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Periodicals

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# Food Protection Trends

**Science and News** from the International Association for Food Protection



Detection and Enumeration  
of *Listeria monocytogenes*

Food Safety Training

IAFP 2008

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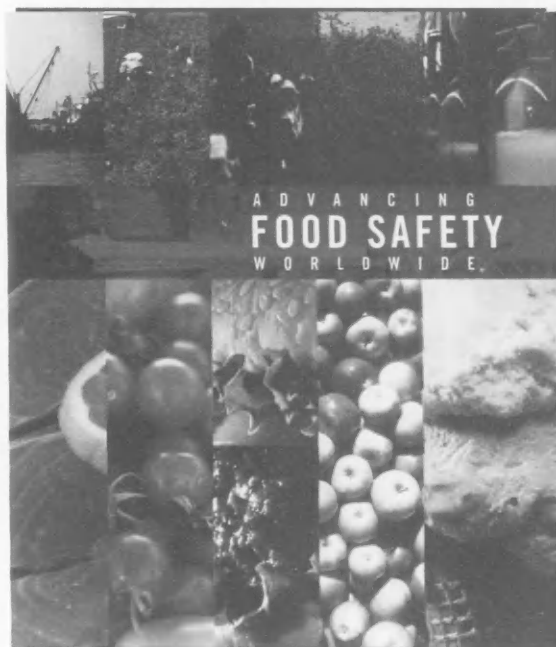
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# “LONE STAR PERSPECTIVE” FROM YOUR PRESIDENT

One of the things I really enjoy about being a member of IAFP is attending the Annual Meeting and visiting the multiple locations where it is held. Our meeting is large enough to contain a variety of subjects and presentations, but small enough to be held in a variety of locations. We all likely belong to some of the larger professional organizations as well as IAFP. Where do they have their meetings? It seems they always meet in the same places: Atlanta, Orlando, Las Vegas, Chicago. Now, don't get me wrong, there is nothing objectionable about those cities; it just gets old always going back to the same places. I like that IAFP is small enough to meet in many different locations. Just look at where we have met in the last few years to talk about *Advancing Food Safety Worldwide*: Phoenix, Calgary, Seattle, Baltimore. We have the opportunity to meet in a greater variety of unique and interesting locations than larger groups, and that is one of the advantages of IAFP that I really enjoy. This year we will meet in Columbus, Ohio.

As I write this column, I am on my way home from Columbus because the Program Committee and Executive Board just finished meetings there as part of our planning for the Annual Meeting. While there, we had an opportunity to view the surrounding area, check out the facilities and try some of the local food. The meeting facility is going to work very well for us. Everything is in one convenient location, and the three hotels where we have rooms are all connected to the convention center, either directly or by skywalks. We will have a larger exhibit



By **GARY ACUFF**  
PRESIDENT

**“So, let me tell you,  
I am excited  
about our  
upcoming meeting”**

hall than we have had in the past, so we shouldn't be turning anyone away this year due to a lack of space. There are impressive shopping opportunities close to the hotels and Convention Center, with unique shops and restaurants everywhere. I have been told that there are at least 22 restaurants within short walking distance of the convention center and hotels. I really enjoyed the dining

I experienced in the area and the wide variety of local restaurants to pick from, many in restored buildings with interesting historical significance. This is going to be a fun meeting. We have excellent facilities, easy access from our hotels and lots of unique places for socializing after the meetings. And, yes, for those of you who are wondering, there is an Irish pub within walking distance. Apparently, that is a traditional meeting place for some of our members.

We also have a great program being developed for this year's meeting by the Program Committee. In case you are not familiar with the process the Program Committee follows to put together our meeting, here is the breakdown of the proceedings. The Program Committee members are assigned submitted abstracts to review according to their area of interest, if possible. They go through those abstracts prior to meeting and are prepared to discuss them with fellow Committee members. The Committee meets at the location of the approaching Annual Meeting for two days to review, discuss and, sometimes, edit abstracts. The abstracts are grouped by subject matter and then sorted with selected symposia to make up the organization of the Annual Meeting. The Program Committee volunteers a tremendous number of hours to do this. First, they spend time at home reviewing the abstracts that were sent to them, then they meet all day Friday and into the night reviewing all the abstracts several times. Rejected abstracts are traded with another review group and reviewed again, along with a representative of the

Executive Board, to make sure a rejection is truly due to one of the stated reasons for rejection. The Committee is very careful not to reject an abstract without the consensus of the group. Their goal is not to see how many abstracts they can accept or reject, but to make sure the quality of the meeting is sustained, and they do an outstanding job. Their work is not completed until they meet again the following day to review symposium proposals and group everything into the final order for the Annual Meeting. Grouping into the final meeting program order is essential to the success of the meeting. There are so many possible conflicts that can exist: presenters needing to be in two places at once, two dairy symposia being held at the same time, etc. It gets very complicated, so it is always impressive when the final program comes together. The most impressive thing about the whole process, though, is the dedication of the Program Committee to a quality meeting, realizing that their time and effort

is all voluntary. So the next time you enjoy the meeting content, make a point to thank a Program Committee member. It doesn't all just come together by accident. The Chair of our Program Committee this year is Emilio Esteban, and the Vice-Chair is Indaue Mello-Hall. They both did a superb job leading the group and making sure we have a top-notch scientific program this summer.

While I am talking about the meeting, there is another item I need to mention. Every year, one of the most successful fundraising efforts for the Foundation is the Silent Auction, and it is also one of our most entertaining fundraising events. If you have not participated in the past, there are a couple of ways you can. First, donate something! If you have an item that you think might be of interest to members, you can donate it to the Silent Auction to be put up for bid. Items of special interest are those that have some sort of connection to food safety or have a historical significance to IAFP, but you can donate any-

thing on which you think people might be willing to bid. Second, you can join in on the bidding. There is no limit to what you may find up for auction, including antique laboratory equipment, microbiological art and clothing, trips to exotic locations, cheese and wine baskets, registration to upcoming IAFP meetings, and the list goes on and on. It is worth your time to look, and it is of great benefit to our Foundation when you bid. If you haven't been around to watch all the snipers trying to beat each other out for a special item at the end of the auction, you have really missed out on the fun!

So, let me tell you, I am excited about our upcoming meeting. The IAFP staff is working full steam to get everything ready; our Program Committee has put together a great program and the local arrangements folks are making sure everything is in place to welcome us to Ohio. All we need is for you to be there. So don't miss out.

As always, feel free to contact me at [gacuff@tamu.edu](mailto:gacuff@tamu.edu).

95th Annual Meeting



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## IAFP WORKSHOPS

**Friday and Saturday**  
**August 1-2**

**Workshop 1**

**Better Process Cheese  
Control School**

**Friday and Saturday**  
**August 1-2**

**Workshop 2**

**The Art of Fungal  
Characterization  
and Identification:  
A Hands-on Workshop**

**Saturday**  
**August 2**

**Workshop 3**

**Hands-on Workshop  
on Microbial Risk  
Assessment Modeling  
and Interpretation**

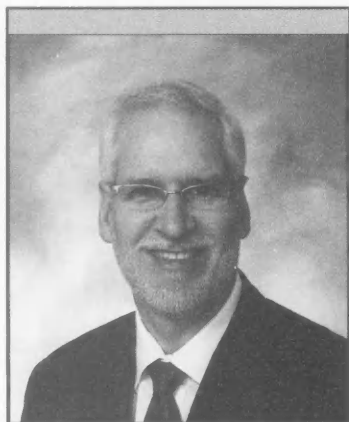
## “COMMENTARY” FROM THE EXECUTIVE DIRECTOR

**H**ow international should IAFP be? This is a question that is asked often by Members, Staff and Board. Up to 2005, it was a question that normally was answered with, “we don’t have the financial resources to play in the international arena!” Preceding our first, truly international meeting held in Prague in 2005; IAFP was international in name only.

The Association began as an international association back in 1911. Before 2005, we were international only because we accepted members from outside of the United States or North America. Over the past 10 years, your Executive Board became extremely interested in expanding activities outside of North America. Because of financial considerations and world events, it took until 2005 to establish this effort. Now that it has begun, things are moving very fast!

It began with a joint effort with the International Life Sciences Institute’s European Branch (ILSI-Europe). We planned a joint workshop with ILSI-Europe that was held in Prague. Along with this, IAFP held its first European Symposium. As that event was taking place, our attendees asked the question, “where is next year’s European meeting going to be held?” Honestly, the first symposium was “experimental” to test the waters. It took a little time, but the Executive Board did decide to hold a Second European Symposium and it took place in Barcelona in 2006.

After the success in Barcelona, the Executive Board agreed to now hold a symposium each year in Europe. So the third symposium was last October in Rome. Now, we have confirmed the location for



By **DAVID W. THARP, CAE**  
EXECUTIVE DIRECTOR

***“IAFP is moving  
fast into the  
international food  
safety arena”***

our Fourth European Symposium on Food Safety which will be held 19–21 November 2008 in Lisbon, Portugal. The program is still in development with speakers being confirmed, but you can plan now to attend this all-important symposium to meet the leaders in European food safety.

As the European Symposium has been developing over these past few years, IAFP continued to look for opportunities to expand our international network of food safety

professionals. One opportunity which we could not pass by was to become involved with the China International Food Safety & Quality Conference (CIFSQ). The first conference was held last September in Beijing and IAFP received great exposure to more than 1,000 conference attendees. With that success, the Executive Board was quick to pledge IAFP’s support to the conference organizers for the 2009 CIFSQ to be held 24–25 September 2008, again in Beijing.

More recently, we established a working relationship with the Dubai International Food Safety Conference (DIFSC). Pete Snyder, a long-time IAFP Member was a speaker at the conference in 2007 and suggested to the organizers that they may want to coordinate with IAFP on future conference programs. For 2008, as the first part of this effort, the organizers invited me to attend the DIFSC this past February. I was able to serve as the session convener on day two and brought increased focus to IAFP in doing so. This conference, now in its third year, attracted more than 1,000 attendees. We look forward to working more closely with the organizers for DIFSC 2009!

The China and Dubai meetings are not directly IAFP meetings, but they offer IAFP the opportunity to reach an audience that we probably would not be able to reach for many more years. Both are great sources of information for food safety professionals in their regions.

In addition to these meetings, IAFP, in conjunction with our Brazil Affiliate and ICMSF organized our first “International Symposium on Food Safety” that will be held 26–28 May 2008. Maria Teresa Destro



and her colleagues Bernadette Franco and Mariza Landgraf have prepared the program, arranged for the facility and handled all logistics for the upcoming symposium. Because of the facility, we will be limited to 400 attendees and all indications show that it will be a sold out event! This meeting will move from location to location each year, so for 2009 we are looking to hold the "International Symposium" in a Pacific Rim country.

As you can see, IAFP is moving fast into the international food safety arena. One change we made a year ago has made IAFP Membership much more attractive to potential

Members from outside of the United States. With our Membership dues restructure, anyone from anyplace in the world can join IAFP for just \$50! Fifty Dollars to belong to the leading professional food safety organization in the world!!! That is a price that most everyone can afford. If a person is interested in research articles from the *Journal of Food Protection*, online access can be added for only \$36. More than fourteen years of searchable JFP articles, plus IAFP Membership for less than \$90 – that cannot be beat.

If you communicate with colleagues around the world, let

them know of this fantastic value. Let them know about IAFP and the great work we are doing globally. Chances are, you can encourage them to become an IAFP Member and they will have access to information that can assist them in making change to their public health systems. They can join you and other IAFP Members in "Advancing Food Safety Worldwide®".

So, how international should IAFP be? As an international association, you can see that your Executive Board has committed to making IAFP a visible leader in food safety all around the world! Help do your part to expand IAFP's worldwide efforts. You will be glad you did.



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# Detection and Enumeration of *Listeria monocytogenes* in Refrigerated and Frozen Seafood Products

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## SUMMARY

The traditional frozen, battered and breaded seafood portion is a low-risk food safety concern, since this product is usually fully cooked prior to consumption. In addition, growth of bacterial pathogens, such as *Listeria monocytogenes*, is unlikely to occur during frozen storage unless there is significant temperature abuse. However, an increasing number of supermarkets and convenience stores are interested in selling unfrozen, raw, partially cooked or fully-cooked, battered and breaded seafood. Many types of refrigerated foods, such as ready-to-eat sandwiches, meat salads, frankfurters, and cold smoked fish products, have been recalled from the marketplace because of contamination with *L. monocytogenes*. This survey examined frozen and refrigerated, raw, partially cooked and fully cooked seafood products ( $n = 112$ ) for the presence of this bacterial pathogen. Qualitative test results revealed that 16 of the 112 (14.3%) samples were positive for *Listeria* species. Among the raw and partially cooked battered and breaded fish portion samples, primarily pollock, cod, or whiting, *L. monocytogenes* was identified in 9 of 79 (11.4%) products. None of the 12 fully-cooked products were positive for *Listeria* spp. Separate 50 g portions of all *L. monocytogenes*-positive samples were analyzed quantitatively by dilution in buffered peptone water and direct plating onto PALCAM, OXA and ALOA agar media. The concentration of *L. monocytogenes* was less than 50 CFU/g for all positive samples. Since *L. monocytogenes* survived in these products, antimicrobial interventions should be considered and manufacturers should provide consumers with a recommended internal cooked product temperature along with easily understood cooking instructions.

A peer-reviewed article

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## INTRODUCTION

*Listeria* spp. are found throughout the environment, including food processing plants, and on many food products. *L. monocytogenes*, generally considered the only *Listeria* spp. that is pathogenic to humans, is responsible for many types of illness and, in some cases, death. Listeriosis is expected to increase during the next several decades because of the increasing numbers of susceptible individuals, including pregnant women, infants, and elderly and immunocompromised individuals (6, 8) although in recent years there has been a relative decrease compared to baseline data taken by FoodNet from the 1996–1998 time period (3). *L. monocytogenes* is considered psychrotrophic and halotolerant, since it can grow at temperatures less than 5°C and in the presence of up to 10% NaCl. Under certain conditions, this organism can survive frozen storage and proliferate during refrigerated storage in raw seafood products. Additionally, in experiments conducted in our laboratories, this pathogen survived deep-frying to maximum internal temperatures  $\leq 64^\circ\text{C}$  (147°F), when inoculated ( $10^7$  cells/g) in battered and breaded pollock portions (1).

In a survey of retail stores, Kalish (12) reported that only 37% of food products were stored at the recommended temperature range of 32–38°F (0–3.3°C), with many cases averaging 44°F (6.7°C) and some as high as 55°F (13.3°C). Audits International (2) reported that approximately 90% of consumer refrigerators operated at temperatures  $\leq 7.2^\circ\text{C}$ , although recommended storage temperatures for perishable foods is  $< 5^\circ\text{C}$ . Farber (5) reported that moderate to severe temperature abuse of contaminated fish products may greatly enhance the growth of *Listeria* spp. on fish. Saguy (17) predicted that *L. monocytogenes* populations could grow to 100 cells/g on products stored under typical retail and consumer temperature conditions. He went on to conclude that while these levels may not pose a hazard to the health of the general public, they may be a risk to people with immune compromised systems. The ingestion of high numbers of *L. monocytogenes* is a significant threat to health for people in high risk groups such as the immuno-compromised, the elderly, fetuses and neonates. In these groups, the mortality from listeriosis is high, typically 20–30% (14). The minimum infective

dose for *L. monocytogenes* has not been established, and there is little evidence that low numbers cause listeriosis (5). Foods implicated in major listeriosis outbreaks have been associated with products in which *L. monocytogenes* are able to grow to large numbers prior to consumption (9). In the United States, federal agencies with responsibility for public health and food protection have established a zero tolerance for *L. monocytogenes* ( $< 1$  organism per 25 g sample) in cooked ready-to-eat (RTE) foods (18).

Studies indicate that *L. monocytogenes* grows well on finished seafood products at refrigerated temperatures (5). Commercial handling and additional processing steps associated with the production of battered and breaded products may allow additional opportunities for contamination of the final product. Also, in RTE foods, in which many competitive spoilage bacteria have been destroyed, surviving pathogens such as *L. monocytogenes* are able to grow during refrigerated storage, resulting in higher risks to the consumer.

The assessment by the United States Department of Agriculture (USDA) and the Food and Drug Administration (FDA) of the relative risk of *L. monocytogenes* to the public from selected ready-to-eat foods states that there are insufficient data on the prevalence and concentration of *L. monocytogenes* in many RTE and other refrigerated and frozen foods (8). The objective of this study was to survey a variety of seafood products, especially those sold as battered and/or breaded, and analyze them qualitatively and quantitatively for *L. monocytogenes*.

## MATERIALS AND METHODS

Frozen and refrigerated seafood products ( $n = 112$ ), including raw and partially cooked battered and breaded fish portions ( $n = 79$ ) and fully cooked portions ( $n = 12$ ), were comprised of catfish (Ictaluridae), clams (Veneridae), cod (Gadidae), crab (Portunidae), flounder (Bothidae), haddock (Gadidae), hoki (Macruridae), perch (Percichthyidae), pollock (Gadidae), salmon (Salmonidae), scallops (Pectinidae), surimi, tilapia (Cichlidae), whitefish (Malacanthidae) and whiting (Gadidae). Products were collected over a one-year period in both retail and commercial markets. Samples were packed frozen or refrigerated (as acquired) and delivered the same day to the micro-

biology laboratory of the Department of Food Science and Technology at Virginia Tech. Analytical procedures for *Listeria* spp. and *L. monocytogenes* followed Food and Drug Administration Bacteriological Analytical Manual methods (7). Five randomly selected separate portions of each seafood product sample were aseptically removed from their package and a 10-g sample was removed. Remaining portions to be used for later enumeration were returned to refrigeration or  $-20^\circ\text{C}$  storage until presumptive results were obtained. A 50-g sample composite was used (5), as opposed to a 25-g sample, to increase the probability of isolating the bacteria. Composite samples were transferred to 50 ml of Listeria Enrichment Broth (LEB) (Oxoid, Inc., Ogdensburg, NY), pummeled in a laboratory blender (Seward Stomacher 400 Circulator) for 2 min at 230 RPM, and then incubated at  $30^\circ\text{C}$  for two days. After 24 and 48 h, LEB was streaked onto PALCAM agar (Oxoid) and Oxford agar (OXA) (Difco, Sparks, MD) media and incubated at  $30^\circ\text{C}$  for 24–48 h.

Presumptive positive of *Listeria* spp. colonies on OXA and PALCAM were identified by the development of a black halo in less than two days. Five or more typical colonies from OXA and PALCAM were transferred to individual Tryptic Soy Agar with yeast extract (TSAYE) plates and purified by the streak plate method. More than one species of *Listeria* may be isolated from the same sample; therefore, 5 or more isolates are necessary. TSAYE plates were incubated at  $30^\circ\text{C}$  for 24–48 h. Bacteria isolated from typical *Listeria* spp. type colonies, when examined in a wet mount (using sterile buffered peptone water, with the oil immersion objective of a phase-contrast microscope), are slim, short rods with slight rotating or tumbling motility.

Additional confirmation included positive Gram stains, positive catalase production, identification by Listeria API biochemical tests (bioMérieux, Inc., Hazelwood, MO), and blue colonies with an opaque halo on Agar *Listeria* according to Ottaviani and Agosti (ALOA) media (Microbiology International, Frederick, MD) (19). For quantitative tests, an additional 50-g portion of sample (composite from the five pieces tested previously) was analyzed from the confirmed *L. monocytogenes* positive samples. These samples were diluted 1:5 in buffered peptone water (Difco), and 0.1 ml was directly

**TABLE 1. *Listeria* positive seafood products\***

Product	Breaded/ Battered	Raw/ Partially cooked	<i>Listeria</i> species
Beer battered cod	yes	raw	<i>L. monocytogenes</i>
Cod fillet	yes	raw	<i>L. welshimeri</i>
Cod fish sticks	yes	partially cooked	<i>L. welshimeri</i>
Flounder fillet	yes	raw	<i>L. monocytogenes</i>
Formed cod	yes	raw	<i>L. monocytogenes</i>
Formed cod	yes	raw	<i>L. monocytogenes</i>
Formed cod	yes	raw	<i>L. monocytogenes</i>
Formed pollock	yes	partially cooked	<i>L. monocytogenes</i>
Minced cod	yes	partially cooked	<i>L. monocytogenes</i>
Minced cod	yes	partially cooked	<i>L. monocytogenes</i>
Pollock squares	yes	raw	<i>L. monocytogenes</i>
Atlantic salmon *	no	raw	<i>L. welshimeri</i>
Catfish fillet *	no	raw	<i>L. monocytogenes</i>
Cod fillet	no	raw	<i>L. welshimeri</i>
Crab cakes	no	raw	<i>L. monocytogenes</i>
Whiting fillet	no	raw	<i>L. monocytogenes</i>

\* all products purchased frozen except for those marked with \*

plated onto PALCAM agar, MOX agar, and ALOA agar media. All media and analytical procedures were tested with a positive control culture developed from a four strain (Scott A, LCDC, V7 and D43) cocktail of *L. monocytogenes*.

**RESULTS AND DISCUSSION**

Qualitative collective test results of samples revealed that 16 of the 112 (14.3%) were positive for *Listeria* species. *L. monocytogenes* was identified in 12 of these (10.7% of total) and *L. welshimeri* in the other 4 (3.6% of total). For the raw and partially cooked battered and breaded seafood products, 11 of the 79 samples (13.9%) were positive for *Listeria* species (Table 1). *L. monocytogenes* was identified in 9 of these (11.4% of total) and *L. welshimeri* in the other 2 (2.5% of total). Among 33 raw and partially cooked non-battered and breaded samples, 5 (15.2%) were positive for *Listeria* spp., including 3 (9.1%) that were *L. monocytogenes* positive. None of the 12 fully-cooked products were positive for *Listeria* spp.

The results were similar to those of previous studies that focused on seafood and seafood products other than those breaded and battered. Weagant et al. (20) found 15 of 57 (27%) frozen samples positive for *L. monocytogenes*, including raw shrimp, cooked and peeled shrimp, cooked crab meat, raw lobster tails, langostinos, scallops, squid and surimi-based imitation seafoods from nine different countries. Farber (5) isolated *L. monocytogenes* from 15 of 113 (13.3%) samples of RTE shrimp, crab or salmon. Rawles et al. (15) reported that 10 of 126 (7.9%) of freshly cooked and picked blue crab meat samples tested positive for *L. monocytogenes*. Jeyasekaran et al. (10) detected *L. monocytogenes* in shellfish (4 of 36, or 12.1%) and finfish (5 of 29, or 17.2%). Laciari and Centorbi (13) sampled squid, hake, mackerel and mussels from Argentina and found 12 out of 100 (12%) were positive for *Listeria* spp. including 3 (3%) that were positive for *L. monocytogenes*. Drake and Marshall (4) reported the incidence of *L. monocytogenes* to be 2% and 73% in channel catfish filets obtained

from a processing plant and from retail, respectively. Also, they showed that detection of *Listeria* spp. was not a reliable indicator for the presence of *L. monocytogenes*. Other surveys for *L. monocytogenes* in fish and seafood products are summarized by Jinneman et al. (11).

As in several other studies (5, 15, 16), levels of *L. monocytogenes* cells were low. Quantitatively, neither PALCAM, Oxford or ALOA plates indicated any bacterial presence; therefore, the concentration of *L. monocytogenes* was less than 50 CFU/g for all 12 samples. Even though the relative concentration of *L. monocytogenes* on seafood products may be low, the organism remains a food safety concern for seafood products (particularly RTE products) because of its continued prevalence, its ability to survive some cooking regimens, increasing numbers of susceptible individuals, common product temperature abuse, and ability to proliferate during refrigerated storage.

Consumers often prefer a breaded and battered seafood product with a cooked appearance at retail, leading processors to partially cook or brown a

product. This, however, may provide an avenue for increased risk of listeriosis. Although these products receive a heat treatment during production, the responsibility for final lethality is passed on to the consumer. When these products are prepared in the oven or deep fryer, it is possible to undercook the product because of its cooked appearance, producing a cooked-looking product with a "hot" center that has not reached proper lethality temperatures for *L. monocytogenes*. However, this may be prevented if manufacturers provide consumers with a recommended internal cooked product temperature along with understandable cooking instructions to achieve the recommended internal temperature to ensure a safe product. Whenever possible, the consumer should check internal product temperature by use of a calibrated thermometer, recognizing the fact that in many cases the portions are too thin to allow the consumer to properly check internal temperatures.

## ACKNOWLEDGMENT

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# Food Safety Training and Foodservice Employees' Knowledge and Behavior

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## SUMMARY

Statistics show that 59% of foodborne illnesses are traced to restaurant operations. Food safety training has been identified as a way to assure public health, yet evidence supporting the effectiveness of training has been inconclusive. A systematic random sample of 31 restaurants in three midwestern states was selected to assess the effect of training on food safety knowledge and behavior. A total of 402 employees (242 pre-training and 160 post-training) participated in this study. Pre- and post-training assessments were conducted on knowledge and behavior related to three key food safety practices: cross contamination, poor personal hygiene, and time/temperature abuse. Overall knowledge ( $P \leq .05$ ) and compliance with standards of behavior ( $P \leq .001$ ) improved significantly between pre- and post-training. When each practice was examined independently, only handwashing knowledge ( $P \leq .001$ ) and behavior ( $P \leq .001$ ) significantly improved. Results indicated that training can improve knowledge and behaviors, but knowledge alone does not always improve behaviors.

## INTRODUCTION

The United States has one of the safest food supplies in the world. However, food safety has again come to the forefront in the past year with outbreaks of *Escherichia coli* O157:H7, including two associated with lettuce consumed at Mexican restaurants in the midwestern and northeastern United States (5). This attention has caused many consumers to doubt the safety of food served in restaurants and other institutions (2, 14).

Foodborne illness prevention is a significant concern and a public health priority in the United States. Yet, foodborne illnesses remain prevalent, and in spite of the positive strides made in commercial eating establishments, a significant proportion of foodborne illness cases are traced back to restaurants (9, 10, 22). In 2005, 59% of foodborne illness outbreaks reported to FoodNet were associated with restaurants (4).

The top five risk factors of foodborne outbreaks in foodservice operations include improper holding temperatures, inadequate cooking, contaminated equipment, purchase and receipt of food from unsafe sources, and poor personal hygiene. These are all directly related to food handler error and can be prevented if food handlers follow proper food safety practices (12, 13, 15).

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In 1998, the Food and Drug Administration (FDA) (12) conducted a study to ascertain the rate at which food handlers were in-compliance with standards established in the Food Code (11). The FDA (12) found that only 60% and 74% of quick-service and full-service restaurants, respectively, were in compliance with identified standards (12). Compliance rates in the restaurant industry were lower than those in hospitals (80%), nursing homes (82%), and elementary schools (80%). The lowest compliance rates in restaurants were related to cross contamination (70%), improper holding/time-temperatures (67%), and poor personal hygiene (55%), all of which have been identified as the most frequently implicated factors in foodborne illness outbreaks (3, 7, 20). A follow-up study by the FDA (13) found that scores across the six risk factors had improved only 1.4% in full-service restaurants and had not changed in quick-service restaurants.

Researchers have reported that food safety training is effective in increasing sanitation inspection scores (8, 17), the microbiological quality of food (6), and self-reported changes in food safety practices (19). However, research has found that foodservice managers and employees receiving training on proper food handling practices and obtaining adequate food safety knowledge does not always translate into improved behaviors (e.g., 16, 18, 23).

Wright and Feun (23) evaluated the effect of foodservice manager certification on inspection scores. They found no significant improvements in knowledge scores between pre- and post-tests, whether the post-tests were administered immediately following the program or six months later. Mathias et al. (18) compared the inspection violations for foodservice establishments with varying numbers of food handlers who were educated in food safety or not. Results indicated that the number of food handlers trained in food safety had no significant effect on food safety inspection violations.

Little research has been conducted exploring actual behavior of foodservice employees before and after food safety training. The purpose of this study was to determine if food safety knowledge and behaviors among employees improved as a result of taking a four-hour food safety training class based on ServSafe®.

## METHODOLOGY

The population for this study was food handlers in commercial independent and chain restaurants licensed to sell food in Kansas, Missouri, and Iowa. Because of budgetary limitations, to qualify for the sample, operations had to be located within 300 miles of the research university. Kansas and Iowa restaurants were chosen from a state agency listing of licensed operations. For Missouri, the telephone directory was used to obtain the names of operations, because the state has no licensing system. Using a systematic random sample, 1,298 restaurant managers were called to request that they participate in the study. In return for their participation, managers were offered free food safety training for their production employees.

Prior to training, employees were asked to complete a 54-item knowledge assessment targeting the three main behaviors that contribute to foodborne illness. The assessment included three questions for each of the three behaviors: cross contamination (properly handling food and work surfaces), time and temperature abuse (use of thermometers), and personal hygiene (handwashing). Each of the nine multiple choice questions had six response options. Respondents were asked to circle all answers within each question they believed to be correct. If an employee circled a response that was correct, that item was coded with a 1. If the response circled was incorrect, the item was coded as a 0. Thus, the mean of each of the 54 individual knowledge items could range from 0 to 1, with an overall composite score of 54 possible. All of the questions within each behavioral category were then combined for possible composite scores of 18. For example, if a respondent answered 13 handwashing questions correctly, his or her composite handwashing score would be 13.

After the knowledge assessment was completed, trained researchers observed each employee in a three-hour period during a lunch or dinner work shift, using a validated restaurant food safety observation form (21). This form included nine behaviors for properly handling food and work surfaces, six for thermometer use, and 16 for handwashing (10 for when to wash hands and six for how to wash

hands). During observations, researchers recorded whether these behaviors were performed correctly or incorrectly. For each of the 31 specific behaviors, the number of occasions that behavior was performed correctly was divided by the total number of observations of that behavior to obtain a percentage of behaviors performed correctly. As an example, if researchers observed an employee washing his or her hands prior to using gloves on two occasions and observed the employee not doing so on three other occasions, the total number of observations would be five, making the percentage of behaviors performed correctly 40%. Composite percentages also were calculated for each of the three broad behaviors (handwashing, handling of food/cleaning and sanitizing, and thermometer use) to represent the extent to which the three behaviors were performed properly.

Following the initial knowledge assessment and observations, employees attended a four-hour ServSafe® class in which the ServSafe® Employee Guide and supporting materials were used. Following the training, employees completed the same knowledge assessment they had completed prior to training and then were observed in the restaurant operation while using the same research procedures.

Through use of SPSS for Windows 11.5, descriptive statistics (frequencies, means, and standard deviations) and independent samples t-tests were used to analyze the data. Reliability analysis was conducted for both the pre-training and post-training knowledge assessment questions, yielding an alpha coefficient of .70 and .75, respectively. Simple linear regression was used to analyze relationships among variables. The type I error rate for all comparisons was set at .05.

## RESULTS

### Response rate

Of the 1,298 restaurant managers contacted, 31 restaurant managers agreed to participate and completed this phase of the project, yielding 242 employees who completed the pre-training assessment. Due to employee turnover and dropouts, 160 employees were trained and completed the post-training knowledge assessment and observation period.

**TABLE 1. Characteristics of employees**

Characteristic	n (%)			Characteristic	n (%)		
	Total (n=402)	Pre- Training (n=242)	Post- Training (n=160)		Total (n=402)	Pre- Training (n=242)	Post- Training (n=160)
<b>Age</b>				<b>Education</b>			
25 years or younger	175 (43.5)	95 (39.3)	80 (50.0)	Less than High School	68 (17.0)	39 (16.1)	29 (18.1)
26 – 35 years	79 (19.7)	43 (17.8)	36 (14.9)	High School Graduate	119 (29.6)	65 (26.9)	54 (33.8)
36 – 45 years	42 (10.5)	27 (11.2)	15 (9.4)	Some College	79 (19.7)	45 (18.6)	34 (21.2)
45 years or older	24 (6.0)	15 (6.2)	9 (5.6)	Associate's Degree	28 (7.0)	17 (7.0)	11 (6.9)
				Bachelor's Degree	24 (6.0)	13 (5.4)	11 (6.9)
<b>Gender</b>				<b>Hours Worked/Week</b>			
Male	225 (56.0)	128 (52.9)	97 (60.6)	Less than 20	36 (9.0)	19 (7.8)	17 (10.6)
Female	109 (27.1)	59 (24.4)	50 (31.3)	20 – 39	159 (39.6)	93 (38.4)	66 (41.3)
				40 – 59	95 (23.6)	51 (21.1)	44 (27.5)
<b>Years of Experience in the Foodservice Industry</b>				60 – 79	24 (6.0)	13 (5.4)	11 (6.9)
Less than 1 year	37 (9.2)	20 (8.2)	17 (10.6)	80 or more	1 (0.3)	0 (0)	1 (0.6)
1 – 5 years	123 (30.6)	73 (30.1)	50 (31.3)	<b>Food Safety Certified</b>			
6 – 10 years	80 (19.9)	43 (17.8)	37 (23.1)	Yes	110 (27.4)	63 (26.0)	47 (29.4)
11 – 15 years	26 (6.5)	13 (5.3)	13 (8.1)	ServSafe®	84 (20.9)	45 (18.6)	39 (24.4)
16 – 20 years	19 (4.7)	12 (4.9)	7 (4.4)	Serving-it-Safe	12 (3.0)	6 (2.5)	6 (3.8)
21 years or longer	19 (4.7)	10 (4.1)	9 (5.6)	Other	11 (2.7)	9 (3.7)	2 (1.2)
				No	206 (51.2)	113 (46.7)	93 (58.1)
<b>Years in Current Position</b>							
Less than 1 year	163 (40.6)	95 (39.3)	68 (42.5)				
1 – 5 years	117 (29.1)	61 (25.2)	56 (35.0)				
6 – 10 years	16 (4.0)	7 (2.9)	9 (5.6)				
11 – 15 years	4 (1.0)	2 (0.8)	2 (1.2)				
16 – 20 years	1 (0.3)	1 (0.4)	0 (0)				
21 years or longer	6 (1.5)	4 (1.7)	2 (1.3)				

<sup>a</sup> Percentages may not total 100% due to non-responses

**TABLE 2. Comparison of pre- and post-training knowledge composite scores**

Category	Mean Correct ± SD <sup>a</sup>	
	Pre-Training <sup>b</sup> (n = 177)	Post-Training <sup>b</sup> (n = 146)
Cross contamination	14.0 ± 2.05	14.0 ± 2.60
Handwashing	15.2 ± 2.14	16.3 ± 1.86**
When to wash hands	5.4 ± .79	5.5 ± .80
How to wash hands	9.8 ± 1.74	10.7 ± 1.30*
Use of thermometers	13.6 ± 2.55	13.9 ± 2.47
Overall knowledge	42.8 ± 5.1	44.1 ± 5.3*

<sup>a</sup> Mean Number of Items Correct ± Standard Deviation

<sup>b</sup> Responses were coded on a two point scale with 0 for incorrect responses; and 1 for correct responses; a perfect score would be 54, or for each practice (cross contamination, handwashing, or use of thermometers) 18. For when to wash hands, a perfect score was 6, for how to wash hands 12.

\*P ≤ .05

\*\*P ≤ .001

## Employee characteristics

Characteristics of employees who participated in the project are presented in Table 1. The majority of employees were male (56.0%). The age of employees ranged from 15 to 79, with a mean of 28 years. Employees had worked an average of 7.6 years in the foodservice industry and an average 2.3 years in their current position. The majority of employees (69.4%) worked more than 20 hours per week.

## Knowledge

Independent samples t-tests were conducted to assess the effect of food safety training on knowledge. Overall, knowledge scores increased significantly between the pre- ( $M = 42.8$ ,  $SD = 5.1$ ) and post-training ( $M = 44.1$ ,  $SD = 5.3$ ) assessments ( $P \leq .05$ ). When the mean composite scores for the separate categories were compared between pre- and post-training, knowledge increased significantly only for the handwashing composite score ( $P \leq .001$ ) (Table 2). Within the handwashing assessment questions, the composite score for questions just related to how to wash hands improved significantly ( $P \leq .001$ ). However, questions related to when to wash hands did not improve significantly.

The number of correct responses for several individual questions within each behavioral category increased significantly between pre- and post-training assessments (Table 3). Despite having attended the food safety training class that included discussion of correct food safety practices about food handling and cleaning and sanitizing work surfaces, employees' scores decreased for individual knowledge questions related to ensuring sanitation of work cutting surfaces ( $P \leq .05$ ) and washing hands when working in food production ( $P \leq .001$ ). However, significant improvement was found in knowledge scores for cleaning and sanitizing surfaces between each food preparation task ( $P \leq .05$ ). Additionally, after training, more employees correctly answered the questions related to cleaning work surfaces every two hours when performing the same food preparation task ( $P \leq .05$ ) and minimizing raw food contact with bare hands when food will be cooked ( $P \leq .05$ ).

For knowledge questions related to thermometer use, scores improved in

knowing that cold food is to be held at 41°F or lower ( $P \leq .05$ ), that hot food is to be held above 135°F ( $P \leq .001$ ), and that a thermometer should be used to check the temperature of foods when it is reheated ( $P \leq .05$ ). More employees also correctly responded that baked goods need not be held above 70°F ( $P \leq .05$ ) to ensure food safety. Significant decreases were found for questions related to improper thermometer usage, including the question on tasting as an acceptable way to assure the food is done ( $P \leq .001$ ) and the question on whether one would need to measure the temperature of food prior to cooking ( $P \leq .001$ ). These findings may be a concern to trainers, given that employees were taught that tasting is not an acceptable method for ensuring that food is cooked.

For handwashing questions, employees' knowledge had improved after training for understanding that shaking hands vigorously is not a proper drying method ( $P < .05$ ). Scores showed that respondents had learned that 20 seconds ( $P \leq .05$ ) rather than 15 seconds ( $P \leq .001$ ) is necessary for proper handwashing, and that warm water should not be used to wash hands ( $P \leq .001$ ) (hands should be washed with hot water). Also, scores showed that trainees understood that using a hand sanitizer ( $P \leq .05$ ) is not necessary for proper handwashing. As for when to wash hands, the one factor for which the score did improve significantly was ensuring that hands are washed before glove usage ( $P \leq .001$ ).

Simple linear regression was used to examine the relationship between the post-training total knowledge score (dependent variable) and the employees' characteristics – gender, age, education, certification, years of experience, and hours worked per week – as the independent variables. The stepwise regression model showed that the overall model was significant ( $F = 14.798$ ,  $P \leq .001$ ). The significant independent variable in the model was the employees' educational level ( $\beta = .334$ ,  $P \leq .001$ ); as an employee's educational level increased, so did his or her food safety knowledge.

## Behaviors

Independent samples t-tests were conducted to assess the effect of food safety training on behavioral compliance. The overall percentage of behaviors

performed correctly across the three behavioral categories increased significantly between pre-training and post-training ( $P \leq .001$ ). When the composite mean percentages of each behavioral category were examined independently, only the behavioral composite related to handwashing increased significantly ( $P \leq .001$ ) (Table 4). Specific behaviors for which a significant improvement was observed included washing hands at designated times to reduce cross contamination ( $P \leq .001$ ) and using the correct handwashing procedure ( $P \leq .05$ ).

Several individual behaviors observed showed significant improvement between pre- and post-training observations (Table 5). For properly handling food and work surfaces, significant improvements were made in assuring that food contact surfaces were clean ( $P \leq .05$ ) and storing sanitizing cloths in a sanitizing solution ( $P \leq .05$ ). No significant improvements on individual items for thermometer use were found, as thermometers were often not available for employees to use, which is a concern because such unavailability is a health code violation. However, for handwashing, all employees in the post-training observations washed their hands at the beginning of the shift ( $P \leq .001$ ), compared to the initial observations in which only 62.5% of employees did so. Significant improvements also were noted in washing hands before putting on gloves ( $P \leq .001$ ), after handling raw food ( $P \leq .05$ ) or chemicals ( $P \leq .001$ ), and when food preparation tasks were interrupted or changed ( $P \leq .05$ ). Within handwashing procedures, employees improved on washing hands for 20 seconds ( $P \leq .05$ ), washing their arms above their wrists ( $P \leq .001$ ), cleaning between fingers ( $P \leq .001$ ), and drying their hands with a single-use paper towel or warm-air hand dryer ( $P \leq .05$ ).

Simple linear regression was used to examine the relationship between the employees' post-training behavior composite score (dependent variable) and total knowledge score (independent variable). The regression model showed that there was a significant ( $F = 4.266$ ,  $P \leq .05$ ) positive relationship between the two. Further analysis determined that none of the post-training knowledge scores influenced their corresponding post-training behaviors in any of the three behavioral categories. In other words, general knowledge is related

**TABLE 3. Comparison of pre- and post-training knowledge scores**

Questions <sup>a</sup> – Food Handling, Cleaning and Sanitizing Work Surfaces	Mean % Correct ± SD		% Change in Mean
	Pre-Training (n=177)	Post-Training (n=146)	
<b>1. Which of these things should be cleaned and sanitized when working in the food preparation area?</b>			
A. Cutting surfaces*	99.4 ± 7.6	94.9 ± 22.0	-4.5
B. Hands*	99.4 ± 7.7	92.0 ± 27.1	-7.4**
C. Utensils*	97.1 ± 16.9	94.9 ± 22.0	-2.2
D. Countertops*	93.5 ± 24.6	92.0 ± 27.2	-1.5
E. Floors*	61.8 ± 48.7	55.0 ± 49.9	-6.8
F. Stovetops*	76.5 ± 42.5	73.1 ± 44.5	-3.4
<b>2. Food surfaces should be cleaned and sanitized at which of the following times?</b>			
A. Before preparing foods*	91.8 ± 27.6	87.0 ± 33.8	-4.8
B. When switching from one food preparation task to another*	84.7 ± 36.1	95.6 ± 20.5	10.9**
C. Between each food preparation task*	80.6 ± 39.6	89.1 ± 31.2	8.5*
D. When they become contaminated*	77.7 ± 41.8	79.7 ± 40.4	2
E. When only working with ready-to-eat foods	78.2 ± 41.4	77.6 ± 41.9	-0.6
F. Every 2 hours when performing the same food preparation task	45.3 ± 49.9	56.5 ± 49.7	11.2*
<b>3. Raw foods that will be cooked before serving should not come into contact with which of the following?</b>			
A. Ready-to-eat foods*	94.7 ± 22.5	94.2 ± 23.4	-0.5
B. Floor*	87.7 ± 33.0	81.8 ± 38.7	-5.9
C. Utensils	66.5 ± 47.3	71.7 ± 45.1	5.2
D. Other raw foods*	67.0 ± 47.1	64.5 ± 48.0	-2.5
E. Countertops	53.5 ± 50.0	52.9 ± 50.1	-0.6
F. Bare hand	36.4 ± 48.2	54.4 ± 50.0	18**
<b>Questions<sup>a</sup> – Use of Thermometers</b>			
<b>4. Which of the following temperatures are correct for food preparation?</b>			
A. Cold food is held below 41°F*	89.4 ± 30.9	95.7 ± 20.5	6.3*
B. Food is reheated to 165°F*	81.2 ± 39.2	84.8 ± 36.1	3.6
C. Baked goods are held above 70°F	72.4 ± 44.9	81.9 ± 38.6	9.5*
D. Beverages are held below 50°F	68.8 ± 46.5	76.1 ± 42.8	7.3
E. Hot food is held above 135°F*	65.3 ± 47.7	86.2 ± 34.6	20.9**
F. Ice must be below 0°F	65.9 ± 47.6	64.5 ± 48.0	-1.4
<b>5. To properly check the temperature of food, which of the following should be done?</b>			
A. Taste it to see if it tastes right	97.1 ± 16.9	86.2 ± 34.6	-10.9**
B. Use a calibrated, sanitized thermometer*	95.8 ± 19.9	96.4 ± 18.8	0.6
C. Touch it to see that it is hot enough	95.3 ± 21.2	94.2 ± 23.5	-1.1
D. Look at it to make sure it is the right color	79.4 ± 40.5	70.3 ± 45.9	-9.1
E. Check the center of the food rather than the surface*	66.5 ± 47.3	71.0 ± 45.5	4.5
F. Make sure it has been cooking for the correct amount of time	55.3 ± 49.9	50.0 ± 50.2	-5.3
<b>6. When should a thermometer be used to check the temperature of food? (Circle all that apply.)</b>			
A. At the completion of cooking*	88.2 ± 32.3	89.8 ± 30.3	1.6
B. Prior to cooking	81.2 ± 39.2	63.0 ± 48.5	-18.2**
C. After reheating*	71.2 ± 45.4	85.5 ± 35.3	14.3*
D. On the hotline*	66.5 ± 47.3	68.8 ± 46.5	2.3
E. On the coldline*	65.8 ± 47.5	66.7 ± 47.3	0.9
F. At the midpoint in cooking	56.5 ± 49.7	55.0 ± 49.9	-1.5

**TABLE 3. (Continued) Comparison of pre- and post-training knowledge scores**

Questions <sup>a</sup> – Handwashing	Mean % Correct ± SD		% Change in Mean
	Pre-Training (n=177)	Post-Training (n=146)	
<b>7. After handwashing, hands should be dried:</b>			
A. With a single use paper towel*	98.8 ± 10.8	98.5 ± 11.9	-0.3
B. On pants	98.2 ± 13.2	100.0 ± 0.00	1.8
C. With an apron	95.8 ± 19.9	99.3 ± 8.5	3.5
D. With a common towel	90.6 ± 29.3	93.5 ± 24.8	2.9
E. By shaking vigorously	90.6 ± 29.3	95.7 ± 20.5	5.1
F. With an air dryer*	67.7 ± 46.9	55.8 ± 49.8	-11.9*
<b>8. Which of the following are necessary for proper handwashing?</b>			
A. Soap*	99.4 ± 81.0	94.9 ± 22.0	-4.5
B. 20 seconds*	87.7 ± 33.0	96.4 ± 18.8	8.7*
C. 15 seconds	87.0 ± 33.7	96.4 ± 18.8	9.4*
D. Hot water*	72.4 ± 44.8	86.2 ± 34.6	13.8*
E. Warm water	57.7 ± 49.6	81.9 ± 38.7	24.2**
F. Hand sanitizer	40.0 ± 49.1	73.9 ± 44.1	33.9**
<b>9. Hands should be washed for food safety purposes in which of the following circumstances?</b>			
A. After going to the restroom*	98.2 ± 13.2	96.4 ± 18.8	-1.8
B. Before work*	97.1 ± 16.9	96.4 ± 18.8	-0.7
C. After touching body parts*	95.8 ± 21.9	96.4 ± 18.8	0.6
D. When switching food preparation tasks*	90.0 ± 30.1	94.9 ± 22.0	4.9
E. Before putting on gloves*	82.9 ± 37.7	94.2 ± 23.5	11.3*
F. Before going to the bathroom	70.6 ± 45.7	73.2 ± 44.5	2.6

<sup>a</sup>Respondents were asked to circle all responses that were correct for each question.

\*P ≤ .05

\*\*P ≤ .001

\*Denotes that the item was correct if circled.

**TABLE 4. Comparison of pre- and post-training behavior composite scores**

Category	N		Mean % Correct ± SD <sup>a</sup>	
	Pre-Training	Post-Training	Pre-Training <sup>b</sup>	Post-Training <sup>b</sup>
Cross contamination	186	91	60.4 ± 33.5	65.8 ± 32.8
Handwashing	208	98	31.2 ± 24.5	45.5 ± 25.0**
When to wash hands	212	98	24.5 ± 25.7	35.2 ± 28.8**
How to wash hands	174	94	53.0 ± 27.5	62.3 ± 23.7*
Use of thermometers	70	35	19.8 ± 35.9	24.5 ± 38.1
Overall food safety compliance <sup>c</sup>	208	98	36.8 ± 22.8	47.2 ± 23.8**

<sup>a</sup>Mean Percentage of Behaviors Performed Correctly ± Standard Deviation.

<sup>b</sup>Behaviors were coded as done either correctly or incorrectly. The number of behaviors performed correctly was divided by total number of behaviors observed to calculate the percent of behaviors performed correctly.

<sup>c</sup>Overall food safety compliance is a composite of the three behavioral categories.

\*P ≤ .05

\*\*P ≤ .001



**TABLE 5. Pre- and post-training comparison of behavioral compliance percentages**

Observed Activity	N		Mean % Correct $\pm$ SD <sup>a</sup>	
	Pre-Training	Post-Training	Pre-Training <sup>b</sup>	Post-Training <sup>b</sup>
<b>Food Handling, Cleaning and Sanitizing</b>				
Leftovers labeled & dated (check anything over 7 days old)	3	0	100.0 $\pm$ 00.0	--
Separate raw products from cooked and ready-to-eat products	24	5	83.3 $\pm$ 38.1	80.0 $\pm$ 44.7
Food contact surfaces are free of dust, dirt, and food particles	143	67	79.1 $\pm$ 34.1	88.9 $\pm$ 24.2*
Food is covered and labeled properly before holding or storing	76	42	78.6 $\pm$ 36.9	87.2 $\pm$ 31.5
Food is covered when transported	84	32	68.9 $\pm$ 42.6	54.7 $\pm$ 46.4
Wiping cloths are stored in a sanitizing solution	72	25	69.4 $\pm$ 44.8	88.0 $\pm$ 33.2*
Separate wiping cloths are used for food and nonfood surfaces	31	6	38.7 $\pm$ 49.5	66.7 $\pm$ 51.6
All food-contact surfaces must be <u>washed</u> , <u>rinsed</u> , and <u>sanitized</u> anytime the type of food or ingredients are switched	88	44	23.2 $\pm$ 38.6	28.5 $\pm$ 37.4
All food-contact surfaces must be <u>washed</u> , <u>rinsed</u> , and <u>sanitized</u> after touching anything that might contaminate the food contact surface	84	34	15.1 $\pm$ 33.9	27.3 $\pm$ 42.4
<b>Thermometers</b>				
Food stored on the hot line is at least 135°F	4	2	100.0 $\pm$ 0.0	100.0 $\pm$ 0.0
Food stored on the cold line is 41°F or less	3	4	66.7 $\pm$ 57.7	87.5 $\pm$ 25.0
Check internal temperature of food by inserting the thermometer stem or probe into the thickest part of the product	16	7	64.6 $\pm$ 47.9	71.4 $\pm$ 48.8
Wash, rinse, sanitize, and air-dry before and after use	12	10	33.3 $\pm$ 49.2	30.0 $\pm$ 48.3
Check temperature of food at the completion of cooking	60	29	14.7 $\pm$ 34.3	21.2 $\pm$ 41.0
Check temperature of food at the completion of reheating	15	5	13.3 $\pm$ 35.2	20.0 $\pm$ 44.7
<b>Handwashing</b>				
When shift begins	40	15	62.5 $\pm$ 49.0	100 $\pm$ 00**
Returning to the work area (after smoking, eating, chewing gum or tobacco, bussing dirty dishes, or using the restroom)	165	68	47.8 $\pm$ 40.4	50.2 $\pm$ 42.3
Before putting on clean gloves	148	78	41.5 $\pm$ 36.9	57.8 $\pm$ 35.0**
When food preparation tasks are interrupted or changed	162	65	37.4 $\pm$ 38.9	54.0 $\pm$ 38.5*
Handling chemicals that might contaminate food	50	21	18.8 $\pm$ 37.0	66.7 $\pm$ 42.8**
Handling raw food (before and after)	91	41	15.9 $\pm$ 31.0	34.7 $\pm$ 39.2*
Touching anything else that may contaminate hands, such as unsanitized equipment, work surfaces, cleaning cloths, and drinking straw	189	74	10.8 $\pm$ 22.7	17.1 $\pm$ 24.2
Sneezing, coughing, or using a handkerchief or tissue	18	4	11.1 $\pm$ 27.4	25.0 $\pm$ 50.0
Touching body parts (hair, face, or body)	106	31	4.8 $\pm$ 18.3	17.7 $\pm$ 36.7
Touching clothing or aprons	149	67	1.1 $\pm$ 5.6	2.5 $\pm$ 12.9
<b>Hand Washing Procedure</b>				
Dry hands and arms with a single-use paper towel or warm-air hand dryer	172	94	93.3 $\pm$ 21.2	98.9 $\pm$ 8.9*
Rinse thoroughly under running water	173	94	93.1 $\pm$ 24.2	95.3 $\pm$ 16.8
Clean between fingers	173	94	44.1 $\pm$ 44.5	65.1 $\pm$ 39.7**
Vigorously scrub hands for at least 20 seconds	173	94	35.6 $\pm$ 43.3	51.7 $\pm$ 41.1*
Vigorously scrub arms above wrists for at least 20 seconds	173	94	27.9 $\pm$ 40.1	45.6 $\pm$ 41.0**
Clean under fingernails	173	94	22.1 $\pm$ 40.2	17.3 $\pm$ 34.5

<sup>a</sup> Mean Percentage of Behaviors Performed Correctly  $\pm$  Standard Deviation

<sup>b</sup> Behaviors were coded as either done correctly or incorrectly. The number of behaviors performed correctly was divided by total number of behaviors observed to calculate the percent of behaviors performed correctly.

\*  $P \leq .05$

\*\*  $P \leq .001$



to general behavior, but no individual behavior is driving the relationship more than others.

## CONCLUSIONS AND APPLICATIONS

The results of this study found that overall behavioral compliance remained low even after food safety training. For several behaviors, the mean was fairly high in the pre-test (e.g., leftovers labeled and dated, food stored on the hot line is at least 135°F) so there was not significant room for improvement. However, even those behaviors with low compliance scores during the pre-training observation (e.g., check internal temperature of food by inserting the thermometer stem or probe into the thickest part of the product), which could have improved substantially, did not. Results did indicate that food safety training had a significant influence on employees' overall handwashing knowledge and behaviors but had little impact on overall cross contamination and thermometer use. These results may be due to the training, which used a hands-on Glo Germ® demonstration to emphasize the importance of handwashing but which had no hands-on activities related to thermometer use and properly handling of food and work surfaces. Also, employees had greater prior knowledge of handwashing, and the training may have reinforced that preexisting knowledge. For thermometers, employees often did not have thermometers to use, which would inhibit their behaviors. It was interesting to note that even though employees' knowledge scores related to washing hands after they had become contaminated were very high in both pre- and post-training assessments, these high scores did not influence the behaviors of the employees.

For properly handling food and work surfaces, scores for only three of the 18 knowledge items and two of the nine behaviors increased significantly. The behavior in lowest compliance after training was the one related to the requirement that all food contact surfaces must be washed, rinsed, and sanitized; only 28% of employees correctly performed this task. This behavior item had high knowledge means. For use of thermometers, again, three knowledge items were significantly

higher and two items significantly lower for post training. The behaviors observed out-of-compliance most often were checking food at the completion of cooking (21%) or reheating (20%). These behavior items had knowledge score means between  $.90 \pm .30$  and  $.86 \pm .35$ , respectively.

This study illustrates that training can have a significant impact on improving knowledge and behaviors. Yet, increasing knowledge does not ensure that behaviors will change, as demonstrated by the high scores on knowledge and low percentages on corresponding behaviors. Therefore, knowledge alone is not sufficient to bring about changes in behavior. These results support the findings of Mathias et al. (18) and Wright and Feun (23). Traditionally, food safety training has focused on increasing knowledge, but more emphasis should be placed on why the behavior should be changed. Clearly, trainers and training programs may be improved by targeting factors rather than just increasing knowledge to change behaviors. The current study indicates that an increase in knowledge does not necessarily mean that a change in behavior will take place.

Whether in a formal food safety class or while conducting inspections, it is imperative that sanitarians not only educate the managers and employees on proper techniques but also on why proper food safety practices must be followed. Key information about food-safety related outbreaks in the area and the consequences for the operation that caused the outbreak could be shared with the managers and employees in the form of newsletters and fliers. This may be more persuasive than what is currently given in formal training and might be enough to bring about a change in behavior.

A primary limitation of this research is the number of restaurants willing to participate in this study. Based on the number of calls (1,298) and the number of participating restaurants (31), the response rate was 2.4%. It was difficult to get restaurant managers to participate in a lengthy research process, even though free employee-paid food safety training was offered. For food safety to improve, restaurant managers must be willing to participate in studies of this type.

Future research should investigate why restaurant managers are unwilling to participate in this type of research

and what are the barriers and/or motivators to increase the use of proper food safety practices within operations. According to the Theory of Planned Behavior (1), such an increase could be attained by exploring ways to influence the attitudes, subjective norms, perceived behavioral controls, intentions and ultimately behavior of foodservice employees to create a long-term change in food safety practices.

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## In Memory

*Gaylord B. Smith*

We extend our deepest sympathy to the family of Gaylord Smith who recently passed away. IAFP will always have sincere gratitude for his contribution to the Association and the profession. Mr. Smith has been a member of IAFP since 1976.

## Highlights of the Executive Board Meeting February 17–18, 2008 Columbus, Ohio

Following is an unofficial summary of actions from the Executive Board Meeting held in Columbus, Ohio on February 17–18, 2008:

### Approved the following:

- Minutes of November 13–14, 2007 Executive Board Meeting
- Minutes of November 13, 2007 Executive Board Executive Session
- Minutes of December 31, 2007 Executive Board Teleconference
- Minutes of January 12, 2008 Executive Board Teleconference
- Increase of spending to 75% of incoming monies for the Speaker Travel Fund
- New Award to recognize young researchers in the first seven years of their career

### Discussed the following:

- E-mail votes taken since the last meeting
- Committee appointments for 2008–2009
- Report from the Program Committee meeting for IAFP 2008
- Ivan Parkin and John H. Silliker Lecturers for IAFP 2008
- Planning update for IAFP 2008
- New registration system for Annual Meeting and Workshops
- Committee meeting schedule for IAFP 2008
- Marketing of IAFP to 5,000 potential new members
- *Journal of Food Protection* author survey
- Planning session scheduled for April Board meeting
- 2008 European Symposium planning – tentative for Lisbon, Portugal – November 19–21, 2008
- Latin America Symposium on Food Safety, Campinas, SP, Brazil – May 26–28, 2008
- China International Food Safety & Quality, Beijing, China September 24–26, 2008

- Dubai International Food Safety Conference, Dubai, U.A.E. – February 24–27, 2008
- FoodMicro 2008, Aberdeen, Scotland – September 1–4, 2008
- IAFP's International meeting for 2009 – location
- Workshop participation – outside organizers
- Staff pay procedures
- Symposia, workshop and technical abstract submission systems
- Retail process and product innovation conference
- FMRC Foundation contribution
- Non O157 *E. coli* white paper
- WHO–NGO update
- 3–A Sanitary Standards, Inc.
- Timely Topics Symposium on Prepared, But Not Ready-to-Eat Foods review
- Prepare a policy on Program Committee attendance
- Consideration of a leafy greens follow up in California

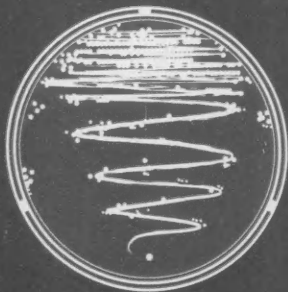
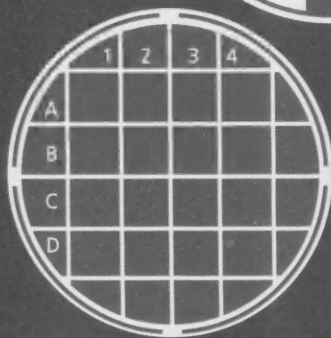
### Reports received:

- *IAFP Report*
- *Food Protection Trends*
- *Journal of Food Protection*
- IAFP Web site
- Membership
- Advertising and sponsorship update
- Board Members attending Affiliate meetings
- *Affiliate View* newsletter
- Future Annual Meeting schedule
- Exhibiting (IAFP On the Road)

Next Executive Board meeting – April 23–25, 2008.

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<sup>1</sup> NACMCF Executive Secretariat, \* 2007. Analytical utility of *Campylobacter* methodologies. U.S. Department of Agriculture, Food Safety and Inspection Service, Washington, D.C. *Journal Food Protect.* 70:241-250.

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# UPDATES

## **Silliker Hires Research Scientist, Dr. Sarita Raengpradub**

**D**r. Sarita Raengpradub has joined the Silliker Food Science Center, South Holland, IL, as a research scientist. A recent graduate of Cornell University, she served as a doctoral research assistant under preeminent food microbiologists Dr. Kathryn Boor and Dr. Martin Weidmann. Her major responsibilities encompass microbial source tracking research and program development.

## **New Director Appointed to Oversee NSF's Expanding Restaurant Food Safety Division**

**N**SF International has announced that Jennifer Tong has been appointed director of NSF's Restaurant Food Safety Division.

In her new role, Ms. Tong is responsible for the strategic development of the NSF Dine Safer™ program, a certification program that helps restaurants and other retail foodservice establishments improve the quality of their food while enhancing their food safety efforts. Dine Safer™ combines both federal and state regulations with Industry Best Practices in food safety, workplace safety and sanitation.

Before joining NSF, Ms. Tong served as a health and safety regulatory affairs consultant for the National Restaurant Association (NRA), advising the Association on health and safety issues. While at the NRA, she also served as NRA's department director. Prior to the NRA, she worked as the director of food safety and nutrition outreach for the United Fresh Fruit and Vegetable Association (UFFVA) where she provided technical advice

to members and association staff departments on produce food safety, food security and nutrition. Ms. Tong has a Bachelor of Science in environmental health from Ohio University in Athens, OH.

## **Aaron Aleithe Named Vice President and General Manager, ABB Inc., Automation Products, Low Voltage Drives**

**A**aron Aleithe has been named vice president and general manager of Low-Voltage Drives at ABB Inc., Automation Products, according to Rick Hepperla, regional division manager for Automation Products in North America. The Low Voltage Drives Business Unit is based in New Berlin, WI. Mr. Aleithe fills the position Hepperla held before his recent promotion to division manager.

In his new role, Mr. Aleithe will be responsible for the continued growth and strategic business development of low voltage drives in the US market. He also will serve as a member of the ABB Global LV Drives Business Unit team, and as a member of the North America Automation Products Division management team.

Mr. Aleithe also will work closely with the Power and Control sales and channel management teams in the US, to ensure continued, aggressive growth in the US industrial market, while extending ABB's leadership position in the US HVAC market segment.

Mr. Aleithe joined ABB in 2005 as vice president of business development for ABB's global Medium Voltage Drives business. He was promoted to vice president and general manager for the Medium Voltage Drives business in North America in 2006. Additionally, he

was named general manager for the Medium Voltage Motors and Low Voltage Motors businesses in North America. Prior to ABB, Aleithe held the position of vice president and director of Strategic Marketing at ASI/Robicon (2000 to 2005). He joined Robicon in 1997 as vice president of sales and marketing. Aleithe has broad experience in drives, motors, and automation, including 17 years at MagneTek and Louis Allis, where he held a variety of sales and marketing positions that included vice president of engineered systems and vice president of sales for the drives and systems business unit. Mr. Aleithe holds a Bachelor of Science Degree in mechanical engineering from the University of Wisconsin in Milwaukee.

## **Apex Manufacturing Solutions Names John Nichols Managing Director**

**A**pex Manufacturing Solutions has announced that John Nichols, formerly director of business development, has been appointed managing director.

In his new post, in addition to sales and marketing activities, Nichols is responsible for setting the company's strategic direction and implementing best business practices and procedures. He also joins Apex's ownership ranks as an equal equity owner and managing member of the limited liability company.

Prior to joining Apex in June, 2007, Nichols held executive management roles at Wonderware Software, the world's foremost manufacturing automation software developer, ISS-Wonderware, a leading Wonderware channel partner, and Incuity Software, Inc., a pioneering business intelligence for manufacturing software provider.

## Probiotics: Live Organisms as Feed Supplements to Fight *Salmonella*

Here's a new way to reduce *Salmonella* in poultry before they go to the processing plant: use probiotics instead of antibiotics for treatment of the birds.

It's been a complex path getting to this point, and the procedure still raises some other issues to be considered. Still, the development offers a way that makes it easy on poultry growers and enhances food safety.

"It's a matter of incorporating the probiotic into either the water or the feed for the poultry," explained Billy Hargis, director of the Poultry Health Research Laboratory at the University of Arkansas System's Division of Agriculture. Results from experiments show that administration of the probiotic can reduce *Salmonella* in either meat-type chicken houses or turkey houses before being transported to the processing plant and reduce the risk of cross contamination among turkeys at the plant.

"It's not a chemical. It's not a drug," explained Hargis, who has pursued the research for the Food Safety Consortium. "These (probiotics) are live organisms."

The term for the probiotic developed in Hargis' lab is FM-B11, also known as a defined lactic acid bacterial culture. Defined cultures eliminate the risk of pathogenic organisms existing within the culture, clearing the way for their effective use in stopping *Salmonella* in commercial poultry.

"Another advantage is that we're talking about organisms that can be produced very cheaply, which keeps the costs of these treatments very low," Hargis said. That's partly because the defined cultures from which the probiotics come

are tolerant of oxygen, avoiding the high cost of fermenting undefined cultures that can't grow in the presence of oxygen.

Antibiotics have long been popular among poultry producers seeking to keep their birds healthy and to promote the birds' growth. Pathogenic bacteria that are harmful to humans are increasing the bacteria's ability to resist antibiotics, but pathogens that can cause animal disease have not built up as much resistance.

"The risk factor for antibiotic resistance from food-producing animals is exceedingly low," Hargis said. But the issue of antibiotic resistance is still becoming a driving force that's making antibiotic usage for animals less popular, and poultry producers are under pressure to use fewer antibiotics. Alternatives are necessary.

Probiotics enter the picture as live organisms that serve as microbial feed supplements for animals to improve their intestinal microbial balance. Hargis' research group has taken the lactobacillus probiotic, a form of milk bacteria found in the bird, and added it to poultry water or feed.

More recent efforts are directed toward beneficial bacteria from a totally different genus called *Bacillus*. During the last year, a substantial laboratory effort has been directed toward identification of organisms of this genus that are harmless to the animals or humans, which inhibit certain pathogenic organisms, and which can produce spores that are resistant to heating or storage. The important part of these new efforts is to develop effective probiotics that can be added to feed, which greatly reduces costs associated with delivery in the drinking water at the farm.

"We can add these to the feed even before pelleting," Hargis said. "The beneficial bacteria in the feed have tremendous advantages

because now we can talk about continuous administration over time. It makes it very simple. It just comes in with the feed."

Replacing antibiotics with probiotics has definite advantages, but there is some tradeoff. Hargis noted that although animal foods won't be populated with antibiotic-resistant bacteria, the lack of antibiotics means producers will need to find other ways to promote their birds' growth. That means giving more feed to the birds to accomplish the task.

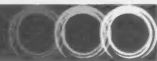
"It's going to take more feed to raise the same amount of meat," Hargis said. "So that means more land has to be involved in row crop production. There's an effect on the world's small grain supply because we'll be putting more small grains into the same amount of meat than we were before." Meanwhile, the price of grain is already going up to meet demand for biofuels, so the price of meats produced from small grains will also rise.

But the advantages offered by probiotics indicate where the future may be. Hargis cited the new probiotic candidate's stability even in the presence of the heat generated when feed is being turned into pellets and its overall environmental stability. The major plus is its usage in the feed itself, which makes it part of an ongoing process.

"We're using it to prevent problems continuously as opposed to treating problems when they occur," Hargis said.

## Quick Analysis of Transport Can Save Problems at Processing Plants

The slaughterhouse's holding pen – known also as lairage – is the end of the line for hogs on their way through the food



chain. It can also be the beginning of the line for the spread of pathogenic *Salmonella* if processors don't take note of whether incoming hogs are bringing the bacteria with them or developing it at the lairage.

The key is finding out early enough in the process at the lairage. That has led Food Safety Consortium researchers at Iowa State University to look for a way to determine within a few hours whether transport vehicles or lairage facilities have a minimal infective dose of *Salmonella*.

They are trying to do so by using a polymerase chain reaction (PCR), a technique for amplifying specific fragments of DNA sequences for ready laboratory analysis.

"We can get a sample in and we use our PCR kit on it," explained Stephen Gaul, an ISU researcher who assisted D. L. (Hank) Harris, professor of animal sciences. "It takes about two hours to do the extractions, depending on how many samples we do at one time. Then running the PCR is another four hours."

About six hours after the sample was obtained, Gaul said, "you'd know if it's positive for *Salmonella* and, hopefully, with the standard controls in there you can find out exactly how much there is in that fecal sample."

Once the results would be known, lairage operators would have time to implement sanitation procedures that would bring any *Salmonella* infection levels down to minimal level, if necessary.

Few studies have been conducted in transport vehicles to determine whether current steps are sufficiently reducing infectious diseases in pigs. Those that have been done indicated that the level of *Salmonella* in cleaned and disinfected transport vehicles is below the level necessary to infect pigs.

The ISU study concentrated on the slaughter plants' holding pens.

Preliminary samples of pens in one slaughter plant suggested that the plant's procedures reduced the transmission of *Salmonella* between different groups of incoming pigs. That could result in a reduction of contaminated carcasses.

Subsequent work will seek to find out if samples from another slaughter plant show effective results in reducing *Salmonella* in its holding pens. Those samples would be compared with the results from the first plant to help make the determination.

## Dude, Wash Your Hands

Proper handwashing with the proper tools – soap, water and paper towel – can significantly reduce the number of foodborne and other illnesses.

People should be washing their hands before handling food and:

- after using the toilet;
- when entering the kitchen to prepare food;
- before handling ready-to-eat food;
- after handling any raw food;
- after changing diapers;
- after playing with or cleaning up after pets; and,
- after handling garbage.

People are continuously exposed to various bacteria and viruses because of improper or no handwashing, such as a simple handshake.

Disease-causing microorganisms such as *Campylobacter*, *Shigella*, hepatitis A, *E. coli* O157:H7 and *Salmonella* can be transmitted via the fecal-oral route, especially when people fail to wash their hands after using the toilet. A study done by the American Society for Microbiology showed that 23% of people who use public restrooms do not wash their hands when they are done.

The steps in proper handwashing, as concluded from the preponderance of available evidence, are:

- wet hands with water;
- use enough soap to build a good lather;
- scrub hands vigorously, creating friction and reaching all areas of the fingers and hands for at least 10 seconds to loosen pathogens on the fingers and hands;
- rinse hands with thorough amounts of water while continuing to rub hands; and,
- dry hands with paper towel.

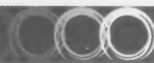
Water temperature is not a critical factor – water hot enough to kill dangerous bacteria and viruses would scald hands – so use whatever is comfortable.

The friction from rubbing hands with paper towels helps remove additional bacteria and viruses.

Next time you visit a bathroom that is missing soap, water or paper towels, let someone in charge know. And next time you see someone skip out on the suds in the bathroom, look at them and say, "Dude, wash your hands!"

## Guide to Minimize Microbial Food Safety Hazards of Fresh-cut Fruits and Vegetables

The Federal Government provides advice on healthful eating, including consuming a diet rich in a variety of fruits and vegetables, through the Dietary Guidelines for Americans and the related MyPyramid food guidance system. In response, per capita consumption data show that Americans are eating more fresh produce. With \$12 billion in annual sales in the past few years, the fresh-cut sector of the produce industry is its fastest growing segment. As the fresh-cut produce market continues to grow, the processors of such produce are faced with the challenge of processing an increasing variety and volume of products in a manner that



ensures the safety of this produce. From 1996 to 2006, seventy-two foodborne illness outbreaks were associated with the consumption of fresh produce. Of these produce related outbreaks, 25 percent (18 outbreaks) implicated fresh-cut produce. Many factors may play a role in the incidence and reporting of foodborne illness outbreaks that implicate fresh produce, such as an aging population that is susceptible to foodborne illness, an increase in global trade, a more complex supply chain, improved surveillance and detection of foodborne illness, improvements in epidemiological investigation, and increasingly better methods to identify pathogens.

Processing fresh produce into fresh-cut products increases the risk of bacterial growth and contamination by breaking the natural exterior barrier of the produce. The release of plant cellular fluids when produce is chopped or shredded provides a nutritive medium in which pathogens, if present, can survive or grow. Thus, if pathogens are present when the surface integrity of the fruit or vegetable is broken, pathogen growth can occur and contamination may spread. The processing of fresh produce without proper sanitation procedures in the processing environment increases the potential for contamination by pathogens (see Appendix B, "Foodborne Pathogens Associated with Fresh Fruits and Vegetables."). In addition, the degree of handling and product mixing common to many fresh-cut processing operations can provide opportunities for contamination and for spreading contamination through a large volume of product. The potential for pathogens to survive or grow is increased by the high moisture and nutrient content of fresh-cut fruits

and vegetables, the absence of a lethal process (e.g., heat) during production to eliminate pathogens, and the potential for temperature abuse during processing, storage, transport, and retail display. Importantly, however, fresh-cut produce processing has the capability to reduce the risk of contamination by placing the preparation of fresh-cut produce in a controlled, sanitary facility.

This guidance is intended for all fresh-cut produce processing firms, both domestic firms and firms importing or offering fresh-cut product for import into the US, to enhance the safety of fresh-cut produce by minimizing the microbial food safety hazards. This guidance does not set binding requirements or identify all possible preventive measures to minimize microbial food safety hazards. We recommend that each fresh-cut produce processor assess the recommendations in this guidance and then tailor its food safety practices to the processor's particular operation. Alternative approaches that minimize microbial food safety hazards may be used so long as they are consistent with applicable laws and regulations.

This guidance primarily addresses microbiological hazards and appropriate control measures for such hazards. However, some chapters in the guidance discuss physical and chemical hazards.

FDA's guidance documents, including this guidance, do not establish legally enforceable responsibilities. Instead, guidances describe the Agency's current thinking on a topic and should be viewed only as recommendations, unless specific regulatory or statutory requirements are cited. The use of the word should in Agency guidances means that something is suggested or recommended, but not required.

## Collaboration to Develop New Test for *E. coli* O157:H7

DuPont Qualicon will collaborate with the US Meat Animal Research Center (USMARC) at Clay Center, NE, on developing a new test for detecting *E. coli* O157:H7 in beef and trim. After responding to an ARS request for proposals on collaboration, DuPont Qualicon and USMARC entered into a cooperative research and development agreement (CRADA).

USMARC is operated by the Agricultural Research Service (ARS), the chief scientific research agency of the US Department of Agriculture. "Our mission is to develop scientific information and new technology to solve high priority problems for the US beef, sheep and swine industries. In the case of *E. coli* O157:H7 detection, we're looking at collaborative ways to quickly develop a new test," said Mohammad Koohmaraie, USMARC director.

"We are very pleased to be working with Dr. Koohmaraie and his team of experts at USMARC. Our long history of commitment to the meat industry with applications of the best science available fits well with USMARC goals for a better *E. coli* O157:H7 test," said Ravi Ramadhar, business development director for DuPont Qualicon.

*E. coli* O157:H7 is a foodborne pathogen usually associated with eating undercooked, contaminated ground beef. Even in low concentrations, it can cause severe illness, sometimes leading to hemolytic uremic syndrome (HUS) and kidney failure in at-risk populations. After several years of declining incidence, 2007 saw a resurgence with more than 30 million pounds of ground beef recalled due to possible *E. coli* O157:H7 contamination.



# INDUSTRY PRODUCTS



Eriez

## **Eriez® XR-41 and XR-51 X-Ray Inspection Systems are Equipped to Handle Large, Tall Packages, Respectively**

Eriez® has two new models of X-Ray inspection systems: The XR-41 and XR-51. These advanced machines are designed to identify contaminants, control product and package mass, scan for missing or damaged product, detect packing voids and confirm fill levels.

Eriez XR-41 is a larger version of Eriez' XR-21 system, designed for belt widths up to 14-inches. This unit is available in two different models; one for packaged goods and another for loose product flows. As with the model XR-21, it offers enhanced inspection capabilities for packaged or loose goods where multiple products and belt speeds are required. This system is ideal for foreign body detection of metal,

glass, calcified bone, PVC and to inspect packages for mass and missing or defective objects. These machines are ideal for larger packages.

Eriez XR-51 is a double-beam system for glass-in-glass or metal-in-metal inspection. It is designed for use on production lines running taller cylindrical containers such as jars and cans. This model is superior at detecting small statistical variations in the product that signal contamination or deviation from accepted specifications.

Both the XR-41 and XR-51 feature a 15-inch color touch screen, stainless steel construction and auto set-up capability. Additionally, these models have connectors, which may be networked as an SQL client with full remote support facilities. For ease of operation, XR-41 and XR-51 do not require frequent calibration.

Eriez automated X-Ray inspection systems employ advanced linear array technology for superior sensitivity, speed and sophistication for both loose product flow and packaged inspection. They provide real time analysis of process and packaged foods, pharmaceuticals and other goods requiring the highest levels of product integrity. Product inspection is achieved through a computer-controlled family of low energy generators and a high-performance computer image analysis system.

**Eriez**  
888.300.ERIEZ  
Erie, PA  
[www.eriez.com](http://www.eriez.com)

## **DuPont Qualicon and USDA Agricultural Research Service to Collaborate on New Test for *E. coli* O157:H7**

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**DuPont Qualicon**  
800.863.6842  
Wilmington, DE  
[www2.dupont.com](http://www2.dupont.com)

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## INDUSTRY PRODUCTS



Hoefer, Inc.

### Hoefer, Inc. New 2-Dimensional Electrophoresis System

Hoefer, Inc. has introduced a new 2-Dimensional Electrophoresis System that offers the highest focusing voltage available for the first dimension and has an easy-to-use, highly reproducible, second-dimension separation tank.

The complete 2D System includes the IEF100 First-dimension Isoelectric Focusing Unit and the SE900 Second-dimension Gel Electrophoresis Unit. The IEF100 will help researchers increase the quality and speed of their IEF separations, and the SE900's single tank design ensures leak-free runs and the ability to reuse buffer. The SE900 is also simple to use, utilizes minimal parts, and provides efficient cooling.

The IEF100 integrated 12,000 Volt Power Supply, with its high voltage and current, enables fast run times and provides both Ethernet and RS232 ports for reporting and control. The first dimension IEF can be run with IPG strips of any length commercially available up to 24 cm.

Up to six IPG strips can be focused at one time and monitored individually.

The SE900 provides second dimension capabilities, and when used with the IEF100, comprises a complete 2D System. For example, the IEF100 is used to generate first dimension separations; then the focused strips are transferred to an SE900 second-dimension slab gel for the second dimension separation by molecular weight. The separation tank can hold up to 6-second dimension gels.

There is also a gel casting option that can be purchased with the SE900. The gels can thus be cast in a multiple gel caster that produces identical gels to allow for highly reproducible production of self cast gels.

Hoefer, Inc.  
800.227.4750  
San Francisco, CA  
www.HoeferInc.com

### New 3-A/ANSI Standard Being Developed for Mechanical Seals for Sanitary Applications

3-A Sanitary Standards, Inc. (3-ASSI) announces the development of a new Standard (to be submitted to the American National Standards Institute (ANSI) as a new American Nation Standard), for Mechanical Seals for sanitary applications. Interested and materially affected parties are invited to participate in the development of this standard. There is no cost to participate.

The Mechanical Seals standard will cover the sanitary aspects of design and materials of construction

for mechanical seals for equipment having rotating shafts for liquid and dry product applications (for food, beverage, and other comestible products). The mechanical seal consists of an entire seal assembly that contains product to the product area of the equipment. This standard applies to those components of a mechanical seal that are necessary to create or maintain a boundary between product contact and non-product areas of the equipment. The Mechanical Seal standard will be the normative reference cited in other 3-A Standards for equipment having sanitary seals.

3-A Sanitary Standards, Inc.  
703.790.0295  
McLean, VA  
www.3-a.org

### Sterilex Introduces Drain Program for the Removal of Biofilm and Food Pathogens in Drains and Trunk Lines

Sterilex has introduced an exciting drain and trunk line sanitation program involving the use of Sterilex biocides in an easy to use device that applies thick foam to drains and down into trunk lines. This program is cost effective and allows users to kill bacteria, remove dangerous biofilms, kill mold and mildew, and remove organic contaminants from their drains and trunk lines. The Sterilex drain program is the first and only program in the US that has been EPA approved to remove biofilm and kill dangerous pathogens that live in drains and trunk lines.

The Sterilex drain program has attracted widespread interest in the food processing, food service,

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## INDUSTRY PRODUCTS

and janitorial industries. Drains and trunk lines have been shown to be a breeding ground for resistant pathogens such which like to form protective biofilms in wet environments. Sterilex offers a revolutionary new formula to combat dangerous biofilms and prevent cross contamination.

Sterilex products have received widespread recognition, and are recommended by QA/QC managers at leading food processing companies. Sterilex was awarded a USDA National Research Initiative grant to demonstrate the efficacy of its products against *Listeria monocytogenes* in meat and poultry plants.

**Sterilex® Corporation**  
800.511.1659  
Owings Mills, MD  
www.sterilex.com

### Xenon Corporation Pre-Aseptic Room Disinfectant System Eliminates Any Bio-Contaminate from Packages

A new system that employs pulsed UV light to achieve bio-reduction and the surface sanitization of boxes, bags, and carts prior to entering an aseptic room was introduced by Xenon Corporation.

The SteriPulse® RS-3000 Aseptic Sanitization System is designed to eliminate any bio-contaminate from packages entering an aseptic room, instantly and safely, without heat or chemicals. Featuring pulsed UV light technology to disinfect the packages, this system is capable of 4 log kill in less than one second; making it ideal for high-speed, in-line conveyor systems.

Faster, safer, and more effective than chemicals, the SteriPulse® RS-3000 Aseptic Sanitization System is totally "green" and the UV light exposure significantly reduces the possibility of having infected packages which are stored at a loading dock in a dirty area from entering an aseptic room. Modular system components include lamps, a controller, and a power supply.

**Xenon Corporation**  
800.936.6695  
Wilmington, MA  
www.xenoncorp.com



TandD Corporation

### New Data Loggers from TandD Corporation

TandD Corporation has introduced the new "S" Version of their proven and ultra-reliable TR-5 data loggers

These new units feature portability, waterproof construction and are battery operated.

With a temperature range of -60°C to +150°C they are ideal for measuring and recording temperature in normal outdoor conditions as well as harsher frozen environments, frozen storage and high humidity situations.

These data loggers have large LCD displays, "Out of Range" alarm function and can log up to 16,000

readings from 1/second to 1/hour. They have battery life of up to 4 years.

The "S" Family includes the TR-50U High Speed USB Connected Communications Cradle for downloading recorded data from the loggers and for device configuration and set-up.

Multiple external sensors are available as options for the TR-52S.

**TandD Corporation**  
518.669.9227  
Saratoga Springs, NY  
www.tandd.com

### New Modular Bar Die Systems from Eagle Offer Style and Functionality

Eagle introduces new modular bar dies designed to simplify installation and maintenance of bar equipment while also delivering great style and decorator options. Configured so that underbar equipment such as Eagle's popular 1800 and 2200 Series underbar equipment can be mounted to and supported by the bar die, the new offerings are available for both flat-wall and pedestal style underbar designs.

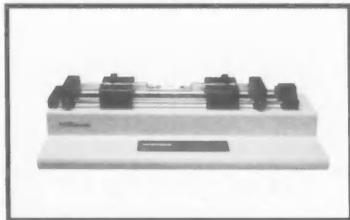
Eagle's modular bar dies offer numerous user benefits and open up new options for bar system customers. The rugged, super-strong bar die design and construction eliminates the need for underbar legs in pedestal style bar configurations. It also completely encloses soda, beer, electrical and plumbing lines in a chase that is incorporated into the unit. This chase serves as a wall or front of the bar which is covered by panels that hide the lines. Panels are removable, providing easy access to the chase for ongoing maintenance or to make modifications.

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## INDUSTRY PRODUCTS

The front panels of the bar die can be covered in a choice of decorative laminate or wood millwork finishes, in addition to stainless steel, thereby giving designers and consultants a wide range of options to fit any décor style. Decorative brass or chrome rails and fittings are also offered to complete the design. The result – a stunning bar setup that is strikingly attractive in addition to being functional and highly durable.

**Eagle**  
800.441.8440  
Clayton, DE  
www.eaglegrp.com



KD Scientific

### **KD Scientific Emulsifier Ideal for Adjunct/Antigen Mixing in Dairy Foods**

**T**he KDS 330 is designed to operate unattended to emulsify adjunct cultures at elevated temperatures in low fat products.

The KDS 330 is ideal for creating viscous fluids/suspensions. This is accomplished by forcing fluids back and forth through a micro-emulsifying needle. The pump eliminates the fatigue and time required to manually prepare emulsions.

The KDS 330 is ideal to prepare an adjuvant/antigen mixture to the correct viscosity ready for injection. The pump is simple to use and set up. Through the menu driven program the user enters the syringe diameter, the flow rate and selects a dispense volume.

The KDS 330 automatically performs the calibration and control functions. When in emulsion mode, the pump cycles from infusion to withdrawal continuously. The unit automatically infuses the preset volume and withdraws the preset volume.

The pump is based on the Model KDS 210 in continuous mode for cycling back and forth and is specifically designed for a 10cc glass syringe and emulsion needle. Two syringes and one emulsifying needle are supplied with the pump.

KD Scientific designs, manufactures and sells a wide range of quality fluidics equipment used by research laboratory markets worldwide.

**KD Scientific**  
508.429.6809  
Holliston, MA  
www.kdscientific.com

### **Computerway's Process Tracking Improves Plant Efficiency**

**C**omputerway Food Systems' Process Tracking is designed to provide accurate plant level tracking capabilities for food manufacturing and processing companies of any kind.

The system is highly configurable and replaces antiquated "clipboard-based" systems with real-time data collection capabilities. Process Tracking improves plant efficiency through the utilization of timely and precise information.

Users benefit from added control when receiving inbound materials such as dry goods, packaging and raw meat. By uniquely identifying products at the time they are received, raw materials and dry goods can be tracked through every step of a process.

Process Tracking optimizes traceability functionalities for sites already employing Computerway R5z systems.

The system's web-based technology provides simple data access for authorized users from any location where the Internet is available. Process Tracking uses various types of electronic devices to record critical steps in production processes as they happen on the shop floor.

"When tied in with other Computerway applications such as R5z, the Process Tracking system can provide recall capabilities from finished goods all the way back to the raw materials," said Bill Altenpohl, Computerway Food Systems president.

Process Tracking can be integrated with ERP systems for the exchange of purchasing information.

**Computerway Food Systems**  
336.841.7289  
High Point, NC  
www.mycfs.com

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95th Annual Meeting



Columbus, Ohio • August 3-6

**IVAN PARKIN  
LECTURE  
SUNDAY, AUGUST 3  
6:00 P.M.**

**UTILITY OF MICROBIOLOGICAL TESTING  
FOR FOOD SAFETY ASSURANCE:  
THE GOOD, THE BAD, AND THE UGLY**

**DR. RUSSELL S. FLOWERS**

Silliker Group Corporation  
Homewood, Illinois



**D**r. Russell S. Flowers, Jr. is Chairman and Chief Scientific Officer of Silliker Group Corporation in Homewood, Illinois, where he spearheads strategic growth opportunities and assures that Silliker remains on the

forefront of science and technology.

Dr. Flowers earned his BS and MS degrees from North Carolina State University, and his Ph.D. from the University of Illinois. He began his career with Silliker as a Laboratory Director in 1979, advancing to President in 1990. At that time, Silliker expanded to a global network with more than 45 locations, offering analytical and advisory services related to food safety and quality. He assumed his present position in January 2007.

Dr. Flowers has been an active researcher, author and speaker in the field of food microbiology, with particular emphasis on the development and validation of rapid analytical methods, and laboratory performance. He was the study director for the validation of the first Enzyme Immuno-Assay and Nucleic Acid Hybridization Assay approved by AOAC, and many subsequent studies that have led to industry-wide method implementation for the detection of pathogens in foods and food environments. Dr. Flowers also chaired the Food Laboratory Accreditation Working Group, which developed specific ISO accreditation criteria adopted by AOAC and A2LA for food testing laboratories.

The recipient of numerous industry awards and honors, Dr. Flowers is an active member of IAFP and several other professional organizations and societies, including the International Commission on Microbiological Specifications for Foods (ICMSF); AOAC International; Institute of Food Technologists (IFT); and the International Dairy Foods Association (IDFA).

95th Annual Meeting



Columbus, Ohio • August 3-6

# JOHN H. SILLIKER LECTURE

WEDNESDAY, AUGUST 6

4:00 P.M.

## FROM WILD PIGS IN SPINACH TO TILAPIA IN ASIA: THE CHALLENGE OF THE FOOD SAFETY COMMUNITY

**DR. MICHAEL P. DOYLE**

University of Georgia  
Griffin, Georgia



**D**r. Michael Doyle is a Regents Professor of Food Microbiology and Director of the Center for Food Safety at the University of Georgia. He is an active researcher in food safety and security, working closely with the food industry on issues related

to the microbiological safety of foods.

Dr. Doyle is a graduate of the University of Wisconsin-Madison, where he earned his BS in Bacteriology, and MS and Ph.D. in Food Microbiology. The author of more than 400 scientific publications, Dr. Doyle has given more than 600 invited presentations at national and

international scientific meetings, and has received several research awards from academic and national scientific organizations. He is a Fellow of IAFP, the American Academy of Microbiology, and the Institute of Food Technologists (IFT), and is a member of the National Academy of Sciences-Institute of Medicine.

In addition to current service on the food safety committees of several scientific organizations, Dr. Doyle has also served as a scientific advisor to many of them, including the World Health Organization (WHO); the National Academy of Sciences-Institute of Medicine and National Research Council; the International Life Sciences Institute-North America (ILSI); the Food and Drug Administration (FDA); the US Department of Agriculture (USDA); the US Department of Defense; and the US Environmental Protection Agency (EPA).



# IAFP 2008 PRELIMINARY PROGRAM

## SUNDAY, AUGUST 3

Opening Session – 6:00 p.m. – 7:00 p.m.

Ivan Parkin Lecture – Utility of Microbiological Testing for Food Safety Assurance: The Good, the Bad, and the Ugly  
— Russell S. Flowers, Ph.D., Chairman and Chief Scientific Officer, Silliker Group Corp., Homewood, IL

## MONDAY, AUGUST 4

Morning – 8:30 a.m. – 12:00 p.m.

### Symposium Topics

- S1 2008 Foodborne Disease Outbreak Update: *Salmonella* in Processed Foods
- S2 Coming Out of the *Campylobacter* Closet: International Strategies for Reducing Human *Campylobacteriosis*
- S3 Globalization of Acceptance Criteria for Microbiological Methods: Separating the Science from the Politics

### Roundtable Topic

- RT1 Eating Seafood – Is It Worth the Risk?

### Technical Sessions

- T1 Pathogens, Beverages and Water
- T2 Antimicrobials and General Microbiology

### Poster Session

- P1 Produce, Toxicology and Sanitation

Afternoon – 1:30 p.m. – 5:00 p.m.

### Symposium Topics

- S4 Bacterial Physiology — A Forgotten Theme That is Critical for the Food Microbiologist
- S5 Sampling and Sample Prep: Unglamorous but Very Necessary
- S6 New and Innovative Ways to Derive Risk-Based Management Options
- S7 Food Safety Issues in Food Transportation – Keeping It Cold and Keeping It Clean

### Roundtable Topics

- RT2 Occurrence and Control of Norovirus: *Is Public Vomiting Public Enemy #1?*
- RT3 Internalization of Pathogens in Produce

### Technical Session

- T3 Toxicology, Seafood and Meat and Poultry

### Poster Session

- P2 Meat and Poultry, Microbial Food Spoilage, Beverage and Dairy

## TUESDAY, AUGUST 5

All Day – 8:30 a.m. – 5:00 p.m.

### Interactive Session

The Sequel to the Mystery Outbreak – What to Do When It Happens to You!

- Session 1: 8:30 a.m. – 10:00 a.m.
- Session 2: 10:30 a.m. – 12:00 p.m.
- Session 3: 1:30 p.m. – 3:00 p.m.
- Session 4: 3:30 p.m. – 5:00 p.m.

Morning – 8:30 a.m. – 12:00 p.m.

### Symposium Topics

- S8 Validating Heat Processes for Reducing *Salmonella* in Low Water Activity Foods
- S9 Retail Session (title to be determined)
- S10 From Fish to Table
- S11 Best Practices in Global Food Export and Import

### Roundtable Topic

- RT4 Global Perspectives and Novel Approaches for Effective Food Safety Communication within Culturally Diverse Audiences

### Technical Session

- T4 Risk Assessment and Produce

### Poster Session

- P3 Applied Laboratory Methods, Education and Epidemiology

Afternoon – 12:15 p.m. – 1:00 p.m.

IAFP Business Meeting

Afternoon – 1:30 p.m. – 5:00 p.m.

### Symposium Topics

- S12 Back to the Future: How Clinical Microbiology Findings Today Predict the Food Microbiology Headaches for Tomorrow
- S13 Pathogen Data Sharing to Advance Food Safety
- S14 Food Safety and Regulatory Issues Associated with Non-Thermal Processing of Foods and Beverages
- S15 Harmonization of Irrigation Water Practices
- S16 Spores in the Dairy Industry – A Growing Concern – What Can You Do?

### Technical Session

- T5 Applied Laboratory Methods and Novel Laboratory Methods

### Poster Session

- P4 Pathogens and Novel Laboratory Methods

## WEDNESDAY, AUGUST 6

Morning – 8:30 a.m. – 12:00 p.m.

### Symposium Topics

- S17 Dairy Pasteurization in Today's Risk-Based Food Safety Environment – International Perspectives on the Use of Risk Assessment Tools
- S18 Innovative Applications of Bacteriophages in Rapid Enrichment, Detection and Identification of Foodborne Pathogens
- S19 Chemical Contaminants Testing in Foods

### Roundtable Topics

- RT5 Comparative International Approaches to Regulating Unsafe Food
- RT6 Water: Potability vs. Drinkability

### Technical Session

- T6 Education and Sanitation

### Poster Session

- P5 Risk Assessment, Antimicrobials, Seafood and General Microbiology

Afternoon – 1:30 p.m. – 3:30 p.m.

### Symposium Topics

- S20 Food Defense Session (title to be determined)
- S21 Is It Overdone? Examining the Meat and Cancer Hypothesis and Its Impact on Food Safety
- S22 What is the 'Real' Issue with MDR?
- S23 The Greening of Food Packaging: Safety of Biodegradable, Reused, and Recycled Food Packaging
- S24 Food Allergens: Scientific Advances and Control Measures

### Technical Session

- T7 Spoilage and Epidemiology

4:00 p.m. – 4:45 p.m.

John H. Silliker Lecture – From Wild Pigs in Spinach to Tilapia in Asia: The Challenges of the Food Safety Community, Michael P. Doyle, Ph.D., University of Georgia, Griffin, GA

Subject to change





# IAFP 2008 NETWORKING OPPORTUNITIES

## IAFP FUNCTIONS

### WELCOME RECEPTION

Saturday, August 2 • 5:00 p.m. – 6:30 p.m.

Reunite with colleagues from around the world as you socialize and prepare for the leading food safety conference. Everyone is invited!

### COMMITTEE MEETINGS

Saturday, August 2 • 3:00 p.m. – 4:30 p.m.  
Sunday, August 3 • 7:00 a.m. – 5:00 p.m.

Committees and Professional Development Groups (PDGs) plan, develop and institute many of the Association's projects, including workshops, publications, and educational sessions. Share your expertise by volunteering to serve on committees or PDGs. Everyone is invited to attend.

### STUDENT LUNCHEON

Sunday, August 3 • 12:00 p.m. – 1:30 p.m.

*Sponsored by Texas A&M Agriculture, Department of Animal Science, Food Safety*

The mission of the Student PDG is to provide students of food safety with a platform to enrich their experience as Members of IAFP. Sign up for the luncheon to help start building your professional network.

### EDITORIAL BOARD RECEPTION

Sunday, August 3 • 4:30 p.m. – 5:30 p.m.

Editorial Board Members are invited to this reception to be recognized for their service during the year.

### OPENING SESSION AND IVAN PARKIN LECTURE

Sunday, August 3 • 6:00 p.m. – 7:00 p.m.

Join us to kick off IAFP 2008 at the Opening Session. Listen to the prestigious Ivan Parkin Lecture delivered by Dr. Russell S. Flowers.

### CHEESE AND WINE RECEPTION

Sunday, August 3 • 7:00 p.m. – 9:00 p.m.

*Sponsored by Kraft Foods*

An IAFP tradition for attendees and guests. The reception begins in the Exhibit Hall immediately following the Ivan Parkin Lecture on Sunday evening.

### IAFP JOB FAIR

Sunday, August 3 through Wednesday, July 6

Employers, take advantage of recruiting the top food scientists in the world! Post your job announcements and interview candidates.

### COMMITTEE AND PDG CHAIRPERSON BREAKFAST (By invitation)

Monday, August 4 • 7:00 a.m. – 9:00 a.m.

Chairpersons and Vice Chairpersons are invited to attend this breakfast to report on the activities of your committee.

### EXHIBIT HALL LUNCH

Monday, August 4 • 12:00 p.m. – 1:00 p.m.

*Sponsored by JohnsonDiversey*

Tuesday, August 5 • 12:00 p.m. – 1:00 p.m.

*Sponsored by SGS North America*

Stop in the Exhibit Hall for lunch and networking on Monday and Tuesday.

### EXHIBIT HALL RECEPTIONS

Monday, August 4 • 5:00 p.m. – 6:00 p.m.

*Sponsored by DuPont Qualicon*

Tuesday, August 5 • 5:00 p.m. – 6:00 p.m.

*Sponsored in part by The Kroger Co., Q Laboratories, Inc., Quality Assurance Magazine, and Springer*

Join your colleagues in the Exhibit Hall to see the most up-to-date trends in food safety techniques and equipment. Take advantage of these great networking receptions.

### PRESIDENT'S RECEPTION (By invitation)

Monday, August 4 • 6:00 p.m. – 7:00 p.m.

*Sponsored by Fisher Scientific*

This by invitation event is held each year to honor those who have contributed to the Association during the year.

### BUSINESS MEETING

Tuesday, August 5 • 12:15 p.m. – 1:00 p.m.

You are encouraged to attend the Business Meeting to keep informed of the actions of YOUR Association.

### JOHN H. SILLIKER LECTURE

Wednesday, August 6 • 4:00 p.m. – 4:45 p.m.

The John H. Silliker Lecture will be delivered by Dr. Michael Doyle.

### AWARDS RECEPTION AND BANQUET

Wednesday, August 6 • 6:00 p.m. – 9:30 p.m.

Bring IAFP 2008 to a close at the Awards Banquet. Award recipients will be recognized for their outstanding achievements and the gavel will be passed from Dr. Gary R. Acuff to Incoming President, Dr. J. Stan Bailey.



# IAFP 2008 GENERAL INFORMATION

## REGISTRATION INCLUDES

Register to attend the world's leading food safety conference.

Full Registration includes:

- Technical Sessions
- Symposia
- Poster Presentations
- Ivan Parkin Lecture
- John H. Silliker Lecture
- Exhibit Hall Lunch (Mon. & Tues.)
- Awards Banquet
- Exhibit Hall Admittance
- Cheese and Wine Reception
- Exhibit Hall Reception (Mon. & Tues.)
- Program and Abstract Book

## PRESENTATION HOURS

### Sunday, August 3

Opening Session 6:00 p.m. – 7:00 p.m.

### Monday, August 4

Symposia & Technical Sessions 8:30 a.m. – 5:00 p.m.

### Tuesday, August 5

Symposia & Technical Sessions 8:30 a.m. – 5:00 p.m.

### Wednesday, August 6

Symposia & Technical Sessions 8:30 a.m. – 3:30 p.m.  
Closing Session 4:00 p.m. – 5:00 p.m.

## REGISTER ONLINE

Register online at [www.foodprotection.org](http://www.foodprotection.org).

## EXHIBIT HOURS

<b>Sunday, August 3</b>	7:00 p.m. – 9:00 p.m.
<b>Monday, August 4</b>	10:00 a.m. – 6:00 p.m.
<b>Tuesday, August 5</b>	10:00 a.m. – 6:00 p.m.

## GOLF TOURNAMENT

### Saturday, August 2

Golf Tournament at Golf Club of Dublin 6:30 a.m. – 12:30 p.m.

## HOTEL INFORMATION

Hotel reservations can be made online at [www.foodprotection.org](http://www.foodprotection.org).

The IAFP Annual Meeting Sessions, Exhibits and Events will take place or depart from the Hyatt Regency Columbus. Official hotels for IAFP 2008 are as follows:

Hyatt Regency Columbus	\$129 per night
Crowne Plaza	\$129 per night
Drury Inn and Suites	\$129 per night

## CANCELLATION POLICY

Registration fees, less a \$50 administration fee and any applicable bank charges, will be refunded for written cancellations received by July 18, 2008. No refunds will be made after July 18, 2008; however, the registration may be transferred to a colleague with written notification. Refunds will be processed after August 11, 2008.

**Event and tour tickets purchased are nonrefundable.**



International Association for  
**Food Protection**

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95th Annual Meeting



Columbus, Ohio • August 3-6

# IAFP 2008 REGISTRATION FORM

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Telephone \_\_\_\_\_ Fax \_\_\_\_\_ E-mail \_\_\_\_\_



Regarding the ADA, please attach a brief description of special requirements you may have.

IAFP occasionally provides Attendees' addresses (excluding phone and E-mail) to vendors and exhibitors supplying products and services for the food safety industry. If you prefer NOT to be included in these lists, please check the box.

**PAYMENT MUST BE RECEIVED BY JULY 1, 2008 TO AVOID LATE REGISTRATION FEES**

**REGISTRATION FEES**

Registration  
 Association Student Member  
 Retired Association Member  
 One Day Registration\*  Mon.  Tues.  Wed.  
 Spouse/Companion\* (Name): \_\_\_\_\_  
 Children 15 & Over\* (Names): \_\_\_\_\_  
 Children 14 & Under\* (Names): \_\_\_\_\_  
 \*Awards Banquet not included  
 Additional Awards Banquet Ticket - Wednesday, 8/6  
 Student Luncheon - Sunday, 8/3

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**GUEST TOURS**

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- Half Gallon New York State Pure Maple Syrup
- New Zealand All Blacks vs. France Rugby Souvenir Pack
- *Listeria, Listeriosis and Food Safety*
- MP3 Player
- *Cuisine and Culture: A History of Food*
- Natural Freshwater Pearl Doubles
- 1966-2000 JFP Achives
- "Lucky Cow" Cow Figurine
- New York State Cheddar Cheese
- Kentucky Fun Pack

To donate an item go to our Web site at [www.foodprotection.org](http://www.foodprotection.org) and complete the Silent Auction Donation Form or contact Donna Gronstal at [dgronstal@foodprotection.org](mailto:dgronstal@foodprotection.org) 515.276.3344; 800.369.6337.



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# COMING EVENTS

## MAY

- **2, Carolinas Association for Food Protection Spring Meeting**, Madren Conference Center, Clemson University, Clemson, SC. For more information, contact Steve Tracey at 704.633.8250; E-mail: smtracey@foodlion.com.
- **4-7, The FMI Show Plus MARKETECHNICS®**, Mandalay Bay Convention Center, Las Vegas, NV. For more information, call FMI at 202.452.8444 or go to [www.fmi.org](http://www.fmi.org).
- **6-9, Better Process Control Schools**, Ramada Inn Geneva Lakefront, Geneva, NY. For more information, contact Nancy Long at 315.787.2288; E-mail: [NPLI@cornell.edu](mailto:NPLI@cornell.edu).
- **8, Metropolitan Association for Food Protection Spring Seminar**, Rutgers University, Cook College Campus Center, New Brunswick, NJ. For more information, contact Carol Schwar at 908.475.7960; E-mail: [cschwar@co.warren.nj.us](mailto:cschwar@co.warren.nj.us).
- **10, 15th Annual Food Allergy Conference – Food Allergies: Living and Learning**, Embassy Suites Hotel, Rosemont, IL. For more information, call 800.929.4040 or go to [www.foodallergy.org](http://www.foodallergy.org).
- **13-15, Florida Association for Food Protection Annual Education Conference**, St. Petersburg Hilton-Bayfront, St. Petersburg, FL. For more information, contact Zeb Blanton at 407.618.4893 or go to [www.fafp.net](http://www.fafp.net).
- **14-15, Pennsylvania Association of Milk, Food and Environmental Sanitarians Annual Meeting**, Nittany Lion Inn, Penn State University, State College, PA. For more information, contact Gene Frey at 717.397.0719; E-mail: [erfrey@landolakes.com](mailto:erfrey@landolakes.com).
- **18-20, 2008 APHL Annual Meeting**, St. Louis, MO. For more information, call APHL at 240.485.2745 or go to [www.aphl.org](http://www.aphl.org).
- **19-22, 3-A SSI 2008 Annual Meeting**, Four Points Sheraton, Milwaukee Airport, Milwaukee, WI. For more information, call 703.790.0295 or go to [www.3-a.org](http://www.3-a.org).

- **21-24, Campylobacter Isolation and Identification from Foods Workshop**, Dept. of Poultry Science, Auburn University, Auburn, AL. For more information, call Omar Oyarzabal at 334.844.2608; E-mail: [oyarzoa@auburn.edu](mailto:oyarzoa@auburn.edu).
- **26-28, IAFP Latin America Symposium on Food Safety**, Campinas, São Paulo, Brazil. For more information, go to our Web site at [www.foodprotection.org](http://www.foodprotection.org).
- **29-30, TNO Beneficial Microbes Conference**, NH Barbizon Palace Hotel, Amsterdam, The Netherlands. For more information, call 31.30.229.42.47 or go to [www.bastiaanse-communication.com](http://www.bastiaanse-communication.com).
- **31, 15th Annual Food Allergy Conference – Food Allergies: Living and Learning**, Marriott Westchester Hotel, Tarrytown, NY. For more information, call 800.929.4040 or go to [www.foodallergy.org](http://www.foodallergy.org).

## JUNE

- **1-5, American Society for Microbiology 108th General Meeting**, Boston Convention and Exposition Center, Boston, MA. For more information, call 202.737.3600 or go to [www.asm.org](http://www.asm.org).
- **6-9, Food Micro 2008 – The 21st International ICFMH Symposium**, Aberdeen Exhibition and Conference Centre, Aberdeen, Scotland. For more information, go to [www.foodmicro2008.org/](http://www.foodmicro2008.org/).
- **7-11, AFDO Annual Educational Conference**, Crowne Plaza Anaheim Resort Hotel, Garden Grove, CA. For more information, call 717.757.2888; E-mail: [afdo@afdo.org](mailto:afdo@afdo.org).
- **9-11, 2008 Midwest Section of AOAC International Annual Meeting and Exposition**, Bozeman Best Western – GranTree Inn, Bozeman, MT. For more information, contact Heidi Hickey at 406.994.3383 or go to [www.midwestaoac.org/2008meeting.html](http://www.midwestaoac.org/2008meeting.html).
- **10, Ontario Food Protection Association Professional Development Day and Golf Tournament**, Springfield Golf Course, Guelph,

Ontario, Canada. For more information, contact Gail Seed at 519.463.5674; E-mail: [seed@golden.net](mailto:seed@golden.net).

- **10-11, Principles of Inspecting and Auditing Food Plants**, Chicago, IL. For more information, contact AIB at 785.537.4750 or go to [www.aibonline.org](http://www.aibonline.org).
- **11-12, Pharmaceutical Technology Transfer**, New Brunswick, NJ. For more information, go to [www.cfpa.com](http://www.cfpa.com).
- **13-20, Twenty-Eighth International Workshop/Symposium – Rapid Methods and Automation in Microbiology**, Kansas State University, Manhattan, KS. For more information, contact Dr. Daniel Y.C. Fung at 785.532.1208; E-mail: [dfung@ksu.edu](mailto:dfung@ksu.edu).
- **18-20, 9th Joint CSL/JIFSAN Symposium**, York, UK. For more information, contact Helen Crevald at [csl-jifsan@csl.gov.uk](mailto:csl-jifsan@csl.gov.uk) or go to [www.csl.gov.uk](http://www.csl.gov.uk).
- **22-25, NEHA 72nd Annual Education Conference**, Tuscon, AZ. For more information, call 303.756.9090 or go to [www.neha.org](http://www.neha.org).
- **24-25, HACCP Workshop (Intermediate Level)**, Chipping Campden, Gloucestershire, United Kingdom. For more information, go to [www.campden.co.uk](http://www.campden.co.uk).

## IAFP UPCOMING MEETINGS

**AUGUST 3-6, 2008**  
Columbus, Ohio

**JULY 12-15, 2009**  
Grapevine, Texas

**AUGUST 1-4, 2010**  
Anaheim, California



# COMING EVENTS

- **24–26, New Zealand for Food Protection Listeria Workshop in Association with New Zealand Institute of Food Science and Technology (NZIFST) Annual Meeting**, Rotorua, New Zealand. For more information, contact Lynn McIntyre at 64.3.351.0015; E-mail: lynn.mcintyre@esr.cr.nz.

## JULY

- **2–4, Missouri Milk, Food and Environmental Health Association**, Stoney Creek Inn, Columbia, MO. For more information, contact Gala Miller at 573.659.0706; E-mail: galaj@socket.net.
- **8, HACCP – The Basics**, Chipping Campden, Gloucestershire, United Kingdom. For more information, go to [www.campden.co.uk](http://www.campden.co.uk).
- **20–23, Canadian Institute of Public Health Inspectors Conference**, St. John's, New Foundland. For more information, go to [www.ciphi.nl.ca](http://www.ciphi.nl.ca).
- **21–25, HACCP – Advanced**, Chipping Campden, Gloucestershire, United Kingdom. For more information, go to [www.campden.co.uk](http://www.campden.co.uk).

## AUGUST

- **3–6, IAFP Annual Meeting, Hyatt Regency Columbus**, Columbus, OH. For more information, go to [www.foodprotection.org](http://www.foodprotection.org).

## SEPTEMBER

- **1–4, Food Micro 2008 – The 21st International ICFMH Symposium**, Aberdeen Exhibition and Conference Centre, Aberdeen, Scotland. For more information, go to [www.foodmicro2008.org/](http://www.foodmicro2008.org/).
- **7–9, 5th International Whey Conference**, Paris, France. For more information, go to [www.iwc-2008.org/home.asp](http://www.iwc-2008.org/home.asp).
- **9–12, ASTHO-NACCHO Joint 2008 Conference**, Sacramento Convention Center, Sacramento, CA. For more information call 703.964.1240 or go to [www.naccho.org](http://www.naccho.org).
- **15, ASIS International – 54th Annual Seminar and Exhibits**, Atlanta, GA. For more information, call 800.465.3717 or go to [www.qmi.com](http://www.qmi.com).

- **16–18, New York Association for Food Protection 85th Annual Conference**, Doubletree Hotel, East Syracuse, NY. For more information, contact Janene Lucia at 607.255.2892; E-mail: [jgg3@cornell.edu](mailto:jgg3@cornell.edu).
- **21–24, AACC International Annual Meeting**, Hawaii Convention Center, Honolulu, Hawaii. For more information, call 651.454.7250 or go to <http://meeting.aaccnet.org>.
- **21–24, 122nd AOAC International Annual Meeting**, Dallas Texas. For more information, go to [www.aoac.org](http://www.aoac.org).
- **24–25, China International Food Safety and Quality Conference and Expo**, The Landmark Hotel & Towers, Beijing, China. For more information, go to [www.chinafoodsafety.com](http://www.chinafoodsafety.com).
- **29–1 Oct., Indiana Environmental Health Association Fall Educational Conference**, Belterra Hotel and Conference Center, Belterra, IN. For more information, contact Kelli Whiting at 317.221.2256; E-mail: [kwhiting@hhcorp.org](mailto:kwhiting@hhcorp.org).



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Vol. 71 March 2008 No. 3

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\* Asterisk indicates author for correspondence.

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Career Services

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# AUDIOVISUAL LIBRARY ORDER FORM

The use of the Audiovisual Library is a benefit for **Association-Members only**. Limit your requests to five videos. Material from the Audiovisual Library can be checked out for 2 weeks only so that all Members can benefit from its use.



**International Association for Food Protection**

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Des Moines, IA 50322-2864, USA  
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Fax: 515.276.8655

E-Mail: [info@foodprotection.org](mailto:info@foodprotection.org)  
Web Site: [www.foodprotection.org](http://www.foodprotection.org)

Member # \_\_\_\_\_

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Company \_\_\_\_\_ Job Title \_\_\_\_\_

Mailing Address \_\_\_\_\_

Please specify:  Home  Work

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PLEASE CHECK BOX NEXT TO YOUR VIDEO CHOICE

(Allow 4 weeks minimum from date of request.)

- DAIRY**
- D1010 The Bulk Milk Hauler Protocol & Procedures
  - D1030 Cold Hard Facts
  - D1031 Dairy Plant
  - D1040 Ether Extraction Method for Determination of Raw Milk
  - D1050 Food Safety: Dairy Details
  - D1060 Frozen Dairy Products
  - D1070 The Gerber Bacterial Test
  - D1080 High-Temperature, Short-Time Pasteurizer
  - D1090 Managing Milk Quality
  - D1100 Mastitis Prevention and Control
  - D1105 Milk Handling Training
  - D1110 Milk Plant Sanitation: Chemical Solution
  - D1120 Milk Processing Plant Inspection Procedures
  - D1125 Ohio Bulk Milk Handling Video
  - D1130 Pasteurizer Design and Regulation
  - D1140 Pasteurizer Operation
  - D1150 Processing Fluid Milk
  - D1180 10 Points to Dairy Quality

- ENVIRONMENTAL**
- E2012 Better TEDs for Better Fisheries
  - E3010 The ABCs of Clean - A Handwashing and Cleanliness Program for Early Childhood Programs
  - E3020 Acceptable Risk?
  - E3030 Air Pollution: Indoor
  - E3031 Allergy Beware
  - E3040 Asbestos Awareness
  - E3055 Effective Handwashing - Preventing Cross-Contamination in the Food Service Industry
  - E3060 EPA Test Methods for Freshwater Effluent Toxicity Tests (Using Fathead Minnow Larva)
  - E3070 EPA Test Methods for Freshwater Toxicity Tests (Using Fathead Minnow Larva)
  - E3075 EPA: This is Super Fund
  - E3080 Fit to Drink
  - E3110 Garbage: The Movie
  - E3120 Global Warming: Hot Times Ahead
  - E3125 Good Pest Exclusion Practices
  - E3126 Integrated Pest Management (IPM)
  - E3130 Kentucky Public Swimming Pool and Bathing Facilities
  - E3131 Key Pests of the Food Industry
  - E3135 Physical Pest Management Practices
  - E3135 Plastics Recycling Today: A Growing Resource
  - E3140 Putting Aside Pesticides
  - E3150 Radon
  - E3160 RCRA-Hazardous Waste
  - E3161 The Kitchen Uncovered: Orkin Sanitized EMP
  - E3170 The New Superfund: What It Is and How It Works
  - E3170 Tape 1 - Changes in the Remedial Process: Clean-up Standards and State Involvement Requirements
  - E3180 Tape 2 - Changes in the Remedial Process: Removal and Additional Program Requirements
  - E3190 Tape 3 - Enforcement & Federal Facilities
  - E3210 Tape 4 - Emergency Preparedness & Community Right-to-Know
  - E3220 Tape 5 - Underground Storage Tank Trust Fund & Response Program
  - E3230 Tape 6 - Research & Development: Closing Remarks
  - E3235 Regulatory and Good Manufacturing Practices
  - E3236 Resident Control Strategies
  - E3240 Sink a Germ
  - E3245 Wash Your Hands
  - E3250 Waste Not: Reducing Hazardous Waste
  - E3251 Would Your Restaurant Kitchen Pass Inspection?
  - E3260 Swabbing Techniques for Sampling the Environment and Equipment

- FOOD**
- F2005 A Lot on the Line
  - F2007 The Amazing World of Microorganisms
  - F2008 A Recipe for Food Safety Success
  - F2009 Basic Personnel Practices
  - F2010 Close Encounters of the Bird Kind
  - F2011 Available Post Harvest Processing Technologies for Onsets

- F2013 Control of *Listeria monocytogenes* in Small Meat and Poultry Establishments
- F2014 Controlling Food Allergens in the Plant
- F2015 Controlling *Listeria*: A Team Approach
- F2016 Bloodborne Pathogens: What Employees Must Know
- F2020 Egg Handling and Safety
- F2021 Egg Production
- F2025 The Special of the Day: The Exceptional Egg
- F2030 Egg Games: Foodservice Egg Handling & Safety
- F2035 Fabrication and Curing of Meat and Poultry Products
- F2056 Emerging Pathogens and Grinding and Cooking Comminuted Beef
- F2057 Cooking and Cooling of Meat and Poultry Products
- F2089 Food for Thought - The GMP Quiz Show
- F2090 Food Irradiation
- F2045 Food Microbiological Control
- F2050 Food Safe Food Smart - HACCP and Its Application to the Food Industry (Part 1 & 2)
- F2060 Food Safe Series I (4 videos)
- F2070 Food Safe Series II (4 videos)
- F2080 Food Safe Series III (4 videos)
- F2081 Food Safety Begins on the Farm
- F2090 Food Safety: An Educational Video for Institutional Food Service Workers
- F2095 Food Safety for Food Service Series I: Now You're Cooking
- F2100 Tape 1 - Food Safety for Food Service: Cross Contamination
- F2101 Tape 2 - Food Safety for Food Service: HACCP
- F2102 Tape 3 - Food Safety for Food Service: Personal Hygiene
- F2103 Tape 4 - Food Safety for Food Service: Time and Temperature Controls
- F2104 Food Safety for Food Service Series II
- F2105 Tape 1 - Basic Microbiology and Foodborne Illness
- F2105 Tape 2 - Handling Knives, Cuts, and Burns
- F2106 Tape 3 - Working Safely to Prevent Injury
- F2107 Tape 4 - Sanitation
- F2110 Food Safety is No Mystery
- F2111 Controlling *Salmonella*: Strategies That Work
- F2120 Food Safety: For Goodness Sake Keep Food Safe
- F2121 Food Safety: The HACCP Way
- F2122 Food Safety Zone Video Series
- F2125 Tape 1 - Food Safety Zone: Basic Microbiology
- F2126 Tape 2 - Food Safety Zone: Cross Contamination
- F2127 Tape 3 - Food Safety Zone: Personal Hygiene
- F2128 Tape 4 - Food Safety Zone: Sanitation
- F2129 Food Technology: Irradiation
- F2150 Food Safety: You Make the Difference
- F2151 Fruits, Vegetables, and Food Safety: Health and Hygiene on the Farm
- F2155 Food Safety First
- F2154 Food Safety: Fish and Shellfish Safety
- F2155 Get with a Safe Food Attitude
- F2156 GMP Basics: Safety in the Food Micro Lab
- F2157 GMP Basics: Avoiding Microbial Cross-Contamination
- F2140 GMP Basics: Employee Hygiene Practices
- F2143 GMP Basics: Guidelines for Maintenance Personnel
- F2147 GMP Basics: Process Control Practices
- F2148 GMP - GSP Hygiene and Practices in Food Manufacturing
- F2150 GMP Personal Hygiene and Practices in Food Manufacturing
- F2151 GMP Food Safety Video Series
- F2152 Tape 1 - Definitions
- F2153 Tape 2 - Personnel and Personnel Facilities
- F2154 Tape 3 - Building and Facilities
- F2154 Tape 4 - Equipment and Utensils
- F2155 Tape 5 - Production and Process Controls
- F2160 GMP: Sources and Control of Contamination during Processing
- F2160 GMPs for Food Plant Employees: Five-volume Video Series Based on European Standards
- F2161 Tape 1 - Definitions
- F2162 Tape 2 - Personnel and Personnel Practices
- F2163 Tape 3 - Building and Facilities
- F2164 Tape 4 - Equipment and Utensils
- F2165 Tape 5 - Production Process Controls
- F2168 HACCP Advantage - Good Manufacturing Practices

- F2169 HACCP: Training for Employees - USDA Awareness
- F2170 The Heart of HACCP
- F2172 HACCP: Training for Managers
- F2173 Inside HACCP: Principles, Practices and Results
- F2175 Inspecting for Food Safety - Kentucky's Food Code
- F2180 HACCP: Safe Food Handling Techniques
- F2190 Is What You Order What You Get? Seafood Integrity
- F2191 Microbial Food Safety: Awareness to Action
- F2210 Northern Delight - From Canada to the World
- F2220 Proper Handling of Peroxiside Acid
- F2240 Purely Confidential
- F2240 On the Front Line
- F2250 100 Degrees of Dilem... The Time and Temperature Capet
- F2265 A Day in the Deli Service: Selection and Good Safety
- F2266 HACCP: A Basic Understanding
- F2270 Pest Control in Seafood Processing Plants
- F2271 Preventing Foodborne Illness
- F2280 Principles of Warehouse Sanitation
- F2290 Product Safety and Shell Life
- F2310 Safe Food: You Can Make a Difference
- F2320 Safe Handwashing
- F2321 All Hands on Deck
- F2322 The Why, The When, and The How Video
- F2325 Safe Practices for Sausage Production
- F2330 Sanitation for Seafood Processing Personnel
- F2340 Sanitizing for Safety
- F2341 Science and Our Food Supply
- F2342 Seafood HACCP Alliance: Internet Training Course
- F2350 Step-By-Step to Food Safety
- F2350-1 Step One: Starting Out with Food Safety
- F2350-2 Step Two: Ensuring Proper Personal Hygiene
- F2350-3 Step Three: Purchasing, Receiving and Storage
- F2350-4 Step Four: Preparing, Cooking and Serving
- F2350-5 Step Five: Cleaning and Sanitizing
- F2350-6 Step Six: Take the Food Safety Challenge: Good Practices, Bad Practices - You Make the Call
- F2370 Supermarket Sanitation Program - Cleaning and Sanitizing
- F2380 Supermarket Sanitation Program: Food Safety
- F2380 Take Aim at Sanitation
- F2391 Understanding Foodborne Pathogens
- F2410 Wide World of Food Service: Brushes
- F2420 Your Health in Our Hands: Our Health in Yours
- F2430 Smart Sanitation: Principles and Practices for Effectively Cleaning Your Food Plant
- F2440 Clearing and Sanitizing in Vegetable Processing
- F2450 Plants: Do It Well, Do It Safely
- F2451 A Guide to Making Safe Smoked Fish
- F2451 HACCP-based Plan Ensuring Food Safety in Retail Establishments
- F2460 Safer Processing of Sprouts
- F2500 East Track Restaurant Video Kit
- F2501 Tape 1 - Food Safety Essentials
- F2501 Tape 2 - Receiving and Storage
- F2502 Tape 3 - Service
- F2505 Tape 4 - Food Production
- F2504 Tape 5 - Warewashing
- F2505 Worker Health and Hygiene Program for the Produce Industry
- F2505 Manager Guide to Worker Health and Hygiene
- F2506 Your Company's Success May Depend on It: Worker Health and Hygiene: Your Job Depends on It
- F2600 Food Industry Security Awareness: The First Line of Defense

- OTHER**
- M4010 Diet, Nutrition and Cancer
  - M4020 Eating Defensively: Food Safety Advice for Persons with AIDS
  - M4030 Ice: The Forgotten Food
  - M4050 Personal Hygiene and Sanitation for Food Processing Employees
  - M4060 Psychiatric Aspects of Product Tampering
  - M4070 Tampering: The Issue Examined
  - M4071 Understanding Nutritional Labeling Processing Employees

Visit our Web site at [www.foodprotection.org](http://www.foodprotection.org) for detailed tape descriptions.

# BOOKLET ORDER FORM

## SHIP TO:

Member # \_\_\_\_\_  
 First Name \_\_\_\_\_ M.I. \_\_\_\_\_ Last Name \_\_\_\_\_  
 Company \_\_\_\_\_ Job Title \_\_\_\_\_  
 Mailing Address \_\_\_\_\_  
 Please specify: Home  Work   
 City \_\_\_\_\_ State or Province \_\_\_\_\_  
 Postal Code/Zip + 4 \_\_\_\_\_ Country \_\_\_\_\_  
 Telephone # \_\_\_\_\_ Fax # \_\_\_\_\_  
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## BOOKLETS:

QUANTITY	DESCRIPTION	MEMBER OR GOV'T PRICE	NON-MEMBER PRICE	TOTAL
	Procedures to Investigate Waterborne Illness—2nd Edition	\$12.00	\$24.00	
	Procedures to Investigate Foodborne Illness—5th Edition	12.00	24.00	
<b>SHIPPING AND HANDLING</b> – \$3.00 (US) \$5.00 (Outside US)		Each additional	Shipping/Handling	
Multiple copies available at reduced prices.		booklet \$1.50	Booklets Total	
Phone our office for pricing information on quantities of 25 or more.				

## OTHER PUBLICATIONS:

QUANTITY	DESCRIPTION	MEMBER OR GOV'T PRICE	NON-MEMBER PRICE	TOTAL
	*JFP Memory Stick – September 1966 through December 2000	\$295.00	\$325.00	
	*International Food Safety Icons and International Food Allergen Icons CD	25.00	25.00	
	Pocket Guide to Dairy Sanitation (minimum order of 10)	.75	1.50	
	Before Disaster Strikes... A Guide to Food Safety in the Home (minimum order of 10)	.75	1.50	
	Before Disaster Strikes... <i>Spanish language version</i> – (minimum order of 10)	.75	1.50	
	Food Safety at Temporary Events (minimum order of 10)	.75	1.50	
	Food Safety at Temporary Events – <i>Spanish language version</i> – (minimum order of 10)	.75	1.50	
	*Annual Meeting Abstract Book Supplement (year requested _____)	25.00	25.00	
	*IAFP History 1911-2000	25.00	25.00	
<b>SHIPPING AND HANDLING</b> – per 10 – \$2.50 (US) \$3.50 (Outside US)			Shipping/Handling	
*Includes shipping and handling			Other Publications Total	
<b>TOTAL ORDER AMOUNT</b>				

Prices effective through August 31, 2008

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#### FAX

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#### MAIL

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Des Moines, IA 50322-2864, USA

#### WEB SITE

www.foodprotection.org



# MEMBERSHIP APPLICATION

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Company \_\_\_\_\_ Job Title \_\_\_\_\_

Mailing Address \_\_\_\_\_

Please specify:  Home  Work

City \_\_\_\_\_ State or Province \_\_\_\_\_

Postal Code/Zip + 4 \_\_\_\_\_ Country \_\_\_\_\_

Telephone # \_\_\_\_\_ Fax # \_\_\_\_\_

E-Mail \_\_\_\_\_

IAFP occasionally provides Members' addresses (excluding phone and E-mail) to vendors supplying products and services for the food safety industry. If you prefer NOT to be included in these lists, please check the box.

## MEMBERSHIPS

	US	Canada/Mexico	International
<input type="checkbox"/> <b>IAFP Membership</b> (Member dues are based on a 12-month period and includes the IAFP Report)	<b>\$ 50.00</b>	<b>\$ 50.00</b>	<b>\$ 50.00</b>
<b>Optional Benefits:</b>			
<input type="checkbox"/> Food Protection Trends	Add \$ 60.00	\$ 75.00	\$ 90.00
<input type="checkbox"/> Journal of Food Protection	Add \$ 150.00	\$ 170.00	\$ 200.00
<input type="checkbox"/> Journal of Food Protection Online	Add \$ 36.00	\$ 36.00	\$ 36.00
<input type="checkbox"/> All Optional Benefits – <b>BEST VALUE!</b>	Add \$ 200.00	\$ 235.00	\$ 280.00

<input type="checkbox"/> <b>Student Membership</b> (Full-time student verification required)	<b>\$ 25.00</b>	<b>\$ 25.00</b>	<b>\$ 25.00</b>
<b>Optional Benefits:</b>			
<input type="checkbox"/> Student Membership with FPT	Add \$ 30.00	\$ 45.00	\$ 60.00
<input type="checkbox"/> Student Membership with JFP	Add \$ 75.00	\$ 95.00	\$ 125.00
<input type="checkbox"/> Student Membership with JFP Online	Add \$ 18.00	\$ 18.00	\$ 18.00
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Recognition for your organization and many other benefits.

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Contact the IAFP office for more information on the Sustaining Membership Program.

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# International Food Safety Icons

Available from  International Association for Food Protection.

Handwashing



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Cooking



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Do Not Work If Ill



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Cross Contamination



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Wash, Rinse, and Sanitize



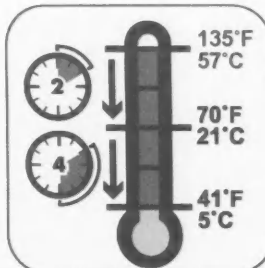
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No Bare Hand Contact



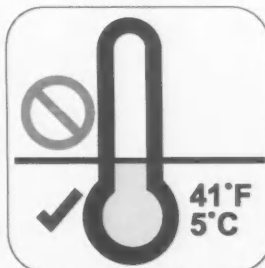
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Cooling



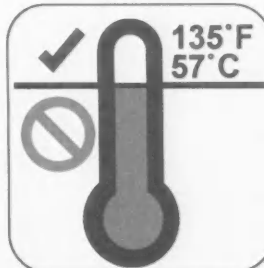
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Refrigeration/Cold Holding



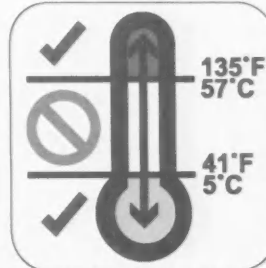
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Hot Holding



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Temperature Danger Zone



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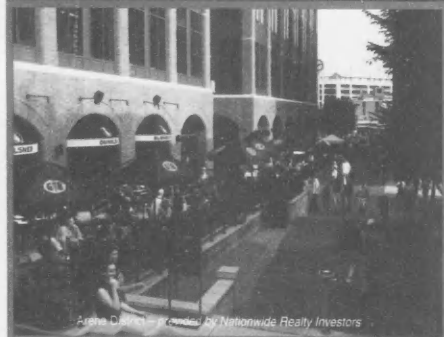
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AUGUST 3-6, 2008

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