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PERIODICALS

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FOOD PROTECTION

SCIENCE AND NEWS

FROM THE
INTERNATIONAL ASSOCIATION
FOR FOOD PROTECTION

TRENDS

MARCH 2004



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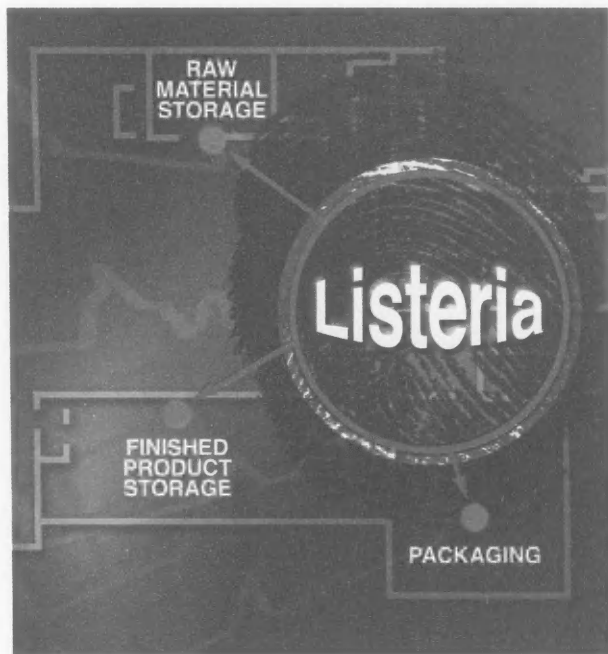
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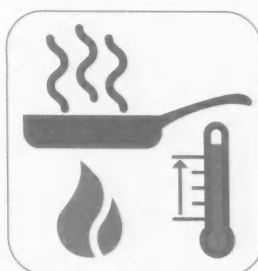
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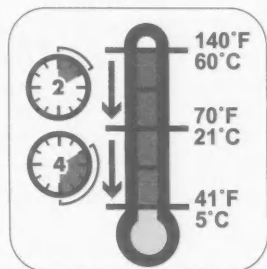
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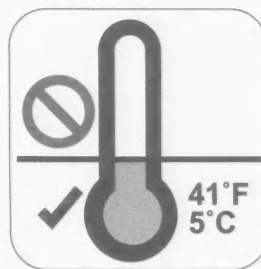
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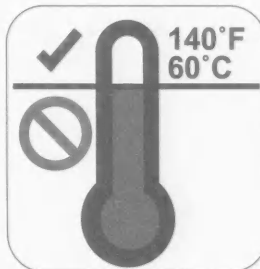
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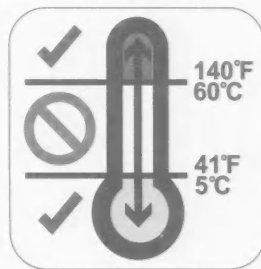
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Review the "Duties and Responsibilities" for the Scientific Editor and, if interested in the position, forward your name and C.V. to the Selection Committee Chairperson:

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"PRESIDENT'S" PERSPECTIVE

Laurie Garrett in her 1994 book, *The Coming Plague: Newly Emerging Diseases in a World Out of Balance*, warned us that "Rapid globalization of human niches requires that human beings everywhere on the planet go beyond viewing their neighborhoods, provinces, countries, or hemispheres as the sum total of their personal ecospheres." That same year, the Nobel Laureate Joshua Lederberg reminded us "The world really is just one village. Our tolerance of disease in any place in the world is at our peril." Although ten years have passed since these words were written, they nevertheless, ring true today as ever before.

In 2003, according to the US Bureau of Census Trade, the total agricultural and fish product imports into the United States, excluding forestry products, was over \$56 billion. This represents a 12% increase over 2002 levels and a 24% increase over 1999 levels. In 2003, agricultural imports from South America, Central America, Asia, and sub-Saharan Africa accounted for over 34% of the US total imports and this trend will continue for the foreseeable future.

We live in a global economy and the way food is grown, processed, and handled can impact any of us in other parts of the world. One just has to look at several recent examples to recognize the global nature of our food supply. These include the global emergence of BSE, recent issues with chlorophenicol in honey and high levels of lead in powdered garlic — both



By **PAUL A. HALL**
PRESIDENT

**"It's not our
personal
ecosphere!"**

commodities sourced from China, cases of cyclosporiasis linked to Guatemalan raspberries, cases of Salmonellosis linked to imported cantaloupe, and an outbreak of hepatitis A among schoolchildren linked to strawberries sourced from Mexico, to name a few. Global sourcing of foods and food ingredients makes eminent economic sense and provides us with a wide variety of foods we otherwise would not enjoy. However, from a food safety perspective, it often provides unique challenges to the food safety professional. Overlay these issues

with the complexity of protecting the food supply from a food security perspective, the challenges seem even more daunting.

In my opinion, it is the responsibility of all of us, as food safety professionals, to work together to address the global food safety issues we collectively face. Your Association is working hard to address this critically important area in a number of ways. For example, we have a number of international affiliates including Brazil, Korea, Mexico, Portugal, and the United Kingdom that are active in promoting scientific exchange and education in the area of food safety in their part of the world. IAFFP has sponsored produce safety workshops in Mexico and Guatemala and we are co-sponsoring a conference in collaboration with the World Health Organization and the International Centre for HACCP Innovation at the University of Salford in England. This workshop entitled "Food Safety and HACCP in the 21st Century, From Theory to Practice" will be held in Bangkok, Thailand, September 1-3, 2004. Anyone interested in this conference should contact our Executive Director, David Tharp, at www.foodprotection.org. Of course, every year we address food safety issues of a global nature at our Annual Meeting and virtually every month we publish excellent peer-reviewed scientific papers from international authors in the *Journal of Food Protection* and *Food Protection Trends*.

While these are all positive developments, there is still so much

that needs to be done in assuring the safety of our global food supply. Innovative and cost-effective controls that can be implemented in developing countries are desperately needed. Consensus needs to be achieved on microbiological criteria and standards for various food commodities in international commerce and dialogue and education need to be an on-going activity. I urge all IAFP Members to cont-

emplate this issue and take action in some form, if you're not already helping to address the issue of global food safety.

Your involvement could range from helping to sponsor travel for deserving scientists from developing countries to our Annual Meeting to participating in international workshops, to starting an IAFP affiliate in your home country if one doesn't exist. I truly believe that it is

our responsibility and duty as food safety professionals to take a global perspective on this issue. After all, the world is not just exclusively our personal ecosphere as Garrett warned us, rather, it is one village, as Lederberg reminded us. How we shepherd our village says a lot about us as a global society. As always, I welcome your thoughts and comments at phall@kraft.com. Until next month...



Announcing IAFP 2004 Workshops

Friday and Saturday, August 6 and 7

- Your Data, Your Job: Quality Systems for Microbial Food Analysis

Saturday, August 7

- Converting to the NCIMS Voluntary HACCP System from Traditional Dairy Inspection
- Best Practices for Quality Aquacultural Products

More information will be available in the April issue of *FPT* or visit our Web site at www.foodprotection.org for the latest information.

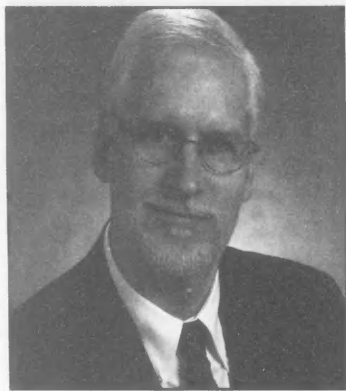
“COMMENTARY” FROM THE EXECUTIVE DIRECTOR

In President Paul Hall's column this month, Paul discusses many global food safety issues and how IAFP assists in bringing Members together to address such issues. I want to expand on this topic and give some specific examples of IAFP involvement in the international marketplace.

For the past five to ten years, IAFP's Annual Meetings have attracted about 10% of our attendees from outside of North America. Another 8% attend from North American countries outside of the United States (Canada, Mexico, and other Central American countries). That brings almost 20% of our attendees to the Annual Meeting from countries other than the United States. This type of interaction between food safety professionals is invaluable when addressing issues of international food safety.

Our international attendees see the value in sharing information on protecting the world's food supply and give many presentations at IAFP's Annual Meetings. There are a large number of repeating attendees and presenters from outside of the United States and North America. This international involvement brings great value to the Annual Meeting and we are truly fortunate to have this type of participation.

One example of international participation, which goes beyond our dreams, can be pointed to through our Korean Affiliate Members. For the past two years, Korean Members attending the



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

***“We all benefit
from international
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Annual Meeting have exceeded 30 Members. They have had such a large attendance that they have scheduled time to hold their own Affiliate meeting during the IAFP Annual Meeting. It is wonderful to see this active connection of food safety professionals.

Two years ago a group from the United Kingdom met at the Annual Meeting in San Diego to explore interest in establishing an Affiliate group. The following year, they met the requirements and received an Affiliate Charter as the United Kingdom Association for Food Protection. They also have a large

participatory group that attends each Annual Meeting giving presentations and taking part in topic discussions.

As Paul touched on, we also have international Affiliates established in Mexico, Brazil and Portugal. Additionally, we have four Affiliate Associations in Canada. Each of these Affiliates has active IAFP Members who contribute to the Association and the Annual Meetings. We all benefit from international involvement and welcome more of the same! Along with this international participation, many of these Affiliate groups have an active student element. Certainly, it is easy to see that we must have students and other young Members involved to keep the Association alive. All of us MUST do everything in our power to assist students and young professionals in their development.

For those of you “seasoned” professionals, think back to your younger days. Maybe you had a mentor; maybe you had someone you secretly looked up to or someone that you modeled your career after. Most everyone had someone to help give his or her career a boost. Wouldn't you feel good if you knew that your assistance was able to make an impact on a young professional? Look around you, be alert for this opportunity, help mentor a young professional and improve the world of food safety!

Paul mentioned articles authored by international authors and that is one thing that we are especially proud of. We have close to 50% of articles published in the *Journal of Food Protection* that are

submitted by authors outside of the United States. This helps to give a worldwide perspective of food safety to the readers of *JFP*. In addition, non-US authors write many of the articles presented in *Food Protection Trends*.

As you most likely are aware, we have full-text articles for the *Journal of Food Protection* available through *JFP* Online. There are three full years of Journals available online and we are now beginning our fourth volume (2004). This helps to make important research available to

readers around the globe immediately and reduces the dependency on our mail and delivery services.

Recently, the IAFP Executive Board, acting on a recommendation from our Student PDG, approved a Student Membership type of "*JFP* Online Only" for students who want to receive access to *JFP* Online and have other benefits of Membership. This was an effort to make Membership easy for those students residing outside of North America and to make access to *JFP* articles instantaneous. Student Members

within North America may also hold *JFP* Online Only Memberships, but the international students really benefit by quicker access and reduced cost because of the high costs to ship *JFP* internationally.

These are a few examples of how IAFP is working to address the needs of our international Members. If you have ideas or suggestions on additional ways we can improve communication between international food safety professionals, we would be most interested in hearing from you!



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Self-reported Changes in Food Safety Practices as a Result of Participation in a Statewide Food Safety Certification Program

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SUMMARY

In July 2004, a Pennsylvania regulation will require any establishment that prepares or serves potentially hazardous foods and possesses a food license to have one member of its supervisory staff attend and pass an approved food safety course. In an effort to assist with the training for this regulation, the Pennsylvania State University (PSU) has developed a Statewide Food Safety Certification Program (SFSCP) that utilizes the National Restaurant Association's ServSafe® curriculum. To measure self-reported behavior changes as a result of attending the SFSCP, a survey was sent to 1,448 students who had completed the SFSCP between January 2001 and May 2001. The response rate was 42%, with the majority of respondents being managers or chefs/cooks. For the statements: "Likelihood of Practicing Food Safety Techniques Before and After Attending Training" and "Likelihood of Using a Thermometer to Check Food Temperature Before and After Penn State University Food Safety Certification Training," survey participants used the following responses: "very likely," "moderately likely," "slightly likely," and "not very likely." For statements addressing food safety behavior before training, survey respondents answered: "practiced," or "did not practice." For statements addressing food safety behavior changes as the result of training, survey respondents answered: "no change," "started practicing," or "practicing more often." Results from the survey indicated that although the majority (86%) of respondents were only "moderately likely" to practice food safety techniques before training, 93% of respondents reported they were "very likely" to practice food safety after training. For participants who reported not participating in various food safety practices before training, the top five areas of self-reported behavior change as a result of the training included calibrating thermometers (81%), cleaning and sanitizing between tasks (79%), ensuring proper handwashing (78%), checking foods with calibrated thermometers (70%), and reheating foods to 165°F (70%).

A peer-reviewed article

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SUMMARY (continued)

For those who reported practicing various food safety procedures before the training, the top 5 areas in which respondents reported practicing procedures more frequently after training included proper handwashing (26%), cleaning and sanitizing between tasks (26%), testing and monitoring the sanitizer concentration of the third compartment sink (24%), using gloves with ready-to-eat foods (23%), and monitoring the temperature of the third compartment sink (23%). The most popular items purchased by participants as a result of attending the training were thermometers, disposable gloves, plastic cutting boards, and sanitizer test strips. This study identifies the areas in which employees of the food service and retail industries are likely to make the necessary changes that have the potential to reduce the risk of foodborne illness.

INTRODUCTION

In 1999, the Centers for Disease Control and Prevention (CDC) estimated that 1 in 4 Americans contract a foodborne illness annually (18). Foodborne illness data from the CDC revealed that 8,804 outbreaks and 202,187 cases were reported for the years 1990–2000, with the majority (45%) of foodborne illness originating from foods purchased at food service establishments (reported as restaurants, fast food outlets, carry-out establishments, cafeterias, or delicatessens) (5). Although, the data for food service establishments may be biased as the result of self-reporting practices, lack of medical tests for foodborne illness, or underreporting, Americans are spending more money on foods away from the home. Over the past seven decades, the proportion of money spent on such foods has risen from 16% to 47% (30). With projected restaurant-industry sales of a record \$426.1 billion in 2003, the trend toward eating foods prepared outside the home is likely to continue (20).

Over the past decade, consumers' awareness of food safety issues has increased (3, 10, 33). To protect public health, many states now require some form of food safety training for those employed in the food service industry (21). Although food service employees are educated on the food safety risks inherent in pre-

paring food for the public and strategies to prevent or reduce the risks of foodborne illness, the translation of knowledge into implementation and risk reduction is never guaranteed. Various methods have been utilized to assess food safety knowledge, attitudes concerning food safety, food safety practices, and/or behavior change as a result of food safety education. These methods include surveys, focus groups, interviews, and observational studies. Redmond and Griffith (26) recently reviewed 88 consumer food safety studies pertaining to the attitudes, knowledge, intention, and self-reported practices of consumer food handling practices in the home. Additional food safety studies conducted in food service or retail environments have focused on attitudes (7, 16), knowledge (2, 13, 17, 19, 25), behavior change as a result of training (12, 13, 14, 17, 19, 28, 29), and the effect of training on inspection scores (15, 24, 34).

The Food Employee Certification Act (FECA) is a Pennsylvania law that will become effective in July 2004. FECA requires any establishment with a Pennsylvania Department of Agriculture (PDA) or local health department food license that prepares or serves potentially hazardous foods (PHF) and/or ready-to-eat foods (RTE) to have one member of its supervisory staff attend and pass an approved food safety course (11). In an effort to assist with training,

Pennsylvania State University (PSU) Cooperative Extension developed a Statewide Food Safety Certification Program (SFSCP). This program, taught by Extension Educators in over 60 counties throughout Pennsylvania, utilizes the National Restaurant Association's (NRA) ServSafe® curriculum. To assess self-reported behavior changes as a result of participating in the ServSafe® training, a survey was developed and distributed to students participating in SFSCP between January 2001 and May 2001.

METHODS

The Penn State statewide food safety certification workshops

In 1999, SFSCP was developed to offer workshops of consistent design across Pennsylvania. Since that time, Extension Educators or approved contract instructors have been teaching the workshop, using the NRA ServSafe® curriculum. To meet the FECA regulation, the workshops are 16 hours in length and include an overview of the ServSafe® curriculum, using presentation materials (slides or PowerPoint presentations) from the NRA as well as several participant activities. The ServSafe® exam is administered at the end of the workshop. The price for the course is consistent across the state. Participants are required to forward their exam scores to PDA upon receipt,

FIGURE 1. Penn State is interested in knowing how the food safety certification training you attended helped you to improve food safety at your establishment. The information will be used to improve future programs for food service professionals like you. Please take a few minutes to respond to this survey by date. We appreciate your input

Q-1. To what extent was the Penn State Food Safety Certification Training helpful in your preparation for the certification exam? (Please check one box.)

	Number of Responses (N = 613)	Percent of Responses
Very Helpful → Please skip to question 3.	520	85
Moderately Helpful	73	12
Slightly Helpful	13	2
Not Very Helpful	3	0.5
Not Sure	4	0.7

Q-2. What would have helped you to better prepare for the certification exam? (Please check all the boxes that apply.)

	Number of Responses (N = 113)	Percent of Responses ¹
More time in class to focus on the information	53	47
More activities in class to reinforce training information	44	39
Other (please specify) ²	21	19

1. Responses add up to more than 100% due to multiple responses.
2. Group input, No classroom, Pretest, Class together not spread out over 4-6 weeks, Shorter classes, Smaller class size, more in-depth explanations, Discussions, More time spent on specific areas of study for the examinations, Test question examples, Classes split so concession people only need to learn pertinent facts, More time but not all at once (spread classes out), More time at home to study, Condensed format was ideal, Chinese textbook, More discussion, Training like that 20 years ago, Written in Italian, More time between class and test, Classes too spread out, Receiving the book earlier.

along with payment of a nominal charge for recording the training with the agency.

Survey

A survey was developed to determine the self-reported change in the food safety practices of participants of the ServSafe® training. The survey (Fig. 1) contained statements designed to assess a variety of self-reported behavior changes including changes in food safety behavior, changes in equipment purchased, and on-site training changes, as well as implementation challenges and rewards for behavior change. State-

ments were designed both to assess participant behavior as a result of training and to assess retroactively their behavior before the training. For the statements: "Likelihood of Practicing Food Safety Techniques Before and After Attending Training" and "Likelihood of Using a Thermometer to Check Food Temperature Before and After Penn State University Food Safety Certification Training," survey participants used the following responses: "very likely," "moderately likely," "slightly likely," and "not very likely." For statements addressing food safety behavior before training, survey respondents answered: "prac-

ticed," or "did not practice." For statements addressing food safety behavior as the result of training, survey respondents answered: "no change," "started practicing," or "practicing more often."

The survey was reviewed by an evaluation specialist at PSU and was subjected to review for approval through the Penn State Office for Regulatory Compliance. Subjects for the survey included 1,448 participants who attended the SFSCP workshops conducted by Extension Educators from January 2001 to May 2001.

Procedure and analyses

In September 2001, a packet, including a cover letter on University letterhead, the survey, and a postage-paid reply envelope, was mailed to 1,448 participants who had completed a SFSCP-sponsored workshop. To increase the response rate, the packet was mailed again to all participants in October 2001. Six hundred fifteen surveys were returned, for a 42% response rate. All responses were anonymous. Responses were entered into a Statistical Package for Social Sciences (SPSS) database, with each row representing a survey respondent and each column corresponding to a specific survey question (27).

RESULTS

The majority of respondents reported that they were managers (44%) or chefs/cooks (22%). Thirty-seven percent of the respondents worked in a restaurant and 14% in a grocery/retail store. Sixty-one percent of the respondents worked in establishments with 1 to 10 employees (Fig. 1, Q-17, 18, 19).

Eighty-five percent of the respondents reported the SFSCP workshops were very helpful in preparing them for the ServSafe® exam (Fig. 1, Q-1). Participants also recommended ways to improve exam preparation (Fig. 1, Q-2), including more time in class to

Q-3. Before attending the Penn State University Food Safety Certification Training, how likely were you to practice safe food techniques in your place of employment? (Please check one box.)

Q-4. After attending the Penn State University Food Safety Certification Training, how likely are you to practice safe food techniques in your place of employment? (Please check one box.)

BEFORE Training Number of Responses (%) N = 293		AFTER Training Number of Responses (%) (N= 293)			
		Very Likely	Moderately Likely	Slightly Likely	Not Very Likely
Very Likely	9 (3%)	9 (100%)	--	--	--
Moderately Likely	253 (86%)	241 (95%)	12 (5%)	--	--
Slightly Likely	26 (9%)	19 (73%)	7 (27%)	--	--
Not Very Likely	5 (2%)	3 (60%)	2 (40%)	--	--
Total	293 (100%)	272 (93%)	21 (7%)	--	--

Q-5. As a result of attending the Penn State Food Safety Certification Training, what additional equipment, if any, have you purchased to improve food safety in your establishment? (Please check all the boxes that apply)

	Number of Responses (N = 591)	Percent of Responses ¹
Thermometers	301	51
No additional equipment purchased yet	192	33
Gloves	174	29
Plastic cutting boards	165	28
Sanitizer test strips	123	21
Shallow pans for cooling food	44	7
Ice wand	43	7
Additional cold storage units	39	7
Hot holding equipment	39	7
Cold holding equipment	16	3
Blast chiller	6	1
Other ² (Please explain)	22	4

- Responses add up to more than 100% due to multiple responses.
- Sanitizers (2), Ice buckets, Hand washing signs and cool foaming hand sanitizer, Tongs, sanitizing solution sprayer, Changed from towels in restrooms to paper towel holders, Enhanced sneeze guards, Wash off labels for cold stored foods, Installed a hand sink, Day dots labels, Metal shelving for chemical storage, and to get food boxes off floor and paper, Installed a complete new kitchen NSF approved, Sanitize tabs, Stainless steel sink and bay, Three unit stainless steel sink, Sanitation bucket, Day Dots, Serving bowls with wide lips for passing, Test tabs for hamburger (cooked), tabs used for dating rolls when we package them, Ice machine.

focus on the information (47%) and more activities in class to reinforce information (39%).

While the majority (86%) of respondents were only "moderately likely" to practice food safety techniques before training, 93% of all respondents reported that they were "very likely" to practice food safety after attending training (Fig. 1. Q-3, 4).

Participants reported purchasing a variety of equipment to assist with food safety tasks as a result of training (Fig. 1. Q-5). The most popular items purchased were thermometers, gloves, plastic cutting boards, and sanitizer test strips.

Almost half of respondents were "not very likely" (25%) or "slightly likely" (23%) to use thermometers to check food temperatures before training (Fig. 1. Q-6, 7), whereas 77% of respondents indicated they were "very likely" to use thermometers to check food temperatures after training. Of the 94 respondents who indicated they were "not very likely" to use thermometers before training, 58% indicated they were "very likely" to use thermometers after training. Interestingly, 4% of respondents indicated they were "not very likely" to use thermometers to check food temperatures even after training.

Before training, 74% of respondents using thermometers were using bimetallic-stemmed thermometers and 15% were using digital thermometers (Fig. 1. Q-8, 9). After training, use of bimetallic thermometers decreased to 69% while use of digital thermometers increased to 32%.

Figure 1: Q-10 represents self-reported behavior before and after training for various food safety practices, including receiving (Q-10a), cross-contamination (Q-10b), thermometer calibration (Q-10c), thawing (Q-10d), cooking (Q-10e), hot and cold holding (Q-10f), cooling (Q-10g), date marking (Q-10h) reheating, (Q-10i), cleaning and sanitizing (Q-10j), and hand washing (Q-10k).

Q-6. Before attending the Penn State University Food Safety Certification Training, how likely were you to use thermometers to check food temperatures? (Please check one box.)

Q-7. As a result of attending the Penn State Food Safety Certification Training, how likely are you to use thermometers to check food temperatures? (Please check one box.)

BEFORE Training Number of Responses (%) (N = 375)		AFTER Training Number of Responses (%) (N = 375)			
		Very Likely	Moderately Likely	Slightly Likely	Not Very Likely
Very Likely	9 (2%)	9 (100%)	--	--	--
Moderately Likely	185 (49%)	161 (87%)	24 (13%)	--	--
Slightly Likely	87 (23%)	65 (75%)	19 (22%)	1 (1%)	2 (1%)
Not Very Likely	94 (25%)	55 (58%)	22 (23%)	4 (4%)	13 (14%)
Total	375 (100%)	290 (77%)	65 (17%)	5 (2%)	15 (4%)

Q-8. Before attending the Penn State University Food Safety Certification Training, what type(s) of thermometer(s) did you use? (Please check all boxes that apply.)

Q-9. As a result of attending the Penn State University Food Safety Certification Training, what type(s) of thermometer(s) do you use? (Please check all boxes that apply.)

Type of Thermometer	BEFORE Training Number of Responses (%) ¹ N = 595	AFTER Training Number of Responses (%) ¹ N = 595
Bi-metallic stemmed	440 (74%)	156 (69%)
Digital (thermistor or thermocouple)	91 (15%)	72 (32%)
Infrared	11 (2%)	13 (6%)
Do not use thermometers yet	91 (15%)	5 (2%)
Not Sure	21 (4%)	3 (1%)
Other ² (Please explain)	13 (2%)	9 (4%)

1. Responses add up to more than 100% due to multiple responses.

2. Trusted refrigerator, thermometer, Use thermometer to check refrigeration, Cold storage unit thermometers, Regular thermometer for freezer and refrigerator, Meat and poultry thermometer, I bake; The oven has a thermometer, For coolers and freezers - no cooking done, Thermometers supplied with refrigeration equipment, Hot and cold thermometers in all refrigerators, One in every cooling unit, Thermostat on equipment, In beer coolers and tap systems, Thermometers for refrigerator and freezer units.

Before training, less than half of the respondents took temperatures of foods at receiving (29%), rejected potentially hazardous foods with temperatures higher than 41°F at receiving (44%), monitored the temperature (34%) or sanitizer concentration (39%) in the third compartment of a three-compartment sink, thawed food in a

microwave oven (47%), or under water (47%), or cooled foods using an ice bath (32%), a cooling wand (9%), or blast chiller (7%). Before training, over half of the respondents practiced the following strategies: thawing food in a refrigerator (93%) or as a part of the cooking process (57%), ensuring proper handwashing (92%), holding

cold food at 41°F or lower (90%), cleaning and sanitizing between tasks (88%), holding hot food at 140°F or higher (87%), separating PHF from RTE foods (86%), cooking food to proper internal temperatures (83%), storing RTE foods above PHF (77%), date-marking foods (72%), reheating foods to 165°F (67%), using gloves with RTE foods (61%), cooling foods using shallow pans (60%), checking foods with calibrated thermometers (57%), and calibrating thermometers (54%).

For those respondents not practicing certain food safety practices before training, 50% or more began practicing the following strategies after training: calibrating thermometers (81%), cleaning and sanitizing between tasks (79%), ensuring proper handwashing (78%), checking foods with calibrated thermometers (70%), reheating foods to 165°F (70%), separating PHF from RTE (66%), holding cold food at 41°F or lower (66%), cooking food to proper internal temperatures (64%), date marking foods (63%), storing RTE above PHF (62%), rejecting PHF with temperatures higher than 41°F at receiving (59%), monitoring the temperature of the third compartment in a three-compartment sink (58%), thawing food in the refrigerator (55%), holding hot food at 140°F or higher (55%), testing and monitoring the sanitizer concentration of the third compartment in a three-compartment sink (55%), and taking the temperature of PHF at receiving (54%). Over three-fourths of respondents who indicated they did not cool food using a blast chiller, thaw food in a microwave oven, thaw food as part of cooking process, thaw food under water, or cool food using a cooling wand before training, did not begin these practices after training.

For those respondents who did participate in various food safety practices before training, over 20% or more began conducting the following practices more frequently after training: ensuring proper handwashing (26%), cleaning and sanitizing between tasks (26%), testing and monitoring the sanitizer concentration

Q-10. In the first two columns, please tell us whether or not you engaged in any of the following food safety practices before attending the Penn State Food Safety Certification Training. Then in the next three columns, tell us the changes in your level of use as a result of attending the training. (Please check all the boxes that apply.)

10a. Receiving

BEFORE Training Number of Responses (%)		AFTER Training Number of Responses (%)		
		No Change	Started Practicing	Practicing More Often
At receiving, take temperatures of potentially hazardous foods (N=506)				
Practiced	148 (29%)	113 (76%)	2 (1%)	33 (22%)
Did Not Practice	358 (71%)	106 (30%)	192 (54%)	60 (17%)
At receiving, reject potentially hazardous foods that are above 41°F (N=493)				
Practiced	218 (44%)	165 (76%)	5 (2%)	48 (10%)
Did Not Practice	275 (56%)	73 (26%)	163 (59%)	39 (14%)

10b. Cross-contamination

Store ready-to-eat foods above raw potentially hazardous foods (N=512)				
Practiced	397 (77%)	327 (82%)	6 (2%)	64 (16%)
Did Not Practice	115 (23%)	26 (23%)	71 (62%)	18 (16%)
Separate potentially hazardous foods from ready-to-eat foods during preparation (N=512)				
Practiced	441 (86%)	359 (81%)	8 (2%)	74 (17%)
Did Not Practice	71 (14%)	14 (20%)	47 (66%)	10 (14%)

10c. Thermometer calibration

Calibrate thermometers (N= 56)				
Practiced	30 (54%)	26 (87%)	--	4 (13%)
Did Not Practice	26 (46%)	2 (8%)	21 (81%)	3 (12%)
Check food temperatures with a calibrated thermometer (N=507)				
Practiced	291 (57%)	224 (77%)	7 (2%)	60 (21%)
Did Not Practice	216 (43%)	25 (12%)	151 (70%)	40 (18%)

of the third compartment of a three-compartment sink (24%), using gloves with RTE foods (23%), monitoring the temperature of third compartment sink (23%), taking temperatures of PHF at receiving (22%), checking foods with calibrated thermometers (21%), and date marking (20%). Over three-quarters (73–87%) of respondents who indicated they conducted food safety practices before training did not change the frequency of practice after training. Regardless of training, the preferred methods of safely thawing and cooling foods were in the refrigerator and using shallow pans, respectively.

The majority of respondents reported being “moderately likely”

(56%) or “slightly likely” (22%) to educate or train others in their establishment on safe food practices before attending the SFSCP training (Fig. 1. Q–11, 12). As a result of training, 84% of respondents indicated they were “very likely” to conduct training for employees.

Although only a relatively small number of employees from individual establishments attended the trainings, the acquisition of food safety information was not limited exclusively to participants of the workshops. Thirty-nine percent of participants reported sharing the food safety information acquired from the trainings with co-workers. Ways in which respondents shared information included informal discussions (73%), conducting one-

on-one trainings (45%), passing reading materials on to co-workers (40%), training others (38%), displaying posters throughout the establishment (38%), conducting at least one “Training Tips” activity from the ServSafe® coursebook (28%), conducting group training (25%), or conducting at least one activity from the training with co-workers (24%) (Fig. 1. Q–13). Most respondents (77%) reported sharing information from the training with 1 to 10 co-workers, with 48% spending less than one hour per week training employees (Fig. 1. Q–14), 29% conducting training 1 to 2 hours per week, 7% conducting training 2 to 3 hours per week, and 5% spending more than 3 hours per week training co-workers on food safety issues. Eleven percent indicated they had not yet conducted any training for employees.

Respondents were surveyed as to whether or not they received any incentives for implementing proper food safety practices (Fig. 1: Q–15). Over half (53%) responded they did not receive any incentives, 15% reported receiving awards, 13% were not sure, and for 20%, receiving incentives was not applicable to their occupation. Of the 47 respondents who listed specific types of incentives provided for implementing proper food safety practices, 40% indicated the incentives were intangible awards such as praise; 19% received tangible incentives such as monetary rewards; 21% received both tangible and intangible rewards; and 19% indicated employers used what can be categorized as the threat of punishment to drive employees to carry out proper food safety procedures.

Figure 1: Q–16 identifies the challenges respondents reported in implementing food safety practices after training. Although reported challenges included a resistance of employees to change (25%), lack of time for training (17%), lack of money for new equipment (12%), management’s lack of understanding of the need for change (5%), management’s not enforcing new food safety procedures

10d. Thawing practices

BEFORE Training Number of Responses (%)		AFTER Training Number of Responses (%)		
		No Change	Started Practicing	Practicing More Often
Thaw food in refrigerator (N=509)				
Practiced	471 (93%)	402 (85%)	3 (0.6%)	66 (14%)
Did Not Practice	38 (8%)	13 (34%)	21 (55%)	4 (10%)
Thaw food in a microwave (N=473)				
Practiced	221 (47%)	191 (86%)	3 (1%)	27 (12%)
Did Not Practice	252 (53%)	225 (89%)	23 (9%)	4 (2%)
Thaw food under potable water in a sink (N=478)				
Practiced	226 (47%)	187 (83%)	5 (2%)	34 (15%)
Did Not Practice	252 (53%)	207 (82%)	30 (12%)	15 (6%)
Thaw food as a part of the cooking process (N=474)				
Practiced	271 (57%)	230 (85%)	6 (2%)	35 (13%)
Did Not Practice	203 (43%)	176 (87%)	20 (10%)	7 (3%)

10e. Cooking

Cook food to proper internal temperatures (N=495)				
Practiced	410 (83%)	339 (83%)	2 (0.4%)	69 (17%)
Did Not Practice	85 (17%)	14 (16%)	54 (64%)	17 (20%)

10f. Holding

Hold hot food for service at 140°F or higher (N=497)				
Practiced	433 (87%)	368 (85%)	3 (0.7%)	62 (14%)
Did Not Practice	64 (13%)	16 (25%)	35 (55%)	13 (20%)
Hold cold food for service at 41°F or lower (N= 513)				
Practiced	463 (90%)	401 (87%)	3 (0.6%)	59 (13%)
Did Not Practice	50 (10%)	9 (18%)	33 (66%)	8 (16%)

(5%), owner(s) lack of understanding of the need for change (4%), and lack of money for training (4%), 60% of respondents reported no challenges in implementing new food safety practices.

DISCUSSION

Over the past two decades, studies have identified the food safety risk factors related to preparing and serving food in homes and in foodservice and retail establishments. Reporting on foodborne outbreaks in the United States between 1973 and 1982, Bryan (4) found the majority (42%) of outbreaks of foodborne disease in homes

were due to contaminated raw food and/or ingredients, and 56% of the foodborne outbreaks from food service establishments were due to improper cooling. Foodborne illness statistics from the CDC from 1988 to 1997 reveal that five risk factors contribute to all foodborne outbreaks, including improper holding temperatures (34.3%), followed by poor personal hygiene (19.3%), inadequate cooking (13.0%), contaminated equipment (12.1%), and food from unsafe sources (6.0%) (3, 22). Using the CDC's five identified risk factors to establish a national baseline on the occurrence of foodborne disease within the foodservice and retail industries, the Food and Drug Admin-

istration (FDA) found five practices and behaviors for which the observed "out of compliance" rate exceeded 40%, including cold holding of potentially hazardous food at 41°F or below; RTE, PHF cold holding at 41°F or below; commercially processed RTE, PHF date marked; surfaces/utensils cleaned/sanitized; and proper, adequate handwashing (9). Generally, the risk factors contributing most frequently to outbreaks of foodborne illness can be categorized as improper temperature control, poor personal hygiene, and cross-contamination.

For participants of the SFSCP who did not practice various food safety strategies before training, at least 50% reported they began practicing 16 different strategies after training. A comparison of the recognized risk factors with the 16 areas of positive behavior change shows the greatest self-reported behavior change in the areas of temperature control (10 strategies adopted), followed by cross-contamination (5 strategies adopted), and personal hygiene (1 strategy adopted). Given that the majority of outbreaks are shown to arise from improper temperature control, the high degree of self-reported behavior change in the area of temperature control is encouraging. The self-reported behavior change also encompassed a 63-79% positive change in the areas in which the FDA found a 40% out-of-compliance rate.

In this study, 20-26% of the respondents who reported practicing various food safety practices prior to training began practicing eight strategies more often as a result of training. When the recognized risk factors were compared with the eight areas of increased practice, it is apparent that almost equal improvements were observed in the three general risk factor categories.

Additionally, further self-reported behavior changes were observed in the area of temperature control. Forty-nine percent of participants indicated that before training, they were "moderately likely" to use a ther-

10g. Cooling

BEFORE Training Number of Responses (%)		AFTER Training Number of Responses (%)		
		No Change	Started Practicing	Practicing More Often
Use an ice bath to cool food (N= 468)				
Practiced	149 (32%)	123 (83%)	--	26 (17%)
Did Not Practice	319 (68%)	159 (50%)	129 (40%)	31 (10%)
Use a cooling wand to cool food (N=448)				
Practiced	42 (9%)	35 (83%)	--	7 (17%)
Did Not Practice	406 (91%)	330 (81%)	63 (16%)	13 (3%)
Use a blast chiller to cool food (N=442)				
Practiced	29 (7%)	25 (86%)	--	4 (14%)
Did Not Practice	413 (93%)	382 (92%)	22 (5%)	9 (2%)
Cool by dividing food among shallow pans (N= 465)				
Practiced	278 (60%)	228 (82%)	5 (2%)	45 (16%)
Did Not Practice	187 (40%)	80 (43%)	86 (46%)	21 (11%)

10h. Date-marking

Mark stored food with a description of the food and the date and time it was prepared and / or the date the food is to be thrown out (N=529)				
Practiced	380 (72%)	295 (78%)	9 (2%)	76 (20%)
Did Not Practice	149 (28%)	29 (19%)	94 (63%)	26 (17%)

10i. Reheating

Ensure that food reaches at least 165°F during the reheating process (N=497)				
Practiced	333 (67%)	266 (80%)	4 (1%)	63 (19%)
Did Not Practice	164 (33%)	21 (13%)	116 (70%)	27 (16%)

10j. Cleaning and sanitizing

BEFORE Training Number of Responses (%)		AFTER Training Number of Responses (%)		
		No Change	Started Practicing	Practicing More Often
Monitor the temperature of the third compartment manual ware washing sink (N= 497)				
Practiced	168 (34%)	128 (76%)	2 (1%)	38 (23%)
Did Not Practice	329 (66%)	94 (29%)	191 (58%)	44 (13%)
Test and monitor concentration of sanitizer solutions (N= 520)				
Practiced	201 (39%)	150 (75%)	3 (2%)	48 (24%)
Did Not Practice	319 (61%)	94 (29%)	175 (55%)	50 (16%)
Clean and sanitize equipment and utensils between tasks (N= 537)				
Practiced	471 (88%)	344 (73%)	5 (1%)	122 (26%)
Did Not Practice	66 (12%)	5 (8%)	52 (79%)	9 (14%)

10k. Hand washing

Ensure proper hand washing procedures (N= 535)				
Practiced	495 (92%)	363 (73%)	6 (1%)	126 (26%)
Did Not Practice	40 (8%)	--	31 (78%)	9 (22%)
Use gloves with ready-to-eat foods (N=509)				
Practiced	311 (61%)	234 (75%)	4 (1%)	73 (23%)
Did Not Practice	198 (39%)	76 (38%)	98 (50%)	24 (12%)

meter to check food temperatures, whereas after training, 77% were "very likely" to do this. This reported change in thermometer use is further supported by the fact that 51% of respondents who purchased thermometers did so as a result of training.

Following training, participants did not alter their original chosen methods for thawing and cooling. Before and after training, the preferred method of safely thawing and cooling foods was in the refrigerator and using shallow pans, respectively. Failure to implement alternative thawing and cooling methods may be due to the expense for additional equipment (i.e., cooling wand) and/or the additional time required during preparation for sufficient cooling of foods.

Many studies have argued for the effectiveness of food safety certification. Although increased food safety knowledge as a result of training has been well documented (1, 2, 13, 17, 19, 25), the correlation between knowledge gain and improved food safety practices is not always clear. Several studies have demonstrated that training does not translate into an implementation of learned food safety strategies (1, 8, 13, 24, 28), whereas other studies argue that training improves food safety practices and/or inspection scores (12, 14, 15, 17, 19, 29, 34). With regard to self-reporting behavior, several studies (6, 23, 26) have demonstrated there is a discrepancy between self-reported behavior and observed or actual behavior. These studies demonstrate that, when researchers observe behavior change after training, the actual change occurs less frequently than is indicated by self reporting of the participants. When asked about the likelihood of practicing food safety techniques before and after the SFSCP training, 93% of respondents indicated that their likelihood of practice was greater after training. Although the self-reported nature of the data may reflect an inflated reporting of positive behavior change, the assumption that the self-reported be-

Q-11. Before attending the Penn State Food Safety Certification Training, how likely were you to educate or train others in your establishment on safe food practices? (Please check one box.)

Q-12. As a result of attending the Penn State Food Safety Certification Training, how likely are you to educate or train others in your establishment on safe food practices? (Please check one box.)

BEFORE Training Number of Responses (%) (N = 418)		AFTER Training Number of Responses (%) (N = 418)			
		Very Likely	Moderately Likely	Slightly Likely	Not Very Likely
Very Likely	58 (14%)	54 (93%)	4 (7%)	--	--
Moderately Likely	234 (56%)	208 (89%)	26 (11%)	--	--
Slightly Likely	91 (22%)	70 (77%)	15 (16%)	6 (6%)	--
Not Very Likely	35 (8%)	21 (60%)	7 (20%)	4 (11%)	3 (9%)
Total	418 (100%)	353 (84%)	52 (12%)	10 (2%)	3 (0.7%)

Q-13. In what ways have you shared the skills and information you received with other employees in your establishment? (Please check all the boxes that apply.)

Ways of Sharing	Number of Responses (N = 590)	Percent of Responses ¹
Had informal discussions with co-workers	431	73
Conduct one-on-one training	226	45
Passed reading materials on to co-workers	236	40
Trained others (how many?) ²	225	38
Displayed posters throughout the establishment	223	38
Conducted at least one "Training Tips" activity from the course book	163	28
Conduct group training	145	25
Conducted at least one activity from the training with the staff	139	24
Have not shared the skills and information yet	21	4
Other ³	8	1

1. Responses add up to more than 100% due to multiple responses.

2. Number of Additional Employees Trained as a Result of Training (N=193)

Number of Trainees	Number of Responses	Percent of Responses
1-10	148	77
11-20	33	17
21-30	6	3
Over 30	6	3

3. Hands on practice, All attended classes and passed, Tie in to snack preparations as relevant, Teach EFNEP classes, Have shared info at restaurant inspections, Did "gotcha month", Reminders of the importance of the "ways" and "whys" of what we practice in order to serve safe food, I teach from the book as I was taught in certificate training - every 2 wks we have training meetings, Video tapes and Glo-germ, Actual scenarios - "what should/would you do".

havior change did occur is likely to be valid. Although the lasting effect of certification training is not known, Kneller et al. (15) found that improved food safety inspection scores up to eighteen months after training. After eighteen months, no improvement was observed, suggesting the need for re-training.

An important but sometimes unrecognized benefit of food safety training is the flow of knowledge from course participants to their co-workers. One hundred ninety-three of the course participants reported that they had shared their newly acquired information with co-workers. Of these, the majority (148) of participants shared information with one to ten co-workers. It can be hypothesized that if each of the 148 participants shared information with an average of five co-workers, the training will have benefited an additional 740 food service or retail employees who did not attend the SFSCP trainings. Respondents also reported that as a result of attending the SFSCP trainings, the likelihood of conducting food safety training programs in their establishments increased, thus further increasing the flow of knowledge from course participants to co-workers.

The effectiveness of a mandatory food safety certification program is dependent upon the degree to which participants implement newly acquired food safety knowledge. The degree of implementation is dependent upon several factors, including the attitude of managers of the establishment, adequacy of size of staff, proper equipment, and financial resources (6, 8, 12, 32). Sixty percent of survey respondents indicated they did not face any challenges in implementing new food safety practices after training. It is believed that managers have more control than other employees over whether or not skills learned in the course are implemented in the establishments. Therefore, the ability to implement new food safety practices may be related to the fact that 44% of the survey participants were managers. This

Q-14. As a result of attending the Penn State Food Safety Certification Training, how much time have you spent training or educating employees about safe food practices? (Please check one box.)

Amount of Time	Number of Responses (N = 561)	Percent of Responses
I have not done any food safety training	62	11
Less than one hour per week	268	48
1-2 hours per week	161	29
2-3 hours per week	40	7
More than 3 hours per week	30	5

Q-15. Have the employees at your establishment ever received any incentives for implementing proper food safety practices? (Please check one box.)

Incentive Awarded?	Number of Responses (N = 585)	Percent of Responses
Yes (if yes, please explain) ¹	87	15
No	310	53
Not Sure	73	13
Not Applicable	115	20

1. Types of Incentives Provided to Employees for Implementing Proper Food Safety Practices

Incentives	Number of Responses (N= 47)	Percent of Responses
Intangible Incentives	19	40
Both tangible and intangible incentives	10	21
Tangible incentives	9	19
Punishment	9	19

Q-16. Since attending the Penn State University Food Safety Certification Training, what kinds of challenges have you faced when trying to implement new food safety practices at your establishment? (Please check all the boxes that apply)

Challenge	Number of Responses (N=543)	Percent of Responses ¹
I have not faced any challenges when implementing new food safety practices	324	60
Employees are resistant to change	137	25
Lack of time for training	90	17
Lack of money for new equipment	63	12
Management does not understand the need for change	27	5
Management does not enforce new food safety practices	27	5
Owner(s) do not understand the need for change	23	4
Lack of money for training	24	4
I have not implemented any new food safety practices yet	15	3
Other ²	5	1

1. Responses add up to more than 100% due to multiple responses.

2. Volunteer company--We get different people at our functions and can't teach everyone, Keeping consistency--they'll do well for a while and then slack off again, etc., Temperature control, Hygiene training one-on-one is the biggest challenge, Very inconsistent roles between training/ state/ and local government. Training is irrelevant for the city of Lancaster.

observation is consistent with findings from Clayton et al. (6), who determined "that the effectiveness of a training program is dependent on the attitude of managers and the hygiene culture of an organization." For those respondents who did report implementation challenges, the most common barriers to implementation were employee attitude, lack of time, and lack of money. Only 15% of respondents reported receiving incentives for implementing food safety practices. The majority of incentives were positive, including financial incentives and praise. Interestingly, 19% of respondents reported receiving some type of punishment if they did not implement proper food safety procedures.

CONCLUSION

Over the past several decades, the value of mandatory food safety certification has been debated and its degree of effectiveness remains unclear. The Pennsylvania Food Employee Certification Act, (FECA), which mandates food safety certification, creates standards only to ensure that "upon successfully passing a test, the supervisory employee has demonstrated adequate food protection knowledge." Unfortunately, no standards were authorized to evaluate the success or effectiveness of FECA; therefore the level of effectiveness relative to changed food safety behavior at the state level will not be measured. As a vendor for the food safety certification courses, PSU was in a unique position to evaluate how or if the knowledge obtained from the courses would be translated to the food service and retail establishments. After attending the food safety certification course and based upon self-reported responses, the majority of survey participants were able to implement food safety practices. These practices included, those related to time-temperature strategies; sharing of knowledge with co-workers; and new equipment purchases that corresponded with specific food safety risks.

Q-17. What is your job title? (Please check one box.)

Title	Number of Responses (N = 595)	Percent of Responses ¹
Manager	264	44
Chef/Cook	131	22
Grocery/Retail	50	8
Volunteer	32	5
Director	27	5
Caterer	26	4
Bar Tender	13	2
Health Officer	6	1
Consultant	5	1
Processor	3	1
Other ²	15	2

1. Responses add up to more than 100% due to multiple responses.

2. Waitress (2), Barbeque competitor, Food server, Owner of movie theater, Pastor, oversee kitchen at church and a church camp, Assistant food service director, Registered Dietitian, Store office clerk, Quality Control, Quality Assurance Coordinator, Café worker, Hospitality lead, Food service worker.

Q-18. In what type of establishment do you work? (Please check one box.)

Type of Establishment	Number of Responses (N = 605)	Percent of Responses ¹
Restaurant	221	37
Grocery/Retail	82	14
School	50	8
Convenience Store	38	6
Deli	38	6
Catering	37	6
Foodservice	32	5
Bakery	20	3
Camp	17	3
Church	16	3
Meals on Wheels	12	2
Elder Care	12	2
Hospital	7	1
State government	8	1
Other ²	99	16

1. Responses add up to more than 100% due to multiple responses.

2. Private Club (4), Senior Center (3), Bar (3), Farm Market (3), Movie theater (2), Club (2), Amusement Park, Insurance Co. just serve lunch and breakfast, SAL / American Legion, Tea Shop, Hotel, SAL / American Legion / Son's of the American Legion, Horse club, Butcher, Grilling/ Barbeque, Golf course, Fair, Monitor, Blueberry farm, Insurance Company, Racetrack, VFW, Group Home, Children's Home, Family Fun Center, Seafood, Owner of building that houses restaurant, Private lodge, Prison, Ice plant, Processing, Bar/Club, Ice cream, Correctional, Resort gift shop, Soup kitchen, Movie exhibition, Tavern

Although the debate regarding the effectiveness of certification is likely to continue, it is clear that food safety training is only one step toward implementing a complete and consistent food safety system into food service and retail establishments. FECA will assist in increasing the food safety knowledge of food service and retail employees in Pennsylvania, but behavior change may or may not occur as a result of training. If positive behavior change is to develop from newly acquired knowledge, then food service and retail industries must provide a proper environment and financial resources to successfully translate learned knowledge to safe food handling practices. This study identifies the areas in which employees of the food service and retail industries are likely to make the necessary changes that have the potential to reduce the risk of foodborne illness.

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Q-19. How many people are employed at your establishment? (Please check one box)

Number of Employees	Number of Responses (N = 540)	Percent of Responses
1-10	327	61
11-20	125	23
21-30	27	5
31-40	16	3
41-50	8	1
Over 50	37	7

**Thank you for completing this survey.
Please return it in the self-addressed, postage-paid envelope provided.**

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HACCP-based Fingertip Rinse Procedure

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SUMMARY

Fingers are frequently used to handle raw chicken on a cook's line. Raw, fresh chicken is often contaminated with vegetative pathogens such as *Salmonella* and *Campylobacter jejuni*. These pathogens can thus be transferred to fingers that touch raw chicken pieces and must be reduced to a safe level before the fingers touch other food products, particularly ready-to-eat food.

A hand washing sink, even in close proximity, is often not convenient for the frequent hand washing necessary to prevent cross-contamination. A possible solution to this food safety problem is described by the following simple procedure. The workstation is provided with a bucket containing 4 liters (4,000 ml) of bacteriostatic solution (water acidified to pH 3.5 with 5% acetic acid [vinegar]). A cloth, approximately 12 inches by 12 inches, is placed in the solution and used by the cook to wipe hands and fingers, thus providing the friction necessary for pathogen removal. Bacteria on fingers are reduced to a safe level, and the acetic acid (vinegar) solution dilutes the bacteria and inhibits bacterial growth. This study reports on an experimental test of this fingertip rinse procedure.

INTRODUCTION

Raw, fresh chicken is often contaminated with vegetative pathogens such as *Salmonella* and *Campylobacter jejuni* (2, 3, 4, 7, 8). *Salmonella* spp. is usually at a low level, perhaps 5 per chicken breast. However, *Campylobacter jejuni* has been found in chicken at much higher levels, as high as 10^5 to 10^6 CFU per chicken carcass (8, 11). When a cook handles the chicken, there is the possibility of transferring 1,000 or more bacteria to the cook's hands and fingers. If the cook does not reduce transferred pathogens to a safe level before touching ready-to-eat food, the ready-to-eat food can become contaminated with a significant number of pathogens that can cause customers to become ill. An infective dose for *C. jejuni* is 400 to 500 vegetative cells (1, 10).

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FIGURE 1. Bucket containing acetic acid rinse solution



Fresh, cooked chicken breast and chicken strips are common restaurant menu items. The food safety problem arises when the cook picks up pieces of raw chicken to put it on the grill or to batter it before placing it into the deep fat fryer. Fingers are the best "tool" for handling the chicken. To prevent cross-contamination, cooks who have handled poultry must wash their hands before handling any ready-to-eat food or touching any ready-to-eat food contact surfaces. While the FDA has not quantified the effectiveness of its recommended 20-second hand wash, the Hospitality Institute of Technology and Management research has shown that a single wash without fingernail brush friction will reduce marker organisms on fingertips about 100-fold (12). However, a hand washing sink, even in close proximity, is often not conducive to the frequent hand washing required during peak hours of food preparation and service. Cooks could use disposable plastic gloves when handling raw chicken. However, even when gloves are worn, hands must still be washed according to FDA Food Code recom-

mendations before gloves are put on and after removal (5). Another possible solution for preventing cross-contamination of pathogenic bacteria from hands that have handled raw poultry to ready-to-eat food is to provide the workstation with a bucket of acetic acid solution (water acidified to pH 3.5 with 5% acetic acid [vinegar]).

Sanitizer solutions containing 50 ppm hypochlorite, 200 ppm quaternary ammonium compounds, or 12.5 ppm iodine do not have prolonged effectiveness, because they are rapidly inactivated by organic food soil. These sanitizer solutions are effective only on clean surfaces that contain little or no organic soil and cannot be relied upon to assure the reduction of bacteria on the surface of hands and fingertips that handle raw poultry. Although weak acetic acid solutions, at room temperature, require time to inactivate bacteria, these solutions are stable when contaminated with food waste and can be used both to inactivate bacteria and to inhibit bacterial growth (9). It is thus reasonable to suggest that removal of bacteria from hands and fingertips and dilution with the use of

an acetic acid solution can be used to reduce the risk of cross-contamination that may occur when food handlers prepare raw foods (e.g., raw poultry products) and then handle ready-to-eat foods (e.g., lettuce or fruit garnishes).

Fingertip rinse procedure

An acetic acid solution was prepared in a bucket with 4 liters of room-temperature water (16 to 32°C) and 15 ml of 5% acetic acid (distilled vinegar). The pH of the solution was 3.5. A clean 12 inch x 12 inch cloth was placed in the solution to provide friction when used to wipe hands and fingertips.

A culture of *Escherichia coli* ATCC 25922 was incubated at 37°C overnight in M broth (International BioProducts). This non-pathogenic species has been found to be very useful as a surrogate non-pathogenic vegetative microorganism for cleaning studies. The culture was diluted in phosphate buffer to about 100,000 *E. coli* per ml so that an inoculum of 10 microliters (containing about 1,000 bacteria) could be put on the first and second fingers of a vinyl gloved hand to simulate the contamination that occurs from touching chicken and the transferring of vegetative pathogens such as *C. jejuni*. The gloved fingers were then immersed in the bucket of acetic acid solution and wiped with the cloth for about 5 seconds.

The *E. coli* transferred to the solution was measured by use of pour plates with VRB (Violet Red Bile) agar plus 4-methylumbelliferyl-B-D-glucuronide (MUG). A pour plate was used because the diluent solution is slightly acidic, and this would prevent acid from affecting outgrowth. The number of *E. coli* was measured by preparing a multiple number of 10 plates and then combining the counts. For example, 1 ml of rinse solution was placed into each plate; thus, the total count of the 10 plates represented the number of bacteria per 10 ml of

TABLE 1. Number of *E. coli* ATCC 25922 per each 10-ml acetic acid rinse solution

Rinse	Test 1	Test 2
1 st rinse	1 CFU / 10 ml	1 CFU / 10 ml
2 nd rinse	4 CFU / 10 ml	3 CFU / 10 ml
3 rd rinse	5 CFU / 10 ml	4 CFU / 10 ml

TABLE 2. Number of *E. coli* ATCC 25922 remaining on glove after 3rd rinse in acetic acid rinse solution

	Test 1	Test 2
Glove	2 CFU / 10 ml	6 CFU / 10 ml

TABLE 3. Number of *E. coli* ATCC 25922 remaining in the acetic acid rinse solution

Hours	CFU/10 ml
Initial	6
4 hours	1
8 hours	<1
24 hours	<1

solution. This procedure facilitated the enumeration of low levels of bacteria.

Following the first rinse in the acetic acid solution, the first and second fingers of the gloved hand were reinoculated with the *E. coli* ATCC 25922 culture and were rinsed again in the acetic acid solution. This procedure was done twice (a total of 3 times). Counts (CFU) were made of the *E. coli* in the acetic acid solution after each fingertip rinse.

To determine the number of *E. coli* ATCC 25922 remaining on the glove after the third rinse, the glove was put into a stomacher bag with 20 ml of phosphate buffer and pummeled for 30 seconds. The *E. coli* count on the glove was determined

using the same 10-petri-dish system already described. To determine the viability of the *E. coli* ATCC 25922 in the acetic acid rinse water, a solution containing about 1,000 CFU/ml was prepared from the stock culture and added to 4,000 ml of the acetic acid rinse water. The *E. coli* ATCC 25922 were enumerated after 4 hours, 8 hours, and 24 hours of room temperature incubation.

RESULTS

The counts of *E. coli* ATCC 25922 in the acetic acid solution after the gloved fingers had been rinsed in the solution are shown in Table 1. After the first rinse, the count was 1 CFU per 10 ml of acetic acid solution; af-

ter the second rinse, the count was 4 CFU per 10 ml; and after the third rinse, it was 5 per 10 ml. These results indicate that *E. coli* ATCC 25922 was diluted to a low level in the acetic acid solution, even after contaminated gloved fingers had been rinsed in the solution 3 times.

The number of bacteria that remained on the glove was 2 in the first test and 6 in the repeat test.

The counts of *E. coli* ATCC 25922 inoculated into the acetic acid rinse solution that remained in this solution after 4, 8, and 24 hours are shown in Table 3.

DISCUSSION

This experiment shows that numbers of bacteria on fingers are significantly reduced by removal, dilution and destruction in an acetic acid solution. In the first fingertip rinse, if 2,200 *E. coli* CFU (total inoculum) on the gloved fingertips was completely transferred to the 4,000-ml acetic acid solution, the expected count of the solution would be 2,200 CFU per 4,000 ml, or about 1 CFU per 2 ml. However, the count was 1 CFU per 10 ml, indicating that some of the *E. coli* probably adhered to the cloth used to wipe fingertips and/or were inactivated by the solution. After the second rinse, the acetic acid solution should have had about 4,400 CFU per 4,000 ml, or 1 CFU per ml; however, 1 CFU per 2 ml was recovered. After the third rinse, 6,600 CFU per 4,000 ml, or about 2 CFU per 3 ml, might be expected to be present in the solution. Actually, only 1 CFU per 2 ml was recovered.

Enumeration of *E. coli* ATCC 25922 remaining on the gloves after the third fingertip rinse, when there were about 1 CFU per 2 ml solution, shows that most of the bacteria were removed by rinsing the gloved fingers in the acetic acid solution. If a food handler washes his/her hands using the FDA 20-second lather and rinse (6), there may be a 100-fold reduction of bacteria on the hands. The method of dipping and rinsing gloved

fingertips in the acetic acid solution after 6,600 CFU *E. coli* ATCC 25922 has been added to the solution gave an even greater reduction of 3,300 CFU to 1 ml (or 6,600 CFU to 2 ml) than the 100 CFU to 1 ml rinse water that the Hospitality Institute of Technology and Management has estimated that the FDA 20-second hand washing method provides.

The acetic acid rinse solution used in this experiment provides a method for removal of *E. coli* ATCC 25922 from fingertip surfaces, as well as dilution and probable destruction of this bacteria.

CONCLUSION

In foodservice kitchens, hand washing sinks are not always near every workstation. As a result, cooks / food preparers may not wash and rinse their hands as often as necessary to prevent cross-contamination between raw foods and ready-to-eat foods. The FDA Food Code permits a bucket of sanitizer solution containing a cleaning cloth for use in sanitizing surfaces, but there is no mention of using a sanitizer solution for hands and fingers. It is known that all sanitizers currently used in foodservice facilities are sensitive to neutralization by organic material that is found on dirty cleaning cloths. This study shows that an acetic acid solution prepared with tap water and distilled vinegar (5% acetic acid), pH 3.5, effectively reduced *E. coli* ATCC 25922 on gloved fingertips.

To decontaminate the fingers (or gloved fingers) after touching a contaminated food such as raw poultry, fingers/hands could be rinsed in a bucket containing an acetic acid so-

lution. The hands and fingertips should be wiped for 2 to 3 seconds on a clean, wet cloth in the bucket — enough to release food residue and bacteria. If desired, hands could be dried with a clean, dry paper towel. The food pathogens on the hands would thus be reduced to a safe level, and fingers could touch ready-to-eat food without danger of causing cross-contamination.

The acetic acid (vinegar) solution in the bucket should be changed when it becomes soiled, or within a 2 to 4 hour time period. This is an aesthetic/quality issue, not a food safety issue, because the pathogens will not grow to an unsafe level in the solution within the time it is used, and the solution will remain effective even if it contains organic soil.

Using an acetic acid solution to rinse hands and fingertips could be used as a critical control point (CCP) by cooks to remove pathogenic microorganisms from hand and finger surfaces after touching raw food on the cook's line before touching ready-to-eat food. The next step for this proposed hazard control is to validate it in operating conditions.

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An Evaluation of the Retail Inspection Process in Oklahoma

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SUMMARY

Bacterial pathogens have been shown to cause the largest percentage of foodborne outbreaks in the United States. The most commonly reported practices that contributed to outbreaks were improper holding and storage temperatures in retail establishments and poor personal hygiene of food handlers. While food sanitation and the protection of the public on a day-to-day basis must be done by the food industry, local regulatory agencies are responsible for seeing that the task is accomplished. Retail inspection is the primary tool a regulatory agency has for detecting procedures and practices that may be hazardous and for taking action to correct deficiencies. Given that industry and regulatory agencies rely fundamentally on the retail inspection process to assure food safety at the retail level, it was postulated that a policy-to-performance void exists, primarily through process fragmentation, indicating that roles and responsibilities are not executed in the manner established through food safety policy. The research effort included the design, collection and statistical evaluation of a questionnaire distributed through direct mail to Registered Sanitarians-Environmental Health Specialists and County Health Department Administrators in the state of Oklahoma. Results revealed a measurable difference in the implementation, understanding and evaluation of the retail inspection process related to areas of policy, implementation and compliance. Most notably, only approximately half of those surveyed use the currently adopted Food Code; only 66% of sanitarians recognize that the state agency is responsible for implementation of policy, and the majority of sanitarians view themselves as responsible for compliance contrary to administrator perception of the State Health Department.

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INTRODUCTION

Food safety has become an issue that not only influences political policy but also is in the forefront of public awareness (4). Both the popularity and the necessity for eating out have created a reliance on restaurants and fast food establishments, as half of all meals are eaten outside the home (12). As retail food establishments have increased in size, type, and number, food preparation and distribution techniques have changed, resulting in new problems in food protection. In keeping with changes, the government has developed new regulations and food safety standards designed to safeguard the food environment; unfortunately, the implementation of these standards has been inconsistent.

Retail food service establishments represent one of the last links in the food chain before food reaches the consumer. Between preparation and consumption, the public and governing agencies rely on one major process, the retail inspection process, to assure that food served to the public is safe, wholesome and honestly presented (2). As currently administered, the retail inspection process does not adequately prevent foodborne illness (FBI). Given that most FBI can be prevented, understanding the inadequacies of the inspection process is vital to the health of the public.

While food sanitation and protection of the public on a day-to-day basis must be done by the food industry, local regulatory agencies are responsible for seeing that the task is accomplished. The specific requirements of inspection frequency, acceptable practices and consequences of non-compliance exhibit considerable variation among local jurisdictions and states (8). A long-established component of public health efforts, retail inspection is mandated by food sanitation codes throughout the United States (6, 14). Retail inspection is the primary tool a regula-

tory agency has for detecting procedures and practices that may be hazardous and for taking action to correct deficiencies (7, 13). The inspection procedure must strike a reasonable balance between safety of the physical facility and equipment on the one hand and conditions relating to greater food safety risk, such as food temperature control, employee health and hygienic practices. The Center for Science in the Public Interest conducted a survey of forty-five agencies across the country to determine if state and local agencies were enforcing twelve key food-safety standards in the FDA Food Code, which included cooking and refrigeration temperatures, frequency of inspections and consumer warnings for raw food (1). None of the forty-five agencies surveyed were following all twelve of the stated Food Code recommendations (1, 10).

Isaacs et al. (11) administered questionnaires to managers and inspectors concerning their perceptions of what is done during the inspection process. What inspectors reported as the strategies used during restaurant inspections and the expectations of managers were not found to be significantly correlated. The differences between inspector behavior and manager expectations were stressed as being indicative of the competing issues and influences faced by inspectors and managers in the course of daily work. Findings suggested that outcome objectives from inspections needed to be identified, as the effectiveness of current strategies was not well understood.

Considering the finding that effective inspections were not being performed and that the degree of collaboration of inspectors working with administrators to resolve problems should be higher, a study was conducted to evaluate the use and function of the retail inspection process in the state of Oklahoma. It was hypothesized that inspectors of retail establishments and administrators of

County Health Departments would have similar perceptions of the mission and goals of food safety policy but would differ with regard to the function, strategy and effectiveness of the process.

MATERIALS AND METHODS

The use and function of the retail inspection process was evaluated with a 46-question survey targeting two groups: (1) Registered Sanitarians/Environmental Health Specialists (hereinafter referred to as sanitarians or RS/EHS), who perform retail inspections, and (2) county health department administrators (University of Oklahoma Health Sciences Center IRB Approval #09871).

The questionnaire was designed as a knowledge/attitude survey using self-reporting, multiple choice or rank-ordered responses (9). Multiple-choice questions were closed-ended, and validity of questions was determined by a pilot study given to a small group of sanitarians in Oklahoma County. A list of all 50 sanitarians performing retail inspections and all 22 county administrators in Oklahoma was provided by the State Health Department. The survey questionnaires were mailed to 100% of these sanitarians and county administrators. After 2 1/2 weeks, reminder letters and a second questionnaire encouraging participants to respond were sent. A third mailing was required to elicit responses from administrators.

Questionnaires were coded and entered into a Microsoft Excel 97 spreadsheet. A second spreadsheet was used to check for internal consistency and data entry errors. Data was imported into SAS Release 8.01, which was used for all statistical tests and frequency distributions. Descriptive summary statistics, Chi Square or Fisher's Exact Test of Inference were conducted on domains of interest, and statistical tests of association were tested against an alpha level of 0.002, with an experiment-wise alpha of 0.18.

<p>1. The food safety policy currently in practice regarding retail inspections is determined by the:</p> <p><input type="checkbox"/> 1 Federal Food Code</p> <p><input type="checkbox"/> 2 State Food Code</p> <p><input type="checkbox"/> 3 Local Food Code</p> <p><input type="checkbox"/> 4 Division directors in county health departments</p> <p><input type="checkbox"/> 5 Sanitarians performing inspections</p>	<p>2. Food safety policy is implemented by:</p> <p><input type="checkbox"/> 1 State health department</p> <p><input type="checkbox"/> 2 County health department</p> <p><input type="checkbox"/> 3 Program administrators</p> <p><input type="checkbox"/> 4 Division directors</p> <p><input type="checkbox"/> 5 Sanitarians</p>
<p>3. Compliance with retail inspections is enforced by:</p> <p><input type="checkbox"/> 1 State health department</p> <p><input type="checkbox"/> 2 County health department</p> <p><input type="checkbox"/> 3 Program administrators</p> <p><input type="checkbox"/> 4 Division directors</p> <p><input type="checkbox"/> 5 Sanitarians</p>	<p>4. The type of inspection performed at an establishment is determined by:</p> <p><input type="checkbox"/> 1 local regulations</p> <p><input type="checkbox"/> 2 state regulations</p> <p><input type="checkbox"/> 3 federal regulations</p> <p><input type="checkbox"/> 4 risk ranking of establishment</p> <p><input type="checkbox"/> 5 previous history of establishment</p>
<p>5. Time spent performing an inspection of a restaurant or fast food establishment is determined by:</p> <p><input type="checkbox"/> 1 Condition of establishment</p> <p><input type="checkbox"/> 2 Previous history of establishment</p> <p><input type="checkbox"/> 3 Experience/knowledge/training of staff of the establishment</p> <p><input type="checkbox"/> 4 Risk ranking of establishment</p> <p><input type="checkbox"/> 5 Tenure of inspector</p> <p><input type="checkbox"/> 6 Allocated resources</p>	<p>6. What percent of time does a registered sanitarian who performs restaurant inspections, spend on inspections and compliance?</p> <p><input type="checkbox"/> 1 less than 10% <input type="checkbox"/> 2 10-20%</p> <p><input type="checkbox"/> 3 21-30% <input type="checkbox"/> 4 31-40%</p> <p><input type="checkbox"/> 5 41-50% <input type="checkbox"/> 6 51-60%</p> <p><input type="checkbox"/> 7 61-70% <input type="checkbox"/> 8 71-80%</p> <p><input type="checkbox"/> 9 more than 80%</p>
<p>7. Inspections of retail establishments performed in Oklahoma use regulations developed under the parameter of the:</p> <p><input type="checkbox"/> 1 1976 FDA Food Code</p> <p><input type="checkbox"/> 2 1982 FDA Food Code</p> <p><input type="checkbox"/> 3 1997 FDA Food Code</p> <p><input type="checkbox"/> 4 1999 FDA Food Code</p>	<p>8. The state of Oklahoma has currently adopted which of the following FDA Food Codes?</p> <p><input type="checkbox"/> 1 1976 FDA Food Code</p> <p><input type="checkbox"/> 2 1982 FDA Food Code</p> <p><input type="checkbox"/> 3 1997 FDA Food Code</p> <p><input type="checkbox"/> 4 1999 FDA Food Code</p>
<p>9. Results of retail inspections are reviewed by management to identify trends related to food safety issues:</p> <p><input type="checkbox"/> 1 monthly</p> <p><input type="checkbox"/> 2 biannually</p> <p><input type="checkbox"/> 3 annually</p> <p><input type="checkbox"/> 4 rarely</p> <p><input type="checkbox"/> 5 never</p>	<p>10. Results of retail inspections are primarily reviewed by:</p> <p><input type="checkbox"/> 1 Board of directors of county health department</p> <p><input type="checkbox"/> 2 Director of county health department</p> <p><input type="checkbox"/> 3 Assistant director of county health department</p> <p><input type="checkbox"/> 4 Program administrator</p> <p><input type="checkbox"/> 5 Sanitarians</p>

RESULTS

For the 50 sanitarians self-identified as performing retail inspections, 48 (96%) returned completed questionnaires, while 13 of 22 (59%) administrators responded. Domains of

interest, included mission and goals, regulations and policy, compliance, time, resources, strategies and responsibilities. The results and discussion will focus on the responses from 24 questions (Fig. 1).

The mission of the process was evaluated using a rank-ordered list in which respondents were asked to rank a list of mission statements from 1 to 7 (Question 15), according to importance, with the option to add a

FIGURE 1. Survey questions (continued)

Retail Inspection Process

<p>11. Currently, the amount of time registered sanitarians spend on performing restaurant and fast food inspections and ensuring compliance is:</p> <p><input type="checkbox"/> 1 adequate</p> <p><input type="checkbox"/> 2 inadequate</p>	
<p>12. According to the health department, the primary goal of performing inspections of retail establishments is:</p> <p><input type="checkbox"/> 1 to prevent the spread of foodborne illnesses</p> <p><input type="checkbox"/> 2 to ensure food handling practices do not result in adulteration of food</p> <p><input type="checkbox"/> 3 to assure that food served to the public is safe and wholesome</p> <p><input type="checkbox"/> 4 to measure risk associated with foodborne illness</p>	<p>13. Your primary goal when performing inspections of retail establishments is:</p> <p><input type="checkbox"/> 1 to prevent the spread of foodborne illnesses</p> <p><input type="checkbox"/> 2 to ensure food handling practices do not result in adulteration of food</p> <p><input type="checkbox"/> 3 to assure that food served to the public is safe and wholesome</p> <p><input type="checkbox"/> 4 to measure risk associated with foodborne illness</p>
<p>The two following rank ordered questions were stratified by most important to least important.</p>	
<p>14. The strategy used by sanitarians to perform routine restaurant inspections is determined by:</p> <p><input type="checkbox"/> 1 past performance</p> <p><input type="checkbox"/> 2 type of establishment</p> <p><input type="checkbox"/> 3 time of day</p> <p><input type="checkbox"/> 4 condition of establishment</p> <p><input type="checkbox"/> 5 risk ranking of establishment</p> <p><input type="checkbox"/> 6 experience/knowledge/ training of establishment staff</p> <p><input type="checkbox"/> 7 food policy and regulations</p> <p><input type="checkbox"/> 8 other</p>	<p>15. The mission of the food service inspection process is:</p> <p><input type="checkbox"/> 1 to prevent the spread of foodborne illnesses</p> <p><input type="checkbox"/> 2 to ensure food handling practices do not result in adulteration of food</p> <p><input type="checkbox"/> 3 to ensure that food served to the public is safe and wholesome</p> <p><input type="checkbox"/> 4 to measure risk associated with foodborne illness</p> <p><input type="checkbox"/> 5 to protect the health of the public</p> <p><input type="checkbox"/> 6 to provide education to food service workers</p> <p><input type="checkbox"/> 7 to enforce regulations adopted from the federal food code</p> <p><input type="checkbox"/> 8 other</p>
<p>Responses to each of the following questions were:</p> <p><input type="checkbox"/> 1 Always <input type="checkbox"/> 2 Usually</p> <p><input type="checkbox"/> 3 Sometimes <input type="checkbox"/> 4 Rarely</p> <p><input type="checkbox"/> 5 Never</p>	
<p>16. The type of inspection performed at a restaurant or fast food establishment is determined by the previous inspection history of an establishment.</p>	
<p>17. Sanitarians verify critical control point monitoring at retail restaurants and fast food establishments.</p>	
<p>18. Sanitarians are aware of most of the critical control points at establishments they inspect.</p>	
<p>19. Sanitarians observe food service workers to monitor hand washing.</p>	
<p>20. Routine inspections are appropriately designed to evaluate hand washing of food service workers.</p>	
<p>21. Routine inspections are appropriately designed to evaluate the personal hygiene practices of food service workers.</p>	
<p>22. Routine inspections are appropriately designed to evaluate cross contamination within an establishment.</p>	
<p>23. Sanitarians provide food safety training to food service workers.</p>	
<p>24. Sanitarians observe food service workers at restaurants and fast food establishments prepare food.</p>	

mission statement. The statement "to ensure that food served to the public is safe and wholesome" was most often chosen by administrators (67%) as the most important mission of the process, while 48.9% of sanitarians

chose "to protect the health of the public". The least important mission identified by both groups was "to enforce regulations adopted from the Federal Food Code". Respondents were also asked their perception of

the goal of the retail inspection process. Both groups perceived the primary goal as "assuring that food served to the public is safe and wholesome". No significant differences were found between groups for the responses to these questions (Table 1).

TABLE 1. Differences in administrator/sanitarian perceptions of inspection process

		Sanitarian (%)	Administrator (%)
Determinants of Time for Inspection (P = 0.427) (Question 5)			
	Condition of Establishment	70.8	69.2
	Previous History of Establishment	0	7.7
	Knowledge/Training of Staff	2.1	0
	Risk Ranking of Establishment	14.6	23.1
	Tenure of Sanitarian	4.2	0
	Resources	8.3	0
Responsibilities of Sanitarians			
Provide Food Safety Training for FSW (P = 1.000) (Questions 23)	always/usually	54.2	61.5
	sometimes	41.7	38.5
	rarely/never	4.2	0
Sanitarians are aware of CCPs (P = 0.326) (Question 18)	always/usually	85.5	92.3
	sometimes	14.6	0
	rarely/never	0	0
Sanitarians verify CCPs (P = 0.351) (Questions 17)	always/usually	68.8	61.5
	sometimes	18.8	33.3
	rarely/never	12.5	0
Sanitarians observe food preparation (P = 0.582) (Question 24)	always/usually	87.5	84.6
	sometimes	10.4	7.7
	rarely/never	2.1	7.7
Sanitarians observe hand washing (P = 1.000) (Question 19)	always/usually	77.1	84.6
	sometimes	18.8	15.4
	rarely/never	4.2	0
Goals of the Inspection Process (P = 0.365) (Question 13)			
	Prevent FBI	19.1	38.5
	Ensure Safe Food Handling	4.3	0
	Assure Food Safety	76.6	61.5
	Measure Risk	0	0
Efficacy of Retail Inspection Process to Evaluate Known Factors			
Hand Washing (P= 0.279) (Question 20)	always/usually	61.7	75.0
	sometimes	19.2	25.0
	rarely/never	19.2	0
Personal Hygiene (P = 0.352) (Question 21)	always/usually	59.6	61.5
	sometimes	25.5	38.5
	rarely/never	14.9	0
Cross Contamination (P = 0.556) (Question 22)	always/usually	79.2	92.3
	sometimes	18.7	7.7
	rarely/never	2.1	0

Question 11 was designed to determine if time allotted to perform inspections and ensure compliance was adequate. Responses between groups were similar, with the majority finding time allotted to be adequate (58.3% of sanitarians and

76.9% of administrators indicated that sanitarians spend more than half of their time performing inspections and enforcing compliance). A second question (#5) depicted time performing an inspection as a function of six characteristics (Table 1). Responses

of the two groups were similar with the majority of both groups choosing "condition of establishment" as the primary characteristic affecting time spent performing an inspection.

Strategies used in performing inspections were evaluated by two

multiple-choice questions and one seven-factor rank-ordered question. Question 4 attempted to relate the type of inspection performed to the previous inspection history of an establishment, while Question 14 offered choices for determining the type of inspection performed. The responses of the two groups were similar, with 15% of both inspectors and administrators indicating that inspection history is rarely or never used. In reference to the determinants of the type of inspection performed at an establishment, the majority of administrators indicated "state regulations," with no administrators choosing "previous inspection history," while 34% of sanitarians chose "state regulations" (Table 2). No significant differences were found between the groups for ranking inspection strategies. The strategy most often cited by sanitarians (29%) was "risk ranking" while the largest response from administrators (31%) was "food policy and regulations".

Comparisons of responses from 8 questions (17-24) were analyzed to determine if administrators and inspectors perceived inspector responsibilities to be the same. No statistically significant differences between groups were indicated (Table 1). Of concern were the indications by a number of sanitarians that food safety training, verification of critical control points (CCPs), and observation of food preparation and hand washing were "rarely or never" performed. Personal hygiene and cross contamination are two of the most common causes of FBI; therefore, several of these questions were designed to evaluate the efficacy of the inspection process in detecting these risk factors. The value of the inspection process in evaluating hand washing of food service workers was found by the majority of sanitarians and administrators to be "always/usually" appropriate, with less than 30% of both groups indicating "sometimes" and 19% of sanitarians indicating

"rarely/never". No significant difference between sanitarians and administrators was observed. The efficacy of the process in detecting cross contamination was found to be "always/usually" appropriate by > 75% of sanitarians and administrators and "rarely/never" appropriate by only small percentage of both groups (< 3%). Nearly two-thirds of sanitarians and administrators concurred that the inspection process was appropriately designed to evaluate the personal hygiene practices of food service workers, although 15% of sanitarians found the process to be "rarely/never" appropriate.

Policy issues included perceptions of determinants of policy, Food Code used in the field, determinants of type of inspection performed, and responsibility for implementation of policy (Table 2). Question 7 concerned legal requirements for food safety policy in Oklahoma. Of the respondents, 48% of sanitarians and 77% of administrators indicated the State Food Code; however, 31% of sanitarians and 15% of administrators chose the Federal Food Code, while 19% of sanitarians chose Local Food Code and 8% of administrators chose "Sanitarians". The respondents were also asked which Food Code had been adopted by the State and which Food Code was used in the field. The majority recognized the adoption of, and operated under the parameters of, the 1999 Food Code that had been partially adopted at the time the study was conducted. The State Health Department was recognized by both groups as being primarily responsible for implementing food safety policy. There was considerable disagreement between the two groups with regard to responsibilities for compliance with food safety policy. Nearly half of the administrators (46%) felt that the State Health Department was the responsible entity, while nearly half (48%) of the sanitarians thought that they were primarily responsible (Table 2). Twice as many

administrators as sanitarians thought that county health departments were responsible for compliance.

Another aspect of policy and implementation involves reviewing results of retail inspections and using the process to identify trends. Differences were found between the two groups regarding who reviewed retail inspections results ($P = 0.046$). Sanitarians expressed the belief that Program Administrators (53%) or Sanitarians (43%) were the primary reviewers of inspection results, while administrators believed that Sanitarians (61%), Program Administrators (23%), or Board of Directors (15%) were the primary reviewers. Fifty percent of the sanitarians and 47% of administrators indicated that inspections are "rarely/never" used to identify trends, and about 25% of both groups felt that results were reviewed annually.

DISCUSSION

This study was based on the premise that sanitarians inspecting retail establishments and administrators of County Health Departments would have similar perceptions of the mission of food safety policy but might differ with regard to the function, strategy and effectiveness of the process. The major factor limiting interpretation of these data was the small size of the target population. Even with a 96% response rate from sanitarians and a 59% response rate from administrators, the statistical power of the study is not high enough to discern small differences between the two groups, forcing conclusions to be drawn from practical instead of statistical considerations. The use of surveillance methods imposes a requirement for self-reporting that presents opportunities for error in data collection. In addition to non-response from participants who refused to participate, item non-response occurred when respondents refused to answer or failed to follow the instructions. Measurement error could have

TABLE 2. Differences in administrator/sanitarian perception of food safety policy

	Sanitarians (%)	Administrators (%)
Determinants of food policy (P = 0.61). (Question 1)		
FFC	31.3	15.4
SFC	47.9	76.9
LFC	18.8	0
Division Directors	2.1	0
Sanitarians	0	7.7
Food code used by sanitarians in field (P = 0.605). (Question 7)		
1976	4.3	7.7
1982	2.2	0
1997	36.2	46.2
1999	57.4	46.2
Determinant of type of inspection performed (P = 0.032). (Question 4)		
Local regulations	14.9	0
State regulations	34.0	84.6
Federal regulations	12.8	7.7
Risk ranking	23.4	7.7
Previous history	14.9	0
Responsibility for implementation of food safety policy (P = 0.156). (Question 2)		
State Health Department	55.3	53.9
County Health Department	10.6	38.5
Program administrators	6.4	0
Division directors	12.8	0
Sanitarians	14.9	7.7
Responsibility for compliance (P = 0.110). (Question 3)		
State Health Department	31.3	46.1
County Health Department	16.7	38.5
Program administrator	4.2	0
Sanitarian	48	15.4

been introduced through the wording, format or order of questions (3).

The recognition of a common mission and common goals to accomplish that mission, especially between individuals who oversee the administration and those who implement the program, is important for the success of a food safety program. Both groups chose the same three of seven mission statements to be ranked first, second and third: (1) protect the health of the public; (2) ensure food served to the public is safe and wholesome; and (3) prevent the spread of FBI, indicating that both sanitarians and administrators perceive the mission of the process to be the same.

Both administrators and sanitarians agreed that the primary goal of the retail inspection process was assuring that food served to the public is safe and wholesome. Given that the inspection process could be considered a risk assessment process, it was expected that some proportion of sanitarians would identify the measurement of the risk of foodborne illness as a goal. Interestingly, none of the respondents made this choice.

It was anticipated that the two groups would differ as to the strategy most often used in the planning and execution of a retail inspection. The majority of administrators chose "food policy and regulations" to be

the strategy of choice while sanitarians chose either "risk ranking" or "food policy and regulations" about equally. Although great emphasis is placed on food policy and regulations as a guiding force, sanitarians have a tendency to rely on other factors, such as risk ranking, past performance, and condition of establishment, when performing retail inspections. Although the majority of respondents indicated that past performance is at least sometimes used, a small fraction of administrators indicated that it is never used.

While the majority of sanitarians and administrators associated food safety policy in Oklahoma with a State Food Code, the fact that some sani-

tarians were following different guidelines and that administrators were allowing sanitarians to choose which policy to follow are matters of concern. Operating under the parameters of different Food Codes may introduce variability in the application of policy in the field. Only about half of the administrators and sanitarians recognized the adoption of, and operate under the 1999 Food Code. A portion of sanitarians and administrators still used the 1976 Food Code. This situation was also found by Boehnke (5), who stated that "so pervasive was the influence of the 1976 code that it is only today, in the year 2000, that many US health agencies are recognizing the superiority of risk assessment/management approaches". In the face of adopting the 2001 Food Code, it would be prudent for all administrators and sanitarians to reference and operate under the auspices of the same resource. If sanitarians consistently use, and administrators consistently refer to, different Food Codes as a guiding policy, trends in policy adoption and implementation cannot be determined.

Administrators and sanitarians were not in complete agreement as to who should be implementing food safety policy. Approximately 92% of administrators, compared with 66% of sanitarians, place responsibility for implementation within the agency; only 15% of sanitarians gave responsibility to themselves. Considering that sanitarians are in the field performing inspections, it was expected that more of them would choose sanitarians.

Compliance was another policy issue on which the two groups disagreed. The majority of sanitarians indicated that sanitarians are responsible for compliance, while the majority of administrators chose the State Health Department. As with implementation, sanitarians are governed by policy adopted by the state or county, but it is the sanitarians who are in the field to ensure compliance

in order to protect the public. By not recognizing the responsibility that sanitarians are willing to take on, or give credence to what sanitarians are already doing, administrators are in effect undermining the effort of the sanitarian, which may lead to a lack of initiative to perform well in the field and perform effective inspections of retail establishments.

Time to perform inspections did not appear to be an issue between groups. For sanitarians, this finding may have a relationship with lack of administration recognition in implementation and compliance activities. Because condition of establishment was the primary characteristic affecting time spent performing an inspection and was recognized as the second most common strategy used in planning inspections, both sanitarians and administrators may be taking into account personal experience with the inspection process in responding to the question.

For the inspection process to be effective, inspection results need to be evaluated to determine where and why problems exist and to identify trends, especially if an establishment has a history of repeated violations. It is an interesting finding that such a large fraction of sanitarians and administrators indicated that management rarely or never reviewed results to identify trends. Indeed, if inspection results are reviewed, the frequency of reviews remains unknown. If trends are not being identified through a review process, it is safe to assume that repeated violations are occurring. Performing the process (inspection) becomes merely a perfunctory act to support the expectations of management in meeting quotas and workload requirements (according to comments from questionnaires). In retrospect, in addition to knowing who reviewed the results and how often, it would be beneficial to know what was done with the results and what constitutes the review process.

A substantial minority of administrators and sanitarians are, sadly, in agreement that sanitarians did not routinely observe food service workers preparing food. Given that observation is the recognized method of ensuring that safe food handling practices are translated into behavior, it was expected that both groups would respond that sanitarians always observe food preparation. It is of considerable concern that 12.5% of sanitarians and 15.4% of administrators thought that this task is performed only sometimes or rarely. If sanitarians are not observing food service workers, it should be determined if this is a failure of the process or of the sanitarians. Sanitarians and administrators agreed that sanitarians usually or always observe hand washing, although the inspection process appears to be better designed for monitoring cross contamination than hand washing or personal hygiene.

CONCLUSION

The variation in the implementation, understanding and evaluation of the process of ensuring food safety is enough to support the conclusion that the process is not performed or used as intended, since such a measurable difference exists. Identifying the differences is the first step in filling the void between mission and process. Few public health issues are more public than food safety, and the unpleasant truth is that some level of contamination of food is likely to remain the rule, not the exception; it is the translation of this reality into well guided policy and practice that will ultimately protect the health of the public.

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Highlights of the Executive Board Meeting January 18-19, 2004

Following is an unofficial summary of actions from the Executive Board Meeting held at the J.W. Marriott Desert Ridge Resort in Phoenix, Arizona on January 18-19, 2004:

Approved the following:

- Minutes of October 2, 2003 Executive Board Meeting
- Minutes of October 2, 2003 Executive Board Executive Session

Discussed the following:

- E-mail votes taken since the last meeting
- *FPT* and *JFP* status reports. Increase number of *FPT* articles to four to reduce backlog. Increase of 22% for manuscripts submitted to *JFP*
- Revenue issues outweigh advantages of providing free pdf of *JFP* articles to authors
- Increased use of e-commerce features at IAFP Web site
- Membership continues stable. Establish a Membership Committee to assist in Membership development
- Advertising projection looks strong for fiscal year considering economy and corporate consolidations
- November financial statements reviewed and compared to budget. Separate accounting for Speaker Travel Fund established
- FYE August 31, 2003 audit report reviewed and accepted
- IAFP Officers made presentations at five Affiliate meetings. Six presentations are scheduled through fall of 2004
- Affiliate educational session sponsorship and topics
- Affiliate Reports due March 15. Asking for areas of Affiliate member interest
- Active potential new Affiliate organizations — Japan and Arizona
- Letter of invitation from Ohio to hold an Annual Meeting in Ohio
- Committee appointments for 2004-2005
- IAFP 2003 – financial results
- IAFP 2003 – workshop financial results
- IAFP 2004 – toured hotel property
- IAFP 2004 – workshop topics
- IAFP 2004 – program report
- IAFP 2007 – negotiation status
- Future Annual Meeting site selection
- Co-sponsorship of First World Congress on the Safety of Organic Food at Michigan State University
- Exhibit results of Worldwide Food Expo
- Future exhibit at Food Safety Summit
- Food Safety Summit session sponsored by IAFP
- *FPT* article on bioterrorism legislation
- Update on 3-A Sanitary Standards, Inc.
- World Health Organization, Non-Governmental Organization
- Ivan Parkin Lecturer travel reimbursement limits
- Award honorarium
- Foundation permanently restricted contribution
- Food Safety Innovation Award
- Code of Ethics
- European meeting

Next Executive Board meeting: April 28, 2004

2004-2005 *Secretary Election*

The following page contains biographical information for the 2004-2005 Secretary candidates. Review the information carefully as you make your voting decision. Ballots were mailed to all International Association for Food Protection Members during the first week of February. Completed ballots are due back to the Association office by March 19, 2004. Sealed ballot envelopes are forwarded to the Tellers Committee for opening and counting. Watch for the election results in the May issue of *Food Protection Trends*.

If you have questions about the election process, contact David W. Tharp, CAE, Executive Director at 800.369.6337, or 515.276.3344, or E-mail dtharp@foodprotection.org.



GARY R. ACUFF



DAVID A. GOLDEN

The Candidates

Biographical Information

Gary R. Acuff

Dr. Gary R. Acuff currently holds the title of Professor of Food Microbiology and serves as the Section Leader for Food Science in the Department of Animal Science at Texas A&M University. He has been a member of the faculty for 18 years, and in 2001 was designated a Faculty Fellow for research leadership in the Texas Agricultural Experiment Station.

Dr. Acuff's research has focused on improving the microbiological quality and safety of beef in all areas of production and utilization, including cattle feeding and holding, slaughter/processing, fabrication, cooking, packaging, retail distribution, and consumer handling. Additional research interests have included characterizing the presence of *Campylobacter jejuni* in turkey processing, improving shelf life of Texas Gulf shrimp, evaluating the heat resistance of *Escherichia coli* O157:H7 in hamburger patties, determining the significance of *Helicobacter pylori* in food and, recently, several research projects have investigated microbiological hazards associated with fresh produce in Texas and Mexico. Dr. Acuff has authored or co-authored over 80 research publications in refereed scientific journals and 10 chapters in various references and textbooks. He recently served on the Editorial Committee of the 4th edition of the *Compendium of Methods for the Microbiological Examination of Foods*.

Since joining the food science teaching faculty at Texas A&M University, Dr. Acuff has taught graduate and undergraduate food microbiology courses and has participated as a team instructor in courses on the Hazard Analysis Critical Control Point (HACCP) system. He served as Chair of the Intercollegiate Faculty of Food Science from 1994 to 1997. In the 13 years that he has been teaching undergraduate food bacteriology, over 3,500 students have taken his class (and most have passed!). Dr. Acuff currently supervises several graduate students, and over his career has served as major professor for 20 students seeking a Master of Science and 8 students pursuing a Doctor of Philosophy.

Dr. Acuff was appointed to the National Advisory Committee on Microbiological Criteria for Food (NACMCF) in 1992 and continued to serve as a member for six years. He is an active member of the American Society for Microbiology and was elected to chair the Food Microbiology Division (Division P) in 1999. Dr. Acuff is also a member of the Institute of Food Technologists and the Society for Applied Microbiology. He has been a member of IAFF since 1982, has served on the Program Committee since 2001, and is currently the Program Committee Chair for the 2004 Annual Meeting in Phoenix, Arizona. He also is a member of the Meat and Poultry Safety and Quality Professional Development Group (PDG). Dr. Acuff has participated as a member of the Editorial Board of the *Journal of Food Protection* since 1994.

Dr. Acuff obtained his B.S. in Biology from Abilene Christian University in 1980 and his M.S. and Ph.D. in Food Science and Technology, specializing in Food Microbiology, from Texas A&M University in 1982 and 1985, respectively.

David A. Golden

Dr. David A. Golden is an Associate Professor of Food Microbiology with the Department of Food Science and Technology at The University of Tennessee (UT). He joined the faculty at UT in 1993. Before that, Dr. Golden spent 2 years as a microbiologist with the Food and Drug Administration in Washington, D.C., where he worked in the areas of food safety research and regulatory compliance as related to food safety. At UT, Dr. Golden's research focuses on ecology, detection, and control of foodborne pathogens in foods and on novel processing technologies for control of foodborne pathogens. Over his career, he has authored or co-authored over 35 peer-reviewed publications and six book chapters on food microbiology and safety and over 65 technical presentations at professional meetings. Additionally, along with Drs. James Jay and Martin Loessner, Dr. Golden is co-author of the seventh edition of *Modern Food Microbiology*, which will be published in 2004. He is a research partner and founding member of the UT Food Safety Center of Excellence.

Dr. Golden teaches courses in Advanced Food Microbiology and Food Laws and Regulations, and serves as the Graduate Coordinator for Food Science and Technology. On a half-time basis, from June 2002 through December 2003, Dr. Golden was Interim Associate Director of the University of Tennessee Honors Program, an undergraduate program for high-ability students. He returned to his full-time position in Food Science and Technology in January of 2004.

Since joining IAFF, Dr. Golden has been an active participant in the organization, presenting technical papers at most Annual Meetings and serving on IAFF committees. He served as a member of the Developing Scientist Awards Committee from 1993 through 1997, chaired the committee in 1996, and has served on the committee on several occasions since 1997. Dr. Golden served as a member of the IAFF Program Committee from 1995 through 2000, chairing the committee in 2000, and is a member of the Fruit and Vegetable Safety and Quality and Meat and Poultry Safety and Quality Professional Development Groups. Additionally, he is presently, and has been for several years, a member of the *Journal of Food Protection* Editorial Board. At the local level, Dr. Golden served as a member of the Local Arrangements Committee for the 1998 Annual Meeting in Nashville, TN.

Other professional affiliations for Dr. Golden include: Professional Member of the Institute of Food Technologists, Co-Editor of the IFT/ASM *Food Microbiology Newsletter*, and Editor of the *International Journal of Food Microbiology*. At the University of Tennessee, Dr. Golden has received awards from Gamma Sigma Delta for excellence in research and teaching, the College of Agricultural Sciences and Natural Resources Outstanding Faculty Advisor and W.F. and Golda Moss Outstanding Teaching Awards, and the Institute of Agriculture's T.J. Whatley Distinguished Young Scientist Award.

Dr. Golden received his M.S. and Ph.D. degrees in Food Science and Technology, with a focus on Food Microbiology, and the B.S. degree in Microbiology, all from the University of Georgia.



NEW MEMBERS

AUSTRALIA

Ian Jenson
Meat & Livestock Australia
North Sydney, New South Wales

Joanne Patterson
Dairy Food Safety Victoria
Hawthorn, Victoria

BRAZIL

Luciana Maria Ramires Esper
University of Campinas
São Paulo

CANADA

Katija A. Blaine
University of Guelph
Guelph, Ontario

Jessica Au-Yeung
Fresh Ideas & Solutions
Burnaby, British Columbia

Michael A. Mensah-Wilson
Schneider Foods
Surrey, British Columbia

ITALY

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Hylobates Consulting srl
Rome

SOUTH KOREA

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Tyn Co. Ltd.
Seoul

SPAIN

David Rodriguez-Lazaro
University of Girona
Girona

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Christie Sun
EC Link Ltd.
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Davis

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Northern Cal District Veterinary
Command
Presidio of Monterey

FLORIDA

Yun-Hwa P. Hsieh
Florida State University
Tallahassee

HAWAII

Louise Jefts
Larry Jefts Farms
Kunia

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West Liberty Foods
West Liberty

MASSACHUSETTS

Charles P. Grover
Rite Foods
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MINNESOTA

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Schweigert Foods
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TEXAS

Don Forrest
FlexXray
Arlington

WASHINGTON

Sun Young Lee
Washington State University
Pullman

UPDATES

NSF International Announces Leadership Promotions

NSF International has announced several key staff promotions to continue to meet growing domestic and international public health and safety demands for safe food, water, air and consumer products.

NSF International president and CEO Kevan P. Lawlor promoted four key staff members:

James G. Kendzel has been appointed senior vice president, administration and will be responsible for human resources, facilities, field services, quality and safety, standards and the Center for Public Health Education. He holds a master's degree in public health from the University of Michigan and a bachelor's degree in environmental health from Bowling Green State University. He is also an ASQ certified quality auditor.

Nancy J. Culotta has accepted a new position as the vice president, food safety—retail, and will be responsible for the development, sales and marketing of the restaurant and supermarket auditing and FreshCheck™ sampling programs. Culotta is also responsible for the Bottled Water and Food Equipment Certification Programs. Nancy holds a master's degree in public health from the University of Michigan and a bachelor's degree from Providence College.

William Fisher has been promoted to vice president, marketing and sales. He is responsible for the launch of the new LiveSafer™ marketing campaign. In addition to overseeing the marketing department, he will be responsible for all corporate sales programs.

Fisher holds a master's degree and a bachelor's degree from the University of Illinois.

William C. Schwartz, Ph.D., has been appointed vice president, food processor programs. He will oversee the Nonfood Compound Registration, HACCP 9000 Registration and the NSF-Cook & Thurber auditing programs. He holds a doctorate in meat science from the University of Nebraska, a master's degree in meat science from Colorado State University and a bachelor's degree in animal science and agricultural business from the University of Wisconsin-River Falls.

Silliker, Inc. Announces Promotions of Reynolds, Paulsen-Hogue in Client Service Division

Silliker, Inc. announced the appointment of Kathy Reynolds as corporate client services manager. She succeeds Deb Paulsen-Hogue who was promoted to corporate client services director. Both bring years of valuable industry experience and expertise to their new positions.

Prior to her new assignment, Reynolds served as a client service manager and microbiology operations manager at the organization's New Jersey laboratory. With over 15 years of industry experience, she possesses an extensive knowledge of testing methodologies, laboratory operations, and client relations. Reynolds' responsibilities include managing existing and new national accounts, ensuring LIMS capabilities are maximized for client benefit, creating programs to improve staff skills, and implementing procedures and policies to better serve clients.

Paulsen-Hogue joined Silliker in 1996 and has been instrumental in the growth of the client service division across the company's US network. In her new role, she will research and implement new technologies to improve services, monitor and further develop SOPs, assist in documenting and monitoring the quality and business progress of the client service function, and establish hiring protocols for client service positions within Silliker.

Connie Tipton Becomes IDFA President and CEO

Connie Tipton has become president and CEO of the International Dairy Foods Association (IDFA), following the December 31 retirement of E. Linwood (Tip) Tipton.

During her 22 years at IDFA, Tipton has managed activities in virtually every area of the association, including: legislative and international affairs, economic policy analysis, communications and public relations, marketing programs, education and training, trade shows, and office management; in addition to involvement on strategy, policy and budgeting for the overall management of the organization. After joining IDFA in 1981, she was promoted to vice president in 1989, to senior vice president in 1994, and to senior group vice president in 1999. She was promoted to executive vice president — and announced as the incoming president and CEO — in January 2003.

During her tenure at IDFA, Tipton has helped launch well-known programs such as the annual Capitol Hill Ice Cream Party, has assisted in

UPDATES

passing legislation to create the famous "milk mustache" campaign and other positive measures for the industry, and has helped promote policies that allow greater competition and growth in dairy markets.

Tipton has served on numerous committees and boards in Washington, D.C., related to agriculture policy, with special emphasis on dairy and sugar policies, and has led successful legislative campaigns to lessen government involvement in regulations that reduce dairy product marketability. She has helped build the industry political action committee, Ice Cream, Milk & Cheese PAC, and is very active in campaigns for federal candidates whose views coincide with IDFA's policy directions. In 2002, Tipton was selected by two separate Capitol Hill publications as one of the top trade association lobbyists in Washington.

Tipton is originally from Dayton, Ohio, and attended Ohio State University in Columbus.

Steve Bairett Promoted to Sales Coordinator

DCI, Inc., is pleased to announce the promotion of Steve Bairett to sales coordinator. In his new assignment, Steve will work closely with customers on tank/equipment

quotations in the food, dairy, cosmetic and pharmaceutical industries. Steve has been with DCI since 2000 in the fabrication, shipping/receiving and QC areas.

Eagle Foodservice Equipment Makes New Rep Appointment

Eagle Foodservice Equipment announces the appointment of Foodservice Applications to handle dealer/distributor relations for the company in the southeastern United States.

The principals are David Terrell and Tom John. In addition to serving the state of Georgia, Foodservice Applications will also be responsible for Alabama, Eastern Tennessee and the Panhandle Region in Florida.

Chr. Hansen Appoints John Lyne as Director of Technical Development for Dairy

John Lyne joins Chr. Hansen, Inc. as director of technical development for the company's dairy business. Mr. Lyne will provide technical support to the dairy sales team in both cheese and fermented milk ingredients.

Mr. Lyne has over 17 years of dairy experience in project

management, product development and plant management. He comes to Chr. Hansen from DSM where he was technical director and site manager. Prior to that, he worked for Chr. Hansen in the UK as a project manager for culture development and application. Mr. Lyne holds a BS in microbiology, and an MS in dairy microbiology from the University College, Cork, Ireland.

Sundberg New VP of Science & Technology for Pork Board

Veterinarian Paul Sundberg has been named vice president of science and technology for the Pork Board. Sundberg replaces veterinarian Beth Lautner, who was tapped to become director of the Plum Island Animal Disease Center in January. Sundberg had been the assistant vice president of veterinary issues at the Pork Board, and has overseen technical input for Pork Checkoff-funded programs including the Pork Quality Assurance program and the Swine Welfare Assurance Program. He also worked on pork-industry issues, including antimicrobial resistance and judicious use of animal health products; swine-health regulations; food safety and pork production.

Dr. Elmer Marth Receives NCI Laureate Award

At a ceremony during the 2004 Dairy Forum, the National Cheese Institute (NCI) awarded its highest honor, the NCI Laureate Award, to Dr. Elmer Marth, professor emeritus of the University of Wisconsin, Madison. NCI chairman Lou Gentine, chairman and CEO of Sargento Foods, presented the award to Marth for his lifelong dedication to researching and teaching cheese safety.

The NCI Laureate Award recognizes individuals who have made significant contributions to the development and growth of the industry. A panel of industry professionals chooses a winner each year based on a person's long-term contributions to the industry. Dr. K. Anjan Reddy, Bel/Kaukauna U.S.A. nominated the professor for this year's award.

Dr. Marth "truly personifies the spirit of this award," noted Gentine during the award presentation. "His groundbreaking research is a key reason that the cheese industry enjoys the excellent food safety record that it has today."

Dr. Marth's life has centered around dairy since his birth, which took place on a dairy farm in Jackson, WI on September 11, 1927. By 1954, he had earned three degrees — his bachelor's, master's and doctorate — from the University of Wisconsin, Madison in bacteriology with a focus on food and dairy science.

After receiving his Ph.D., Dr. Marth served as a bacteriology instructor at his alma mater for

three years. His love of teaching lured him back to University of Wisconsin, Madison, where he became an associate professor of food science, bacteriology, food microbiology and food toxicology in 1967 and a full professor in 1971.

Upon his retirement from day-to-day university life in 1990, he became a professor emeritus. He continues to publish industry guidance and serve as a food safety consultant.

Dr. Marth conducted the majority of his research at the University of Wisconsin, Madison, where he compiled a vast body of dairy foods science, with an emphasis on cheese. His work included studies on *Salmonella* in cheese, the behavior of aflatoxin M1 during the manufacture and storage of cheese, and behavior of *Listeria monocytogenes* during various types of cheesemaking. Throughout his career, he has authored or co-authored more than 660 scientific publications, including the books "Applied Dairy Microbiology" (first edition published in 1998, second edition in 2001), "Dairy Foods Safety" (editions in 1995 and 1998) and "*Listeria*, Listeriosis and Food Safety" (first edition published in 1991, third edition currently in production). In 2003, Dr. Marth worked with the Wisconsin Milk Marketing Board to review and edit "The Wisconsin Cheese Food Safety Manual," which is now being distributed to all state cheese plants.

Dr. Marth's research interests were not confined to microbiology. He was also the co-inventor of a process to make cottage cheese that was issued in nine countries. The method extends the shelf life by using a hot creaming mix; this

process also results in yield improvement by recovering about 70% of the whey proteins, lactoglobulin and lactoalbumin.

Dr. Marth has been a frequent speaker and active member within many food industry organizations, including the International Association for Food Protection (IAFP), the Institute for Food Technologists (IFT), and the American Dairy Science Association (ADSA).

Marth served as the editor of the *Journal of Food Protection* from 1967 to 1987, and was a visiting professor at the Swiss Federal Institute of Technology in Zurich in 1981. Many organizations, including IAFP, IFT, and ADSA, have bestowed numerous honors and awards to Dr. Marth for his outstanding accomplishments.

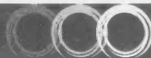
2004 Crumline Award Deadline Approaching

The Foodservice & Packaging Institute, Inc. (FPI) is accepting applications for the 2004 Samuel J. Crumline Award for Food Protection at the Local Level. The entry deadline is March 15, 2004.

Entries for the Crumline Award competition are limited to US and Canadian local government public health agencies (county, district, city, town or township) that provide food protection services to their communities under authority of a statute or ordinance.

The basic award criteria by which achievement is measured are:

- Sustained improvements and excellence, as documented by specific outcomes and achievements, over the



preceding four to six years, as evidenced by continual improvements in the basic components of a comprehensive program;

- Innovative and effective use of program methods and problem solving to identify and reduce risk factors that are known to cause food-borne illness;
- Demonstrated improvements in planning, managing, and evaluating a comprehensive program; and
- Providing targeted outreach; forming partnerships; and participating in forums that foster communication and information exchange among the regulators, industry and consumer representatives.

The Crumaine Award is supported by the International Association for Food Protection (IAFP), the Conference for Food Protection in cooperation with the American Academy of Sanitarians, American Public Health Association, Association of Food & Drug Officials, Foodservice & Packaging Institute, Inc. (FPI), International Food Safety Council, National Association for County and City Health Officials, National Environmental Health Association (NEHA), NSF International, and Underwriters Laboratories, Inc.

For more information about the Crumaine Award, go to FPI's Web site at www.fpi.org (in the "Awards Programs" section).

UK Scientists Create Medical and Food Safety Tool from Virus

UK scientists have found a way to explode deadly food-poisoning bacteria using an agent found in viruses.

Professor Mike Gasson from the Institute of Food Research in

Norwich discovered the potential of viruses while researching flavor development in cheese in the early 1990s. And with the help of Profos AG, an international company specializing in bacterial viruses and antimicrobial agents, and PBL, technology transfer experts on the Norwich Research Park, the germ of an idea is translating into practical technology. A new, exclusive worldwide license marks a first step towards commercialization.

"Viruses can infect bacteria as well as humans. A virus invades bacterial cells, multiplies and then produces an enzyme to burst the cell wall, enabling it to escape and infect more cells. We targeted an enzyme with this fire-power, to develop its potential in combating pathogenic bacteria," says Professor Gasson.

Viruses that infect bacteria are called bacteriophages. The bacteria-bursting enzymes that caught Gasson's attention are called lysins. Different lysins attack specific bacteria, so could be used as a diagnostic tool as well as an antimicrobial therapy in people and animals. The bacteriophage lysins covered in the licence can be used to detect or selectively kill *Listeria* and *Clostridium*. They could even provide an alternative to antibiotics in some applications.

Rapid detection is particularly important for some of the more virulent bacteria, such as *Listeria monocytogenes*. *Listeria* exists naturally in the soil and general environment, but in some soft mold-ripened cheeses and pâtés can be present in higher numbers. The elderly, pregnant women and babies are most vulnerable, which is why pregnant women are advised against eating soft, mold-ripened cheeses such as Brie, Camembert and blue-veined varieties.

When listeriosis takes hold, it is often severe and life-threatening. The United States government

operates a zero tolerance policy of *Listeria* in food. But there is no other simple rapid test available for large scale use by food manufacturers.

"*Listeria* is the food industry's nightmare. Professor Gasson had the vision to spot the potential of using a virus to destroy it. With the expertise at Profos we're turning that investigative science into a significant food safety tool to benefit the public," says Jan Chojecki, managing director of PBL.

The licence also covers lysins that destroy *Clostridium*. This bacteria forms hardy spores, resistant to heating and drying. In poultry, *Clostridium perfringens* causes necrotic enteritis, currently cured with antibiotics. In humans, *Clostridium difficile* causes diarrhea in patients receiving antibiotic treatment — the bacterium seizes the opportunity to infect provided by disruption to naturally occurring bacteria of the bowel.

"The demand for commercial alternatives to antibiotics is growing, in response to the need to tackle bacterial antibiotic resistance. As well as providing a new tool to combat bacteria now, there is interest in developing bacteriophage lysins to replace antibiotics in some applications in the future. Unlike antibiotics, this technology provides a precision tool, designed to kill specific bacteria while leaving other microorganisms intact," says Professor Gasson.

New, Quicker Tests Identify *E. coli* Strains

New tests that more quickly identify dangerous strains of *Escherichia coli* bacteria are being developed by Agricultural Research Service scientists in Wyndmoor, PA.

ARS microbiologist Pina M. Fratamico, at the agency's Eastern Regional Research Center (ERRC)



in Wyndmoor, is working with Pennsylvania State University to develop tests that quickly identify *E. coli* strains.

Certain *E. coli* strains, such as O157:H7, causes serious diseases, including bloody diarrhea and hemorrhagic colitis. Infections may result in serious health complications, including kidney failure. Other *E. coli* serogroups, including *E. coli* O26, O111 and O121, also cause gastrointestinal illnesses in humans.

Currently, scientists commonly use a procedure called serotyping to distinguish between different types of *E. coli*—some harmful, others harmless. However, this procedure is time-consuming and labor-intensive.

Fratamico, with ERRC's Microbial Food Safety Research Unit, and her team are developing both conventional and real-time polymerase chain reaction (PCR) tests. These chemical procedures generate enough of a bacterium's genetic material so that it can be studied and identified. With one real-time PCR reaction, four products can be amplified simultaneously and detected in "real time" as they multiply.

Scientists have little information about some individual *E. coli* serogroups; therefore, the number of diseases these organisms cause is likely underestimated. Fratamico is targeting genes in the *E. coli* O-antigen gene clusters so researchers can detect and identify specific serogroups and increase knowledge about each one's potency.

In one study, a real-time PCR assay was more sensitive than other detection methods. According to Fratamico, the US Department of Agriculture's Food Safety and Inspection Service has expressed interest in the new PCR tests for detection and confirmation of not only *E. coli* O157:H7, but of other *E. coli* strains as well.

FSIS Training for Inspectors on Target Food Safety and Inspection Service

Administrator Dr. Garry L. McKee has announced that more than 1,000 individuals have completed FSIS' inaugural, customized job training regime.

"Our meat inspection system is based on sophisticated science. We are continuing to improve and enhance our training programs so that inspectors understand the latest scientific developments," McKee said.

In April 2003, FSIS inaugurated new Food Safety Regulatory Essentials (FSRE) training, which is designed to better equip inspection personnel in verifying an establishment's Hazard Analysis Critical Control Points (HACCP) food safety system. All trainees receive training in the fundamentals of inspection, covering the Rules of Practice, Sanitation Performance Standards, and Sanitation Standard Operating Procedures (SSOP). Customized food safety training is then provided based on the types of products being produced at the establishments where inspectors are assigned.

Also, in April 2003, a training session was held in which all Compliance Officers and Consumer Safety Officers were instructed in the proper review and analysis of plant records and testing data. FSIS has made it a priority that inspectors regularly review all plant-generated data, which is an important indicator of whether and how well plants are executing their corrective actions.

In July, FSIS released a vision document to guide continuing food safety initiatives, including revamping

its education and training programs to better prepare field employees to implement and enforce new food safety regulations. FSIS is focused on strengthening its public health mission by recruiting scientifically-trained employees as well as by training its current employees in scientific and technical principles. That document is available at <http://www.fsis.usda.gov/oa/programs/vision071003.htm>.

In August, Dr. McKee also announced that training would be made more accessible through the establishment of five new regional training sites: Atlanta, Dallas, Philadelphia, Des Moines and Boulder. Office locations have been established, and a rigorous selection process is near completion which will identify the five instructors who will initiate the regional training. Once they receive their training, they will begin staffing the new training sites in the early spring of 2004. In addition, FSIS is in the process of conducting interactive and on-site training sessions that will be easily accessible to its field employees. Some of this training will be provided through distance learning. This will enable FSIS to rapidly update its geographically dispersed workforce with training on new policy issuances targeted to address emerging issues related to ensuring food safety and public health.

During fiscal year 2004, FSIS will train all new entry-level slaughter establishment inspectors and veterinary medical officers in technical, regulatory and public health methods. The types of training offered will be expanded in the future. As the training curriculums are available, they will be posted on the FSIS Web site.



Laboratories Must be Accredited by 2005

Over 63,000 samples of food are analyzed every year by the official laboratories, the new chief executive of the Food Safety Authority of Ireland (FSAI) Ann Westby told the first FSAI international laboratory conference held in Ireland. The testing of food samples for either microbiological or chemical contamination underpins food safety control systems throughout the country in efforts to reduce the incidence of foodborne illness. Ms. Westby stated that she wanted all food laboratories dealing with the FSAI in Ireland fully accredited to ISO 17025 by end of 2005, so that there would be uniform quality standards in all laboratories.

Speaking to over 160 laboratory personnel at New and Emerging Issues for Food Laboratories, Ms. Westby praised laboratory personnel for the extensive level and range of analyses carried out in Ireland. She stated that while a lot had been done to date to develop food laboratory structures in Ireland, there was still a lot more areas that require development and investment to achieve an optimum level of efficiency and effectiveness, with the ultimate goal of further protecting human health from foodborne illness.

"Food analysis benefits consumers through the speedy detection of problems leading to better control of potential foodborne illness. Laboratory work provides the scientific basis to link human cases of infection to contaminated food and to providing information to the sampling and inspecting officers to assist in tracking infections throughout the entire country.

Rapid detection of foodborne outbreaks allows control measures to be put in place quickly and reduces the number of people falling ill. It is only by identifying the strains of bacteria, the source of a food contamination and/or establishing the common links between affected people, will a contaminated food product or bad hygiene practice be stopped," Ms. Westby said.

Ms. Westby also acknowledged the contribution made by private laboratories and those laboratories owned by specific food businesses providing "own check" testing services to the food industry. This allows industry to self monitor compliance with food legislation and measure the quality of the food it produces.

At the conference, the FSAI launched the first edition of a *Laboratory Guide*, which provides an overview of each the food laboratory working under service contract to the FSAI. It details the main areas of each organizations work and the type of analysis carried out. In addition the Guide provides the legislative framework under which samples are tested. It is available on the FSAI Web site www.fsai.ie.

"Great progress has been made since the first round of service contracts with the laboratories in the official agencies, in developing numerous multi-agency laboratory networks to promote cross agency working. It is important that laboratories are resourced sufficiently to achieve the highest standards of operation and I am urging all laboratories to be fully accredited by 2005 when the next round of service contracts are agreed with the FSAI. It is heartening that a number of laboratories have already achieved this high standard and are accredited; however, for those that are not

accredited, they need to make this a matter of utmost priority," Ms. Westby continued.

Ms. Westby advised the industry that the range of sampling and testing carried out by the official agencies means that food retailers or suppliers have no hiding place if they supply or sell substandard products.

"Food laboratories in Ireland carry out testing on every conceivable product or commodity from eggs, milk, meat, right through to fish, fats, flavorings, ice-cream and alcohol. They are testing for a wide range of microbiological and chemical parameters including pesticides, antibiotics, metals, food contact materials and bacteria. Through shared information among all our laboratories both private and public, a food incident can be recognized and corrective action applied rapidly. Industry has a clear legal responsibility to place safe foods on the market and those found in breach will feel the force of the full arm of the law and the consequential penalties."

Vitamin E May be Key to *Listeria*-free Turkeys

Adding Vitamin E to the diets of turkeys may further reduce the likelihood of consumers contracting a serious foodborne illness from the popular holiday and sandwich fowl.

That's what Agricultural Research Service scientists and their colleagues found when studying ways to control *Listeria monocytogenes*, a major human bacterial foodborne pathogen found in poultry. ARS is the chief scientific research agency of the US Department of Agriculture (USDA).

Microbiologist Irene Wesley of the ARS National Animal Disease



Center (NADC) in Ames, IA, found that supplementing turkeys' diets with the vitamin stimulates their immune responses, helping them clear the gut of the microorganism that causes the disease. This can, in turn, lead to reduced contamination of carcasses at slaughter and during processing. Wesley is part of NADC's Pre-Harvest Food Safety and Enteric Diseases Research Unit.

Listeria monocytogenes causes listeriosis, a disease that affects mainly pregnant women, newborns, and adults with weakened immune systems. It accounts for 2,500 total cases annually of human meningitis, encephalitis, sepsis, fetal death and premature births. In a 1998 USDA study, *L. monocytogenes* was found in nearly 6 percent of turkey carcass rinses and in 31 percent of the ground turkey meat examined.

These studies, conducted in collaboration with the University of Arkansas and Iowa State University, found that vitamin E boosts turkeys' white blood cells, which go into action when disease-causing organisms are detected.

Turkeys require vitamin E for normal development and function of the immune system. Wesley used alpha-tocopherol—the most active form of vitamin E in humans, and a powerful biological antioxidant—because it is readily available from commercial sources and can be used in animal feed preparations.

Earlier tests conducted at Iowa State showed that dietary vitamin E also enhances poultry meat's quality and shelf life.

Plans are in the works for testing vitamin E against *Salmonella* and *Campylobacter*, two other important foodborne pathogens.

Aussie Know-how Makes Japanese Meat Safer

Traceable T-bones are now appearing on Japanese dinner tables thanks to the ingenuity of Australian engineers and the international business acumen of Australia's largest food research organization, Food Science Australia.

Following the Japanese Government's recent announcement that meat "trace-back" systems must be installed in all abattoirs, Food Science Australia has facilitated an agreement whereby meat industry IT specialist company, Thorsys Australia, supplies the required equipment to Japan's Okinawa Meat Center.

"Trace-back systems use computer-based technology designed to record data about animals as they enter the abattoir," says the company's business systems consultant, Terry Farrell.

"The system produces documents and bar codes to track the meat through processing to the consumer. This traceability is crucial in ensuring the safety of meat products."

International threats like foot and mouth disease and, most recently, the bovine spongiform encephalopathy (BSE) outbreak and

subsequent meat recall in the US have prompted many governments to review their policies and take a hard line in the area of meat safety. Trace-back systems are already required in Australia to conform with meat industry legislative requirements.

"With the help of people at Food Science Australia, we are very pleased to have secured the contract with Okinawa Meat Center," Mr. Farrell says. "It's great to see Queensland-based technology cracking the Japanese market and advancing food technology."

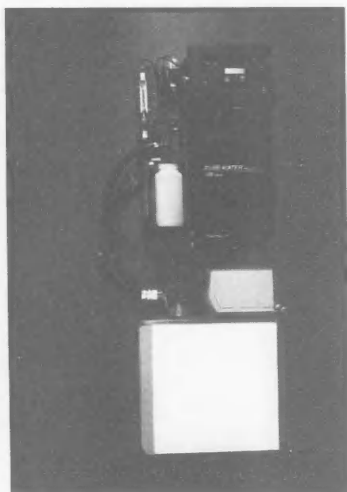
Food Science Australia's business and knowledge development manager, Dr. Lyndon Kurth, says securing the contract is a good example of how an Australian research organization can work with industry to promote new Australian-made technologies.

"The end result should be safer beef leading to restored confidence in beef products in Japan and subsequently increased consumption," Dr. Kurth says. "It is a win for both the Australian and Japanese beef industries and the industry worldwide," Food Science Australia has working relationships with the Japanese meat industry through Itochu and JAMTI (Japan Meat Technology Institute). Food Science Australia is a joint venture of CSIRO and the Australian Food Industry Science Centre (AFISC).

The trace-back system designed by Thorsys Australia was introduced to the Japanese meat industry by equipment supplier, Advance Food Technology.

**Visit our Web site
www.foodprotection.org**

INDUSTRY PRODUCTS



Thermo Orion

Thermo Orion Introduces the New 1817LL On-line Low Level Chloride Analyzer for Boiler Water

Thermo Orion, a developer and manufacturer of chemical measurement product lines, introduces the new 1817LL On-Line Low-Level Chloride Analyzer.

The new Thermo Orion 1817 Low-Level Chloride Analyzer exceeds EPRI (Electric Power Research Institute) guidelines for the control of boiler water under equilibrium phosphate treatment (EPT). In these guidelines, EPRI suggests that chloride levels in EPT boilers operating at 17.2 MPa (2500 psia), should be maintained below 30 ppb \pm 10 ppb. The 1817LL is capable of detecting chloride at levels of 10 \pm 1-5 ppb by ion-selective electrode (ISE).

A high percentage of boiler operators have moved from congruent phosphate treatment (CPT) to equilibrium phosphate treatment (EPT).

EPT, which uses significantly lower phosphate concentrations than CPT, has the advantage of reducing phosphate hideout and the acid-phosphate corrosion that is associated with it. However, it has become evident that EPT requires lower levels of contaminants, especially chloride, to prevent corrosion due to the formation of hydrochloric acid. The 1817LL can detect Chloride at these low levels and is far more cost effective and less cumbersome than ion chromatography or existing on-line methods.

Thermo Orion
978.232.6057

www.thermo.com/orion
Beverly, MA

TERG-A-ZYME® Brand Detergent Effective in Cleaning Fermentors and Filters in Biotechnology/Genetic Engineering Laboratory Applications

One of the most demanding industrial cleaning applications in biotechnology and genetic engineering involves removing proteinacious residues from fermentors and foulants from filtration systems. These vessels and filters must be kept scrupulously clean to gain maximum, pure bio-product yields and avoid corruption of research and production results.

Even the most stubborn soils can be easily removed from the stainless, glass and plastic vessels and machine parts used in fermentors as well as foulants from their filtration systems using TERG-A-ZYME brand cleaner from Alconox, Inc., a formulator and manufacturer of aqueous critical cleaning agents.

The process used to clean soils from these types of laboratory equipment is simple and effective whether manual, soak or circulate clean-in-place (CIP) procedures are used. For best results, a dilution of 0.5% to 1% cleaner to water should be employed. For caked-on, proteinacious soils, a pre-soak in hot (120 to 130°F) water can help eliminate heavy debris prior to cleaning. Articles can then be cleaned with a wash of TERG-A-ZYME solution with water for about ten minutes (wash temperatures can range from ambient to hot, dependent on the type of substrate being cleaned), followed by rinsing with deionized (DI) water.

For filtration systems, it is best to circulate the solution slowly then purge by pumping in one full system capacity of water, circulating it and then rinsing by draining at least two times the system's water capacity with DI water (some filtration units may require additional rinsing).

Concentrated to save cleaning time and money, TERG-A-ZYME is an enzyme-active powdered aqueous detergent. Its surfactants exhibit excellent wetting power and the protease enzyme is excellent for removal of proteinacious soils and fermentation residues. It is biodegradable, readily disposable, and free rinsing (passes inhibitory residue test for water analysis) to provide reliable results with no interfering residues.

In addition to cleaning laboratory ware, pharmaceutical equipment, sampling equipment, reverse osmosis and ultrafiltration membranes, TERG-A-ZYME is effective in cleaning hospital instruments, dairy equipment, cosmetics manufacturing equipment, tubing, pipes, process equipment, industrial parts, desalination plant equipment, as well as processing tanks and reactors.

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INDUSTRY PRODUCTS

It is authorized by the USDA for use in federally inspected meat and poultry plants. It can also be used to pass cleaning validation tests for lab accreditation as well as plant-inspection approvals.

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White Plains, NY

Chr. Hansen Globally Re-launches Sugar Spheres NF for Sustained and Time-release Applications

Pharmaceutical companies around the world can now obtain Chr. Hansen Sugar Spheres NF, which was previously known in the USA as Nu-Pareil Sugar Spheres NF. Chr. Hansen is a basic manufacturer of coatings, combined with this specialized time-release technology, give pharmaceutical companies significant advantages in formulation solutions.

Chr. Hansen Sugar Spheres NF are used in the production of sustained or time-release dosage pharmaceuticals. Ranging in mesh size from 14/18 to 60/80, the product line's highly consistent sphere size allows for uniform, controlled distribution. "The advantages of Chr. Hansen Sugar Spheres NF," according to Margot Connor, VP of sales for human health and nutrition at Chr. Hansen, "allow precise application of the drug active to ensure drug accuracy, best efficacy and higher yield of final product, which means less cost to the customer."

The Chr. Hansen Sugar Spheres NF technology adds synergistic benefits to the company's product portfolio. "Our customers have told us how important our sugar spheres technology platform is to their current and new product development," states John Brown, business development, marketing manager for human health and nutrition at Chr. Hansen. "No other product comes close to matching this product's performance.

Chr. Hansen Sugar Spheres NF is a natural fit with our pharmaceutical product portfolio that includes one-step coating systems and other branded excipients."

Chr. Hansen, Inc.
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www.chr-hansen.com
Milwaukee, WI

Wastewater Pump Keeps Food Plant Running Fresh from Pumpex, Inc.

Tank and vessel cleanup and general process area washdown operations in dairy, meat, and produce processing plants incorporate rugged, durable Pumpex wastewater grinder pumps to handle increasingly more stringent water management guidelines.

Food processors, especially those located in small communities, are being prohibited from discharging waste streams into rivers or streams, and are further restricted from overloading municipal water treatment facilities with raw wastewater. Pumpex offers these food processors a variety of submersible wastewater pumps for the efficient processing, pre-treatment and handling of effluent.

Pumpex offers a sturdy single or three-phase grinder/wastewater pump that handles heads of up to 140 feet and flows up to 70 gpm. The hardened cutter assembly features a specially designed shredder and a wear-resistant impeller for reliable, long-wearing, clog-free operation. (Also available are single and three-phase wastewater pumps that provide economy, flexibility, and performance for handling particulate-laden high head low flow of up to 20,000 gallons per minute.)

Pumpex wastewater pumps are designed with SmartSeal™ technology, a cartridge mechanical seal that achieves smoother-running performance by isolating the pump cooling system from the particulate-laden

effluent. The modular construction provides for long-wearing reliability and fast, easy, on-site maintenance.

Pumpex, Inc.
908.927.0800
www.pumpex.com
Somerville, NJ



Columbus Instruments

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Columbus Instruments' new Oxymax ER is an ideal solution for respirometry experiments on soil, water, sludge, compost, seed and food. Using precise gas analyzers for oxygen and carbon dioxide, the head space gas exchange is measured directly in up to 10 different samples. With its rugged and compact design, it can be used in a laboratory with limited bench space or taken on site. In the lab, it connects to your IBM compatible PC for experiment configuration and data collection/presentation (software included). The Oxymax ER can then also be carried on site, in stand-alone operation, powered by a cigarette lighter adapter. The Oxymax ER can aid in the identification of contaminated sites; and then, turn right around and aid in the bioremediation effort by monitoring respiration of samples with different micronutrients, inoculum, etc. Furthermore, the Oxymax ER can be used to measure respiration of germinating seeds, or used to test for rancidity of food products.

Columbus Instruments
614.276.0861
www.colinst.com
Columbus, OH

Optimize Your Use of Near IR Fiber Probes from Lambda Solutions

Lambda Solutions, Inc. has introduced three new models of its Near Infra-Red Vector Probes. These fiber optic probes are designed for diffuse reflectance spectroscopy requiring high sensitivity and dynamic range. They will interface with most existing FTIR, AOTF and Dispersive Spectrometers.

The Vector Probes are ideally suited for research, quality assurance and quality control applications in the chemical, agricultural, food and pharmaceutical industries. The design of the units allow for ease of use in repetitive testing environments.

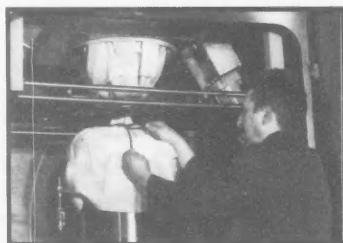
The new models include the NIR-H which is a 10 cm probe with a Gun-Handle Grip for ease of handling. The NIR-HT which includes the Gun-Handle Grip also provides a built-in trigger, LEDs and a serial port interface to allow convenient connection to computer systems.

The third new model is the NIR-MB which is available with probe head lengths up to 30 cm and a versatile "torpedo-shaped" barrel grip. The NIR-MB is also supplied complete with mounting accessories for fixed-position operation.

A proprietary optic design allows for exceptionally low internal light reflection and high light collection efficiency ensuring high signal to noise characteristics.

All the new models are constructed of stainless steel with sapphire windows and solvent resistant fittings. The standard fiber length is 2 meters but models are available with custom fiber lengths. In addition, all models can be supplied with immersible probe heads.

Lambda Solutions, Inc.
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www.LambdaSolutions.com
Waltham, MA



Spiroflow Systems, Inc.

Spiroflow Closure Bars Ideal for Hygienic Bulk Bag Discharger Applications

Spiroflow Systems' yoke closure bar system for their line of bulk bag dischargers increases operator safety and provides a hygienic way to control powder flow. Especially ideal for specialty food and pharmaceutical applications, the yoke closure bars are an available option on all Spiroflow series Bulk Bag Dischargers.

Spiroflow's yoke closure bars consist of a series of "Y"-bars that cinch the bulk bag spout shut, allowing for easy tie-offs and further prevention of powder leakage. With the yoke closure bars closed, operator safety is ensured when tying and untying the bulk bag.

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Santa Maria, CA

Advanced Biotechnology's Successful Food Waste Diversion Demonstration—Ad Solid Organic Food Waste Biologically Converted to Nutrient Rich Water

The "GOMIXER Complete Organic Waste Disposal System" was successfully demonstrated by

Advanced Biotechnology Inc. at Canada's Drumheller Institution Correctional Service for six weeks. The G350 Unit was put through its paces digesting food waste from the kitchen and cafeteria area. Mixed into the food waste was some paper waste in the form of napkins, buttercups, paper plates, etc. The paper waste was easily digested with the food waste.

For the demonstration, a Model G350 was temporarily installed in the existing composting building. It took up very little space in one corner of the building. A storage tank was used to collect the discharged water for use in the farming operations of the Institution. The water was tested and found to be well within the parameters of irrigation water.

"The system is designed for restaurants, hospitals, hotels and other

large facilities. By enabling these facilities to process food waste on site, the GOMIXER reduces or eliminates landfill use, landfill fees and transportation costs," said Rey Rawlins, vice president of marketing for Advanced Biotechnology Inc.

The GOMIXER proved to be a low maintenance, easily operated, highly efficient machine that biologically converts virtually all organic food waste products, including small fish and chicken bones, in a very short period of time. Using a continuous operation, the GOMIXER biological conversion process is so complete there is virtually no solid waste to deal with, only nutrient-rich water.

Advanced Biotechnology Inc.

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www.gomixer.com

Alberta, Canada



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IAFP 2004



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August 8-11, 2004

Ivan Parkin Lecture

Sunday, August 8, 2004

7:00 p.m. – 8:00 p.m.

Presented by

Martin B. Cole

Chief Research Scientist
Food Science Australia
North Ryde, New South Wales, Australia

Announcing

The inaugural "John H. Silliker Lecture"



R. Bruce Tompkin

To be held at IAFP 2004 during a Plenary Session
on Tuesday, August 10, 2004 in Phoenix, Arizona

Featured Speaker: R. Bruce Tompkin
Retired Vice President—Product Safety
ConAgra Refrigerated Foods

Presentation Title: "Guess Who's Come to Stay –
The Resident Pathogen Issue"

Tuesday, August 10, 2004

3:45 p.m.

Phoenix, Arizona

***IAFP thanks Silliker, Inc. for their contribution
to the IAFP Foundation in support of this Lecture.***

IAFP 2004 Preliminary Program



Sunday, August 8, 2004 – 7:00 p.m.

- Opening Session
- Ivan Parkin Lecturer — Martin B. Cole, Food Science, Australia

Monday, August 9, 2004

Morning – 8:30 a.m. – 12:00 p.m.

Symposium Topics

- Molecular Subtyping of Foodborne Pathogens: Tying It All Together
- Retail Food Safety Risks: Protecting Public Health and Changing Behaviors
- Validation and Verification of Pathogen Interventions in Meat and Poultry Processing
- Extending the Shelf Life of Fluid Dairy Products

Technical Session

- Don't be Sonoran (Antimicrobials and Produce)

Poster Session (9:00 a.m. – 1:00 p.m.)

- Antimicrobials and Foods of Animal Origin

Afternoon — 1:30 p.m. – 5:00 p.m.

Symposium Topics

- Postprocessing Intervention Technologies
- Water's Role in Food Contamination
- Recent Developments in *Listeria monocytogenes* Research
- Integrating Genomic Data in Quantitative Risk Assessments
- Sanitary and Hygienic Design, Construction and Fabrication of Dairy and Food Equipment

Technical Session

- General Microbiology and Sanitation

Poster Session (2:00 p.m. – 6:00 p.m.)

- Rattlesnake Roundup (General Microbiology and Sanitation, Methodology, and Toxicology)

Tuesday, August 10, 2004

Morning — 8:30 a.m. – 12:00 p.m.

Symposium Topics

- Food Safety for Immunocompromised Populations
- Chatterbugs: Quorum Sensing and Food Safety
- Transfer and Spread of Pathogens in Food Environments
- Indicator Organisms and Testing — Where's the Value?

Technical Session

- Foods of Animal Origin

Poster Session (9:00 a.m. – 1:00 p.m.)

- Saguaro Soiree (Risk Assessment, Education, and Pathogens)

Afternoon — 1:30 p.m. – 3:30 p.m.

Symposium Topics

- Update on Foodborne Disease Outbreaks
- Everything You Wanted to Know about Adopting New Methods... But Were Afraid to Ask!
- Food Toxicology 101: Basics for the Food Safety Professional
- *Salmonella* Control in Broiler Chickens: What Can We Learn from the Scandinavian Experience

Technical Session

- Education

Technical Session

- Risk Assessment

Plenary Session — 3:45 p.m. – 4:45 p.m.

John H. Silliker Lecturer

- R. Bruce Tompkin, ConAgra Refrigerated Foods (Retired)

Business Meeting — 4:45 p.m. – 5:30 p.m.

Wednesday, August 11, 2004

Morning — 8:30 a.m. – 12:00 p.m.

Symposium Topics

- Credibility in Science
- Risk and Control of *Enterobacter sakazakii*
- Impact of Environmental Viral and Parasitic Contamination on Food Safety
- Safety of Raw Milk Cheeses — The State of the Science
- Packaging Innovations, Safety Concerns and Seafood
- Heat Resistant Spoilage Microorganisms in the Juice and Beverage Industry

Poster Session (8:00 a.m. – 12:00 p.m.)

- Pathogens

Afternoon — 1:30 p.m. – 5:00 p.m.

Symposium Topics

- Sanitation — Because You Have to be Clean to be Safe
- The Global Food Safety Initiative
- Optimizing Data and Minimizing Risk
- Biofilms and Their Impact on Food Safety

Technical Session

- Chips and Salsa (General Food Microbiology and Methods)

Technical Session

- Pathogens

Poster Session (1:00 p.m. – 5:00 p.m.)

- Prickly Pear Potpourri (Dairy, Produce, and Other Commodities)

Visit our Web site for updated information at www.foodprotection.org

IAFP 2004 Networking Opportunities



IAFP FUNCTIONS

NEW MEMBER RECEPTION

Saturday, August 7, 2004 • 4:30 p.m. – 5:30 p.m.

If you recently joined the Association or if this is your first time attending an IAFP Annual Meeting, welcome! Attend this informal reception to learn how to get the most out of attending the Meeting and meet some of today's leaders.

AFFILIATE RECEPTION

Saturday, August 7, 2004 • 5:30 p.m. – 7:00 p.m.

Affiliate officers and delegates plan to arrive in time to participate in this educational reception. Watch your mail for additional details.

COMMITTEE MEETINGS

Sunday, August 8, 2004 • 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 any number of committees or PDGs. All meetings are open.

STUDENT LUNCHEON

Sunday, August 8, 2004 • 12:00 p.m. – 1:30 p.m.

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.

OPENING SESSION

Sunday, August 8, 2004 • 7:00 p.m. – 8:00 p.m.

Join us to kick off IAFP 2004 at the Opening Session. Listen to the prestigious Ivan Parkin Lecture delivered by Martin B. Cole, Chief Research Scientist, Food Science Australia, North Ryde, Australia.

CHEESE AND WINE RECEPTION

Sunday, August 8, 2004 • 8:00 p.m. – 10:00 p.m.

Sponsored by Kraft Foods, Inc.

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

IAFP JOB FAIR

Sunday, August 8 through Wednesday, August 11, 2004

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 9, 2004 • 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 committees.

EXHIBIT HALL RECEPTION

Monday, August 9, 2004 • 5:00 p.m. – 6:30 p.m.

Join your colleagues in the exhibit hall to see the latest trends in food safety techniques and equipment. Discuss with exhibitors their latest products or use this time to view the poster presentations. Grab a drink and take advantage of this great networking reception.

JOHN H. SILLIKER LECTURE

Tuesday, August 10, 2004 • 3:45 p.m.

This plenary session will feature R. Bruce Tompkin, Retired Vice President — Product Safety, ConAgra Refrigerated Foods. He will deliver a presentation titled "Guess Who's Come to Stay — The Resident Pathogen Issue."

BUSINESS MEETING

Tuesday, August 10, 2004 • 4:45 p.m. – 5:30 p.m.

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

PRESIDENT'S RECEPTION (By invitation)

Tuesday, August 10, 2004 • 5:30 p.m. – 6:30 p.m.

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

PAST PRESIDENTS' DINNER (By invitation)

Tuesday, August 10, 2004 • 6:30 p.m. – 10:00 p.m.

Past Presidents and their guests are invited to this dinner to socialize and reminisce.

AWARDS BANQUET

Wednesday, August 11, 2004 • 7:00 p.m. – 9:30 p.m.

Bring IAFP 2004 to a close at the Awards Banquet. Award recipients will be recognized for their outstanding achievements and the gavel will be passed from Dr. Paul Hall to Incoming President Dr. Kathy Glass.

IAFP 2004 Event Information



EVENING TOURS

MONDAY NIGHT SOCIAL AT RAWHIDE WESTERN TOWN

Monday, August 9, 2004 • 6:30 p.m. – 10:00 p.m.



Step back in time to the days when the West ran wild! This is the Wild West of good guys, bad guys, balladeers, shoot-outs, saloon girls, and delightfully crooked card dealers. Upon arrival at Rawhide, you will have the opportunity to stroll down Main Street, browse in the numerous shops and boutiques, witness a blacksmith at work and watch Rawhide's street entertainers. Satisfy your appetite by stopping in the Steakhouse and Saloon for a "Chuckwagon Feast". Grab your partners, jump on the bus and get ready for a rip-roarin good time — YEE HA!

DIAMONDBACKS BASEBALL GAME

Saturday, August 7, 2004 • 6:00 p.m. – 10:00 p.m.



Enjoy a night at the ballpark as the Arizona Diamondbacks take on the Atlanta Braves at Bank One Ballpark. From its signature swimming pool to its retractable roof, Bank One Ballpark has become one of the game's most recognizable landmarks. Since the air-conditioned facility first opened its doors, fans have enjoyed the opportunity to watch the Arizona Diamondbacks without worrying about Phoenix's summer heat. Ticket price includes admission to the game and transportation to and from the JW Marriott Desert Ridge Resort.

GOLF TOURNAMENT



GOLF TOURNAMENT – Arnold Palmer Signature Course at Wildfire Golf Club
Saturday, August 7, 2004 • 6:00 a.m. – 11:00 a.m.

Everyone is invited to play in this best-ball golf tournament on the Arnold Palmer Signature Course at Wildfire Golf Club. A desert-style course of championship length, with generous fairways and large, bent-grass greens, the Palmer Course is challenging to all levels of golf skill. Begin IAFP 2004 with a round of golf playing before a backdrop of the Camelback Mountains!



DAYTIME TOURS

SEDONA AND VERDE VALLEY TOUR

Saturday, August 7, 2004 • 8:00 a.m. – 4:00 p.m.



Known worldwide for its brilliant red rock mountains, breathtaking scenery and quaint artisan shops, Sedona is a "must see" destination for visitors to Arizona.

During the drive north, you will travel through the diverse terrain of the Sonoran Desert, Verde Valley and Camp Verde. Along the way, the guide will provide interesting narration about the area and answer questions.

Prior to reaching Sedona, we will stop at Montezuma's Castle, a twelfth century cliff dwelling built by the Sinagua Indians. This is considered one of the best-preserved cliff dwellings in the Southwest. Upon arrival in Sedona, your guide will point out the numerous red rock formations for which Sedona is famous — Snoopy Rock, Bell Rock, Chapel Rock, Submarine Rock and others. Lunch will be served at a quaint local eatery. Guests will have time to explore the galleries and shops of Main Street and Tlaquepaque.

CITY TOUR AND OLD TOWN SCOTTSDALE

Sunday, August 8, 2004 • 10:00 a.m. – 3:00 p.m.



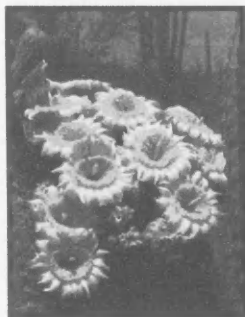
With amazing sunsets and spectacular mountain views, Arizona is a site to behold! The City Tour meanders through the amazing aspects of the

valley. Each tour is unique in that the guide will stop along the way at several of the most beautiful sites and private homes in the valley.

The Wrigley Mansion is well known for its unique architecture, the Biltmore Resort has had the pleasure of Frank Lloyd Wright's touch and the State Capitol is majestic against the blue sky backdrop of the city. This tour provides an opportunity to stop and enjoy the unique shopping experiences of Old Town Scottsdale as well as a delicious lunch. Old Town encompasses over a square mile of themed shopping streets. Walking the sidewalks of this section of Scottsdale, one can find everything from Native American jewelry and artwork to western clothing.

DESERT BOTANICAL GARDEN AND HEARD MUSEUM TOUR

Monday, August 9, 2004 • 8:00 a.m. – 1:00 p.m.

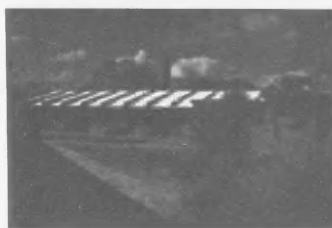


Two of the Southwest's most unique visitor attractions, The Desert Botanical Garden and Heard Museum, have teamed up to present an unbeatable tour designed to acquaint visitors with the diversity of the region and the resourcefulness of its Native American people. This tour includes visits to both attractions

plus lunch at the Heard Museum Cafe. Your visit begins at the Desert Botanical Garden which displays more than 10,000 desert plants in a spectacular outdoor setting. Plants and People of the Sonoran Desert, a three-acre permanent exhibit with authentic historic and prehistoric structures, shows how Sonoran Desert dwellers have used native plants for thousands of years for food, construction, fiber, and medicines. Continuing on you will visit the amazing Heard Museum, a museum of Native American cultures and art. The Heard Museum is internationally recognized for its collections of Native American artifacts and contemporary fine art.

FRANK LLOYD WRIGHT – TALIESIN WEST TOUR

Tuesday, August 10, 2004 • 8:00 a.m. – 12:00 p.m.



Taliesin West in Scottsdale is considered one of Frank Lloyd Wright's greatest architectural masterpieces. From its inception, the buildings

at Taliesin West astounded architectural critics with their beauty and unusual form. Taliesin West still serves as a living, working educational facility with an on-site architectural firm. By touring Taliesin West visitors are able to broaden their appreciation of architecture and Wright's continuing contribution to it through his theories of organic design.

If you're interested in an in-depth, intimate look at Taliesin West, this exclusive experience is a must! Visit the Cabaret Cinema, Music Pavilion, Seminar Theater and Wright's private office — all linked by dramatic terraces, gardens and walkways overlooking the rugged Sonoran Desert and Valley below. You'll have the chance to talk to a Wright associate, have leisurely mid-morning refreshments in the colorful Taliesin Fellowship dining room and explore the dramatic Taliesin West living room — called the "Garden Room" by Wright. You'll sit in Wright-designed furniture and experience firsthand the drama of being a guest in Wright's famous Garden Room.

SOUTHWESTERN COOKING CLASS

Wednesday, August 11, 2004 • 10:30 a.m. – 1:00 p.m.

This hands-on class explores the magic and mysteries of tamales, one of the great culinary traditions of the America's. While making tamales you will learn the secrets of choosing a filling and flavoring them with different types of wrappers, from cornhusks to banana leaves. You will also learn how to choose and make a complementary salsa to create a more satisfying and dynamic taste experience. This class is a total emersion into tamales and salsas that provides you with all the knowledge and skills to create your own tamales at home! Following the class you will enjoy lunch at Blue Sage.

HOSPITALITY ROOM

Register your spouse/companion and they will have access to the hospitality room where a continental breakfast and afternoon snacks are provided Sunday through Wednesday.



IMPORTANT! Please read this information before completing your registration form.

MEETING INFORMATION

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

Registration includes:

- Technical Sessions
- Symposia
- Poster Presentations
- Ivan Parkin Lecture
- Silliker Lecture
- Exhibit Hall Admittance
- Cheese and Wine Reception
- Exhibit Hall Reception
- Program and Abstract Book

4 EASY WAYS TO REGISTER

Complete the Attendee Registration Form and submit it to the International Association for Food Protection by:



Online: www.foodprotection.org



Fax: 515.276.8655



Mail: 6200 Aurora Avenue, Suite 200W,
Des Moines, IA 50322-2864, USA



Phone: 800.369.6337; 515.276.3344

The early registration deadline is July 7, 2004. After this date, late registration fees are in effect.

REFUND/CANCELLATION POLICY

Registration fees, less a \$50 administration fee and any applicable bank charges, will be refunded for written cancellations received by July 23, 2004. No refunds will be made after July 23, 2004; however, the registration may be transferred to a colleague with written notification. Refunds will be processed after August 16, 2004. Event and tour tickets purchased are nonrefundable.



EXHIBIT HOURS

Sunday, August 8, 2004	8:00 p.m. – 10:00 p.m.
Monday, August 9, 2004	9:30 a.m. – 1:30 p.m. 3:00 p.m. – 6:30 p.m.
Tuesday, August 10, 2004	9:30 a.m. – 1:30 p.m.

DAYTIME TOURS

Saturday, August 7, 2004	
Sedona and Verde Valley Tour (Lunch included)	8:00 a.m. – 4:00 p.m.
Sunday, August 8, 2004	
City Tour and Old Town Scottsdale (Lunch included)	10:00 a.m. – 3:00 p.m.
Monday, August 9, 2004	
Desert Botanical Garden and Heard Museum Tour (Lunch included)	8:00 a.m. – 1:00 p.m.
Tuesday, August 10, 2004	
Frank Lloyd Wright – Taliesin West Tour	8:00 a.m. – 12:00 p.m.
Wednesday, August 11, 2004	
Southwestern Cooking Class (Lunch included)	10:30 a.m. – 1:00 p.m.

EVENING EVENTS

Saturday, August 7, 2004	
Diamondbacks Baseball Game	6:00 p.m. – 10:00 p.m.
Sunday, August 8, 2004	
Opening Session	7:00 p.m. – 8:00 p.m.
Cheese and Wine Reception <i>Sponsored by Kraft Foods North America</i>	8:00 p.m. – 10:00 p.m.
Monday, August 9, 2004	
Exhibit Hall Reception	5:00 p.m. – 6:30 p.m.
Monday Night Social at Rawhide Western Town	6:30 p.m. – 10:00 p.m.
Wednesday, August 11, 2004	
Awards Banquet Reception	6:00 p.m. – 7:00 p.m.
Awards Banquet	7:00 p.m. – 9:30 p.m.

GOLF TOURNAMENT

Saturday, August 7, 2004	
Golf Tournament Arnold Palmer Signature Course at Wildfire Golf Club	6:00 a.m. – 11:00 a.m.

HOTEL INFORMATION

For reservations, contact the hotel directly and identify yourself as an IAFP 2004 attendee to receive a special rate of \$139 per night, single/double or make your reservations online. This special rate is available only until July 7, 2004.

JW Marriott Desert Ridge Resort
5350 E. Marriott Dr.
Phoenix, Arizona 85054
Phone: 800.228.9290 • Fax: 480.293.3738
Web site: www.marriott.com/phxd
(Group Code INTINTA)

Attendee Registration Form



**International Association for
Food Protection®**

6200 Aurora Avenue, Suite 200W
Des Moines, IA 50322-2864, USA
Phone: 800.369.6337 • 515.276.3344
Fax: 515.276.8655
E-mail: info@foodprotection.org
Web site: www.foodprotection.org

Name (Print or type your name as you wish it to appear on name badge) _____ Member Number: _____

Employer _____ Title _____

Mailing Address (Please specify: Home Work) _____

City _____ State/Province _____ Country _____ Postal/Zip Code _____

Telephone _____ Fax _____ E-mail _____

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

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 7, 2004 TO AVOID LATE REGISTRATION FEES

REGISTRATION FEES:	MEMBERS	NONMEMBERS	TOTAL
Registration (Awards Banquet included)	\$ 365 (\$415 late)	\$ 555 (\$605 late)	_____
Association Student Member (Awards Banquet included)	\$ 75 (\$ 85 late)	Not Available	_____
Retired Association Member (Awards Banquet included)	\$ 75 (\$ 85 late)	Not Available	_____
One Day Registration: * <input type="checkbox"/> Mon. <input type="checkbox"/> Tues. <input type="checkbox"/> Wed.	\$ 200 (\$225 late)	\$ 305 (\$330 late)	_____
Spouse/Companion* (Name): _____	\$ 55 (\$ 55 late)	\$ 55 (\$ 55 late)	_____
Children 15 & Over* (Names): _____	\$ 25 (\$ 25 late)	\$ 25 (\$ 25 late)	_____
Children 14 & Under* (Names): _____	FREE	FREE	_____
*Awards Banquet not included			
EVENTS:		# OF TICKETS	
Golf Tournament – Arnold Palmer Signature Course (Saturday, 8/7)	\$ 105 (\$115 late)	_____	_____
Diamondbacks Baseball Game (Saturday, 8/7)	\$ 26 (\$ 36 late)	_____	_____
Student Luncheon (Sunday, 8/8)	\$ 5 (\$ 15 late)	_____	_____
Monday Night Social at Rawhide Western Town (Monday, 8/9)	\$ 42 (\$ 52 late)	_____	_____
Children 14 and under	\$ 37 (\$ 47 late)	_____	_____
Awards Banquet (Wednesday, 8/11)	\$ 50 (\$ 60 late)	_____	_____
DAYTIME TOURS:			
(Lunch included in daytime tours except on Tuesday)			
Sedona and Verde Valley Tour (Saturday, 8/7)	\$ 90 (\$100 late)	_____	_____
City Tour and Old Town Scottsdale (Sunday, 8/8)	\$ 55 (\$ 65 late)	_____	_____
Desert Botanical Garden and Heard Museum Tour (Monday, 8/9)	\$ 78 (\$ 88 late)	_____	_____
Frank Lloyd Wright – Taliesin West Tour (Tuesday, 8/10)	\$ 70 (\$ 80 late)	_____	_____
Southwestern Cooking Class (Wednesday, 8/11)	\$ 65 (\$ 75 late)	_____	_____

PAYMENT OPTIONS:

Check Enclosed

Credit Card # _____

Name on Card _____

Signature _____

Check box if you are a technical, poster, or symposium speaker.

TOTAL AMOUNT ENCLOSED \$ _____
US FUNDS on US BANK

Expiration Date _____

JOIN TODAY AND SAVE!!!
(Attach a completed Membership application)

EXHIBITORS DO NOT USE THIS FORM



Contribute to the Seventh Annual Foundation Fund Silent Auction Today!

The Foundation of the International Association for Food Protection will hold its Annual Silent Auction during IAFP 2004, the Association's 91st Annual Meeting in Phoenix, Arizona, August 8-11, 2004. The Foundation Fund supports:

- ❖ Ivan Parkin Lecture
- ❖ Travel support for exceptional speakers at the Annual Meeting
- ❖ Audiovisual Library
- ❖ Developing Scientist Competition
- ❖ Shipment of volumes of surplus *JFP* and *FPT* journals to developing countries through FAO in Rome

Support the Foundation by donating an item today. A sample of items donated last year included:

- ❖ Waterford Crystal Bowl
- ❖ Food Safety Handbook
- ❖ Walt Disney World Theme Park Tickets
- ❖ United States Flag
- ❖ Lionel Electric Train
- ❖ Oscar Mayer Remote Controlled Wiener Mobile
- ❖ Freshwater Stick Pearl Necklace
- ❖ Wine
- ❖ "Taste of Chicago" Gift Certificates
- ❖ Ultimate Garden State Gift Basket

Complete the form and send it in today.



Description of Auction Items _____
Estimated Value _____
Name of Donor _____
Company (if relevant) _____
Mailing Address _____
(Please specify: Home Work)
City _____ State or Province _____
Postal Code/Zip + 4 _____ Country _____
Telephone # _____ Fax # _____
E-mail _____

Return to:

Donna Gronstal
International Association for Food Protection
6200 Aurora Avenue, Suite 200W
Des Moines, IA 50322-2864, USA
800.369.6337; 515.276.3344
Fax: 515.276.8655
E-mail: dgronstal@foodprotection.org



International Association for
Food Protection®

Promotional Opportunities

We invite you to participate as a sponsor for IAFP 2004. Sponsorship participation provides an excellent opportunity to position your company or organization as a supporter of the Association.

Please review the event listing to select the one that will best position your organization. Reservations will be taken in order received for any open sponsorship events. A waiting list for events with a right of first option will be established.

Sponsorship Event List

Amount	Event	Amount	Event
\$17,000	Monday Evening Social	\$3,000	Coffee Break <i>(Wednesday Afternoon)</i>
\$16,000	Opening Reception <i>(Sunday)</i>	\$3,750	Notepads with Sponsor's Logo
\$15,000	Exhibit Hall Reception <i>(Monday)</i>	\$3,500	Spouse/Companion Hospitality Room
\$12,000	Conference Program Bag	\$3,500	Student PDG Luncheon <i>(Sunday)</i>
\$10,000	President's Reception <i>(Tuesday)</i>	\$3,000	Affiliate Educational Reception <i>(Saturday)</i>
\$8,000	Badge Holders w/Lanyards	\$2,500	IAFP New Member Orientation <i>(Saturday)</i>
\$6,000	Exhibit Hall Pastries and Coffee <i>(Monday Morning)</i>	\$2,000	Awards Banquet Flowers <i>(Wednesday)</i>
\$6,000	Exhibit Hall Pastries and Coffee <i>(Tuesday Morning)</i>	\$1,750	Committee Day Refreshments <i>(Sunday)</i>
\$3,500	Exhibit Hall Coffee Break <i>(Monday Afternoon)</i>	\$1,500	Exhibitor Move-in Refreshments <i>(Sunday)</i>
\$3,500	Coffee Break <i>(Tuesday Afternoon)</i>	\$1,000	Speaker Travel Support
\$3,500	Coffee Break <i>(Wednesday Morning)</i>		

Partial sponsorship for the above events is available.

Contact David Larson for details.

Phone: 515.440.2810

Fax: 515.440.2809

E-mail: larson6@earthlink.net

Sponsorship Participant

Name _____

Company _____

Address _____

City _____ State or Province _____

Country _____ Postal Code/Zip + 4 _____

Phone _____ Fax _____

E-mail _____

Desired Event to Sponsor _____

Amount Paid \$ _____

U.S. Funds on U.S. Bank

Return form to:

IAFP

6200 Aurora Ave., Suite 200W

Des Moines, IA 50322-2864

Phone: 515.276.3344

Fax: 515.276.8655

E-mail: info@foodprotection.org

Payment: Check Mastercard
 VISA American Express

Account Number _____

Expiration Date _____

Cardholder Signature _____

COMING EVENTS

APRIL

- **16-21, Conference for Food Protection**, San Marcos Resort, Chandler, (Phoenix) AZ. For more information, call Trevor Hayes at 408.848.2255; E-mail: TWHgilroy@aol.com.
- **19, Microbiology V: Listeria**, Guelph Food Technology Centre, Guelph, Ontario, Canada. For more information, contact Marlene Inglis at 519.821.1246; E-mail: minglis@gftc.ca.
- **19-23, Dairy Technology Workshop**, Birmingham, AL. For more information, call 205.595.6455; E-mail: us@randolphconsulting.com.
- **20-21, FSIS Verification of HACCP Plans**, Washington, D.C. For more information, contact Jennifer Epstein at 202.393.0890; E-mail: www.fpi-food.org.
- **20-22, ASTM Committee E27 on Hazard Potential of Chemicals**, Little America Hotel and Towers, Salt Lake City, UT. For more information, contact Scott Orthey at 618.832.9730; E-mail: sorthey@astm.org.
- **22-23, Prerequisites to HACCP**, Washington, D.C. For more information, contact Jennifer Epstein at 202.393.0890; E-mail: www.fpi-food.org.
- **23, International Fresh-cut Produce Association 17th Annual Meeting and Exhibition**, Reno, NV. For more information, call 703.299.6282; E-mail: info@fresh-cuts.org.
- **30, Eighth Annual Symposium on Industrial and Fermentation Microbiology**, Radisson Center, LaCrosse, WI. For more information, call Dr. S. N. Rajagopal at 608.785.6976; E-mail: rajagopa.s@uwlax.edu.

MAY

- **2-4, United 2004 Produce Expo and Conference**, McCormick Place, Chicago, IL. For more information, call 202.303.3400; Web site: www.uffva.org.
- **3-7, Diploma in Food Hygiene and Safety**, GFTC, Guelph, Ontario, Canada. For more information, contact Marlene Inglis at 519.821.1246; E-mail: minglis@gftc.ca.
- **4-5, Plant Operations Conference**, Hilton Chicago Hotel and Tower, Chicago, IL. For more information, call 202.737.4332; or go to www.idfa.org.

- **4-6 HACCP for Juice Processors**, Atlanta, GA. For more information, call 800.355.0983; E-mail: fpi@nfpa-food.org.
- **4-6 South Dakota Environmental Health Association Annual Educational Conference**, Holiday Inn City Center, Sioux Falls, SD. For more information, contact Mark Schuttloffel at 605.367.8783.
- **13-14, HACCP II: Developing Your HACCP Plan**, GFTC, Guelph, Ontario, Canada. For more information, contact Marlene Inglis at 519.821.1246; E-mail: minglis@gftc.ca.
- **15-20, IFFA Delicat**, Frankfurt, Germany. For more information, contact Dirk Ebener at 770.984.8016; E-mail: info@usa.messefrankfurt.com.
- **17-21, 3-A Sanitary Standards Inc. Annual Meeting**, Milwaukee, WI. For more information, call 703.790.0295; Web site: www.3-a.org.
- **18-19, Cultured Dairy Products Conference**, Hyatt Regency, Minneapolis, MN. For more information, call 202.737.4332; or go to www.idfa.org.
- **18-19, Pennsylvania Association of Milk, Food and Environmental Sanitarians Annual Meeting**, Nittany Lion Inn, State College, PA. For more information, contact Gene Frey at 717.397.0719.
- **18-20, Ingredients & Ingredient Functionality Workshop**, University of Nebraska Food Processing Center, Lincoln, NE. For more information, contact Pauline Galloway at 402.472.9751; E-mail: pgalloway2@unl.edu.
- **19, Dairy HACCP Workshop**, University of Wisconsin-Madison, Madison, WI. For more information, contact Marianne Smukowski at 608.265.6346 or go to www.wisc.edu/foodsci/.
- **25-26, Dairy Cost Accounting Workshop**, Sofitel Chicago O'Hare, Rosemont, IL. For more information, call 202.737.4332; or go to www.idfa.org.
- **26, Metropolitan Association for Food Protection Annual Spring Meeting**, Rutgers, Cook College, New Brunswick, NJ. For more information, contact Carol Schwar at 908.689.6693.
- **31, Microbiology VI: Salmonella Control**, GFTC, Guelph, Ontario, Canada. For more information, contact Marlene Inglis at 519.821.1246; E-mail: minglis@gftc.ca.

JUNE

- **7-11, 5th World Congress Foodborne Infections and Intoxications**, Berlin, Germany. For more information, call 49.30.8412.1939; E-mail: officewk5@bfr.bund.de.
- **8-9, Wisconsin Cheese Grading Short Course**, University of Wisconsin-Madison, Madison, WI. For more information, contact Scott Rankin at 608.263.2008 or go to www.wisc.edu/foodsci/.
- **18-20, Food Allergens: Issues and Solutions for the Food Product Manufacturer**, Hotel Sofitel, O'Hare, Chicago, IL. For more information, contact Pauline Galloway at 402.472.9751; E-mail: pgalloway2@unl.edu.
- **18-25, International Workshop/Symposium on Rapid Methods and Automation in Microbiology XXIV**, Kansas State University, Manhattan, KS. For more information, contact Debbie Hagenmaier at 800.432.8222; E-mail: debbieh@ksu.edu; outside USA call 785.532.5575.
- **23-24, IDFA's Washington Conference**, Washington Court Hotel, Washington, D.C. For more information, call 202.737.4332; or go to www.idfa.org.

JULY

- **14-15, 10th Annual Hawaii Lodging, Hospitality and Foodservice Expo**, Neal Blaisdell Center, Honolulu, HI. For more information, call 800.525.5275; E-mail: kanter@lava.net.

IAFP UPCOMING MEETINGS

AUGUST 8-11, 2004
Phoenix, Arizona

AUGUST 14-17, 2005
Baltimore, Maryland

AUGUST 13-16, 2006
Calgary, Alberta, Canada

IT'S A FACT

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Development
Group today!**

Contact the PDG Chairperson.

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Member Listing
visit our web site at

www.foodprotection.org

ADVERTISING INDEX

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In Memory of...

Dr. Carl Vanderzant
San Angelo, Texas

IAFP would like to extend our deepest sympathy to the family and friends of Dr. Carl Vanderzant who passed away in December 2003.

IAFP will always have sincere gratitude for his contributions to the Association and the profession.

CAREER SERVICES SECTION



**Make your Mark
Where it really counts.**

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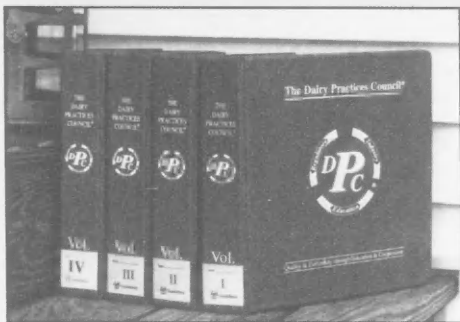
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- ◆ **Journal of Food Protection** — First published in 1937, the Journal is a refereed monthly publication. Each issue contains scientific research and authoritative review articles reporting on a variety of topics in food science pertaining to food safety and quality.
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