking done quickly? The problem is that the highly irregular heating patterns of most microwave ovens can leave part of the food undercooked. Research assistant Sophia Czechowicz explains that the microwave heating process is different from conventional oven heating. Microwave heating is somewhat uncontrollable because there isn't a constant temperature—the power pulses on and off—and the heat distribution is very uneven, extremely so in some brands of ovens. It's better to cook slowly and safely.

Zottola and Czechowicz cooked and analyzed over 1,000 hamburgers in their laboratory. The food scientists began by determining how much microwave energy it takes to destroy *E. coli*, which can cause painful intestinal disorders. They inoculated ground beef with the pathogen, prepared uniform patties, cooked them and looked for surviving organisms. The search was exhaustive, with samples of each cooked burger incubated for 4 days, then analyzed again for bacteria.

Then they compared different brands of microwave ovens to see how effective different heating patterns were in destroying *E. coli*. In full-size ovens with power ratings over 800 watts, quarter-pound burgers were free of the bacteria after 2.5 minutes on high power. In the ovens with power ratings less than 800 watts, longer cooking times were needed. An

industrial oven was also tested and took only one minute to destroy the bacteria.

The researchers used a unique but simple method to find the cold spot in each oven. They covered the entire bottom of the oven with thermal wax paper and cooked it on high power for five minutes. Since the paper is heat sensitive, hot spots turn the paper dark and the cold areas leave the paper white. The result is a map of hot and cold areas. (Caution: If you try this in your own microwave, do not heat the wax paper for longer than five minutes or it may catch fire.)

During the burger tests the temperature was monitored by probes placed in the coolest locations within each patty. And, as anyone who has watched food being zapped in a microwave knows, the edges heat up first. The study showed that the center, top surface of the hamburger was the last area to cook. To speed up the cooking and eliminate the center cool spot, the researchers developed and tested a burger with a hole in the middle. "The donut-shaped burger reduced cooking times by 15 to 20 percent," Zottola notes.

From a safety standpoint, "what you want to do is cook in the cold spot of your oven," Zottola summarizes. It will take a little longer, but it ensures that all parts of the food will be thoroughly and safely cooked. In addition to being useful to individual consumers, the methods can be adapted by the fast food industry to improve preparation of hamburgers.

Funding for this University of Minnesota, Agricultural Experiment Station study was provided by the Minnesota Beef Council. "Food safety is the responsibility of everyone in the food chain, from farm to fork," says council executive director Ron Eustice. "Our goal is to eliminate any food pathogen in the food supply, and this research is a major step in that effort."

## VICAM Tests — Salmonella Screen/SE Verify and Salmonella Screen/Salmonella Verify — Both Receive AOAC-Research Institute Approval

**T**he AOAC Research Institute has granted "Performance Tested" status and awarded Certificate No. 961001 to VICAM's Salmonella Screen/SE Verify on October 22, 1996. VICAM's Salmonella Screen/Salmonella Verify received its Certificate No. 961002 attesting to its "Performance Tested" status shortly thereafter. The Screen module captures *Salmonella*, while the Verify module confirms the presence or absence of *Salmonella*. SE Verify confirms the absence of *Salmonella enteritidis* while Salmonella Verify confirms the presence or absence of *Salmonella* species.

The performance of Salmonella Screen/SE Verify and Salmonella Screen/Salmonella Verify were evaluated in a comparison study using the USDA-FSIS method for isolation and identification of *Salmonella enteritidis* and *Salmonella* species, respectively. In addition, the Salmonella Screen/Salmonella Verify test kit was evaluated under the terms of the United States Department of Agriculture Food Safety Inspection Services (USDA-FSIS) memorandum of understanding and it was found to meet USDA-FSIS reference method performance standards. A variety of food types including beef, pork, sausage, chicken, eggs, and animal feeds were inoculated with either *Salmonella* or SE. Samples were analyzed by either Salmonella Screen/Salmonella Verify, Salmonella Screen/SE Verify, or the USDA-FSIS methods. The Salmonella Screen/SE Verify and Salmonella Screen/Salmonella Verify tests were

shown to be as effective in detecting *Salmonella* and *Salmonella enteritidis* as the USDA-FSIS method. The performance of the test kits were verified at independent testing laboratories under the AOAC Research Institute's *Performance Tested* Program.

## Reduced PPE for Gramoxone Extra Label

**Z**eneca Ag Products announces a reduction in the personal protective equipment (PPE) requirements for Gramoxone Extra non-selective herbicide.\* Gramoxone Extra is a leading herbicide used throughout the U. S. to burndown annual weeds in no-till, reduced till and conventional till fields. It is used in a wide variety of crops, including row crops, orchards, fruits and vegetables.

"EPA approved these changes after thorough testing and review of the data. We're pleased with the reduced PPE requirements because they make Gramoxone more user-friendly," says George Glatz, nonselective herbicides market lead at Zeneca Ag Products. "While changes in a product's label often mean added restrictions, these reductions in requirements are good news for those who handle the products. Applicators can now mix and apply Gramoxone and easily comply with worker protection standards."

The new standards require applicators using the herbicide to wear long-sleeved shirts, long pants, waterproof gloves, and shoes and socks. Applicators are no longer required to wear protective eyewear or chemical-resistant headgear.

Mixers and loaders of the herbicides should wear a long-sleeved shirt, long pants, waterproof gloves, a chemical-resistant apron, a face shield, and shoes and socks. The new requirements

specify that they are no longer required to wear protective eyewear, chemical-resistant headgear for overhead exposure, or mist-filtering respirators.

These changes have been made following extensive testing and do not offer any undue risk to the user. While restrictions on Gramoxone are reduced, it is important to follow complete label directions and use safe practices to prevent exposure.

## New International Paper Bleached Board Team Meets Initial Manufacturing and Quality Objectives

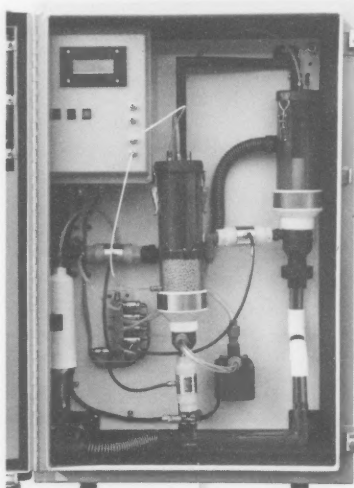
**T**he new bleached board division manufacturing, sales, marketing and technology teams created following International Paper's recent merger with Federal Paper Board have increased productivity within the division's mill system by 160 tons per day.

International Paper, which has five bleached board mills, created the new "task teams," comprised of International Paper and former Federal employees, as a way to draw upon the strengths of both organizations to make more product available to customers and help ensure consistent quality, according to Tom Gestrich, vice president/bleached board.

The division's products include Everest® and Starcote™ SBS board from mills in Arkansas, Mississippi, North Carolina, Georgia and Texas and recycled board produced in Connecticut.

International Paper, headquartered in Purchase, N.Y., is a worldwide producer of a broad range of paper and forest products. The company is a major supplier of printing and writing papers, paperboard and packaging products and wood products; it also operates specialty products businesses and distribution systems.

# IndustryProducts



Columbus Instruments, Inc.

## On-Line Respirometer (On-Line BOD/Toxicity Monitor)

Columbus Instruments' new On-Line Respirometer utilizes a patented principle of measuring oxygen consumption in gaseous stage in the head space of the bio reactor instead of immersed DO (dissolved oxygen) probes utilized in most other designs. Although the advantages of measuring head space gas exchanges are numerous, the most important advantage is the separation of the oxygen sensor from the aggressive media of sludge or wastewater and, therefore, avoiding the sensor's damage or contamination.

Another important advantage is that besides measuring oxygen consumption, there is the possibility of measuring additional gases

evolved from the wastewater or sludge such as  $\text{CO}_2$  and  $\text{H}_2\text{S}$ . The principle of Columbus Instruments' Respirometer is based on measuring the respiration of bacteria culture in the form of the fixed film attached to ceramic granules. This bacterial culture is alternatively exposed to clean water to measure background respiration and to wastewater to measure the increase of oxygen consumption due to available nutrients.

The difference in respiration is presented as value contributed to the available organic nutrients in the wastewater (BOD). Columbus Instruments' Respirometer can also be programmed to periodically measure oxygen consumption of the bioreactor exposed to the standard solution of glucose or glutamic acid for testing biotoxicity. The wide measuring range from 0.1 to 200,000  $\text{mg O}_2/\text{l}$  far exceeds sensitivity and range of any similar product. It allows the measurement of BOD of water from relatively clean river or stream as well as active sludge. Reactor size is 3 liters but can easily be changed to 4 or 10 liters. On-Line Respirometer is controlled by its own microprocessor and provides results on numerical display. Historical data for measurements from the previous 30 days is also stored and can be recalled on demand.

All valves controlling liquids are non-corrosive, non-occluding "pinch tube" type and are operated by the pressure of the water line therefore there is no need for compressed air line. Up to four

sampling sides in the plant can be measured sequentially with one Columbus Instruments' Respirometer. The entire equipment is housed in a weatherproof NEMA 12 enclosure (H36", W24", D12") (914 mm  $\times$  609 mm  $\times$  305 mm) which can be attached to a movable stand. RS-485 (or RS-232) interface and graphic software is available to communicate and transfer data to a remote computer located up to 3000 feet (1000 m) away.

Columbus Instruments, Columbus, OH

Reader Service No. 324

## New Food Safety Operating System Reduces Risk and Cost of Foodborne Illness

A new food safety system which will enable foodservice operators to minimize their risk of foodborne illness while enhancing food quality and reducing waste has just been published by Food Safety Institute, LLC, (FSi) according to Martin D. Mick, President.

*Food Safety Management & Compliance* was written by Mick and James L. Budd, co-founders of FSi and two of the nation's leading experts on foodservice management and food safety regulation. The system offers all of the necessary information and tools needed to reduce the risk of foodborne illness and to comply with FDA model food code standards. The 450-page manual with accompanying software provides a practical simplification of regulatory stan-

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dards now being effected nationwide. The system includes software to facilitate rapid customization of a written food safety plan by each foodservice establishment.

The new *Food Safety Management & Compliance* manual covers every phase of the subject, including an overview of food safety issues, management and personnel, food handling, equipment, utensils and linens, water, plumbing and waste, physical facilities, poisonous or toxic materials, compliance and enforcement, operational policy, professional hygiene, handling complaints, the relevance of Hazard Analysis Critical Control Point, the "person in charge," foodborne illness, and future regulation.

"By following the *Food Safety Management & Compliance* system you will realize additional benefits to your business," Budd stated. "Through use of a sound food safety program, food quality, operational issues – and even profitability – will improve."

The manual comes in loose-leaf form with a software disk which replicates chapters 2-8 with accompanying checklists and forms. FSI will provide a one-year upgrade of the software program and manual pages. In addition, purchasers who send in their local food code will receive an appendix adapting FSM&C to meet or exceed local regulations. The manual can also be customized for food service enterprises with specific policy needs.

Food Safety Institute, Madison, NJ

Reader Service No. 325

## New Streamline UV Disinfection for Food/Beverage Processing

Now available from Aquionics, the new Streamline series low pressure UV disinfection system for low flow systems destroys contami-

nating bacteria, mold and viruses in water used for food/beverage processing applications.

The Streamline unit treats 5 to 50 gallons per minute without the use of heat or chemicals. Product taste, smell and pH values are not affected. The compact unit features easy-to-read controls enclosed in the system's endcap so there is no bulky control cabinet to take up valuable space.

The Streamline unit is easily retrofitted into existing pipework and requires minimal maintenance. An optional wiper protects the lamp sleeves from particle build-up; customers may also select a UV-sensor or alarm signal for remote monitoring.

Aquionics, Erlanger, KY

Reader Service No. 326



Pall Corporation

## The New Palltronic™ TruFlow Filter Integrity Test System Now Features Workstation Keyboard Protector

The Palltronic™ TruFlow Filter Integrity Test System's standard PC workstation now features a new custom-designed flexible keyboard protector. This protective shield, which is now offered as a standard

item included with the system, prevents potential damage from splashes with filter integrity test fluids, limits concerns when using the system in a moist environment and increases test location flexibility. Since the unique modular design of the Palltronic TruFlow system also enables the printing function to be done at a suitable distance from liquid splash hazards, the system can be operated with no liquid sensitive components exposed to the work area.

The Palltronic TruFlow system is a technological advance in filter integrity testing that provides a quick and accurate electronic method for integrity testing of sterilizing grade filters. Filter integrity testing time is greatly reduced and tests can typically be completed in 10 minutes or less without sacrificing accuracy or reliability.

Pall Corporation, Port Washington, NY

Reader Service No. 327

## Gelman Sciences Adds VacuCap® PF with Built-In Prefilter to Line of Innovative Bottle-Top Filters

Now you can maximize throughput of hard-to-filter solutions with the new VacuCap PF disposable bottle-top filter with built-in prefilter. This innovative medium-volume filter provides fast, easy vacuum filtration of 100 mL to 5 liters of aqueous solutions.

VacuCap devices are designed to ease the tedious process of media preparation in cell culture applications. The devices draw directly from a mixing reservoir and filter directly into the desired container, protecting against contamination from transfer steps by eliminating the need to con-

stantly refill an upper fluid reservoir. An automatic shut-off feature protects the vacuum source and eliminates loss of solution.

VacuCap and VacuCap PF filters are available in 60 and 90 mm diameters. The PF version has a built-in prefilter of patented, fast flow rate 0.8  $\mu$ m Supor<sup>®</sup> membrane layered over the 0.2  $\mu$ m final layer. The VacuCap product line also is available nuclease free for added assurance when filtering solutions used in DNA/RNA preparation and analysis.

Gelman Sciences offers a wide variety of Supor membrane filters that makes scaling up from the lab through process filtration easy. Our comprehensive Supor product line includes membrane discs, Acro-disc<sup>®</sup>, syringe filters, VacuCap bottle-top filters, the new Spiral-Cap<sup>™</sup> capsule for 5 to 20 liters, capsules, mini-cartridges, and cartridges.

Gelman Sciences, Ann Arbor, MI

Reader Service No. 328

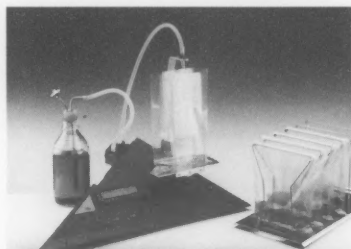
## Industrial Laboratory Services

Great Lakes Scientific is an independent laboratory offering confidential testing services for foods, water, and environmental samples and is a USDA Accredited (Chemistry) Laboratory. Microbiological analyses include *Listeria*, *Salmonella*, Staph., *E. coli*, *E. coli* O157:H7, etc. Chemical analyses include fats, protein, sodium, nitrites, cholesterol, fatty acids, Vitamin A & D

analyses for all dairy products. Full Nutritional labeling analyses (NLEA) and USDA Label performed with package discounts available. Additional services include pesticide testing, shelf-life studies, and quality control programs. The necessary sampling materials such as swabs are provided at no charge. Great Lakes Scientific offers fast and reliable service at competitive prices.

Great Lakes Scientific, Inc.,  
Stevensville, MI

Reader Service No. 329



Micromation Inc.

## Automated Dilution System Processes Samples Four Times Faster

Using sample weight, desired dilution factor, and diluent flow rate, the Chronodilutor automatically prepares dilutions in 1/4th the time it would take using manual methods. The need to manually weigh precise amounts of sample into previously prepared dilution blanks is eliminated. Solid, semisolid, or liquid samples can be accurately weighed to the nearest 0.01 gram. The easy to use dilutor weighs the sample, calculates amounts, and delivers the diluent

into a sample bag holder. The sample bag holder allows for easy use with the Masticator homogenizer. A Filter Sterilization feature produces a sterile diluent on demand and eliminates presterilization of dilution blanks.

The system has a maximum sample weight capacity of 2400 g and a minimum weight of 0.5 g with dilution factors ranging from :2-1:1000. The entire dilution process entails placing the empty sample bag on the holder, depositing a sample of any weight in the bag, and moving diluent nozzle over the bag to start dilution. The average time to deliver 100 ml of sterile diluent is 5-6 seconds.

Micromation Inc., Monmouth Junction, NJ

Reader Service No. 330

## Expanding Check Sample Programs

Silliker Laboratories Group has expanded its existing check sample programs. Silliker now offers a complete (*Salmonella*, *Listeria*, *E. coli*, Yeast & Mold, etc.) and pathogen-free microbiological program as well as 8 industry-specific analytical chemistry programs. The programs can help you routinely assess the technical proficiency of your in-house lab and demonstrate it to others in a tangible way. For a free brochure detailing all our programs, or to subscribe, please call our Lab Products department at (708) 225-1435.

Silliker Laboratories Group,  
Inc., Homewood, IL

Reader Service No. 331

# BusinessExchange

## Services/Products

### COMPLETE LABORATORY SERVICES

Ingman Labs, Inc.  
2945 - 34th Avenue South  
Minneapolis, MN 55405  
612-724-0121

Reader Service No. 153



### Michelson Laboratories, Inc.

6280 Chalet Drive, Los Angeles, CA 90040  
Telephone: (310) 928-0553 / (714) 971-0673 / FAX (310) 927-6625

#### COMPLETE ANALYSIS SPECIALIZING IN:

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- Microbiological
- Sugar Profile
- Fatty Acid Profile
- Vitamin A & D
- Quality Assurance
- Consulting
- IMS-USPHS-FDA
- Antibiotic Analysis
- Approved 06143



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- Mass Spectrometry
- Gas Chromatography
- Atomic Absorption
- Spectrophotometry
- Spectrofluorometry
- Microscopy
- Inductively Coupled Plasma
- Optical & Direct Microscopic Cell Count
- ELISA Methodology

Also Offering: Milk calibration Samples for Infra-red Milk Analyzer and Electronic Somatic Cell Counter

Reader Service No. 163

### FDA DOCUMENTS

Inspection: sampling, evidence, procedures, sanitation, detention, tampering, recall...

Product inspection: dairy, pasta, cereals, spice, seafoods...

Action levels/tolerances: food defects/contaminants/additives, pesticides residues...

Science & Technology System

P: 916-372-2655; F: 916-372-2690

Reader Service No. 239

## Professional Opportunities

### The Advantage is Working at Star

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#### Manager of Food Safety & Sanitation

- Develop and administer the food safety and sanitation training program for managers and food handlers.
- Create and maintain a sanitation services program that meets the needs of the company.
- Knowledgeable in retail/food service preparation; HACCP application preferred.
- Develop and oversee the OSHA program training for bloodborne pathogens, hazard communication and personal protective equipment.
- Maintain liaison with national food safety and sanitation officials as well as industry peers.
- Bachelor's degree in sanitation, industrial hygiene, occupational health or a related field required.
- 5+ years' inspection/training experience in food safety or related field.
- Current or eligible for registration as a Registered Sanitarian or Environmental Health Specialist.
- Excellent oral/written communication skills.

Please send your resume with salary history to: **Star Markets Company, 625 Mount Auburn Street, Human Resources Dept. FSS, Cambridge, MA 02138. Fax: (617) 528-2379. E-mail your resume to: [starmkts@aol.com](mailto:starmkts@aol.com)** For an up-to-date job listing, call our **Job Line at (617) 528-3400.** Star is an equal opportunity employer.

## STAR MARKET

### Not a Member?

*Would you like to be?*

Becoming a member of IAMFES is easy! For more information on how to join, and the many benefits available to members, please contact:

Julie Cattanach, Membership Coordinator, IAMFES, 6200 Aurora Ave., Suite 200W, Des Moines, Iowa 50322-2863; telephone (515) 276-3344 or (800) 369-6337.

# BusinessExchange

## Professional Opportunities

**STATE OF MICHIGAN  
DEPARTMENT OF AGRICULTURE  
EMPLOYMENT OPPORTUNITY**

- POSITION:** Director, Food Division  
Michigan Department of agriculture  
(Classified as State Office Administrator 17)
- RESPONSIBILITIES:** Provide administrative direction for all division programs relating to food safety, inspection of food processing, food handling, and grocery store facilities; food service sanitation, motor fuels quality, weights and measures, and the enforcement of State of Michigan laws which regulate the industry.
- SALARY RANGE:** \$58,986.00 to \$85,503.00
- APPLICATION DEADLINE:** February 15, 1997
- MINIMUM QUALIFICATIONS:** Education: Possession of a bachelor's degree.
- Experience: Two years experience as a professional manager or equivalent experience, six months of which is in programs and services related to food quality, food service sanitation, motor fuels quality, or weights and measures.

**ALL APPLICANTS WILL BE REQUIRED TO TAKE AND PASS A STATE CIVIL SERVICE EXAMINATION.**

INTERESTED, QUALIFIED APPLICANTS MUST SUBMIT A RESUME NO LATER THAN FEBRUARY 15, 1997 TO:

Michigan Department of Agriculture  
Human Resources Division  
Attention: Karen Anderson  
P.O. Box 30017  
Lansing, MI 48909  
Telephone: (517) 373-9093  
Fax: (517) 373-4315

The Michigan Department of Agriculture is an Equal Employment Opportunity Affirmative Action Employer.

## ANNOUNCING!

In-Line Business Exchange Advertisements are now available in the Business Exchange Section of *Dairy, Food and Environmental Sanitation*.

**85¢** per word

Bold and capitalized words are charged as two words. Area code and phone number count as one word.

All in-line business exchange ads must be paid in advance. \$20.00 per ad minimum charge.

**For more information on how your organization may utilize these ads, call Rick McAtee, IAMFES Advertising/ Exhibits Manager at (800) 369-6337 or (515) 276-3344.**

# WANTED:

## PROFESSIONALS

and

## STUDENTS

in the Food Science, Safety  
or Sanitation Industries

for

### Membership in an International Association.

#### GENEROUS

Compensation Package  
including:

★ Monthly issues of *Dairy,  
Food and Environmental  
Sanitation*

★ Optional plan with  
subscription to the *Journal  
of Food Protection*

★ Access to an exclusive  
Audio/Visual Library

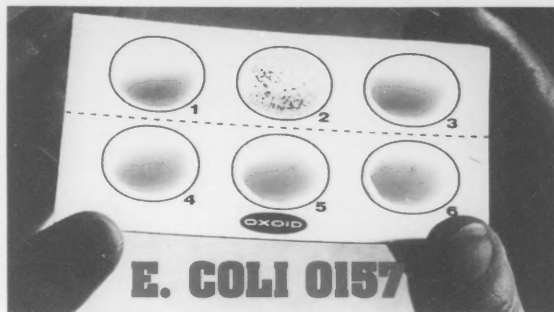
★ Annual Awards  
Competition

★ Participation in an  
Annual Meeting to be held in  
a different select location  
each year

---

Interested individuals are  
encouraged to inquire at:  
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(800) 369-6337; or write:

The International Association of  
Milk, Food and Environmental  
Sanitarians, Inc. (IAMFES)  
6200 Aurora Avenue,  
Suite 200W  
Des Moines, Iowa 50322-2863  
U.S.A.



### Rapid . . . Easy . . . Cost Effective!

- Tests for *E. coli* serogroup 0157.
- May be performed on sorbitol negative colonies.\*
- Blue latex for ease of reading.
- 100% sensitive and specific.\*\*
- Entire procedure takes only 2 minutes!
- Includes controls and cards.
- Costs only \$.75 per test.

\*When cultured on MacConkey with Sorbitol Agar plates.  
Sowers, Journal of Clinical Microbiology, May 1996, p.1286-1289. Data available on request.

Prod. No. DR620, by Oxoid, 100 tests, \$75

Call (800) 266-2222, ext:696 to order.



Reader Service No. 238

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# 84th IAMFES Annual Meeting Registration Form

Hyatt Regency Grand Cypress — Orlando, FL — July 6 - July 9, 1997

(Use photocopies for extra registrations)

FOR OFFICE USE  
 Date Rec'd. \_\_\_\_\_  
 Registration # \_\_\_\_\_  
 First initial \_\_\_\_\_  
 Last name \_\_\_\_\_

First Name (will appear on badge) \_\_\_\_\_ (please print) Last Name \_\_\_\_\_  
 Title \_\_\_\_\_ Employer \_\_\_\_\_  
 Mailing Address (Please specify: Home or Work) \_\_\_\_\_  
 City \_\_\_\_\_ State/Province \_\_\_\_\_ Country \_\_\_\_\_ Postal/Zip Code \_\_\_\_\_  
 Telephone # \_\_\_\_\_ Fax # \_\_\_\_\_

**Please check where applicable:**

- IAMFES Member
- Non-Member
- Local Arrangements
- 30 Yr. Member
- 50 Yr. Member
- Past President
- Executive Board
- Speaker
- Honorary Life Member
- Exhibitor
- IAMFES Sustaining Member
- IAMFES Program Advisory Committee

**Credit Card payments may be sent via Fax today!**  
**515-276-8655**

**Sign up to become  
 a NEW member**  
 and take advantage  
 of the member discount.

**\*REGISTER BY MAY 30, 1997 TO AVOID LATE REGISTRATION FEES**

REGISTRATION:	MEMBERS	NON-MEMBERS	AMOUNT
Registration (Banquet included)	\$220 (\$270 late)*	\$305 (\$355 late)*	_____
Student Member	\$ 35 (\$ 45 late)*	Not Available	_____
One Day Registration (Circle: Mon/Tues/Wed)	\$110 (\$135 late)*	\$145 (\$165 late)*	_____
Spouse/Companion (Name): _____	\$ 35 (\$ 35 late)*	\$ 35 (\$ 35 late)*	_____
Children (14 & Under, Names): _____	FREE	FREE	_____

**NEW MEMBERSHIP FEES:**

Membership with Dairy, Food & Environmental Sanitation	\$ 75.00	_____
Membership with Dairy, Food & Env. Sanitation & Journal of Food Protection	\$ 120.00	_____
**Student Membership <input type="checkbox"/> Dairy, Food & Env. San. or <input type="checkbox"/> Journal of Food Protection	\$ 37.50	_____
**Student Membership with Dairy, Food & Env. San. & Journal of Food Protection	\$ 60.00	_____

*\*\*Full-time student verification required.*

<b>SHIPPING CHARGES: OUTSIDE THE U.S. - SURFACE RATE</b>	\$ 22.50 per journal	_____
<b>AIRMAIL</b>	\$ 95.00 per journal	_____

**OTHER FEES:**

	PER PERSON	# OF TICKETS
Cheese and Wine Reception (Sun., 7/6)	FREE	_____
Sail Away... A Key West Evening (Mon., 7/7)	\$ 55 (\$ 60 late)	_____
IAMFES Awards Banquet (Wed., 7/9)	\$ 35 (\$ 40 late)	_____
Children's Banquet (Wed., 7/9)	\$ 15 (\$ 20 late)	_____

**SPOUSE/COMPANION EVENTS:**

	PER PERSON	# OF TICKETS
Kennedy Space Center (Sun., 7/6)	\$ 42 (\$ 50 late)	_____
All Around Orlando (Mon., 7/7)	\$ 30 (\$ 35 late)	_____
Cypress Gardens (Tues., 7/8)	\$ 49 (\$ 55 late)	_____

Please indicate here if you have a disability requiring special accommodations.

Credit Card Payments: Please Circle: VISA/MASTERCARD/AMERICAN EXPRESS

Card # \_\_\_\_\_ Exp. Date \_\_\_\_\_

Name on Card \_\_\_\_\_ Signature \_\_\_\_\_

Total Amount  
 Enclosed \$ \_\_\_\_\_  
**U.S. FUNDS DRAWN ON U.S. BANK**

**Registration Information**

Send payment with registration to IAMFES, 6200 Aurora Avenue, Suite 200W, Des Moines, IA 50322-2863. Make checks payable to IAMFES. Registration must be post-marked by May 31, 1997. Registration post-marked after May 31, 1997 will be charged the late registration fee. For additional information contact Julie Cattanach at 800-369-6337.

**Refund/Cancellation Policy**

The IAMFES policy on refunds and/or cancellations is as follows: Registration fees, minus a \$50 processing fee, will be refunded for written cancellations post-marked by June 20, 1997. No refunds will be made for cancellations post-marked after June 20, 1997, however, the registration may be transferred to a colleague with written notification to IAMFES.



**Rental Car Information**

For information on special rental car rates from Budget call 1-800-772-3773. Please mention Rate Code: V9Y and BCD #: UO51950.

Guest Room Commitment  
GOOD UNTIL JUNE 4, 1997  
Make Your Reservation Now

## HOTEL RESERVATIONS

### IAMFES

84th Annual Meeting  
July 6 - July 9, 1997  
Hyatt Regency Grand Cypress  
Orlando, FL

Please check accommodation requested:

- Single (1 person)    Triple (3 persons)    King Bed  
 Double (2 persons)    Quad (4 persons)    2 Double Beds

Bed type:

Special Requests \_\_\_\_\_

- Please indicate here if you have a disability requiring special accommodations.

NAME \_\_\_\_\_

SHARING WITH (Name) \_\_\_\_\_

COMPANY NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_

STATE/PROVINCE \_\_\_\_\_ COUNTRY \_\_\_\_\_ ZIP \_\_\_\_\_

TELEPHONE \_\_\_\_\_

ARRIVAL DATE \_\_\_\_\_ (Check-In Time is after 4 p.m.) DEPARTURE DATE \_\_\_\_\_ (Check-out Time is 12 p.m.)

SPECIAL REQUESTS \_\_\_\_\_

All Reservations must be held with one (1) night's deposit payable by credit card (or check received within fourteen (14) days). Reservations canceled less than seventy-two (72) hours prior to arrival will forfeit the deposit. After June 4, 1997, reservations will be accepted on a space and rate available basis.

CREDIT CARD # \_\_\_\_\_ TYPE OF CREDIT CARD \_\_\_\_\_

EXPIRATION DATE \_\_\_\_\_

CARD-HOLDERS SIGNATURE \_\_\_\_\_

**SPECIAL ROOM RATES for this convention:**  
**\$120 per night, plus taxes**

For Reservations Call: (800) 233-1234 or (407) 239-1234  
Or FAX: (407) 239-3800

# I A M F E S

# 84<sup>th</sup>

## Annual Meeting

Orlando, Florida

July 6 - July 9

MAIL DIRECTLY TO:

### HYATT REGENCY GRAND CYPRESS

C/O RESERVATIONS  
1 GRAND CYPRESS BLVD.  
ORLANDO, FL 32836-6734

# Coming Events

## FEBRUARY

• **3-6, Basic Food Processing Sanitation Course**, Manhattan, KS. This course features the essential elements needed to develop and maintain today's modern food product safety programs. For additional information, contact AIB, 1213 Bakers Way, Manhattan, KS 66502-4576; (913) 537-4750; (800) 633-5137; (800) 242-2534; fax (913) 537-1493.

• **4-5, Food Science Course: Introduction to Food Microbiology**, Rutgers University, New Brunswick, NJ. For further information, contact Keith Wilson, Office of Continuing Professional Education, Rutgers University-Cook College, P.O. Box 231, New Brunswick, NJ 08903-0231; (908) 932-9271.

• **16-19, National Mastitis Council 36th Annual Meeting**, at the Hyatt Regency in Albuquerque, NM. The seminar is being jointly sponsored with the International Dairy Federation (IDF) A2 Group of Mastitis Experts. The objective of the meeting is to disseminate technical and applied information on udder health, mastitis management, milk quality and milk safety. For further information, contact Dr. Keith Sterner, Program Committee Chair, 2650 Ernest Rd., Ionia, MI 48846; phone (616) 527-3320; fax (616) 527-0277.

• **16-21, XV International Symposium of the World Association of Microbiologists, Immunologists and Specialists in Infectious Diseases (W.A.V.M.I.)**, will be held in Cyprus. The theme will be Salmonellosis - Brucellosis as World Health Problems for Humans and Animals. For additional information, contact K. Polydorou V.P.H. Institute, P.O. Box 284, Nicosia, Cyprus; Fax/Tel. (357-2) 453121.

• **17-19, Annual Technical Seminar**, to be held at the University Centre Hotel in Gainesville, FL. For

more details, call Sara Jo Atwell, (352) 372-0436.

• **25-27, Milk Protein Polymorphism II Seminar**, at the Steeple Conference Centre, Quality Hotel, Palmerston North, New Zealand. Presentations and discussions will be held on the processing characteristics of milks containing different milk protein variants, the relationship between genetic polymorphism and product functionality, the nutritional and health-related aspects of variant milk proteins, and provide a forum of new information about milk production traits as related to the polymorphism of milk proteins. For registration information contact, Mrs. Lynnette Dyer, NZDRI, Private Bag 11029, Palmerston North, New Zealand; Fax +64 6 356 1476.

• **27, Food Science Course: CPA 7D**, Rutgers University, New Brunswick, NJ. For further information, contact Keith Wilson, Office of Continuing Professional Education, Rutgers University-Cook College, P.O. Box 231, New Brunswick, NJ 08903-0231; (908) 932-9271.

## MARCH

• **4-5, HACCP Train the Trainer**, Toronto. The HACCP Train the Trainer program is designed to equip HACCP Team members in food processing workplaces with the knowledge and skills to be effective trainers in their own facilities. For further information, contact the Office of Open Learning at (519) 767-5000 or fax (519) 767-1114.

• **5-6, Food Science Course: Pest Management/Food Product Safety**, Rutgers University, New Brunswick, NJ. For further information, contact Keith Wilson, Office of Continuing Professional Education,

Rutgers University-Cook College, P.O. Box 231, New Brunswick, NJ 08903-0231; (908) 932-9271.

• **10-12, North American Food Safety Educational Workshop - Food Service and Food Retailers**, in College Park, MD. This conference is intended for professionals interested in food safety related to grocery stores, convenience stores, and food service establishments including commercial, institutional, and military sectors. Emphasis will be given to challenges, barriers, and evaluation of training food service workers and the feasibility of applying HACCP to food service and retail. The cost of the workshop is \$150.00 before February 1, 1997. For further information, contact Lisa Gordon, North Carolina State University, phone (919) 515-2956; fax (919) 515-7124; e-mail lisa@unity.ncsu.edu.

• **11-12, Workplace Safety Seminar**, Atlanta, GA. This seminar is designed to translate OSHA's complex regulatory requirements into understandable language that can be used in a workplace setting. For additional information or to enroll, contact AIB Worker Safety, 1213 Bakers Way, Manhattan, KS 66502, or call (913) 537-4750; fax (913) 537-1493.

• **17-21, Aseptic Process and Packaging (Food Science Course)**, Rutgers University, New Brunswick, NJ. For additional information, contact Keith Wilson, Office of Continuing Professional Education, Rutgers University-Cook College, P.O. Box 231, New Brunswick, NJ 08903-0231, or call (908) 932-9271.

• **18-19, Basic Food Microbiology Seminar**, at the Holiday Inn - Portland Airport, Portland, OR. In general, participants will be introduced to the characteristics of microorganisms (bacteria, yeast, and molds), how food is used as a growth medium by microorganisms to cause



food spoilage, how to prevent food contamination and spoilage, the basics of foodborne illness, and the relationship of good manufacturing practices and personal hygiene to overall food safety. The concept of HACCP will also be introduced. The course is designed for individuals with limited microbiology or science backgrounds. For further information, contact Jack R. Brook, MS, RD, Instructor/Coordinator, Food Science Technology at (503) 667-7473 or fax (503) 667-7831.

• **18-21, Lipidex '97 Symposium & Tradefair**, in Antwerp, Belgium. This symposium programme is designed to be of benefit to a wide audience from the international oils and fats trade, with sessions that will appeal to traders, buyers and marketing executives, as well as those of interest to technical managers and delegates with operational responsibilities in production. For further information, contact Ms. Erika Vercauteren, The ANTWERP HILTON, Groenplaats, 2000 Antwerpen, Belgium, Telephone (+32) 3 204 8279; fax (+32) 3 204 8640.

• **24-28, Molds and Mycotoxins in Food**, Lincoln, NE. Cosponsored by the American Institute of Baking. For more information, contact the AACC Short Course Department, 3340 Pilot Knob Road, St. Paul, MN 55121-2097; phone (612) 454-7250; fax (612) 454-0766; e-mail aacc@scisoc.org.

#### APRIL

• **7-8, American Institute of Baking Food Plant Pest Control Seminar**, in Manhattan, KS. The seminar is designed to increase awareness of pest control strategies and alternatives to the use of chemicals as the main control strategy for pests in the food industry. For additional information, contact AIB, 1213 Bakers Way, Manhattan, KS 66502 or call (913) 537-4750; fax (913) 537-1493.

• **8-9, Oregon Dairy Industries Annual Conference**, Eugene Hilton. For additional information, contact Lilly Smith, Oregon Dairy Industries, Food Science Dept., 100 Wiegand Hall, OSU, Corvallis, OR 97331-6602; phone (503) 745-5545; fax (503) 745-1018.

• **8-10, Pasta and Noodles: Raw Materials and Processing**, Fargo, ND. For more information, contact the AACC Short Course Department, 3340 Pilot Knob Road, St. Paul, MN 55121-2097; phone (612) 454-7250; fax (612) 454-0766; e-mail aacc@scisoc.org.

• **9-11, Food Science Course: Applied Sensory Evaluation**, Rutgers University, New Brunswick, NJ. For further information, contact Keith Wilson, Office of Continuing Professional Education, Rutgers University-Cook College, P.O. Box 231, New Brunswick, NJ 08903-0231; (908) 932-9271.

• **14-17, Better Process Control School**. For information, contact The World Wide Web at <http://www.foodsci.purdue.edu/> or Gwen Shoemaker, Food Science Department, 1160 Smith Hall, Purdue University, West Lafayette, IN 47907; phone (317) 494-8270; e-mail: shoemake@foodsci.purdue.edu.

• **15-17, FPI-HACCP (Food Science Course)**, Rutgers University, New Brunswick, NJ. For additional information, contact Keith Wilson, Office of Continuing Professional Education, Rutgers University-Cook College, P.O. Box 231, New Brunswick, NJ 08903-0231, or call (908) 932-9271.

• **20-23, 48th Meeting of the Pacific Fisheries Technologists**, Astoria, OR. Topics will cover areas related to seafood processing, quality and safety. For more information, contact Michael Morrissey, fax (503) 325-2753; e-mail moorimic@ccmail.orst.edu.

• **29-May 1, Hazard Analysis and Developing Your HACCP Program**, Guelph. Hazard Analysis Criti-

cal Control Point is an internationally recognized process-oriented approach to food safety involving the entire food chain. While reference is made to the Food Safety Enhancement Program guidelines and forms, this program will be of benefit to all food companies interested in the economical and food safety benefits of adopting a HACCP system. For further information, contact the Office of Open Learning, Room 159, Johnston Hall, University of Guelph, Guelph, Ontario N1G 2W1 or call (519) 767-5000; fax (519) 767-1114.

#### MAY

• **3-8, The 26th National Conference on Interstate Milk Shipments**, at the Hyatt Regency, San Francisco Airport. For further information, contact Leon Townsend, NCIMS Executive Secretary, 110 Tecumseh Trail, Frankfort, KY 40601. Telephone and/or fax (502) 695-0253.

• **5-6, Symposium on Texture of Fermented Milk Products and Dairy Desserts**, in Vicenza, Italy. The objective of the seminar is the presentation and discussion of new information about the different factors affecting the texture of fermented milk and dairy desserts. Besides the key factors influencing the texture of products, an up-to-date will be given on the instrumental and sensory evaluation of texture. For further information, contact Symposium Secretariat, Istituto Sperimentale Lattiero-Caseario, Dr. Roberto Giangiaco, Via A. Lombardo, 11, 20075 LODI-ITALY; phone +39-371-430990; fax +39-371-35579.

• **13-14, Fourth Annual Cultured Dairy Products Symposium**, at the Wyndham Milwaukee Center Hotel in Milwaukee. Guest speakers from around the world will address topics on the manufacture and development of yogurt products, frozen yogurt, nonfat cultured products, cottage cheese, and new probiotic cultures. For additional information, contact

Lisa Lecher or Dr. Bill Watrous at Chr. Hansen, Inc., by phone at (800) 247-8321; fax (414) 476-2313.

• **19-22, Purdue Aseptic Processing and Packaging Workshop.** For information, contact The World Wide Web at <http://www.foodsci.purdue.edu/> or Gwen Shoemaker, Food Science Department, 1160 Smith Hall, Purdue University, West Lafayette, IN 47907; phone (317) 494-8270; e-mail: shoemake@foodsci.purdue.edu.

• **20-24, InterChinapack 97, International Exhibition for Packaging Machines and Processing Equipment,** will take place at the China International Exhibition Center in Beijing, China. The Düsseldorf Trade Fair Company is renowned as the organizer of interpack, the world's largest trade fair for packaging machinery and materials and confectionery machinery. For further information, contact Düsseldorf Trade Shows, New York, 70 West 36th St., Suite 605, New York, NY 10018; telephone (800) 232-3914; (212) 356-0407; fax (212) 356-0420.

• **22-25, ProPak Asia 97—The 7th International Food Processing & Packaging Technology Exhibition,** Queen Sirikit National Convention Centre, Bangkok, Thailand. ProPak Asia 97 is not just for food processing and packaging. Other important themes within the exhibition are canning & canmaking, pharmaceutical processing and packaging, brewing, and seafood. For further information, contact Overseas Exhibition Services Ltd., 11 Manchester Square London W1M 5AB, United Kingdom; Tel: +44 (0) 171 486 1951; fax +44 (0) 171 413 8277.

• **27-28, HACCP Train the Trainer,** Guelph. The HACCP Train the Trainer program is designed to equip HACCP team members in food processing workplaces with the knowledge and skills to be effective trainers in their own facilities. For

further information, contact the Office of Open Learning at (519) 767-5000 or fax (519) 767-1114.

• **28-30, Food Process Automation Workshop.** For information, contact The World Wide Web at <http://www.foodsci.purdue.edu/> or Gwen Shoemaker, Food Science Department, 1160 Smith Hall, Purdue University, West Lafayette, IN 47907; phone (317) 494-8270; e-mail: shoemake@foodsci.purdue.edu.

## JUNE

• **3-6, Wet Milling,** Champaign, IL. For more information, contact the AACC Short Course Department, 3340 Pilot Knob Road, St. Paul, MN 55121-2097; phone (612) 454-7250; fax (612) 454-0766; e-mail: aacc@scisoc.org.

• **24-26, Crystallization in Foods (Food Science Course),** Rutgers University, New Brunswick, NJ. For additional information, contact Keith Wilson, Office of Continuing Professional Education, Rutgers University-Cook College, P.O. Box 231, New Brunswick, NJ 08903-0231, or call (908) 932-9271.

## JULY

• **6-9, IAMFES Annual Meeting,** in Orlando, FL at the Hyatt Regency Grand Cypress Hotel. For additional information, call (800) 369-6337; (515) 276-3344; fax (515) 276-8655.

• **11-18, 17th International Workshop on Rapid Methods and Automation in Microbiology XVII,** in Manhattan, KS. A symposium will occur on July 11 and 12. Contact Daniel Y.C. Fung, telephone (913) 532-5654; fax (913) 532-5681; e-mail: DANFUNG@KSU.KSU.EDU.

• **20-23, 9th Australian Food Microbiology Conference,** to be held in Sydney. All inquiries regarding submission of papers, registra-

tion, exhibition participation or sponsorship may be directed to the Conference Secretariat at GPO Box 2609, Sydney NSW 2001, phone (02) 241 1478; fax (02) 251 3552, e-mail: reply@icmsaust.com.au.

• **21-25, Principles of Corn Tortilla and Chip Production,** in Manhattan, KS. The seminar is designed to teach the latest in process technologies and approaches to produce corn-based products. The curriculum includes labs and lectures relating to the functions and effects of ingredients and their variations, product evaluation, troubleshooting and problem-solving techniques. For additional information, contact AIB, 1213 Bakers Way, Manhattan, KS 66502 or call (913) 537-4750; fax (913) 537-1493; e-mail: www.aibonline.org.

## AUGUST

• **4-8, Applied Baking Science Seminar,** in Manhattan, KS sponsored by American Institute of Baking. Emphasis is on familiarizing participants with common baking laboratory analytical equipment and understanding what the resulting data really means. For additional information, contact AIB, 1213 Bakers Way, Manhattan, KS 66502 or call (913) 537-4750; fax (913) 537-1493.

## SEPTEMBER

• **9-10, Workplace Safety Seminar,** Philadelphia, PA. This seminar is designed to translate OSHA's complex regulatory requirements into understandable language that can be used in a workplace setting. For additional information or to enroll, contact AIB Worker Safety, 1213 Bakers Way, Manhattan, KS 66502, or call (913) 537-4750; fax (913) 537-1493.

## 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 the United States. In addition, its membership and subscriber rosters list individuals and organizations throughout the United States, Canada and other parts of the world.

For the past 26 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 State Regulatory Agencies in each of the member 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.

**The entire set consists of 54 guidelines including:**

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>1 Planning Dairy Freestall Barns</li> <li>2 Effective Installation, Cleaning and Sanitizing of Milking Systems</li> <li>3 Selected Personnel in Milk Sanitation</li> <li>4 Installation, Cleaning, &amp; Sanitizing of Large Parlor Milking Systems</li> <li>5 Directory of Dairy Farm Building &amp; Milking System Resource People</li> <li>7 Sampling Fluid Milk</li> <li>8 Good Manufacturing Practices for Dairy Processing Plants</li> <li>9 Fundamentals of Cleaning and Sanitizing Farm Milk Handling Equipment</li> <li>10 Fluid Milk Shelf-Life</li> <li>11 Sediment Testing and Producing Clean Milk</li> <li>13 Environmental Air Control &amp; Quality for Dairy Food Plants</li> <li>14 Clean Room Technology</li> <li>16 Handling Dairy Products From Processing to Consumption</li> <li>17 Causes of Added Water in Milk</li> <li>18 Fieldperson's Guide to Troubleshooting High Somatic Cell Counts</li> <li>21 Raw Milk Quality Tests</li> <li>22 Control of Antibacterial Drugs and Growth Inhibitors in Milk and Milk Products</li> <li>23 Preventing Rancid Flavors in Milk</li> <li>24 Troubleshooting High Bacteria Counts of Raw Milk</li> <li>25 Cleaning and Sanitizing Bulk Pickup and Transport Tankers</li> <li>28 Troubleshooting Residual Films on Dairy Farm Milk Handling Equipment</li> <li>29 Cleaning and Sanitizing in Fluid Milk Processing Plants</li> <li>30 Potable Water on Dairy Farms</li> <li>31 Composition and Nutritive Value of Dairy Products</li> <li>32 Fat Test Variations in Raw Milk</li> </ul> | <ul style="list-style-type: none"> <li>33 Brucellosis and Some Other Milkborne Diseases</li> <li>34 Butterfat Determinations of Various Dairy Products</li> <li>35 Dairy Plant Waste Management</li> <li>36 Dairy Farm Inspection</li> <li>37 Planning Dairy Stall Barns</li> <li>38 Preventing Off-flavors in Milk</li> <li>39 Grade A Fluid Milk Plant Inspection</li> <li>40 Controlling Fluid Milk Volume and Fat Losses</li> <li>41 Milkrooms and Bulk Tank Installation</li> <li>42 Stray Voltage on Dairy Farms</li> <li>43 Farm Tank Calibrating and Checking</li> <li>44 Troubleshooting Dairy Barn Ventilation Systems</li> <li>45 Gravity Flow Gutters for Manure Removal in Milking Barns</li> <li>46 Dairy Odor Control</li> <li>47 Naturally Ventilated Dairy Cattle Housing</li> <li>48 Cooling Milk on the Farm</li> <li>49 Postmilking Teat Dips</li> <li>50 Farm Bulk Milk Collection Procedures</li> <li>51 Controlling the Accuracy of Electronic Testing Instruments for Milk Components</li> <li>52 Emergency Action Plan for Outbreak of Milkborne Illness in the Northeast</li> <li>53 Vitamin Fortification of Fluid Milk Products</li> <li>54 Selection and Construction of Herringbone Milking Parlors</li> <li>56 Dairy Product Safety (Relating to Pathogenic Bacteria)</li> <li>57 Dairy Plant Sanitation</li> <li>58 Sizing Dairy Farm Water Heater Systems</li> <li>59 Production and Regulation of Quality Dairy Goat Milk</li> <li>60 Trouble Shooting Microbial Defects: Product Line Sampling &amp; Hygiene Monitoring</li> <li>63 Controlling the Quality &amp; Use of Dairy Product Rework</li> <li>65 Installing &amp; Operating Milk Precoolers Properly on Dairy Farms</li> </ul> |
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If purchased individually, the entire set would cost \$219. 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).

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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 3,200 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 15 to 20 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 who request it with their membership.

**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 or (800) 369-6337; fax (515) 276-8655.

*"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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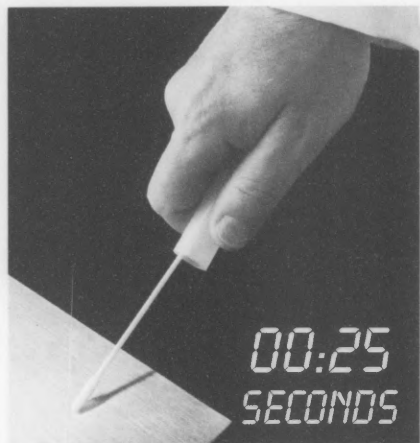
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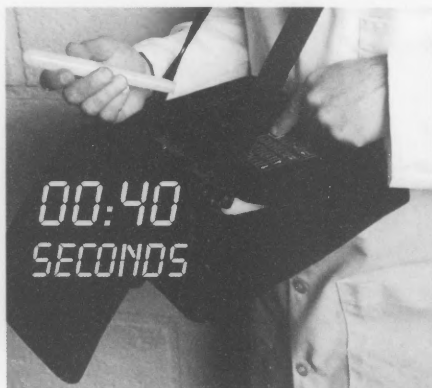
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