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FOOD PROTECTION TRENDS

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JULY 2006

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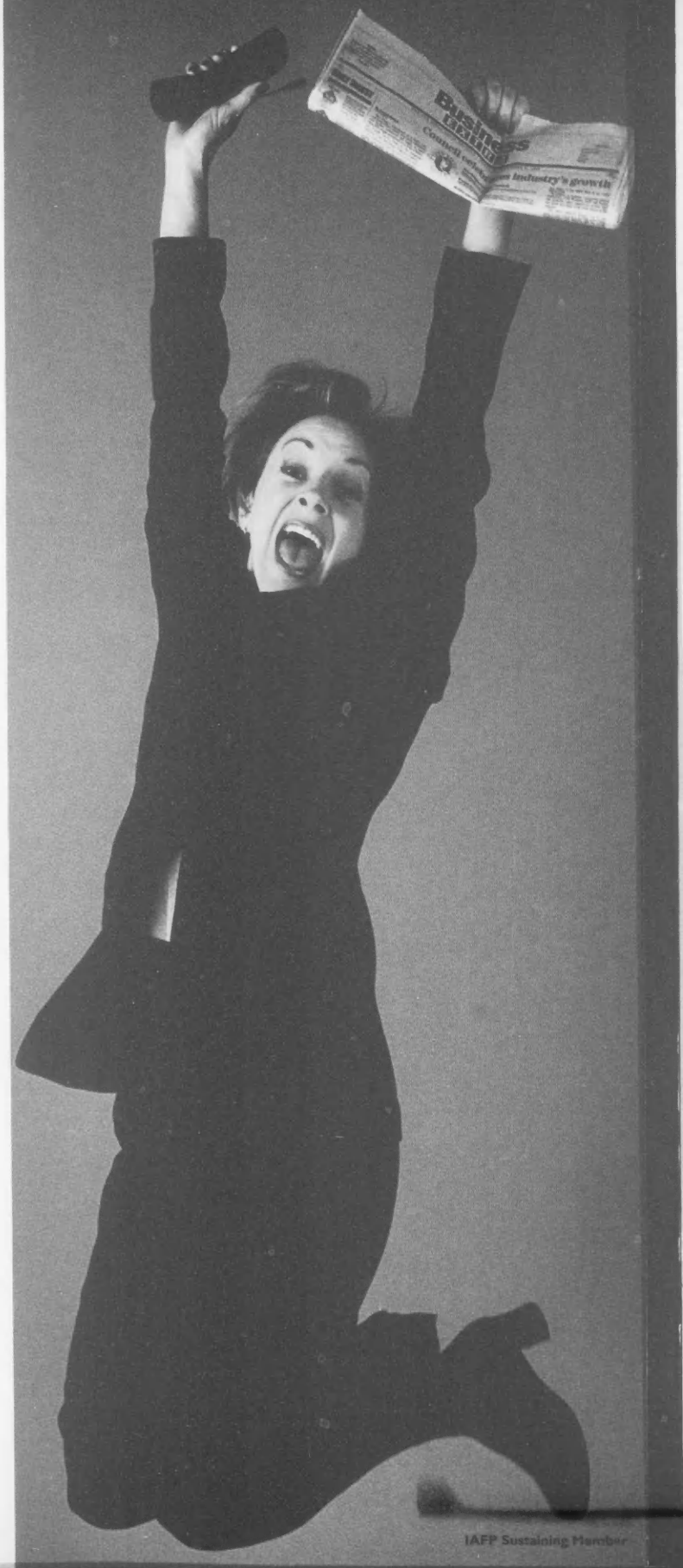

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"PERSPECTIVES FROM NORTH OF THE 49TH"

By JEFFREY FARBER
PRESIDENT

"I thought I would first share with you some tips for getting the most from your next conference"

This month's column has a little something for everyone – conference attendees, students and job seekers. As I am sure you are all getting geared-up and excited for our Annual Meeting in Calgary, I thought I would first share with you some tips for "getting the most from your next conference," some of which was recently published in *The Scientist*.

1. You should try and sit at the front during talks – no, this is not so you can increase your chances of getting your picture taken or to avoid falling asleep, but will definitely help you feel more involved in the talk.
2. Break away – As is human nature, people tend to always hang around with people they know and feel comfortable with; try either at lunch or during the coffee breaks, etc., to talk and sit with people you don't know. This can help you learn new things, find out how other organizations operate, discuss common problems, etc.
3. Rate the speakers for content and presentation style – this will help to keep you alert, as well as possibly give you ideas about various presentations that you can use to integrate into your next talk.
4. Take notes – even if you really do not need them, taking notes during presentations really does help focus those neurons!
5. Size matters – attending smaller-size meetings means you are likely to actually meet and talk to the speakers you want to instead of standing in a long line or never running into them in the hallways. This is still the beauty of IAFP; I like to think of it as a small and a big meeting – small in numbers, big in heart and scientific content.
6. Be excited about your work and your presentation! If people see that you are excited about your work, they will feed off of this, and you are much more likely to attract people's attention. Remember that you are in essence, always selling yourself and your science!

I have often been asked what makes a good M.Sc. or Ph.D. student. An article, which recently appeared in *Nature* outlines some of the advice professors should be giving prospective graduate students. Some of the highlights include:

1. Choose a supervisor whose work you know and admire, who is well supported by grants and who has good support and infrastructure. In addition, speak to students in the professor's lab and ask them questions such as; is the professor around enough, are there regular lab meetings, etc.
2. Working hard – graduate students need to work long days and part of most weekends – if research is a passion for you, this will be easy; if the hours are a drag for you, you are likely in the wrong field;
3. Plan your days and weeks carefully to overlap experiments so that you have a small amount of downtime;
4. Keep a good lab book and be sure to write your results in a systematic manner at least 2 or 3 times a week, and every day if possible;
5. Develop good writing and oral presentation skills; this will stand you in good stead throughout your whole career;
6. Read the literature in your immediate and surrounding area, both past and present. For you to make a contribution to your field, you need to know what has already been done;
7. Learn to take mini-breaks so that you do not burn out; long weekends or a nice holiday will do the trick;

8. Be creative. Always think about what you are doing and look for better ways to do it;
9. Try to get along with everyone and develop good interpersonal and networking skills; and
10. In the end, to be successful, you must think and be smart, be highly motivated, creative, energetic and hard working, skillful and lucky. Yes, a little serendipity goes a long way in research!

A recent article for job hunters appearing in local newspapers, talks about what job hunters want now. Although the thinking relates mainly to people who have switched jobs or have been laid off, I feel it is equally as pertinent for anyone looking for a job:

1. Work-life balance is extremely important for people; Will my work schedule allow me time for outside interests is a frequently asked question.
2. Reporting relationships were also seen as important; who will be my boss?
3. Alignment with personal values was also found to be important; what is the workplace culture?
4. In addition, career development was important; what are going to be my opportunities in the future for growth and advancement?
5. The right fit was also deemed to be very important; will I be able to make a meaningful contribution to the organization?

A big thanks to Ben Chapman for setting up an "Ask the Pres" discussion forum for students during the latter part of May. Although not too many students asked questions, those who did were very insightful, and I thoroughly enjoyed the dialogue. I think we can build on this next year to get more participation from students.

Things are looking for very good for our Annual Meeting in terms of number of attendees, exhibitors, facilities, poster and oral sessions, etc. So please make sure you get your registration in, make your hotel reservation, convince at least one of your colleagues to attend, and enjoy!

Dr. J's Science Corner:

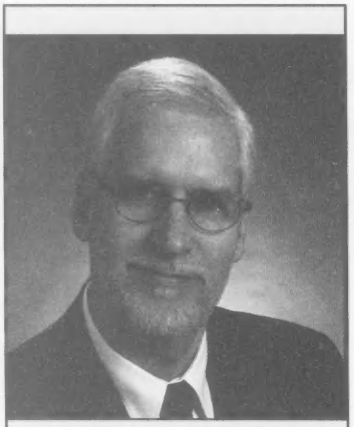
As reported in *Nature*, a new antibiotic, platensimycin, which has potent activity against Gram-positive pathogens, including those nasty resistant staph and enterococci, has been discovered. This antibiotic is a significant new antibacterial compound, which represents a novel class of antibiotic, in that it inhibits bacterial fatty-acid biosynthesis.

Platensimycin has shown promising results in a mouse model of infection, but extensive clinical trials for safety and efficacy in humans has not been done. Thus, although it may be a while before we see this drug being used to treat bacterial infections in humans, its discovery is very exciting.

As always, I can be reached by E-mail at jeff_farber@hc-sc.gc.ca and would love to hear from you!

Have a great month.

"COMMENTARY"
FROM THE EXECUTIVE DIRECTOR



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

"We look forward to seeing you next month in Calgary!"

This issue of *Food Protection Trends* is our Annual Meeting issue and includes the full program for IAFP 2006. Our coverage of the 93rd Annual Meeting begins on page 513. You will want to review the program to plan for your participation in the "leading food safety conference!"

If you have never been to Calgary, you will love the city and surrounding area. You should consider bringing family members or friends, as most of us do not have the opportunity to travel to Calgary but once in a lifetime. Calgary is a beautiful, clean and enjoyable city with excellent restaurants (many close to our hotels) and great shopping opportunities including many one-of-a-kind shops.

We arranged a number of tours that your friends or family may choose to participate in. There are even tours for you to consider on Saturday and Sunday prior to the start of our meeting and a day of activities planned for Thursday after the meeting. Tour descriptions are on page 546, but let me entice you. On Saturday, our tour travels west of Calgary to the Canadian Rocky Mountains. You will visit Banff National Park sites including Lake Louise, Johnston Canyon and the majestic, Fairmont Chateau Lake Louise. It is a beautiful journey through the mountains and one you will long remember!

Also on Saturday, IAFP will hold a golf tournament for those interested in golfing in beautiful, scenic surroundings. There are panoramic Rocky Mountain views on each hole of The Links of GlenEagles. The course was carved into the rugged foothills as they run up to the Rocky Mountains. Portions of the course border 200-foot cliffs overlooking the Bow River Valley. Join your colleagues for a day of golf you will talk about for months and years to come.

On Sunday, a tour around the city of Calgary takes place. You will begin at the Calgary Tower with spectacular views of the city and the Canadian Rockies. A visit to Heritage Park will take you back in time and a stop at Canada's Olympic Park will bring back memories of the winter Olympic competitions.

Following IAFP 2006, we planned a day for activities in the Kananaskis Valley and an Alberta barbecue. You may want to consider staying an extra day to enjoy one of these activities: horseback riding, whitewater rafting, canoeing, biking or hiking. Top that off with a true, Alberta barbecue – not a bad way to relax after three days of learning at IAFP's Annual Meeting!

Tours on Monday, Tuesday and Wednesday include a trip to Drumheller and the Badlands of Alberta, an art walk and a combined yoga and cooking class. Drumheller is the location of the Royal Tyrrell Museum of Paleontology, which is a major research center for dinosaurs. You will enjoy the unique landscape of the Badlands and your time at the museum! The art walk tour will take you to some of Calgary's best-known art galleries and will end at Art Central with an art demonstration. Our yoga and cooking class combine the health and vitality of Western Canada's lifestyle. I think most would find something of interest in one of these tours, or maybe even all of them!

New this year is two Foundation Fundraisers. On Tuesday evening, a limited number of attendees will experience one of two, unique dining experiences. The first is a murder mystery dinner conducted at the Deane House on the banks of the Elbow River. Our second option is dinner at The Ranche, one of Calgary's finest and most creative restaurants located in Fish Creek Provincial Park. Registration fees for both events include a donation to the IAFP Foundation so please help the Foundation grow while you enjoy great food and an evening with your colleagues!

As you can see, there are so many things to experience in Calgary; you will want to spend some extra time there. We hope you have made your plans to attend IAFP 2006 and we look forward to seeing you in Calgary next month.

In addition to the Annual Meeting, I want to call to your attention IAFP's Career Services that are now available online at the IAFP Web site (see ad on this page). We have made a major expansion in our job postings to benefit both employers and job seekers. Job seekers can now post their resumes, search our job listings and request E-mail notification when jobs fitting their particular interests are posted.

Employers may now post job advertisements directly to our Career Services area on the IAFP Web site and no longer have to wait for our staff to perform this task. Job ads are posted in real time! There are many additional features for both employers and job seekers and we encourage you to take a look at this new, exciting service.

There will be further information on the IAFP Career Services coming your way and information will be distributed at IAFP 2006. Once again, we look forward to seeing you next month in Calgary!

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6200 Aurora Ave., Suite 200W, Des Moines, IA 50322-2864

International Association for Food Protection

Foods Associated with Foodborne Illness Outbreaks from 1990 through 2003

CAROLINE SMITH DEWAAL,* GISELLE HICKS, KRISTINA BARLOW, LUCY ALDERTON, and LEORA VEGOSEN
Center for Science in the Public Interest, 1875 Connecticut Ave. NW #300, Washington, D.C. 20009, USA

SUMMARY

Critical to the understanding of foodborne illness outbreaks is the identification of both the contaminated food item and the responsible pathogen, allowing traceback to the original source of contamination and subsequent intervention. The Center for Science in the Public Interest (CSPI) maintains a database of foodborne illness outbreaks categorized by food vehicle, compiled from sources including the Centers for Disease Control and Prevention, state health departments, and scientific journals. Between 1990 and 2003, the foods most commonly linked to outbreaks with identified vehicles were seafood (n = 899), produce (n = 554), poultry (n = 476), beef (n = 438), and eggs (n = 329). Multi-ingredient foods, including pizza and sandwiches, were linked to 812 outbreaks. Overall, 27% (1229/4486) of the outbreaks were attributed to meats, including beef, poultry, pork, and luncheon meats, while 66% (2954/4486) of outbreaks were linked to other food items. Seven percent (303/4486) were linked to multiple food vehicles. Our findings demonstrate the value of routinely linking outbreaks to specific foods and illustrate the importance of using a consistent, common-sense food categorization scheme for all food safety stakeholders. Food attribution and categorization allow consumers to more readily assess food safety hazards and provide better information on which to base policy decisions.

INTRODUCTION

The US Centers for Disease Control and Prevention (CDC) estimates that foodborne disease causes 76 million illnesses and 5,000 deaths per year in the United States *(19)*, and the US Department of Agriculture (USDA) has calculated that the annual economic burden of foodborne illnesses likely exceeds $7 billion *(14)*. While most foodborne illnesses occur as isolated cases, some are clustered together as a result of individuals ingesting a common contaminated food. These clustered illnesses, which can involve from two up to thousands of people, constitute an outbreak. Foodborne outbreaks occurring in the last few years have been linked to the consumption of such food items as tomatoes, unpasteurized milk/cheese, snow peas, basil, ground beef, and turkey *(6–7, 10, 12–13, 23)*.

Outbreak reporting is one of the most critical components of foodborne disease surveillance. These reports are essential in determining food/hazard combinations, which is a crucial step toward preventing outbreaks from reoccurring. However, previous research has documented that underreporting of foodborne illness outbreaks is a major issue. Many outbreaks are never recognized because of to their small size, long incubation period, or geographic dispersion. Other factors include an inability to identify the pathogen involved or the occurrence of mild cases of illness, with no medical care *(4, 19–20)*.

The division of investigation and reporting responsibilities is another obstacle to outbreak reporting. Although CDC has established the FoodNet program to monitor laboratory isolations of

A peer-reviewed article

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TABLE 1. CSPI Food Categories and Subdivisions Summary of Outbreaks and Cases, 1990–2003

FDA-Regulated Foods

Category	Subdivision	Outbreaks	Cases
Beverages			
	Juices	21	1,302
	Other Beverages	45	1,341
	Beverages Total	**66**	**2,643**
Breads & Bakery			
	Bakery	89	2,642
	Breads	27	851
	Breads & Bakery Total	**116**	**3,493**
Dairy			
	Cheese	44	1,680
	Ice Cream	38	1,632
	Milk	53	1,319
	Other Dairy	18	525
	Dairy Total	**153**	**5,156**
Eggs			
	Eggs	69	2,085
	Egg Dishes	260	8,764
	Eggs Total	**329**	**10,849**
Game	**Game Total**	**25**	**182**
Multi-Ingredient Foods			
	Prepared Foods	180	3,289
	Rice/Beans/Stuffing/Pasta Dishes	168	4,301
	Salads	181	7,841
	Sandwiches	104	2,565
	Sauces/Dressings/Oils	55	1,875
	Other Foods	124	3,255
	Multi-Ingredient Foods Total	**812**	**23,126**
Produce			
	Fruits	93	7,799
	Vegetables	205	10,358
	Produce Dishes	256	10,158
	Produce Total	**554**	**28,315**
Seafood			
	Finfish	571	2,991
	Molluscan Shellfish	135	3,156
	Seafood Dishes	129	2,400
	Other Seafood	64	765
	Seafood Total	**899**	**9,312**
FDA Total	**FDA Total**	**2,954**	**83,076**

common foodborne pathogens, this system tracks sporadic cases of illness and does not identify the food vehicle involved in the identified cases *(25)*. Foodborne illness outbreaks are more likely to have an identified food source, but outbreaks are investigated by state and local health departments. The quality of these investigations varies depending on state and local funding *(3, 16)* and subsequent reporting to the CDC is mostly voluntary *(15)*. While the CDC is charged with nationwide surveillance of outbreaks and the tracking of new and emerging pathogens, it does not have the authority to mandate uniform state reporting of foodborne illness outbreaks. Consequently, each state independently determines which diseases to track and sets out its own reporting requirements for health providers *(15)*. Finally, responsibility for recalling unsafe food at the national level is divided among several federal agencies. Overall, twelve federal agencies share responsibility for monitoring, surveillance, inspection, enforcement, outbreak management, research and education *(14)*. Such a highly fragmented system contains significant gaps that increase the risks to consumers *(17, 22, 24)*.

Critical to the understanding and prevention of foodborne illness outbreaks is the identification of both the responsible pathogen and the contaminated food item, allowing traceback to the original source of contamination and subsequent intervention *(15)*. In order to design and prioritize food safety interventions, food attribution and categorization need to be performed to identify the specific food-pathogen combinations causing illness *(4)*. However, the majority of reported foodborne illness outbreaks do not have an identified etiology *(20)* and food vehicle *(18)*. In addition, there exists no consistent food categorization scheme for outbreak data *(4)*.

To address these gaps, the Center for Science in the Public Interest (CSPI) has organized existing outbreak data by food source. Such data alert consumers to food safety hazards, allow consumers to make informed handling decisions about the foods they eat, and provide better information to the government as a basis of setting priorities for food safety resource allocation. This article presents the results of CSPI's food categorization efforts and highlights the importance of food attribution.

METHODS

Data collection

CSPI maintains a database of foodborne illness outbreaks, compiled largely from CDC and state health department

TABLE 1. *(continued)* USDA-Regulated Foods

Category	Subdivision	Outbreaks	Cases
Beef			
	Ground Beef	164	3,280
	Beef Dishes	111	3,311
	Other Beef	163	6,111
	Beef Total	**438**	**12,702**
Luncheon & Other Meats			
	Luncheon	48	981
	Meat Dishes	62	2,115
	Other Meats	35	2,191
	Luncheon & Other Meat Total	**145**	**5,287**
Pork			
	Ham	45	2,105
	Pork Dishes	27	763
	Other Pork	98	2,991
	Pork Total	**170**	**5,859**
Poultry			
	Chicken	179	3,363
	Turkey	88	5,146
	Poultry Dishes	203	6,114
	Other Poultry	6	106
	Poultry Total	**476**	**14,729**
USDA Total	**USDA Total**	**1,229**	**38,577**

Multiple Foods

Category	Subdivision	Outbreaks	Cases
Both	**Both Total**	**303**	**16,969**

All Categories

All Foods	Total Outbreaks	Total Cases
Grand Total	**4,486**	**138,622**

annual outbreak line listings. Since 2001, the CDC outbreak data have been available as annual line listings on the Internet *(5)*. Data on additional outbreaks were obtained from scientific articles, federal government publications, state health department postings, and newspaper reports verified by public health officials.

CSPI's outbreak data, maintained in Microsoft Access, is entered and managed by professional level staff who are familiar with Microsoft Access and trained on how to enter the data. Data selection is based on several factors. Data is carefully observed to determine listed food vehicle, etiology, and location of outbreak. Outbreaks are excluded if the food vehicle is unknown or if a source other than food, e.g., ice, is the listed vehicle. Once the data has been entered, each entry is evaluated for accuracy by another staff person.

Incidents of foodborne illness were included in the CSPI database only if they met the CDC's definition of an outbreak: when two or more people have consumed the same contaminated food and come down with the same illness *(9)*. In addition, each outbreak must have an identified etiology and food vehicle, must have occurred in the US or its territories between 1990 and 2003, and must have been reported by a reliable source. Outbreak reports that meet CSPI's inclusion criteria were further evaluated to determine whether they were already listed in the database or whether they represented new outbreaks. Outbreak reports from different sources may contain slightly different information about the same outbreak. When such discrepancies were discovered, a public health official at the state, local or federal level was contacted to determine which information was most accurate.

Excluded from the CSPI database were sporadic cases of foodborne illness (individual cases not linked to an outbreak), outbreaks that had no identifiable etiology or food vehicle, and waterborne outbreaks.

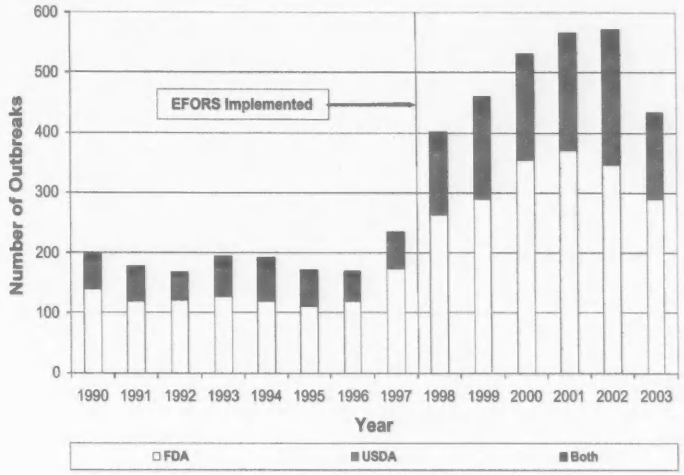
Food categorization scheme

Each outbreak in the CSPI database was categorized both as to the implicated food and the regulatory agency with primary responsibility for that particular food item. In general, meat, poultry, and processed egg products are regulated by the USDA, while seafood, shell eggs, produce and processed foods are subject to oversight by the US Food and Drug Administration (FDA) *(15)*. In addition, restaurant foods are inspected by state, county or local public health officials.

The CSPI categorization scheme contains thirteen food categories in the majority of which were further divided into food subdivisions, presented in Table 1. Many outbreak reports involve mixed food ingredients, and sometimes multiple food vehicles. To simplify, we have put multi-ingredient foods without meat under FDA jurisdiction, and those containing meat under USDA jurisdiction. Where the suspected food source includes both FDA- and USDA-regulated foods, we use the category "Both."

Multi-ingredient foods were categorized under "Multi-ingredient" only if another more specific food category could not be identified. For example, "Chicken salad" was categorized under "Poultry

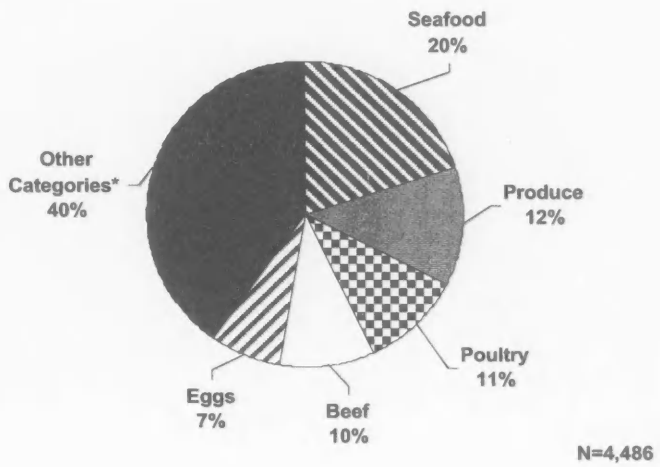
FIGURE 1. Number of Foodborne Illness Outbreaks by Year and Regulating Agency,* 1990–2003



*Agency with primary responsibility for regulating the implicated food. "Both" indicates that multiple foods were linked to an outbreak, some regulated by FDA and some by USDA.

The CDC Electronic Foodborne Outbreak Reporting System (EFORS) enabled state health departments to report foodborne illness outbreaks via the Internet, resulting in increased outbreak reporting.

FIGURE 2. Foodborne Illness Outbreaks By Food Category, 1990–2003



Percentages have all been rounded to the nearest whole number.

* Includes multi-ingredient salads such as coleslaw, potato salad, or salad bar. Salads reported as green, or lettuce-based were categorized under Produce.

Dishes" and "Meat pizza" was categorized under "Meat Dishes," but vehicles reported as "Soup" and "Pizza" were both categorized under "Multi-ingredient." Similarly, outbreaks were included in the "Eggs" category only if the identified food vehicle specifically implicated contaminated eggs. For example, an outbreak linked to "Cake (eggs)" would be categorized under "Egg Dishes," while an outbreak linked to "Cake" would be categorized under "Bakery."

RESULTS

A total of 4,486 outbreaks, involving 138,622 cases of illness occurring between 1990 and 2003, were included in the CSPI database (Fig. 1). Seven percent of these outbreaks were from sources other than the CDC. The five food categories, excluding multi-ingredient foods, linked to the largest numbers of foodborne illness outbreaks were seafood, produce, poultry, beef and eggs (Fig. 2 and 3). These five food categories were responsible for 60% (2696/4486) of all outbreaks in CSPI's database and to 55% (75,907/138,622) of the cases. The produce category alone was linked to the largest number of foodborne illnesses associated with outbreaks, constituting 20% (28,315/138,622) of all cases in CSPI's database.

Outbreaks linked to non-meat (FDA-regulated) multi-ingredient foods comprised 18% (812/4486) of the database, and outbreaks due to multiple foods, including both meat (USDA-regulated) and non-meat (FDA-regulated) items, comprised 7% (303/4486) of the database.

FDA-regulated foods were linked to 2,954 outbreaks with 83,076 cases, while USDA-regulated foods were linked to 1,229 outbreaks with 38,577 cases. Foods such as seafood, non-meat multi-ingredient foods, produce, eggs, dairy, breads, and beverages were linked to more than twice as many outbreaks and cases as meats (Fig. 4).

Seafood and seafood dishes

A total of 899 foodborne illness outbreaks and 9,312 cases were linked to seafood and seafood dishes. Outbreaks linked to seafood and seafood dishes comprised 20% of the outbreaks listed in the CSPI database, and 7% of the cases. The median number of cases per seafood-linked outbreak was three.

Of the seafood-linked outbreaks, 571 outbreaks and 2,991 cases were linked to finfish such as tuna and grouper; 135 outbreaks and 3,156 cases were linked to

FIGURE 3. Trends in Foodborne Illness Outbreak Reporting, 1990–2003

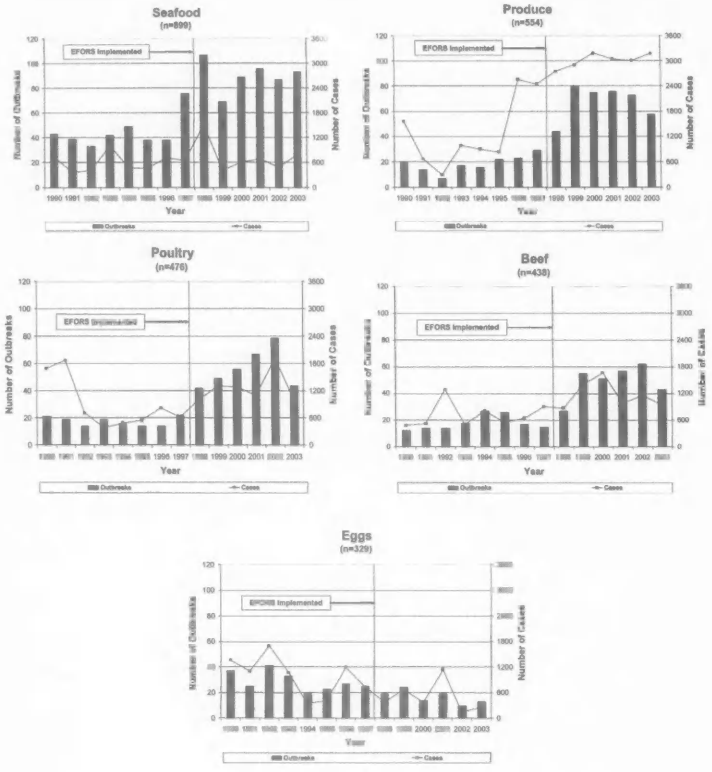
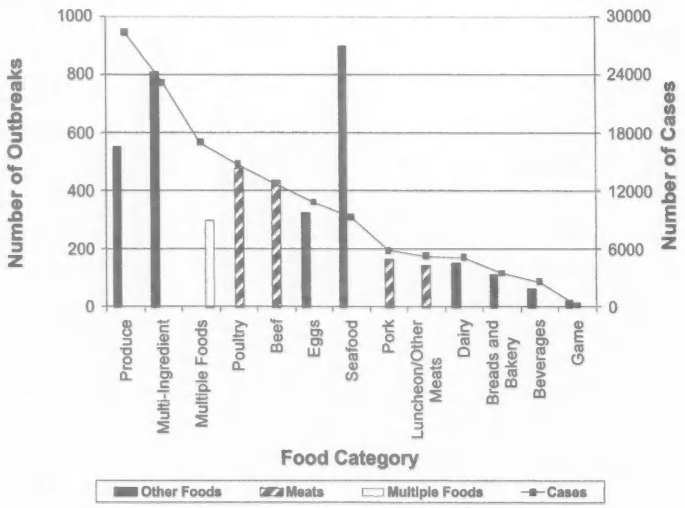


FIGURE 4. Cases Linked to Foodborne Illness Outbreaks, 1990–2003



molluscan shellfish, including oysters and clams; 129 outbreaks and 2,400 cases were linked to seafood dishes such as crab cakes and sushi; and 64 outbreaks and 765 cases were linked to other seafood, such as shrimp and lobster. The most common seafood items linked to outbreaks were tuna, raw oysters, and mahi mahi. Thirty-eight percent (341/899) of the seafood-associated outbreaks were caused by scombrotoxin and histamine, while another 24% (215/899) were caused by ciguatoxin. Although *Vibrio* species cause only 9% (78/899) of the overall seafood-linked outbreaks, they accounted for 33% (44/135) of the molluscan shellfish outbreaks and 36% (23/64) of the other seafood outbreaks.

Produce and produce dishes

A total of 554 outbreaks and 28,315 cases were linked to produce and produce dishes. Outbreaks linked to produce and produce dishes comprised 12% of the outbreaks listed in the CSPI database, and involved 20% of the cases. The median number of cases per produce-linked outbreak was 20.

Ninety-three produce-linked outbreaks and 7,799 cases were linked to fruits such as cantaloupe and various berries; 205 outbreaks and 10,358 cases were linked to vegetables, including alfalfa sprouts and mushrooms; and 256 outbreaks and 10,158 cases were linked to produce dishes such as lettuce-based salads, fruit salads and mashed potatoes. The most common produce food items linked to outbreaks were various produce-based salads and alfalfa sprouts. Almost 40% (215/554) of the produce-associated outbreaks were caused by either Norovirus or Hepatitis A. Another 30% (168/554) were caused by bacteria commonly found in meat and poultry, such as *E. coli* O157:H7, *Salmonella* spp. and *Campylobacter* spp., and twelve percent (67/554) were caused by *Bacillus cereus, Clostridium botulinum, Clostridium perfringens,* and *Staphylococcus aureus*. Although *Cyclospora* spp. outbreaks comprised only 3% (16/554) of the produce-associated outbreaks, they constituted 11% (3,233/28,315) of the cases due to two large outbreaks, each linked to raspberries, affecting more than 1,000 individuals each.

Poultry

A total of 476 outbreaks and 14,729 cases were linked to poultry. Poultry-linked outbreaks comprised 11% of both the outbreaks and the cases listed in the CSPI database. The median number of cases per poultry-associated outbreak was 13.

Chicken was linked to 179 outbreaks and 3,363 cases, turkey to 88 outbreaks and 5,146 cases, and poultry dishes such as chicken salad and chicken enchiladas to 203 outbreaks and 6,114 cases. Six outbreaks with 106 cases to other poultry including duck and Cornish hen. The most common poultry food items linked to outbreaks were chicken, turkey, and chicken salad. Forty-one percent (195/476) of the poultry-linked outbreaks were caused by *Campylobacter* spp., *E. coli*, and *Salmonella* spp. and another 36% (172/476) were caused by *Bacillus cereus*, *Clostridium perfringens* and *Staphylococcus aureus*. Norovirus was linked to an additional 13% (61/476) of the poultry-associated outbreaks. There were no poultry-linked outbreaks due to Hepatitis A.

Beef

A total of 438 outbreaks and 12,702 cases were linked to beef. Outbreaks linked to beef comprised 10% of the outbreaks and 9% of the cases in the CSPI database. The median number of cases per beef-linked outbreak was 12.

Of the outbreaks associated with beef, 164 outbreaks with 3,280 cases were linked to ground beef, 111 outbreaks and 3,311 cases were linked to beef dishes such as beef stew and beef tacos, and 163 outbreaks and 6,111 cases were linked to other beef, including roast beef and prime rib. The most common beef food items linked to outbreaks were ground beef, hamburger and roast beef. *E. coli* O157:H7, *Campylobacter* spp. and *Salmonella* spp. caused 45% (199/438) of the beef outbreaks. *Bacillus cereus*, *Clostridium perfringens*, and *Staphylococcus aureus* caused 38% (168/438) and Norovirus and Hepatitis A together caused another 8% (35/438) of the beef-associated outbreaks.

Eggs and egg dishes

A total of 329 outbreaks and 10,849 cases were linked to eggs and egg dishes. Outbreaks linked to eggs and egg dishes comprised 7% of the outbreaks and 8% of the cases listed in the CSPI database. The median number of cases per egg-linked outbreak was 16.

Eggs were linked to 69 outbreaks and 2,085 cases, and egg dishes such as eggs benedict and omelettes were linked to 260 outbreaks with 8,764 cases. The most common food items linked to egg outbreaks were eggs, while the most common egg dishes associated with outbreaks were ice cream and lasagna for which contaminated eggs have been implicated. Ninety-six percent (316/329) of the egg-associated outbreaks were caused by *Salmonella* spp., of which eighty-six percent (273/316) were *Salmonella* Enterica serovar Enteritidis.

Multi-ingredient foods

A total of 812 outbreaks and 23,126 cases were linked to multi-ingredient foods. Outbreaks linked to multi-ingredient foods comprised 18% of the outbreaks listed in the CSPI database, and 17% of the cases. The median number of cases per outbreak associated with multi-ingredient foods was 12.

Of the outbreaks linked to multi-ingredient foods, 180 outbreaks with 3,289 cases were linked to prepared foods such as lasagna, pizza, and tacos. Multi-ingredient salads, including coleslaw and potato salad, were linked to 181 outbreaks and 7,841 cases, while multi-ingredient sandwiches such as submarine sandwiches were associated with 104 outbreaks and 2,565 cases. Foods including rice, beans, stuffing and pasta dishes were linked to 168 outbreaks and 4,301 cases. Fifty-five outbreaks and 1,875 cases were linked to sauces, dressings, and oils. Other foods, including nuts and unspecified soups, were linked to 124 outbreaks and 3,255 cases. Thirty-one percent (251/812) of the outbreaks linked to multi-ingredient foods were caused by bacteria such as *Bacillus cereus*, *Clostridium perfringens*, and *Staphylococcus aureus*. Thirty-two percent (262/812) of the outbreaks associated with multi-ingredient foods were caused by Norovirus or Hepatitis A. Another twenty-four percent (198/812) of these outbreaks were caused by *Campylobacter* spp., *E. coli*, and *Salmonella* spp.

DISCUSSION

Historically, meats such as beef, pork, and poultry have been thought to pose greater hazards than other foods, but CSPI's data show that only 27% of foodborne illness outbreaks were attributed to meats. An additional seven percent of outbreaks were linked to multiple foods, including both meat and non-meat items; this may be a reflection of an inability to confirm a specific common food vehicle during the outbreak investigation, due to cross contamination. The majority (66%) of outbreaks were linked to other non-meat foods, including seafood, multi-ingredient foods, eggs, produce, and dairy, although some of these likely represent a transfer of pathogens from meat sources. For example, thirty percent of the produce-associated outbreaks identified by CSPI were caused by pathogens that live inside animals' intestines and frequently contaminate meat and poultry, such as *Campylobacter* spp., *E. coli* O157:H7, *Salmonella* spp., and *Yersinia* spp. Therefore, targeting food safety interventions toward on-farm handling practices of animals and their waste products and the prevention of cross contamination along the entire spectrum of food production might prove more effective than a focus solely on meat products. In addition, although FDA-regulated foods are directly linked to more outbreaks than USDA-regulated foods, the original source of contamination might be similar for both categories of foods.

The five single-food categories most commonly implicated in outbreaks were seafood, produce, poultry, beef, and eggs. Interventions directed at these specific food categories would help to reduce the frequency of foodborne illness outbreaks. Although these food categories have been recognized in previous research as common sources of foodborne illness *(1, 20)*, it is difficult to compare these results with results of previous outbreak research, since most foodborne illness data has been organized by pathogen and includes some non-foodborne illness data *(5, 8)*.

Our research indicates that it is important to know which foods are most frequently linked to outbreaks, because identifying specific food/hazards combinations allows for better targeting of food safety interventions. For example, the vast majority of egg outbreaks are linked to one pathogen, *Salmonella* Enteritidis, so that interventions either on the farm or in the kitchen must be tailored to that pathogen. Food/hazard identification also provides critically important information to conduct the "hazard analysis" that is essential to developing effective Hazard Analysis Critical Control Point (HACCP) systems. A HACCP system is a systematic, science-based approach to the identification, evaluation, and control of food safety hazards.

The linking of foodborne illness outbreaks to specific foods necessitates food categorization, allowing identification and analysis of outbreak trends. Consistent food categorization enables researchers to assess which types of pathogens are causing outbreaks within a specific food type. Such evaluations can also indicate whether particular food categories are more prone to contamination on the farm, mishandling, inadequate preparation, cross contamination or personal hygiene factors. For instance, almost 40% of the seafood-associated outbreaks were caused by scombrotoxin or histamine, which typi-

cally results from inadequate refrigeration. Forty percent of the produce-linked outbreaks were caused by Norovirus and Hepatitis A, indicating the food was contaminated by infected humans, either through improper exposure to sewage in growing or processing or because of poor personal hygiene practices among food handlers *(11)*. Another 30% of the produce-linked outbreaks were due to pathogens of animal origin, likely indicating cross contamination somewhere between the farm and the fork. Among the beef-associated outbreaks, the 43% caused by *E. coli* O157:H7 and *Salmonella* spp. were likely a result of undercooking, while the 37% due to *Clostridium perfringens* or *Staphylococcus aureus* likely indicate post-cooking handling abuses, including inadequate holding temperatures. Over thirty percent of the multi-ingredient food outbreaks were also linked to pathogens associated with inadequate holding temperatures, with another thirty percent due to Norovirus, potentially indicating poor personal hygiene practices among ill food workers.

Despite the value of food categorization, there are many difficulties inherent in categorizing the food vehicles associated with outbreaks because category decisions must be made for each individual outbreak. A challenge to consistent categorization of outbreaks is cross contamination. Cross contamination has the potential to occur at multiple points in the food production chain and it is often not possible to identify whether contamination occurred on-farm, during processing, at the retail level, or in the kitchen. When cross contamination has been identified, questions regarding which food category the outbreak belongs to and the consequences for the original source need to be addressed and consistently resolved. For example, outbreaks are categorized by the food consumed, unless investigators clearly identified another food as the cause of the outbreak. Such clear identification is rare, but when it occurs, we have categorized the outbreak according to the responsible food; e.g., an outbreak due to *E. coli* O157:H7 and associated with watermelon consumption but linked to raw beef cross contamination of the produce was categorized under "Beef" and not "Produce." Clearly, cross contamination poses challenges in any categorization scheme.

Multi-ingredient foods pose a second challenge to categorization efforts. It is almost impossible to know all of the components of a particular dish, and even when they are known, it is difficult to accurately attribute illness to any one of the ingredients. However, most foods consumed are multi-ingredient. CSPI approached this problem by incorporating food subdivisions called "Dishes" into its scheme to categorize vehicles with a primary ingredient. For example, outbreaks linked to "chicken salad" were categorized under "Poultry Dishes." While foods with highly varying primary ingredients, such as pizza or lasagna, remain a challenge, they were to be categorized consistently throughout the database under "Multi-ingredient Foods."

A third important challenge in creating a strong food categorization scheme is to ensure that it is based on common sense and that is intuitive for the average consumer. CSPI's categorization scheme is accessible to consumers because it uses easily recognizable categories, is useful to producers and scientists because it groups similar foods together, and is valuable to policy makers because it categorizes foods by regulatory agency.

Several food categorization schemes have addressed these difficulties differently. While studies in the United States have generally focused on pathogens, Adak et al. identified the foods most often linked to indigenous foodborne illness in England and Wales and analyzed food-specific risks by use of a food categorization scheme different from that used by CSPI *(1)*. For example, the scheme used by Adak et al. included categories such as "infected food handler" and "cooked vegetables." Classifying foods along varying characteristics can enable different analyses that might be useful for different purposes. However, categories such as "infected food handler" represent the source of contamination, and thus indicate another level of outbreak categorization that is distinct from food attribution. Once outbreaks have been classified by food vehicle, they can be further broken down by cause, such as infected food handler, manure contamination on the farm, contamination in the processing plant, or cross contamination in the kitchen. Such cause identification, or determination of how contamination occurred, will frequently be more difficult to confirm than a food vehicle identification, but should be an important goal of foodborne illness surveillance because of the application to appropriate interventions and improved prevention.

Another food categorization scheme, proposed by the CDC *(21)*, includes categories such as "row crops" and "tree crops," neither of which is intuitive to a consumer shopping in the produce aisle. Although such categories may have their advantages, it is essential that any scheme be easily understandable and accessible to the average consumer as well as to researchers and policy makers. Adopting a universal categorization scheme across studies would also aid in comparison of results and analysis of trends.

Although the outbreaks represented in the CSPI database have been thoroughly checked for accuracy, outbreak data in general have several limitations. The outbreaks included constitute only a small proportion of the true number of outbreaks. Many foodborne illness outbreaks go unreported, and of those that are reported by the CDC in fewer than 40% are both an etiology and food source identified *(5, 18)*. The outbreaks analyzed by CSPI are the most representative sample available of foodborne illness outbreaks in the United States with identified etiology and food vehicle, but certain biases in the database may be unavoidable. Foodborne illnesses that are diagnosed relatively easily, such as scombrotoxin and ciguatoxin, are more likely to be reported, and this could lead to overrepresentation of food categories such as seafood. Foodborne pathogens more likely to cause sporadic infections rather than outbreaks (i.e. *Vibrio vulnificus*, *Campylobacter* spp., and *Listeria monocytogenes*) are more likely to be underrepresented.

The lack of consistent outbreak reporting practices across the different US states also impacted the nature of the outbreaks in the database, as each state health department has different criteria for reporting their identified outbreaks to CDC. In addition, outbreak reporting practices varied dramatically between the periods of 1990–1997 and 1998–2003 because of the implementation of the Electronic Foodborne Outbreak Reporting System (EFORS) in 1998. This makes comparisons of outbreak data from these two periods difficult (Fig. 1). Although the implementation of EFORS greatly increased the number of reported outbreaks and improved the timeliness of the reports, there is still a lack of real-time outbreak reporting. This means that information is often not released until months or years after the investigation. Because of this, CSPI monitors news releases, scientific journals, and state health departments for more recent and up-to-date outbreak information. Finally, although outbreak data are a critical component of food safety surveillance, they cannot be considered in isolation. Food attribution and categorization information for sporadic cases are also very important and should be systematically compiled and released in a timely manner *(2, 8)*.

CSPI's database and food categorization efforts provide critical information to consumers, producers, and policy makers for risk-based decision-making. The database could be improved if foodborne illness outbreak reporting by each state

to the CDC were made mandatory and were based on consistent criteria. The CDC and state health departments should routinely perform food attribution for all outbreaks, and this information should be made available to the public in a timely manner. Food categorization should be consistent and adhere to a common sense scheme. Policy makers and the public would benefit if a uniform categorization scheme were used by researchers and government alike. Such measures could greatly improve the consistency of outbreak reporting and the usefulness of such data in protecting public health.

REFERENCES

1. Adak G. K., S. M. Meakins, H. Yip, B. A. Lopman, and S. J. O'Brien. 2005. Disease risks from foods, England and Wales, 1996–2000. Emerg. Infect. Dis. 11(3):365–372.
2. Allos, B. M., M. R. Moore, P. M. Griffin, and R. V. Tauxe. 2004. Surveillance for sporadic foodborne disease in the 21st century: the FoodNet perspective. Clin. Infect. Dis. 38 (Suppl 3):S115–S120.
3. Anonymous. 2004. Epidemio-surveillance of foodborne diseases and food safety rapid alert systems. Prepared by the United States of America. Second FAO/WHO Global Forum of Food Safety Regulators. Bangkok, Thailand, 12–14 October 2004. Conference Room Document 75. Available at: <http://www.fao.org/docrep/meeting/008/ae205e.htm>.
4. Batz, M. B., M. P. Doyle, J. G. Morris Jr., J. Painter, R. Singh, R. V. Tauxe, M. R. Taylor, and D. M. A. Lo Fo Wong, for the Food Attribution Working Group. 2005. Attributing illness to food. Emerg. Infect. Dis. 11(7):993–999.
5. Centers for Disease Control and Prevention. 2005. U.S. foodborne disease outbreaks. Last accessed on 6 July 2005 at <http://www.cdc.gov/foodborneoutbreaks/us_outb.htm>.
6. Centers for Disease Control and Prevention. 2005. Outbreaks of *Salmonella* infections associated with eating roma tomatoes – United States and Canada, 2004. MMWR 54(13):325–328.
7. Centers for Disease Control and Prevention. 2005. Human tuberculosis caused by *Mycobacterium bovis* – New York City, 2001–2004. MMWR 54(24):605–608.
8. Centers for Disease Control and Prevention. 2005. Preliminary FoodNet data on the incidence of infection with pathogens transmitted commonly through food – 10 sites, United States, 2004. MMWR 54(14):352–356.
9. Centers for Disease Control and Prevention. 2005. Foodborne illness: general information. Last accessed on 03 August 2005 at http://www.cdc.gov/ncidod/dbmd/diseaseinfo/foodborneinfections_g.htm#whatoutbreak.
10. Centers for Disease Control and Prevention. 2004. Outbreak of cyclosporiasis associated with snow peas – Pennsylvania, 2004. MMWR 53(37):876–878.
11. Dato, V. M. D., et al. 2003. Hepatitis A Outbreak Associated with Green Onions at a Restaurant — Monaca, Pennsylvania, 2003. MMWR 52(47): 1155–1157.
12. Food and Drug Administration. 2005. FDA works to trace source of foodborne illness in Florida. FDA News P05-27, 3 June 2005.
13. Food Safety and Inspection Service, USDA. 2005. FSIS issues alert on the importance of cooking and handling ground beef. News release, 29 January 2004.
14. General Accounting Office. 1999. Food safety: US needs a single agency to administer a unified, risk-based inspection system. Testimony of Lawrence J. Dyckman before the US Senate, Committee on Governmental Affairs, Subcommittee on Oversight of Government Management, Restructuring, and the District of Columbia. August 4, 1999. GAO/T-RCED-99-256. Available at: <http://www.gao.gov/archive/1999/rc99256t.pdf>.
15. General Accounting Office. 2001. Food safety: CDC is working to address limitations in several of its foodborne disease surveillance systems. Report to the Chairman, Committee on Agriculture, Nutrition, and Forestry, U.S. Senate. September 2001. GAO-01-973. Available at: <http://www.gao.gov/new.items/d01973.pdf>.
16. Hoffman, R. E., J. Greenblatt, B. T. Matyas, D. J. Sharp, E. Esteban, K. Hodge, A. Liang. 2005. Capacity of state and territorial health agencies to prevent foodborne illness. Emerg. Infect. Dis. 11(1):11–16.
17. Institute of Medicine National Research Council. 1998, Ensuring safe food from production to consumption. National Academy Press, Washington, D.C.
18. Jones, T. F., B. Imhoff, M. Samuel, P. Mshar, K. Gibbs McCombs, M. Hawkins, V. Deneen, M. Cambridge, and S. J. Olsen, for the Emerging Infections Program FoodNet Working Group. 2004. Limitations to successful investigation and reporting of foodborne outbreaks: an analysis of foodborne disease outbreaks in FoodNet catchment areas, 1998–1999. Clin. Infect. Dis. 38 (Suppl 3): S297–S302.
19. Mead, P. S., L. Slutsker, V. Dietz, L. F. McCaig, J. S. Bresee, C. Shapiro, P. M. Griffin, and R. V. Tauxe. 1999. Food-related illness and death in the United States. Emerg. Infect. Dis. 5(5):607–625.
20. Olsen, S. J., L. C. MacKinon, J. S. Goulding, N. H. Bean, and L. Slutsker. 2000. Surveillance for foodborne disease outbreaks – United States, 1993–1997. MMWR 49(SS01):1–51.
21. Painter, J. 2005. Point-of-consumption attribution: using outbreak data to determine the attribution of human illness to important food categories. Food safety interventions and food attribution workshop, Decatur, Georgia, April 26–27, 2005. Last accessed on 17 October 2005 at http://www.card.iastate.edu/food_safety/workshop3/presentations/outbreak_data.htm.
22. Smith DeWaal, C. 1999. Food safety inspections: A call for rational reorganization. Food and Law Journal 54(3):453–458.
23. South Carolina Department of Health and Environmental Control. 2005. Undercooked turkey most likely cause of *Salmonella* outbreak. News release, June 3, 2005. Last accessed on 27 June 2005 at <http://www.scdhec.net/news/releases/2005/200505/Camden%20Updates/nr06CamdenUp0305.htm>.
24. Taylor, M. 1997. Preparing America's food safety system for the twenty-first century–who is responsible for what when it comes to meeting the food safety challenges of the consumer-driven global economy? Food and Drug L.J. 52(13).
25. Vugia, D. et al. 2004. Preliminary FoodNet data on the incidence of infection with pathogens transmitted commonly through food—10 Sites, United States, 2004. MMWR 54(14):352–356.

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Correlation of Visual Perceptions of Cleanliness and Reported Cleaning Practices with Measures of Microbial Contamination in Home Refrigerators

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SUMMARY

Consumers are the final line of defense against foodborne illness. Consumer food handling and storage practices may impact the degree of microbial contamination in the home refrigerator and thus the risk of foodborne illness for family members. While 147 consumers completed a home refrigeration practices survey, the condition of their refrigerators was evaluated by a trained observer. Cleanliness, fullness, and organization of five areas of each refrigerator were recorded on a four-point scale; potentially unsafe circumstances were also noted. Several 100 cm^2 areas of each refrigerator were swabbed with sterile buffer. A microbial ATP (mATP) bioluminescense assay was performed on the refrigerator swabs to assess microbial contamination. Seventy-two percent of swabs had detectable mATP, indicating that the majority of home refrigerators contain viable microbial populations. The highest mATP levels were found in the vegetable bins and the meat areas. Levels of mATP were undetectable in some vegetable bins (14%), while over 15% had relatively high levels of microbial contamination. Microbial ATP in the vegetable bin was correlated with the cleanliness score for that compartment. Cleanliness scores for several refrigerator compartments were correlated with mATP found on the bottom shelf. Microbial ATP in refrigerator compartments failed to show a clear relationship to reported refrigerator-cleaning frequency so that in our opinion, self-reported refrigerator cleaning practices are not a reliable means of predicting microbial contamination. Consumers should regularly engage in adequate cleaning of their refrigerators regardless of visible soiling.

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INTRODUCTION

In recent years, many socioeconomic factors have altered consumers' food preferences and handling practices *(2)*. A variety of studies have attempted to evaluate the food safety knowledge and food handling practices of consumers *(8, 9, 17)*. Because consumers are the final line of defense against foodborne illness, their food handling and storage practices may greatly impact the degree of microbial contamination found in the home refrigerator, and thus the risk of foodborne illness for family members and the likelihood of food spoilage. Few data quantifying microbial contamination in home refrigerators are available.

Several methods exist for assessing microbial contamination on surfaces. Aerobic plate count (APC), and *Enterobacteriacea* count are commonly used as indications of the microbial load for food preparation surfaces *(12)*. Psychrotrophic plate count (PPC) is often used as an indication of bacteria that grow under refrigeration temperatures. However, these standard culture methods require 2 – 10 days to complete the analysis. In addition, researchers often travel to multiple states for in-home interviews with participants, and it is inconvenient to transport the samples back to the laboratory in a timely manner. To minimize the effect of transporting samples, a rapid assay for personnel with minimum training to perform on sites is preferred.

ATP bioluminescence is a rapid method that has proven useful in assessing cleanliness of milk *(15, 16)* and meat *(7, 24)* handling equipment. In addition, ATP bioluminescence has been applied in rapid assessment of bacterial contamination on the surfaces of red meat carcasses *(3, 21)* and poultry carcasses *(6, 20)*, as well as in drinking water *(5)*, raw milk *(18)*, and beer *(22)*. Prior to this study, we evaluated the efficacy of using ATP bioluminescence for rapid assessment of microbial contamination on refrigerator surfaces *(1)*. Compared to standard culture methods, the microbial ATP (mATP) bioluminescence assay was shown to be an efficient and reliable method to determine overall microbial contamination of refrigerator surfaces. The correlation coefficients (r) between APC and mATP and between PPC and mATP were 0.823 and 0.851, respectively. Moreover, the mATP appeared to be a reliable prediction of the sum of APC and PPC (r = 0.895). It is reasonable to assume that the amount of ATP in a bacterium reflects the physiological activity of the cell, which is affected by the nutritional status of the microbe and the temperature of the environment. We therefore have suggested that mATP be used as a practical estimate of bacterial activities on surfaces in home refrigerators *(1)*.

The objectives of the current research were to collect information from consumers regarding their food handling and refrigeration knowledge and practices, visually assess the contents and cleanliness of home refrigerators, and evaluate microbial contamination on surfaces within consumers' refrigerators by use of the mATP bioluminescence assay. Microbial contaminations of the refrigerator surfaces (defined as the mATP measurements from bioluminescence assay) were compared with several consumer practices and visual inspection scores of home refrigerators.

MATERIALS AND METHODS

In an earlier comprehensive consumer study, over 550 adults completed interviews regarding their food handling and refrigeration knowledge and practices *(9)*. Reported here are results of a follow up in-home study of 147 subjects living in Florida or Tennessee. These consumers completed another home refrigeration practices survey, which included questions regarding home refrigeration practices, handling of cold foods, and refrigerator cleaning. A second trained observer, using a checklist, recorded information regarding the condition of the consumer's refrigerator. Five refrigerator compartments – the door, upper, middle and bottom shelves, and vegetable bins – were scored for cleanliness, fullness, and organization as follows: cleanliness, 1 = very clean to 4 = dirty; fullness, 1 = less than 1/4 full to 4 = more than 3/4 full; and organization, 1 = very orderly to 4 = very disorganized. Circumstances that might allow for cross contamination of foods, presence of moldy or spoiled food or unsealed containers, and other potentially unsafe or unusual conditions within the refrigerator were also noted by the researcher.

Sample collection

A 10 cm × 10 cm wire template was placed over each site to be sampled within each refrigerator. The area was swabbed twice, first horizontally and then vertically, using sterile swabs moistened with buffer (Environmental swab in 5-ml Neutralizing buffer, Hardy Diagnostics, Santa Clara, CA). A total of 369 swabs were collected. A minimum of two surfaces were swabbed in each refrigerator, following a predetermined priority plan. The most frequently sampled areas were the meat area (either a compartment or the location where meat was stored), bottom shelf and vegetable bin.

ATP bioluminescence

The bioluminescence assay was performed by use of a microluminometer NHD Model 3560 and PROFILE®-1 Reagent Kit (New Horizons Diagnostic, Columbia, MD). Positive pressure was used to push 1 ml of swab buffer solution through a concentrator containing a Filtravette, a combined device of filter and cuvette with pore size of 0.45 µm. Somatic cell releasing agent was applied to the Filtravette twice to eliminate eukaryote ATP and other interfering materials. Bacterial releasing agent was then applied to the Filtravette, followed by Luciferin-luciferase solution. The output in relative light units (RLU) was recorded immediately from the Microluminometer. The procedure was completed within 5 minutes.

Data analysis

All survey responses and checklist results were numerically coded where possible and entered into SPSS-PC. For certain analyses, RLU results, reflecting mATP, were recoded into five categories: nondetectable; up to 2,000; 2,001 to 20,000; 20,001 to 200,000; and over 200,000. These categories are equivalent respectively to > 10^3, 10^3 to 10^5, 10^5 to 10^6, 10^6 to 10^7, and > 10^7 CFU/100cm^2, based on the data from our previous study *(1)*. Frequency analysis, Pearson correlation, Chi-Square, One-way Analysis of Variance and Tukey's Multiple Comparison tests were used to evaluate the data.

RESULTS AND DISCUSSION

Demographics

Eighty-four percent of the participating consumers were female. Fifty-three percent were White, non-Hispanic, 31% African American, and 14% Hispanic. The majority of the participants (92%) had high school or higher diplomas or degrees, and 84% had a household income of more than $15,000. Of the households, 12% consisted of five or more persons, 31% contained at least one elderly individual, and 36% had children. A toddler or infant was present in 10% of households.

TABLE 1. Overall cleanliness, fullness, and organization scores as a percentage of refrigerators (N = 147)[a]

Cleanliness		Fullness		Organization	
1 very clean	29.0	1 less than 1/4	13.0	1 very orderly	15.8
2 clean	48.5	2 1/4 to 1/2 full	31.6	2 somewhat ordered	46.7
3 slightly dirty	20.4	3 1/2 to 3/4 full	36.1	3 disorganized	31.5
4 dirty	2.0	4 more than 3/4	19.3	4 very disorganized	6.0

[a]Values in the table represent the percentages (%) of the refrigerators

TABLE 2. Cleanliness, fullness and organization scores for various refrigerator compartments (mean ± sem; N = 147)

Refrigerator Location	Cleanliness	Fullness[a]	Organization[a]
Door shelves	$1.83 + .06_A$	$3.14 + .08_B$	$2.03 + .07_A$
Upper compartment	$1.90 + .06_A$	$2.56 + .07_A$	$2.39 + .07_B$
Middle compartment	$1.96 + .06_A$	$2.48 + .07_A$	$2.49 + .06_B$
Lower compartment	$2.03 + .07_A$	$2.32 + .08_A$	$2.31 + .07_B$
Vegetable bins	$2.05 + .06_A$	$2.37 + .08_A$	$1.97 + .07_A$

[a]Within a column, means with different subscript letters are significantly different ($P < .05$)

TABLE 3. Percent of sampled locations in refrigerators by mATP concentration

Location in Refrigerator	ATP Concentration [RLU]				
	ND[a]	Up to 2000	2k – 20k	20k – 200k	Over 200k
Top shelf	25.0	70.0	5.0		
Middle shelf	19.2	73.1	7.7		
Meat area	40.2	47.1	8.0	3.4	1.1
Bottom shelf	31.0	62.8	4.1	2.1	
Vegetable bin	14.0	59.4	11.2	9.8	5.6

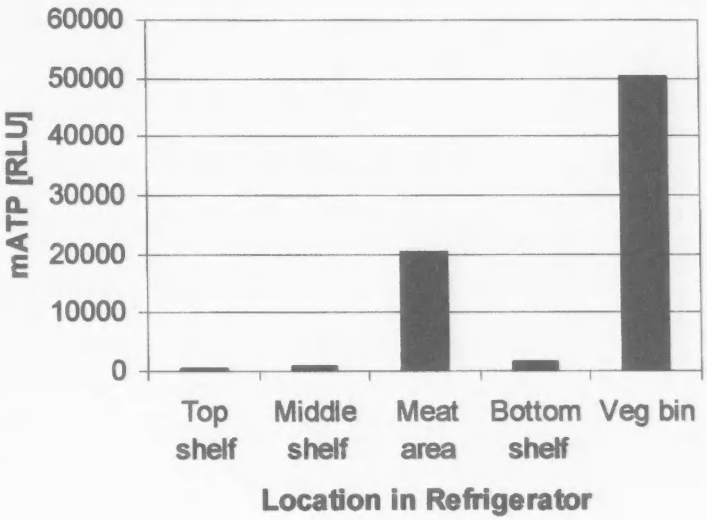
[a]Non-detectable

Refrigerator observations

Sixty-one percent of the refrigerators examined were standard design, with a freezer compartment above the refrigerator, while 37% were side-by-side refrigerators, and 2% had a freezer compartment beneath the refrigerator portion. All refrigerators were located in the kitchen area of the consumers' homes. Table 1 shows the scores for cleanliness, fullness and organization for the five refrigerator compartments. About 78% of refrigerator areas were scored as either very clean or clean, 20% were judged slightly dirty, and only 2% were considered dirty. The majority (two-thirds) of refrigerator areas were found to be between 1/4 and 3/4 full. Over 60% of refrigerator areas were being maintained in at least a somewhat orderly manner, leaving 31.5 and 6 percent, respectively, as disorganized or very disorganized. These results suggest that consumers as a rule are maintaining their refrigerators relatively clean if not well ordered.

Average scores for cleanliness, fullness, and organization for five areas in the refrigerators appear in Table 2. Refrigerator doors were judged slightly cleaner than the bottom shelves and vegetable bins. Cleanliness scores for each of the five areas of the refrigerator were correlated with one another in all cases. Refrigerator door shelves were more full than the other compartments ($P < .01$). Refrigerator doors and vegetable bins were more organized than the

FIGURE 1. Mean ATP values [RLU] in refrigerator compartments



upper, middle and bottom compartments ($P < .01$). Not surprisingly, fullness and organization scores were correlated with one another for all areas except the refrigerator door (r = .349 to .496; $P < .01$). Cleanliness and fullness were not related for any compartment, while cleanliness and organization were related for all areas except the bottom compartment (r = .189 to .223; $P < .05$). Lack of organization within a refrigerator could contribute to a lack of cleanliness, or, rather, a high degree of organization may lead to a perception of cleanliness.

We speculate that some persons may have cleaned their refrigerators before the researchers arrived, even though they had been asked not to do so. This cleaning was apparent to the researchers in a few instances; however, the proportion of consumers who did this is likely small, given that old or moldy foods and various inappropriate conditions were found in many homes. Nonetheless, more refrigerator areas might have scored very dirty had they not been cleaned beforehand.

Microbial ATP

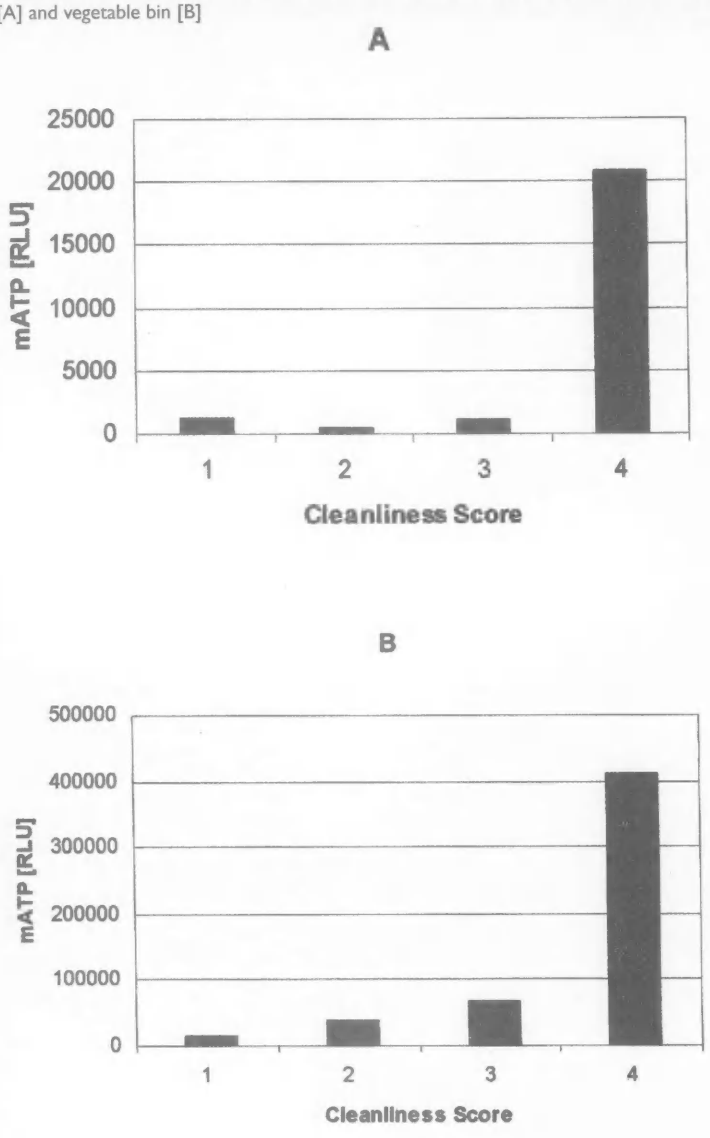
Mean mATP values, expressed in relative luminescence units (RLU), appear in Fig. 1. Although the highest RLU were observed in the meat storage area and the vegetable bin, variation within each refrigerator location was large. The percentages of each refrigerator area with mATP levels within the five recoded mATP categories appear in Table 3. Overall, 72% of swabs had detectable mATP, suggesting that the majority of home refrigerators contain viable microbial populations. The vegetable bin had fewer non-detectable (14%) and more elevated mATP outcomes (over 15%) than the other areas swabbed. Interestingly, although the meat area in a number of refrigerators showed elevated mATP, the greatest percentage of samples with nondetectable levels were from this area as well. Juices from raw meat may contribute to microbial contamination or serve as a growth medium for microorganisms in the meat area; however, this can occur only if the meat juice is not retained within a sealed container. Moreover, because it is perishable, raw meat is generally not refrigerated for long periods, which reduces the opportunity for leakage. In addition, raw meats were not present in the majority of refrigerators in this study. We speculate that contamination in the meat area may reflect an "all or none" phenomenon. If leakage from a meat container occurs, microbial numbers in that area of the refrigerator are likely to be high. Sealed containers of meat, even if they contain high bacterial numbers, will not contaminate the meat area of the refrigerator. It is also likely that this area would be cleaned more frequently because leakage would be visible. Conversely, consumers may store vegetables for relatively long periods of time in their refrigerators. This may have contributed to the prevalence of microbial contamination found in the vegetable bin. It appears that extended storage of these foods may allow the progressive buildup of microbial numbers within the vegetable bins of refrigerators. Moreover, consumers may clean the vegetable bins and lower shelves of their refrigerators less often or less thoroughly, allowing microbial buildup to occur in these areas.

Cleanliness scores and mATP

Microbial ATP on the bottom shelf correlated with the cleanliness score for that area (r = .210, $P < .05$). Moreover, cleanliness scores for all the refrigerator compartments except the vegetable bin were correlated (r = 0.167 to 0.236, $P < .05$), with mATP found on the bottom shelf suggesting that bacteria settle down within refrigerators from the upper compartments to contaminate the bottom shelf so as to produce increased bacterial numbers in that area. Forty-two percent of the refrigerators examined had grid type shelves, while the remainder had solid shelves. There was a trend of greater ($P = .054$) mATP on the solid bottom shelves in the refrigerators with grid upper shelves, which would have allowed bacteria to settle down, more readily compared with the mATP of the refrigerators with solid shelves (3431 $\pm$ 1916 and 300 $\pm$ 107 RLU, respectively).

Several authors have suggested that visual assessment of cleanliness may not be a reliable indicator of microbial contamination. Worsfold and Griffith *(24)* found that the extent of soiling in retail butcher shops was visually underestimated, and visual assessment was considered a poor indicator of cleaning efficacy in a study of cleaning regimens within a hospital ward, including the kitchen *(10)*. Likewise, visual assessment proved not to be a good indicator of hygiene in university communal kitchens *(19)*, nor were visual inspection and microbiological evaluation correlated in food service operations *(13)*. Our findings agree with these reports. Figure 2 depicts mATP on the bottom shelf and in the vegetable bins of refrigerators receiving different cleanliness scores. Microbial ATP was greatest in the dirty refrigerators; however, in both instances the number of cases was small. Other refrigerator areas studied (not shown) demonstrated even less relationship between mATP and cleanliness score. Thus, visual appraisal of cleanliness of domestic refrigerators is not a consistently reliable indicator of microbial numbers.

FIGURE 2. Mean ATP values [RLU] by cleanliness score for bottom compartment [A] and vegetable bin [B]



Cleaning practices and mATP

The self-reported refrigerator cleaning practices described by consumers appear in Table 4. Approximately three-quarters of consumers frequently clean up spills in their refrigerators. Refrigerators of consumers who more often clean spills in their refrigerators had greater mATP values on the bottom shelves ($r = 0.251$, $P < .05$). Spills within the consumers' refrigerators may have contributed organisms or substrate to the microbial population found on the bottom shelf.

A majority of surveyed consumers often or occasionally clean compartments within their refrigerators, but half rarely or never empty and clean the refrigerator (Table 4). Figure 3 shows mATP for the bottom shelf and vegetable bins expressed in relation to the self-reported frequency with which consumers emptied and cleaned their refrigerators. In general, mean mATP was greater in refrigerators that were emptied and cleaned less frequently; however, the mATP in the vegetable bins of consumers who never thoroughly clean their refrigerators was inexplicably low. Similar data from other refrigerator compartments (not shown) failed to show a clear relationship between refrigerator cleaning frequency and mATP, so that, in our opinion, self-reported refrigerator cleaning practices are not a reliable means of predicting microbial contamination.

As noted earlier, the highest mean mATP was found in the vegetable bins (Fig. 1). Microbial ATP in the vegetable bin was correlated with the cleanliness score for that compartment ($r = 0.252$, have allowed bacteria to settle down, $P < .01$); however, mATP was not related to the self reported frequency of washing the vegetable bins.

Technical considerations

ATP bioluminescence is being applied as a rapid method to assess microbial populations in a number of settings within the food industry. Chen et al. *(1)* have shown that mATP represents a reasonable estimate of bacterial numbers on surfaces in home refrigerators. Similarly, Paez et al. *(16)* reported that ATP bioluminescence was a reliable means of evaluating the hygienic status of milking equipment, and Davidson et al. *(4)* found that an ATP bioluminescence procedure compared favorably to traditional swabbing and plating of microbes from a food grade stainless steel surface. One advantage of mATP is that the method detects viable organisms that cannot be cultured on agar media *(23)*. On the other hand, ATP bioluminescence results may be altered by the presence of cleaning agents and chemical sanitizers or disinfectants *(11, 14)*. Approximately two-thirds of consumers in our study reported using some type of cleaning compound either often or occasionally within their refrigerators (Table 4). The effect of these cleaning compounds on our mATP measurements is unknown.

Great variation in mATP was apparent between and within the five refrigerator surfaces that were swabbed. Worsfold and Griffith *(24)* reported similar results. Variable mATP results are likely due to the random nature of microbial contamination and growth, as well as the sampling procedure. When a compartment of a refrigerator that included an area of active microbial growth was swabbed, a high mATP result could have been obtained even though low or even nondetectable mATP levels may have been found in swabs taken from a different portion of the same compartment or from other areas in the same refrigerator.

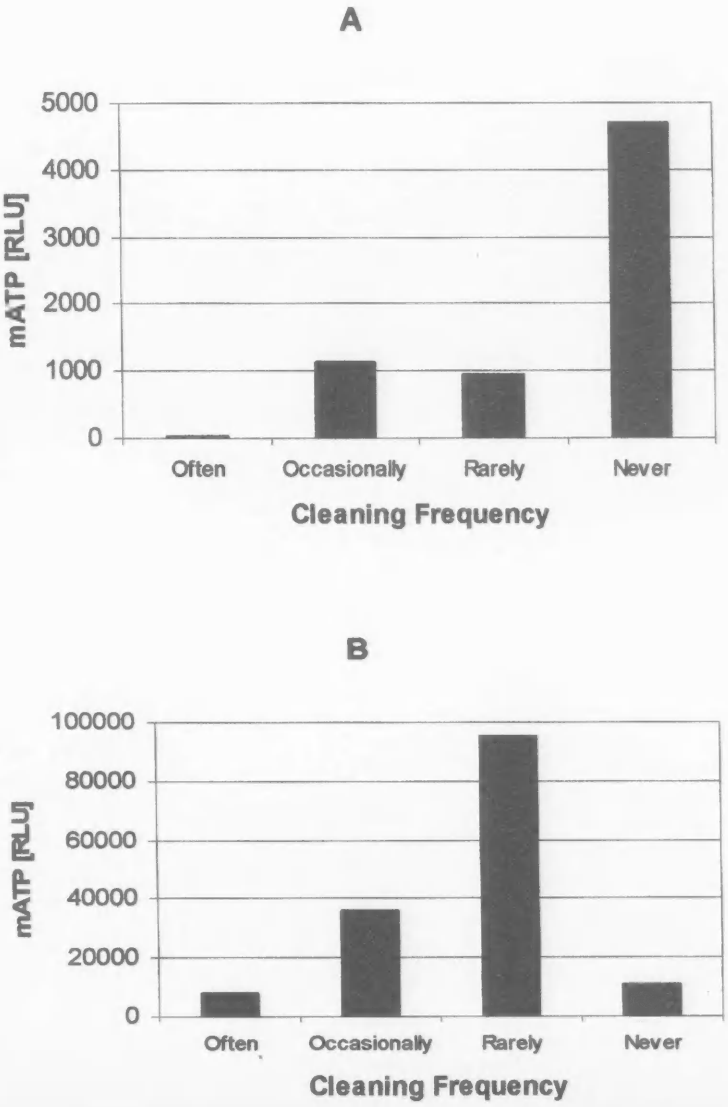
Households and checklist items

The elderly and children, especially infants, are particularly more vulnerable to foodborne illness. However, no relationship was established for either cleanli-

TABLE 4. Consumer reported refrigerator cleaning activities (percent); N=147

Activity	Very Often	Often	Occasionally	Rarely	Never
Clean up spills	49.0	27.9	19.7	2.0	1.4
Wipe off outside	9.5	45.6	36.1	4.8	4.1
Empty & clean door	0.7	11.6	61.6	18.4	7.5
Wash the shelves	2.7	30.6	54.4	8.8	3.4
Wash veggie bins	3.4	21.1	62.6	8.2	4.8
Empty & clean all	0	5.4	44.2	34.0	16.3
Use cleaning compound	10.2	20.4	39.5	8.2	21.8

FIGURE 3. Mean ATP values [RLU] for bottom compartment [A] and vegetable bin [B] by reported frequency of emptying and cleaning refrigerator



ness scores or mATP of the five refrigerator areas evaluated and the number of persons in the household, the number of elderly persons, or the number of children. Similarly, none of the mATP parameters were related to any of the other checklist items evaluated for each refrigerator, which included a list of the foods present at the time of the study and their condition. Observers rated the bottom compartments and vegetable bins as less clean in refrigerators that contained unsealed or open food containers, raw foods stored next to cooked foods, or other circumstances that would allow for possible cross contamination of foods ($P < .05$).

CONCLUSIONS

These results support the following conclusions.

- A majority of swabbed surfaces of consumer refrigerators contain detectable populations of bacteria as assessed by ATP bioluminescence, indicating the presence of viable microbial populations in most home refrigerators.
- Refrigerator cleanliness scores and mATP results support the hypothesis that contaminants within a home refrigerator may settle to the bottom shelf.
- Vegetable bins of home refrigerators commonly showed the highest mATP levels, perhaps due to the storage practices of consumers.
- Visual appraisal is not a reliable method of assessing microbial contamination within a home refrigerator, nor are self-reported cleaning practices of consumers reliable in predicting microbial contamination.

- Consumers should regularly clean interior surfaces and compartments of their refrigerators regardless of the presence of visible soiling.

ACKNOWLEDGMENTS

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REFERENCES

1. Chen, F-C., and S. L. Godwin. 2006. Comparison of a rapid ATP bioluminescence assay and standard plate count methods for assessing microbial contamination of home refrigerators. J. Food Prot. (Submitted.)
2. Collins, J. E. 1997. Impact of changing consumer lifestyles on the emergence/reemergence of foodborne pathogens. Emerging Infect. Dis. 4:1–12.
3. Cutter, C. N., W. J. Dorsa, and G. R. Siragusa. 1996. A rapid microbial ATP bioluminescence assay for meat carcasses. Dairy Food Environ. San. 16:726–736.
4. Davidson, C. A., C. J. Griffith, A. C. Peters and L. M. Fielding. 1999. Evaluation of two methods for monitoring surface cleanliness – ATP bioluminescence and traditional hygiene swabbing. Luminescence 14:33–38.
5. Delahaye, E., B. Welte, Y. Levi, G. Leblon and A. Montiel. 2003. An ATP-based method for monitoring the microbiological drinking water quality in a distribution network. Water Res. 37:3689–3696.
6. Ellerbroek, L., and C. Lox. 2004. The use of neck skin for microbial process control of fresh poultry meat using the bioluminescence method. Dtsch Tierarztl Wochenschr 111: 181–184.
7. Farrell, B. L., A. B. Ronner and A. C. Wong. 1998. Attachment of *Escherichia coli* O157:H7 in ground beef to meat grinders and survival after sanitation with chlorine and peroxyacetic acid. J. Food Prot. 61:817–822.
8. Godwin, S., R. Coppings, L. Speller-Henderson, and L. Pearson. 2005. Study finds consumer food safety knowledge lacking. J. Fam. Cons. Sci. 97:40–44.
9. Godwin, S., and R. Coppings. 2005. Analysis of consumer food handling practices from grocer to home including transport and storage of selected foods. J. Food Dist. Res. 36:55–62.
10. Griffith, C. J., R. A. Cooper, J. Gilmore, C. Davies, and M. Lewis. 2000. An evaluation of hospital cleaning regimes and standards. J. Hosp. Infect. 45:19–28.
11. Green, T. A., S. M. Russell, and D. L. Fletcher. 1999. Effect of chemical cleaning agents and commercial sanitizers on ATP bioluminescence measurements. J. Food Prot. 62:86–90.
12. Henroid, D. H., A. F. Mendonca, and J. Sneed. 2004. Microbiological evaluation of food contact surfaces in Iowa schools. Food Prot. Trends 24:682–685.
13. Kassa, H., B. Harrington, M. Bisesi, and S. Khuder. 2001. Comparisons of microbiological evaluations of selected kitchen areas with visual inspections for preventing potential risk of foodborne outbreaks in food service operations. J. Food Prot. 64:509–513.
14. Lappalainen, J., S. Loikkanen, M. Havana, M. Karp, A. M. Sjoberg, and G. Wirtanen. 2000. Microbial testing methods for detection of residual cleaning agents and disinfectants – prevention of ATP bioluminescence measurement errors in the food industry. J. Food Prot. 63:210–215.
15. Oulahal-Lagsir, N., A. Martial-Gros, M. Bonneau, and L. J. Blum. 2000. Ultrasonic methodology coupled to ATP bioluminescence for the non-invasive detection of fouling in food processing equipment – validation and application to a dairy factory. J. Appl. Microbiol. 89:433–441.
16. Paez, R., M. Taverna, V. Charlon, A Cuatrin, F. Etcheverry, and L. H. da Costa. 2003. Application of ATP-Bioluminescence technique for assessing cleanliness of milking equipment, bulk tank and milk transport tankers. Food Prot. Trends 23:308–314.
17. Redmond, E. C., and C. J. Griffin. 2003. Consumer food handling in the home: A review of food safety studies. J. Food Prot. 66:130–161.
18. Samkutty, P. J., R. H. Gough, R. W. Adkinson, and P. McGrew. 2001. Rapid assessment of the bacteriological quality of raw milk using ATP bioluminescence. J. Food Prot. 64:208–212.
19. Sharp, K., and H. Walker. 2003. A microbiological survey of communal kitchens used by undergraduate students. Int. J. Consumer Studies 27:11–16.
20. Siragusa, G. R., W. J. Dorsa, C. N. Cutter, L. J. Perino and M. Koohmarale. 1996. Use of a newly developed rapid microbial ATP bioluminescence assay to detect microbial contamination on poultry carcasses. J. Biolumin. Chemilumin. 11:297–301.
21. Siragusa, G. R., C. N. Cutter, W. J. Dorsa, and M. Koohmarale. 1995. Use of a rapid microbial ATP bioluminescence assay to detect contamination on beef and pork carcasses. J. Food Prot. 7:770–775.
22. Takahashi, T., Y. Nakakita, J. Watari, and K. Shinotsuka. 2000. Application of a bioluminescence method for the beer industry: sensitivity of MicroStar-RMDS for detecting beer spoilage bacteria. Biosci. Biotechnol. Biochem. 64:1032–1037.
23. Venkateswaran, K., N. Hattori, M. T. LaDue, and R. Kern. 2003. ATP as a biomarker of viable microorganisms in clean-room facilities. J. Microbiol. Methods 52:367–377.
24. Worsfold, D., and C. J. Griffith. 2001. An assessment of cleaning regimes and standards in butcher's shops. Int. J. Environ. Health Res. 11:245–256.

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Effect of Steam Pasteurization/ Vacuum Packaging on Physical Properties, Sensory Attributes, Chemical Composition, and *Listeria monocytogenes* Lethality of Double-packed Frankfurters

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SUMMARY

In a comparison of steam pasteurization/vacuum packaging with vacuum packaging only, the pH, color, instrumental texture (shear and compression), and chemical composition of frankfurters were not affected by steam pasteurization/vacuum packaging technology. In packaged frankfurters stored at 4°C for 24 h, there were no differences for the amount of water purge in frankfurter packages. A descriptive sensory evaluation found no differences in basic taste, aromatics, feeling factors, aftertaste, texture, and appearance of frankfurters between steam pasteurization/vacuum packaging and vacuum packaging only. Inoculation studies resulted in more than 3 $\log_{10}$ reductions of *L. monocytogenes* on frankfurters when steam pasteurization technology was applied for 1.5 s in a packaging machine.

INTRODUCTION

Listeria monocytogenes is a bacterium that occurs widely in soil, plants, water, and food processing environments *(8)*. *Listeria monocytogenes* causes the mild non-invasive illness referred to as listerial gastroenteritis and the severe, sometimes life-threatening, disease referred to as listeriosis. In healthy people, *L. monocytogenes* usually causes only a non-invasive gastrointestinal illness, with symptoms including fever, vomiting, and/or diarrhea. Listeriosis, the most significant illness induced by eating food contaminated with *L. monocytogenes*, has serious public health consequences to susceptible groups of people. Although listeriosis is rare, with approximately 3.4 cases per million people annually it can be life threatening when it does occur *(20, 21)*.

Babies can be born with listeriosis if their mothers eat contaminated food during pregnancy. Although healthy persons may consume contaminated foods without becoming ill, those at increased risk for infection can probably get listeriosis

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after eating food contaminated with even a few cells of the pathogen. Even with prompt treatment, some infections result in death. Therefore, *L. monocytogenes* is particularly dangerous to pregnant women, infants, elderly people, and people who already have serious medical problems *(7, 14)*. In 1997, the Centers for Disease Control and Prevention (CDC) Foodborne Diseases Active Surveillance Network (FoodNet) showed that, of all foodborne illnesses, infection with *L. monocytogenes* had the highest rate (88%) of hospitalization and, of all of foodborne pathogens, *L. monocytogenes* had the highest case fatality rate, of 23% *(6)*. It was estimated that in an average year, 1,850 people in the United States might contract listeriosis and 425 people could die of the disease *(5)*.

The Healthy People 2010 goals for national health promotion and disease prevention called on federal food safety agencies to reduce foodborne listeriosis by 50% by the end of the year 2005. Efforts by industry and regulatory agencies during the early 1990s resulted in reduction of approximately 44% in the incidence of listeriosis between 1989 and 1993. Preliminary FoodNet data on the incidence of foodborne illnesses in the United States indicated that between 1996 and 2001, the incidence of *L. monocytogenes* infection decreased from 0.5 to 0.3 cases per 100,000 people per year. This reduction was an outcome of various factors, including research (identification of niches, better sanitation, and equipment redesign), continual surveillance, outbreak response, and regulatory oversight *(9)*.

After 2001, the level of listeriosis incidences reached a plateau, mainly due to the unique challenges associated with controlling this pathogen and trend changes in food distribution, preparation, and consumption *(9)*. Consumers continue to seek convenience, as reflected in their food purchasing, preparation, and consumption practices. Consumption of ready-to-eat foods, including those with extended refrigerated shelf lives, continues to increase. This increased consumption of ready-to-eat foods presents unique challenges in food handling and storage practices to minimize microbial contamination by food manufacturers, food distributors, food preparers, and food consumers. Foods are increasingly bought already prepared from retail establishments, grocery stores, and deli counters, where food safety measures may not be sufficient to meet the high level of sanitation needed to control or prevent *L. monocytogenes* contamination *(9)*.

Not only is *L. monocytogenes* commonly found in food processing, distribution, retail, and household environments, but it is also more resistant than most foodborne pathogens to the treatments and conditions generally used to control microorganisms. In particular, *L. monocytogenes* can grow in many foods when stored at refrigeration temperatures. Deli meats and frankfurters (not reheated) are in the food categories that have very high predicted relative risk rankings for causing listeriosis on both a per-serving and per-annum basis, which reflects that they have relatively high rates of contamination by *L. monocytogenes*, have been directly linked to outbreaks of listeriosis, support relatively rapid growth of *L. monocytogenes* under refrigerated storage, are stored for extended periods of time before consumption, and are consumed extensively by people *(9)*.

The processors of ready-to-eat meats had taken measures to improve the food safety of processed meats through meticulous in-plant sanitation and pre- or post-package pasteurization. However, listeriosis outbreaks continued to occur. In 2002, an outbreak that resulted in 54 illnesses, 8 deaths, and 3 fetal deaths in 9 states was traced to consumption of contaminated turkey meat *(7)*. Therefore, ready-to-eat deli meat and poultry products continue to receive the attention in relation to the national goal of reducing the incidence of foodborne listeriosis with actions including the development of new control strategies.

In order to reduce listeriosis incidences further to a level of 0.25 cases per 100,000 people, additional targeted measures to improve food safety are needed from the industry. Pre- or post-package pasteurizations by using a stand-alone steam or hot water cooker have been studied and used by the industry to reduce *Listeria* in ready-to-eat meat and poultry products *(10, 13, 15, 16, 17, 18)*. The objective of this study was to evaluate an alternative intervention to control *L. monocytogenes* at the point of retail packaging by applying a combined steam pasteurization/vacuum packaging technology instead of vacuum packaging only. Amount of water purge, physical characteristics, sensory attributes, chemical composition, and *L. monocytogenes* reduction were evaluated for frankfurters packaged in double layer arrangements by using steam pasteurization/vacuum-packaging technology and comparing the results with results of currently used vacuum packaging technology.

MATERIAL AND METHODS

Frankfurters

Fully cooked frankfurters (26 mm diameter × 127 mm length) were obtained from a processor. The ingredients of the frankfurters included beef, water, corn syrup, less than two percent salt, potassium lactate, sodium phosphate, flavorings, sodium diacetate, ascorbic acid, sodium nitrite, and extractive of paprika. The formulation of the frankfurters was proprietary to the processor. Each shipment of the frankfurters were kept at 4°C and used within 3 days.

Steam pasteurization/vacuum packaging

The frankfurters (4°C) were loaded onto film trays of about 127 mm length × 104 mm width × 52 mm height in double-layer arrangements (8 frankfurters per chamber and 4 frankfurters in each layer) along the packaging conveyor belt. The loaded frankfurters were processed through a steam pasteurization station where steam at 104°C was applied for 1.5 or 3 s. The steam-treated frankfurters were immediately transported into a vacuum-sealing station where the top films were sealed onto the frankfurters to form the packages. The packaged frankfurters were analyzed immediately or stored in a refrigerator at 4°C to be analyzed later. Evaluations for amount of water purge, physical characteristics, sensory attributes, and chemical composition were conducted, using non-inoculated frankfurters processed on a sterile machine. Inoculation studies for *L. monocytogenes* were conducted separately, following the procedures described below.

Amount of water purge in packages

Water purge in frankfurter packages was determined by weighing the liquid in each of the packages. Water purge in frankfurter packages were measured immediately after packaging and after the packaged frankfurters were stored at 4°C for 24 h, 7 days, or 14 days, respectively.

Characteristics of frankfurters and water purge

The pH of water purge, color of frankfurters, color of water purge in frankfurter packages, turbidity of water purge

in frankfurter packages, and instrumental texture of frankfurters were compared between the samples processed by steam pasteurization/vacuum packaging and those packaged by vacuum packaging only. The pH was measured at 23°C by use of a pH meter (Accumet Basic Fisher Scientific, Denver Instrument Company, Denver, CO). Turbidity of water purge in frankfurter packages was determined by measuring suspended solids in water purge by use of a spectrophotometer (HP 8452 A Diode Array Spectrophotometer, Wilmington, DE).

The color of frankfurters or color of water purge in frankfurter packages was evaluated by L, c, and h° values by use of a chroma meter (Minolta CR-300, Japan). This color space is often referred to simply as Lch°. The system is the same as the CIELab color space, except that it describes the location of a color in space by use of polar coordinates rather than rectangular coordinates. L is a measure of lightness of an object, ranging from 0 (black) to 100 (white). The c, a measure of chroma (saturation), represents the distance from the neutral axis. The h° is a measure of hue and is represented as an angle ranging from 0° to 360°. The hue angles (h° values) that range from 0° to 90° are reds, oranges, and yellows; from 90° to 180° are yellows, yellow-greens, and greens; from 180° to 270° are greens, cyans (blue-greens), and blues; and from 270° to 360° are blues, purples, and magentas.

For convenience of comparison between treatments, the yellowness indices were also used to put the color measurements on one single scale. The yellowness indices (YI), a measure of the degree of yellowness, were calculated according to ASTM Method E313 as YI = 100*(1-0.847*Z/Y), where Z and Y were the values from CIE tristimulus XYZ scale and can be mathematically converted from polar scale Lch° *(11)*.

The texture of frankfurters was measured instrumentally for razor blade (RB) shear force and energy to simulate the teeth bite by a human and for compression force and energy to determine hardness *(3, 4)*. The RB shear force and energy were determined by use of a Texture Analyzer (Model TA-XT2i, Texture Technologies, Scarsdale, NY) with a 5 kg load cell using a razor blade (24 mm height × 8 mm width × 1 mm thickness) to achieve a penetration depth of 20 mm into frankfurter samples. Crosshead speed was set at 10 mm/s and the test triggered by a 10 g contact force. The RB shear force (RBF, N) was calculated as the maximum force recorded and the RB shear energy (RBE, N•mm) was calculated as the total area under the force deformation curve from the beginning to the end of the test.

A single compression test was carried out using a Texture Analyzer (Model TX-XT2i, Texture Technologies, Scarsdale, NY) equipped with the Texture Expert data acquisition software (Stable Macro Systems, Surrey, England). In this test, a frankfurter of 26 mm diameter × 127 mm length was placed lengthwise between two flat surfaces and compressed once. The probe used for the test was a compression plate of 100 mm diameter × 8 mm thickness.

The compression test was performed using an automatic trigger force of 10 g, a return distance of 20 mm, a crosshead pretest speed of 5.0 mm/s, a test speed of 5.0 mm/s, and a post-test speed of 10 mm/s. Each frankfurter sample was compressed to 80% strain with a data acquisition rate of 200 points/s. Data was reported in the form of a force deformation curve with the peak force or maximum force (MCF, N) recorded as instrumental hardness and with the compression energy (TCE, N•mm) calculated as the total area under the force deformation curve from the beginning to the end of the test. A macro (Stable Macro Systems, Surrey, England) was used to extract the maximum compression force and to calculate the total compression energy from the force deformation curve.

Sensory attributes

The sensory attributes of packaged frankfurters were compared between steam pasteurization/vacuum packaging technology and vacuum-packaging only after the packaged frankfurters were stored at 4°C for 3 days. For steam pasteurization/vacuum packaging, a steam treatment time of 1.5 or 3 s was used. For the vacuum-packaged frankfurters, a comparison study was also conducted for the sensory attributes between the packaged frankfurters that were stored at 4°C for 3 and 6 days.

Sensory analysis was conducted by an eleven-member professionally trained meat descriptive panel (Sensory Spectrum Inc., Chatham, NJ) housed by the University of Arkansas Institute of Food Science and Engineering, Fayetteville, AR (for details of the panel, please see http://www.uark.edu/depts/ifse/major3.html). An initial orientation (one 3-h session) was held to refine particular attribute definitions and evaluation techniques and to monitor panel performance for repeatability, consistency, and discriminating ability. Intensities of each of the attributes in the frankfurter samples were compared to references of assigned intensities. All intensities were expressed to one significant digit on 15-point numerical scales.

The frankfurter samples were baked at 350°F (177°C) to reach an internal temperature of 165°F (74°C) prior to panel evaluations. All frankfurter samples were presented in soufflé cups in duplicate to all panelists during the two testing sessions, utilizing a randomized complete block design. Between samples, panelists were instructed to cleanse their palate with water and crackers. A 15-min break period was allocated to each panelist halfway through each of the two sessions.

Chemical composition

Chemical composition of frankfurters was determined for each sample packaged by steam pasteurization/vacuum packaging technology or vacuum packaging only. Compositional analyses for total moisture, protein, fat, and ash were carried out per AOAC procedures in sections 950.46B, 981.10, 985.15, and 900.02A *(1)*.

The salt content of frankfurters was analyzed by using a chloride analyzer (Model 926, Nelson and Jameson, Marshfield, WI), and the calcium content according to AOAC method sections 975.03 and 969.31 *(2)* by using an atomic absorbance spectrophotometer (Perkin Elmer, AAanalyst 100, Boston, MA). Free fatty acids (including butyric, capric, caproic, caprylic, lauric, linoleic, linolenic, myristic, myristoleic, oleic, palmitic, palmitoleic, and stearic acid) were analyzed according to the AOAC method sections 932.22 and 960.32 *(1, 2)* by use of gas chromatography (HP 5890A, Hewlett Packard, Wilmington, DE) using a FID detector.

Bacterial preparation

Five strains of *L. monocytogenes* (ATCC 7644, 984, 19115, 51777, and 51414) were individually maintained by Deibel Laboratories (Madison, WI). To prepare each stock culture for test trials, a loopful of each *L. monocytogenes* strain was transferred from tryptic soy agar (TSA) + 0.6% yeast extract (YE) to 10 ml tryptic soy broth (TSB) + 0.6% YE and incubated at 35°C for 24 h as stock cultures. An aliquot (0.1 ml) of each stock culture was transferred to 9 ml of TSB + 0.6% YE and incubated at 35°C for 24 h as sub-stock cultures. Each sub-stock culture was enumerated to be 10^9 CFU/ml.

TABLE 1. Water purge in frankfurter packages processed by steam pasteurization/vacuum packaging at a steam treatment time of 1.5 and 3 s or by vacuum packaging only

Water Purge in Frankfurter Packages	Steam Pasteurization/Vacuum Packaging		Vacuum Packaging Only(g)
	1.5 s of steam	3 s of steam	
right after packaging	5.3 ± 2.7	6.5 ± 2.4	< 0.5
after stored at 4°C for 24 h	8.0 ± 3.2	8.5 ± 3.6	9.5 ± 2.5
after stored at 4°C for 7 days	10.2 ± 2.8	12.6 ± 2.5	13.8 ± 2.1
after stored at 4°C for 14 days	11.5 ± 3.1	13.4 ± 2.2	15.8 ± 3.1
commercially vacuum-packaged after stored at 4°C for 24 h	not applicable		11.0 ± 2.3
commercially vacuum-packaged after stored at 4°C for 7 days	not applicable		18.1 ± 1.9
from retail store 38th day before the use-by date on the label[1]	not applicable		19.2 ± 2.5

[1]The normal use-by date was about 77 days from the packaging date

TABLE 2. pH, color of frankfurters, color of water purge in frankfurter packages, turbidity of water purge in frankfurter packages, shear force and energy of frankfurters, and compression force and energy of frankfurters packaged by steam pasteurization/vacuum packaging or by vacuum packaging only

Parameters	Steam Pasteurization/Vacuum Packaging		Vacuum Packaging Only	
	1.5 s of steam	3 s of steam	3 d at 4°C	6 d at 4°C
pH	6.08 ± 0.14	6.09 ± 0.15	6.10 ± 0.18	6.10 ± 0.18
Color of frankfurters	L=56.2 ± 2.5	L=56.5 ± 2.1	L = 58.9 ± 1.9	L = 59.5 ± 2.5
	c=30.7 ± 1.7	c=30.8 ± 1.4	c = 29.8 ± 2.1	c = 28.4 ± 1.9
	h° = 50.9 ± 2.1	h° = 50.4 ± 18	h°=51.9 ± 2.3	h°=49.6 ± 2.4
Color of water purge	L = 32.7 ± 0.9	L = 31.9 ± 0.9	L = 31.6 ± 0.6	L = 31.4 ± 0.5
	c = 4.5 ± 0.1[a]	c = 3.9 ± 0.3[a]	c = 5.9 ± 0.4[b]	c = 6.2 ± 0.4[b]
	h° = 93.4 ± 0.7[a]	h° = 94.5 ± 1.2[a]	h°= 86.7 ± 0.5[b]	h° = 85.7 ± 0.8[b]
Turbidity of water purge (g/100 ml)	1.681 ± 0.231[a]	1.480 ± 0.144[a]	0.896 ± 0.328[b]	1.223 ± 0.135[ab]
Total force of shear (N)	5.5 ± 0.6	5.3 ± 0.7	5.9 ± 0.9	6.1 ± 1.1
Total energy of shear (N•mm)	78.4 ± 8.4	75.4 ± 9.8	79.7 ± 8.4	82.5 ± 10.0
Total force of compression (N)	576.4 ± 13.1	551.7 ± 35.5	553.7 ± 37.4	526.0 ± 35.2
Total energy of compression (N•mm)	5236.5 ± 263.1	5307.5 ± 508.8	5263.3 ± 398.7	5190.3 ± 371.5

Significant differences $\alpha = 0.05$ were indicated by different superscripts a or b across the same row. Where not indicated, no significant differences were found at $\alpha = 0.05$ between steam pasteurization/vacuun packaged and only vacuum-packaged frankfurters.

TABLE 3. Descriptive scores by an eleven-member professionally trained meat sensory panel for basic tastes, aromatics, feeling factors, aftertastes, first bite, chewing down characteristics, residual characteristics, and appearance of frankfurters packaged by steam pasteurization/vacuum packaging or by vacuum packaging only

Sensory Attributes	Steam Pasteurization/Vacuum Packaging		Vacuum Packaging Only	
	1.5 s of steam	3 s of steam	3 d at 4°C	6 d at 4°C
sweet (basic taste)	1.5 ± 1.5	1.5 ± 1.5	14. ± 1.2	1.6 ± 1.4
salt (basic taste)	14.5 ± 2.5	13.9 ± 2.8	1.04 ± 2.2	14.0 ± 2.4
sour (basic taste)	0.0 ± 0.0	0.0 ± 0.0	0.1 ± 0.1	0.0 ± 0.0
smoke (aromatics)	3.7 ± 1.7	3.8 ± 1.2	3.7 ± 1.4	3.9 ± 1.1
cooked fat (aromatics)	4.0 ± 1.7	4.0 ± 1.7	3.9 ± 1.5	3.5 ± 1.8
cooked meat (aromatics)	4.7 ± 1.0	4.6 ± 1.0	4.7 ± 1.0	4.5 ± 0.8
astringent (1st bite)	4.4 ± 2.4	4.2 ± 2.4	4.3 ± 2.4	3.7 ± 2.5
phosphate (1st bite)	1.1 ± 1.1	1.1 ± 1.1	1.0 ± 1.0	1.4 ± 1.4
other (aromatics)	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0
sweet (aftertaste)	0.3 ± 0.6	0.5 ± 0.5	0.3 ± 0.3	0.5 ± 0.7
salt (aftertaste)	8.3 ± 3.8	8.0 ± 3.8	8.1 ± 3.4	7.8 ± 4.3
sour (aftertaste)	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0
smoke (aftertaste)	2.5 ± 1.5	2.6 ± 1.6	2.4 ± 1.6	2.7 ± 1.6
cooked fat (aftertaste)	2.8 ± 1.9	2.8 ± 1.9	2.8 ± 1.9	2.2 ± 2.0
cooked meat (aftertaste)	2.7 ± 1.6	3.2 ± 1.4	3.0 ± 1.3	3.0 ± 1.6
other (aftertaste)	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0
springiness	8.3 ± 1.4	8.7 ± 1.4	8.4 ± 1.4	8.6 ± 1.8
cohesiveness	5.8 ± 1.1	6.0 ± 1.2	5.9 ± 1.2	6.2 ± 1.3
hardness	5.1 ± 0.4	5.2 ± 0.5	5.2 ± 0.5	5.2 ± 0.5
denseness	7.2 ± 1.4	7.2 ± 1.5	7.2 ± 1.4	7.3 ± 1.4
moisture release	2.6 ± 1.1	2.6 ± 1.0	2.5 ± 1.1	2.6 ± 1.4
number of chews	18.1 ± 4.5	17.5 ± 4.3	18.5 ± 4.0	17.9 ± 6.2
moistness of mass	10.3 ± 1.8	10.2 ± 1.4	9.9 ± 2.1	10.7 ± 1.7
hardness of mass	4.2 ± 0.8	4.2 ± 0.8	4.2 ± 1.0	4.2 ± 1.2
cohesiveness of mass	6.7 ± 1.2	6.9 ± 0.9	6.6 ± 1.1	6.7 ± 0.9
loose particles	4.4 ± 1.8	4.4 ± 1.7	4.3 ± 1.8	4.4 ± 1.8
oily/greasy film	5.8 ± 1.6	5.7 ± 1.8	5.9 ± 1.5	5.8 ± 1.6
inside color	4.5 ± 1.0	5.5 ± 1.0	5.75 ± 1.3	6.0 ± 1.0
outside color	9.0 ± 1.4	9.5 ± 1.0	8.5 ± 1.0	8.25 ± 1.3

Bacterial inoculation

Immediately before inoculation, each sub-stock culture was mixed in an equal volume and diluted with sterile phosphate buffer (pH 7.0) to obtain a cocktail of *L. monocytogenes* inoculation culture. Each frankfurter was submerged in a sterile pan containing 300 ml of the *L. monocytogenes* inoculation culture for about 2 min. After the inoculation, the frankfurter was removed and the excess fluid was allowed to drip off. After equilibration at 4°C in a plastic bag for 60 minutes, the inoculated frankfurters were removed from the bags and allowed to air-dry for 2 min, after which they were processed through a packaging machine (Lodi, WI) via steam pasteurization/vacuum packaging technology or vacuum packaging only.

At each test trial, inoculated and untreated frankfurters prepared by the same procedure as above were used to calculate the initial inoculation levels of *L. monocytogenes* on the frankfurters.

Bacterial enumeration

A minimum of 48 packaging units (384 frankfurters) was microbiologically analyzed for each treatment at each trial to determine the surviving cells of *L. monocytogenes* on the frankfurters. For each microbial analysis, fifty ml of sterile phosphate buffer solution was used to rinse the surfaces of 8 frankfurters placed in a plastic bag by shaking the bags of frankfurters and buffer mixture for 2 min. Serial dilutions were pour-plated onto TSA + YE (0.6%) overlaid with modified oxford medium (MOX) to resuscitate heat-injured cells. The viable colonies were counted after incubating the plates at 35°C for 48 h. At a low detection level, an enrichment procedure was used by mixing one liter of UVM *Listeria* enrichment broth with the entire package of frankfurters and incubating at 35°C for 24 h, following the USDA-FSIS method for *L. monocytogenes* detection *(12)*.

TABLE 4. Chemical composition of frankfurters packaged by steam pasteurization/vacuum packaging technology or by vacuum packaging only

Composition	Steam Pasteurization/Vacuum Packaging		Vacuum Packaging Only	
	1.5 s of steam	3 s of steam	3 d at 4°C	6 d at 4°C
Fat (%)	26.90 ± 0.14	26.46 ± 0.51	26.52 ± 0.30	27.15 ± 0.09
Protein (%)	10.69 ± 0.01	10.73 ± 0.05	11.01 ± 0.05	10.79 ± 0.11
Moisture (%)	52.42 ± 0.36	52.46 ± 0.25	51.92 ± 0.51	51.10 ± 0.29
Salt (%)	2.09 ± 0.02	2.11 ± 0.03	2.06 ± 0.06	2.08 ± 0.02
Ash (%)	3.89 ± 0.08	4.16 ± 0.57	4.25 ± 0.51	4.42 ± 1.19
Calcium (mg/100 g)	9.07 ± 0.88	10.00 ± 1.41	9.76 ± 0.39	8.44 ± 0.89

Data analysis

Six replicated test trials were conducted. In each trial, a minimum of 60 pounds (480 links) of frankfurters were processed. The survivors of *L. monocytogenes* on the frankfurters after each treatment were expressed as CFU (colony forming units) per cm^2 of frankfurter surface area. The means and standard deviations were calculated. Comparisons of significant differences were determined by Duncan's test at level of 0.05, using SAS version 8.1 (SAS Corporation, Cary, NC).

RESULTS AND DISCUSSION

Amount of water purge in packages

Packaged frankfurters processed by using steam pasteurization/vacuum packaging technology at a steam treatment time of 1.5 or 3 s were compared with those processed by using vacuum packaging only. In this study, the upper boundary of steam treatment time was set to be 3 s because of practical considerations, such as that applying steam pasteurization/vacuum packaging technology in a continuous frankfurter packaging machine would not reduce the production line speed of commercial operations. In a normal continuous process of commercial frankfurter operations, packaging line speed is expected to be 3 s per indexing station.

Table 1 gives the amount of water purge in frankfurter packages measured immediately after packaging or after the packaged frankfurters were stored at 4°C for 24 h, 7 days, or 14 days. For steam pasteurization/vacuum packaging technology, there was no significant ($\alpha = 0.05$) difference in amount of water purge in the frankfurter packages between 1.5 and 3 s of steam treatment time. Immediately after packaging, the frankfurter packages processed by using steam pasteurization/vacuum packaging technology contained about 6 g of water purge, while the frankfurters packages processed by using vacuum packaging only contained less than 0.5 g of water purge.

During post-package storage at 4°C, the amount of water purge in frankfurter packages changed, and this change was affected by the packaging method. After 24 h at 4°C, the amount of water purge substantially increased in the frankfurter packages processed by vacuum packaging only; this substantial increase was not observed in the packages processed by steam pasteurization/vacuum packaging technology. After 24 h at 4°C, the amount of water purge in the frankfurter packages processed by using steam pasteurization/vacuum packaging technology were not significantly (at $\alpha = 0.05$) different from that in the frankfurter packages processed by using vacuum-packaging only.

When packaged frankfurters were stored at 4°C for more than 24 h, the amount of water purge in the frankfurter packages gradually increased. For vacuum-packaged frankfurters, the amount of water purge increased approximately 66% (from 9.5 g to 15.8 g) from 24 h to 14 days. However, for steam-pasteurized/vacuum packaged frankfurters, the amount of water purge increased approximately 58% (from 8.5 g to 13.4 g) from 24 h to 14 days, slightly less than in the packages processed by vacuum packaging only.

The amount of water purge in packages of the same brand of frankfurter that were processed at a commercial plant was also evaluated. The commercially processed frankfurters were vacuum-packaged and the packaged frankfurters were stored at 4°C for 24 h or 7 days. After vacuum-packaging, the amount of water purge in the commercially processed packages was 11 g after storage at 4°C for 24 h and 18 g after storage at 4°C for 7 days. The amount of water purge in the same brand of frankfurter retail packages that were purchased from a local grocery store was also measured in this study. The amount of water purge in these retail packages was about 19.2 g on the 38th day prior to the use-by date on the label. The normal use-by date was about 77 days from the date of packaging (personal communication with the processor).

Characteristics of frankfurters and water purge

Table 2 shows the measurements for frankfurters packaged by use of steam pasteurization/vacuum packaging technology and of vacuum packaging only. The comparisons were conducted for a steam treatment time of 1.5 or 3 s after the packaged frankfurters were stored at 4°C for 3 days. No significant ($\alpha = 0.05$) differences were found in pH, color, razor blade shear (both the maximum force and total energy), or compression (both the maximum force and total energy) of frankfurters between steam pasteurization/vacuum packaging and vacuum packaging only.

After 3 days at 4°C, the turbidity of water purge in the frankfurter packages processed by vacuum-packaging only

TABLE 5. Free fatty acids in frankfurters packaged by steam pasteurization/vacuum packaging technology or by vacuum packaging only

Fatty Acid	Steam Pasteurization/Vacuum Packaging		Vacuum Packaging Only	
	1.5 s of steam	3 s of steam	3 d at 4°C	6 d at 4°C
Butyric (%)	< 0.1	< 0.1	< 0.1	< 0.1
Capric (%)	< 0.1	< 0.1	< 0.1	< 0.1
Caproic (%)	< 0.1	< 0.1	< 0.1	< 0.1
Caprylic (%)	< 0.1	< 0.1	< 0.1	< 0.1
Lauric (%)	< 0.1	< 0.1	< 0.1	< 0.1
Linoleic (%)	0.49 ± 0.04	0.40 ± 0.02	0.55 ± 0.03	0.45 ± 0.04
Linolenic (%)	< 0.1	< 0.1	< 0.1	< 0.1
Myristic (%)	0.88 ± 0.13	0.74 ± 0.06	1.08 ± 0.09	0.80 ± 0.04
Myristoleic (%)	0.39 ± 0.09	0.34 ± 0.04	0.49 ± 0.04	0.36 ± 0.02
Oleic (%)	17.13 ± 1.53	14.20 ± 0.26	19.33 ± 0.82	15.63 ± 0.97
Palmitic (%)	6.79 ± 0.72	5.62 ± 0.21	7.93 ± 0.81	6.12 ± 0.29
Palmitoleic (%)	1.20 ± 0.13	1.01 ± 0.04	1.42 ± 0.16	1.09 ± 0.06
Stearic (%)	3.95 ± 0.41	3.15 ± 0.06	4.38 ± 0.44	3.51 ± 0.24

appeared to be lower (39%) than that in the frankfurter packages processed by steam pasteurization/vacuum packaging. The turbidity of water purge in frankfurter packages also varied with storage time. At 4°C, the turbidity of water purge in vacuum-packaged samples increased about 36% when the storage time was increased from 3 to 6 days. The turbidity of water purge in frankfurter packages might be partly due to insoluble salts. However, further analysis of the calcium content in water purges revealed no significant (at $\alpha = 0.05$) differences between the frankfurter packages processed by steam pasteurization/vacuum packaging technology and those processed by vacuum packaging only.

With steam pasteurization/vacuum packaging technology, the calcium content in the packages was 9.58 ± 0.56 mg per 100 g of water purge and 8.96 ± 0.25 mg per 100 g of water purge, respectively, for a steam treatment of 1.5 and 3 s. Storage time after packaging did not appear to affect the calcium content in water purge. After vacuum-packaging, the calcium content in the water purge was 9.15 ± 0.04 mg/100 g in packaged frankfurters that were stored at 4°C for 3 days and 9.25 mg/100 g those stored at 4°C for 6 days.

Therefore, it is speculated that steam treatment during steam pasteurization/vacuum packaging might have temporarily increased the solubility of some organic salts on the frankfurters and allowed these organic salts to be washed off the frankfurter surfaces into the water purge. An increase of turbidity in the purge of frankfurter packages was also observed when washing the frankfurters with hot water at a temperature of above 140°F (60°C).

From this study, a significant ($\alpha = 0.05$) difference was found for color of water purge in frankfurter packages between steam pasteurization/vacuum packaging technology and vacuum packaging only. The chroma (color saturation, c) of water purge in the frankfurter packages processed by using steam pasteurization/vacuum-packaging technology was about 34% less than that in the frankfurter packages processed by using vacuum packaging only. The hue angle (h°) of water purge in the frankfurter packages processed by steam pasteurization/vacuum packaging was about 9% greater than that of the frankfurter packages processed by using vacuum packaging only. This indicated that the water purge in the frankfurter packages processed by using steam pasteurization/vacuum-packaging technology was lighter (smaller c value) and less red (greater h° value) than in the frankfurter packages processed by vacuum packaging only. With use of ASTM Method E313 *(11)*, the yellowness indices (YI) of water purge in the frankfurter packages processed by using steam pasteurization/vacuum packaging technology was 14.10, which was about 30% lighter than that for frankfurter packages processed via vacuum packaging only (YI = 20.02).

In this study, the vacuum-packaged frankfurters stored at 4°C for 3 days were compared with those stored at 4°C for 6 days. No significant ($\alpha = 0.05$) differences were found in pH, color of frankfurters, instrumental textures (shear and compression) of frankfurters, and color of water purge in frankfurter packages.

Sensory attributes

In Table 3, the descriptive scores for each of the sensory attributes evaluated for frankfurters packaged by steam pasteurization/vacuum-packaging technology are compared with those of frankfurters packaged by vacuum packaging only. The sensory attributes for the frankfurt-

FIGURE 1. Survival of *L. monocytogenes* on frankfurters packaged via steam pasteurization/vacuum packaging technology at an initial inoculation level of 4.15 log_{10}CFU/cm^2

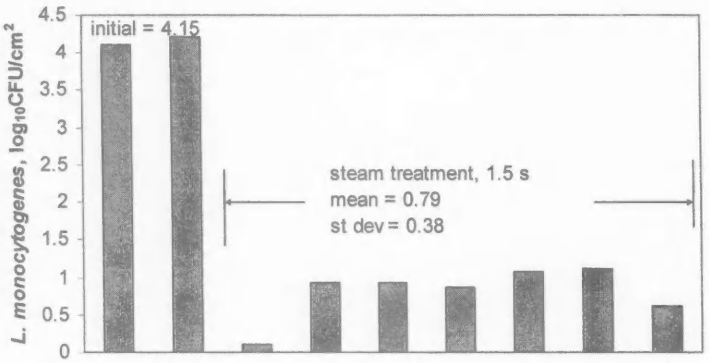
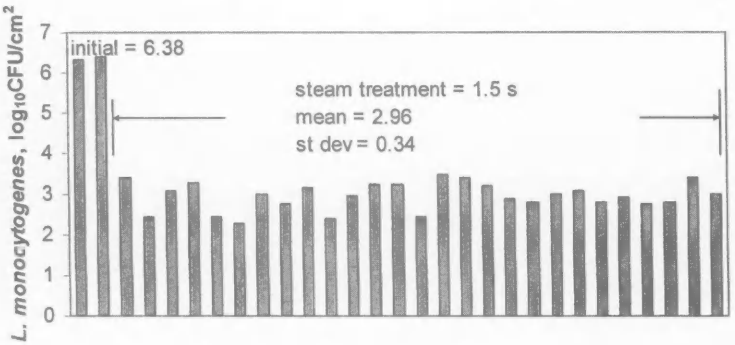


FIGURE 2. Survival of *L. monocytogenes* on frankfurters packaged via steam pasteurization/vacuum packaging technology at an initial inoculation level of 6.38 log_{10}CFU/cm^2



ers packaged by steam pasteurization/vacuum-packaging technology were evaluated for steam treatment times of 1.5 and 3 s. Between a steam treatment time of 1.5 and 3 s, no significant (at $\alpha = 0.05$) differences were found in sensory attributes, consisting of basic tastes (sweet, salt, and sour), aromatics (smoke, cooked meat, and cooked fat), feeling factors (astringent and phosphate), aftertastes (smoke, sweet, salt, sour, cooked fat, and cooked meat), first bite (springiness, hardness, cohesiveness, denseness, and moisture release), chewing down characteristics (cohesiveness of mass, hardness of mass, moistness of mass, and number of chews), residual characteristics (oily/greasy film and loose particles), and appearance (inside and outside color) of frankfurters.

No significant ($\alpha = 0.05$) differences were found in any of the evaluated sensory attributes between the frankfurters packaged by steam pasteurization/vacuum packaging technology and those packaged by vacuum packaging only. No other flavors or aftertastes were found by the sensory panel among all of the frankfurter samples evaluated. The studies were also conducted for vacuum-packaged frankfurters stored at 4°C for 3 and 6 days. No significant ($\alpha = 0.05$) differences were found in the sensory attributes between the packaged frankfurters stored for 3 and for 6 days.

Chemical composition

Chemical composition (total fat, protein, moisture, salt, ash, and calcium), was evaluated for frankfurters packaged by steam pasteurization/vacuum packaging or by vacuum packaging only (Table 4). The frankfurters contained about 27% fat, 11% protein, 52% moisture, 2% salt, 4% ash, and 10 mg/100 g of calcium. No significant ($\alpha = 0.05$) differences were found in fat, protein, moisture, salt, ash, and calcium in the frankfurters among the treatments.

Table 5 gives the profile of free fatty acids in the frankfurters packaged by steam pasteurization/vacuum packaging or vacuum packaging only. Among the fatty acids analyzed, oleic acid (14 to 19%) was present in the highest amount, followed by palmitic (5 to 8%), stearic (3 to 4%), and palmitoleic acid (1 to 1.5%). The other fatty acids, including linoleic, myristic, and myristoleic acid, were less than 1% of the frankfurters. The frankfurters contained less than 0.1% of butyric, capric, caproic, caprylic, lauric, and linolenic acid. Thus, steam pasteurization/vacuum packaging did not significantly ($\alpha = 0.05$) affect the profile of free fatty acids in the frankfurters.

Lethality of *Listeria monocytogenes*

Theoretically, any length of steam treatment time that reduces the pathogen of concern and at the same time has minimum effect on food quality may be selected when applying steam pasteurization/vacuum packaging technology as a post-lethality intervention. However, when considering the practicality in commercial application, the design criterion for application of steam pasteurization/vacuum packaging technology must be not only to optimize pathogen lethality and food quality but at the same time to avoid reducing the current commercial production line-speed.

Therefore, in this study, the inoculation tests for evaluating the lethality of *L. monocytogenes* on frankfurters packaged by use of steam pasteurization/vacuum-packaging technology were conducted with a main design goal of reserving current commercial production features, especially continuous line packaging speed. To be able to maintain the current production line speed and still allow time for mechanical delays while the operating valves open and close, steam pasteurization/vacuum-packaging technology was optimized for a steam treatment time of 1.5 s for treatment of frankfurters arranged in double layers on a continuous packaging machine.

Figures 1 and 2 show that at both initial inoculation levels 4 and 6 log_{10}CFU/

cm^2, *L. monocytogenes* numbers were reduced more than 3 log_{10} CFU/cm^2 from the frankfurters packaged in a double layer arrangement after treatment with steam for 1.5 s. Thus the reductions of numbers of *L. monocytogenes* by steam pasteurization/vacuum packaging technology were not affected by initial inoculation levels of the pathogen on the frankfurters.

The results from this study were in agreement with those of a previous study of frankfurters packaged in a single layer arrangement. Three log_{10} reductions of *L. monocytogenes* were also obtained on the single-layer packaged franks by use of steam pasteurization/vacuum packaging technology *(19)*. Although different types (single-layer vs. double layer) of commercial continuous line machines were used, the two types of packaging machines were designed on the basis of same principle, verifying that steam pasteurization can be applied in a commercial continuous frankfurter packaging machine to reduce *L. monocytogenes* by three log_{10} CFU/cm^2. Because in-package surface pasteurization relies solely on heat transfer by conduction, *L. monocytogenes* on interior frankfurter-to-frankfurter surfaces may be largely unaffected by in-package surface pasteurization and some bacterial survival is likely on these interior surfaces. In this study, high velocity steam increased heat transfer by convection on frankfurter surfaces.

CONCLUSIONS

Applying steam pasteurization to treat double-layer packaged frankfurters in a vacuum packaging machine reduced *L. monocytogenes* by 3 log_{10} CFU/cm^2 in 1.5 s, did not change the amount of water purge in the packages, did not affect pH, color, and instrumental texture of frankfurters, and had no effect on chemical composition and sensory attributes of frankfurters. However, the color of water purge in the frankfurter packages processed by steam pasteurization/vacuum packaging technology was approximately 30% lighter than that in the frankfurter packages processed by vacuum packaging only. A slightly difference was noted in the turbidity of water purge between the packages with use of steam pasteurization/vacuum packaging and vacuum packaging only. The results from this study provide useful information for ready-to-eat meat and poultry processors to evaluate steam pasteurization/vacuum packaging technology as a post-lethality intervention alternative to reduce *L. monocytogenes* on ready-to-eat meats. This process meets the requirements of the new federal regulations for reducing *Listeria* and causes no deterioration of the product. This study provides the optimized treatment conditions for achieving a 3-log reduction of *L. monocytogenes* without detrimentally affecting product quality or reducing production-line speed.

ACKNOWLEDGMENTS

The authors thank Deibel Laboratories at Madison, WI and Lincolnwood, IL for their analytical work and technical assistances. The authors also appreciate Cindi Brownmiller, Drs. Ron Buescher and Luke Howard, Applied Biochemistry Lab and Sensory Lab at the Department of Food Science, University of Arkansas, Fayetteville, AR for their technical assistances.

REFERENCES

1. AOAC. 1990. Official Methods of Analysis, 15th ed. Association of Official Analytical Chemists, Washington, D.C.
2. AOAC. 1997. Official Methods of Analysis, 16th ed. Association of Official Analytical Chemists. Gaithersburg, MD.
3. Cavitt, L. C., J. F. Meullenet, R. K. Gandhapuneni, G. W. Youm, and C. M. Owens. 2004a. Rigor development and meat quality of large and small broilers and the use of the Allo-Kramer shear, needle puncture, and razor blade shear method to measure texture. Poultry Sci. 84:113–118.
4. Cavitt, L. C., G. W. Youm, J- F. Meullenet, C. M. Owens, and R. Xiong. 2004b. Prediction of poultry meat tenderness using razor blade shear, Allo-Kramer shear and sarcomere length. J. Food Sci. 69:11–15.
5. CDC. 1998. Center for Diseases Control and Prevention. CDC. 1998 Annual Report. Program and Planning, Food Safety Research Information Office. CDC/USDA/FDA Foodborne Diseases Active Surveillance Network. CDC's Emerging Infections Program. Accessed on November 27, 2004 at: http://www.jifsr.gov/ppd/cdc04.htm.
6. CDC. 1997. Morbidity and Mortality Weekly Report. Incidence and foodborne illnesses–FoodNet, 1997. 47(37):782
7. CDC. 2003. Centers for Diseases Control and Prevention. 2003. Listeriosis. Disease Information. Division of Bacterial and Mycotic Diseases. Accessed on November 2, 2004 at: http://www.bt.cdc.gov.
8. FDA. 1999. Food and Drug Administration Center for Food Safety and Applied Nutrition. US Department of Agriculture Food Safety and Inspection Service. Accessed on November 27, 2004 at: http://vm.cfsan.fda.gov/~dms/listrisk.html.
9. FDA-CFSAN, USDA-FSIS, and CDC. 2003. Food and Drug Administration/Center for Food Safety and Applied Nutrition, United States Department of Agriculture/Food Safety Inspection Service, and Centers for Disease Control and Prevention. Quantitative assessment of relative risk to public health from foodborne *Listeria monocytogenes* among selected categories of ready-to-eat foods. Accessed on November 2, 2004 at http://www.fsis.usda.gov.
10. Gill, V. S., H. Thippareddi, R. K. Phebus, J. L. Mardsen, and C. L. Kastner. 2001. Validation of a steam-based post-process pasteurization system for control of *Listeria monocytogenes* in ready-to-eat deli meats. The Food Safety Consortium Annual Meeting, Sept. 16–18.
11. Hunter Lab. 2003. Measurement Values. Accessed on November 11, 2004 at: http://www.hunterlab.com/kb/d25values.pdf.
12. Johnson, J. L. 1998. Isolation and identification of *Listeria monocytogenes* from meat, poultry and egg products, pp. 8–1, 8–18. *In* USDA-FSIS Microbiology Laboratory Guidebook 3rd edition. USDA-FSIS Washington D.C.
13. Kozempel, M., N. Goldberg, E. R., Radewonuk, and O. J. Scullen. 2000. Rapid hot dog surface pasteurization using cycles of vacuum and steam to kill *Listeria innocua*. J. Food Prot. 63: 457–461.
14. Mead, P. S., L. Slutsker, V. Dietz, L. F. McCaig, J. S. Bresee, C. Shapiro, P. M. Griffinand, and R. V. Tauxe. 2000. Food related illness and death in the United States. CDC synopses, Emerging Infectious Diseases. Vol 5, No 5. Access on February 25, 2004 at: http://www.cdc.gov/ncidod/eid/vol5no5/mead.htm.

15. Muriana, P. M., W. Quimby, C. A., Davison, and J. Grooms. 2002. Post-package pasteurization of ready-to-eat deli meats by submersion heating for reduction of *Listeria monocytogenes*. J. Food Prot. 65:963–969.
16. Murphy, R. Y., L. K. Duncan, K. H., Driscoll, K. H., B. L. Beard, M. E, Berrang, and J. A. Marcy. 2003a. Determination of thermal lethality for *Listeria monocytogenese* in fully cooked chicken breast meat products during postcook in-package pasteurization. J. Food Prot. 66:578–583.
17. Murphy, R. Y., L. K. Duncan, K. H., Driscoll, and J. A. Marcy. 2003b. Lethality of *Salmonella* and *Listeria innocua* in fully cooked chicken breast meat products during post-cook in-package pasteurization. J. Food Prot. 66:242–248.
18. Murphy, R.Y., L. K. Duncan, K. H., Driscoll, J. A., Marcy, and B. L. Beard. 2003c. Thermal inactivation of *Listeria monocytogenes* on ready-to-eat turkey breast meat products during post-cook in-package pasteurization via hot water. J. Food Prot. 66:1618–1622.
19. Murphy, R.Y., R. E. Hanson, N. Feze, N. R., Johnson, L. L. Scott, and L. K. Duncan. 2004. Eradicating *L. monocytogenes* from fully cooked franks using an integrated pasteurization/packaging system. J. Food Prot. (accepted on Oct. 29, 2004).
20. USDA-FSIS. 2003a. FSIS rule designed to reduce *Listeria monocytogenes* in ready-to-eat meat and poultry products. Food Safety and Inspection Service United States Department of Agriculture, Washington, D.C. Accessed on February 25, 2004 at http://www.fsis.gov/OA/background/lmfinal.htm.
21. USDA-FSIS. 2003b. Control of *Listeria monocytogenes* in ready-to-eat meat and poultry products; final rule. Federal Register 9 CFR Part 430: June 6, 2003 (Volume 68, Number 109). From the Federal Register Online via GPO Access [www.gpoaccess.gov].

Highlights of the Executive Board Meeting
April 24–25, 2006

Des Moines, Iowa

Following is an unofficial summary of actions from the Executive Board Meeting held at the Hilton Garden Inn in Des Moines, Iowa on April 24–25, 2006.

Approved the following:

- Minutes of February 19–20, 2006 Executive Board Meeting
- Minutes of February 19, 2006 Executive Board Meeting, Executive Session
- William Brewer and William LaGrange as Honorary Life Members
- Budget for Fiscal Year Ending August 31, 2007

Discussed the following:

- Future planning for IAFP with Board and staff
- E-mail votes taken since the last meeting
- Committee appointments to begin at IAFP 2006
- Revision of the *Procedures to Investigate Foodborne Illness*
- Paper on Food Worker Hygiene
- Proposed changes to the Constitution and Bylaws
- IAFP 2006 preparations update
- Local Arrangements preparations
- Ivan Parkin and John Silliker lecturers
- ILSI status for IAFP symposia
- Foundation DVD project and review
- Foundation print materials
- Rapid response series
- White paper on Avian Influenza
- University Speaker Program
- Student Travel Scholarship Award Program
- Member dues restructure plan – target date of January 1, 2007
- E-Newsletter sample
- Affiliate activity
- Potential new Affiliate groups
- Non-compliant Affiliates
- European Symposium for fall of 2006
- Exhibit opportunities for 2006–2007
- Possible Foodsafe sponsorship
- Allergy Icon development
- WHO-NGO progress
- Electronic balloting-plan for 2008 Secretary election
- Partnership for Food Safety Education planning meeting
- Guiding principals for holding international meetings
- China delegation visit report
- Food Safety Summit-China – IAFP's participation
- Retail Foodservice Conference — IAFP's participation
- Sponsorship monies available for conferences in small amounts

Reports received:

- *Food Protection Trends*
- *Journal of Food Protection*
- IAFP Web Site
- Membership
- Financial statements–February 2006
- Board Members attending Affiliate meetings
- Affiliate Newsletter
- Future Annual Meeting schedule
- Exhibiting (IAFP on the Road)

Next Executive Board meeting:
August 11–17, 2006

IAFP 2006
93rd Annual Meeting
August 13-16
Calgary
Alberta Canada

Come Early for These Special Events!

Golf Tournament
The Links of GlenEagles
Saturday, August 12
7:30 a.m. – 4:00 p.m.

The Best of Lake Louise and Banff
Saturday, August 12
8:30 a.m. – 5:00 p.m.

Visit the Web site at **www.foodprotection.org** to sign up.

IAFP 2006 Award Winners

BLACK PEARL
Sponsored by Wilbur Feagan and F & H Food Equipment Company
Springfield, MO

Ecolab Inc.
St. Paul, MN

FELLOW

John N. Sofos

HONORARY LIFE MEMBERSHIP

William H. Brewer
William S. LaGrange

HARRY HAVERLAND CITATION
Sponsored by Zep Manufacturing Co., Atlanta, GA

Gale Prince

HAROLD BARNUM INDUSTRY
Sponsored by Nasco International, Inc.
Fort Atkinson, WI

Paul A. Hall

EDUCATOR
Sponsored by Nelson-Jameson Inc.
Marshfield, WI

Lee-Ann Jaykus

SANITARIAN
Sponsored by Ecolab Inc.
St. Paul, MN

Jack Guzewich

MAURICE WEBER LABORATORIAN
Sponsored by Weber Scientific
Hamilton, NJ

Catherine W. Donnelly

INTERNATIONAL LEADERSHIP
Sponsored by Cargill, Inc.
Minneapolis, MN

Christopher Griffith

FOOD SAFETY INNOVATION
Sponsored by 3M Microbiology
St. Paul, MN

Edward C. Mather

STUDENT TRAVEL SCHOLARSHIP
Sponsored by the IAFP Foundation

Yvonne C. Chan
Luciano Chi
Eb Chiarini
Ashley S. Pedigo

DEVELOPING SCIENTISTS
Sponsored by the IAFP Foundation

To be determined

FPA FOOD SAFETY
Sponsored by the Food Products Association
Washington, D.C.

Microbial Food Safety Research Unit (ARS/USDA)

SAMUEL J. CRUMBINE
Sponsored by the Conference for Food Protection, in cooperation with American Academy of Sanitarians, American Public Health Association, Association of Food & Drug Officials, Foodservice and Packaging Institute, Inc., International Association for Food Protection, International Food Safety Council, National Association of County and City Health Officials, National Environmental Health Association, NSF International and Underwriters Laboratories, Inc.

Multnomah County Environmental Health

AFFILIATE AWARDS:

C. B. SHOGREN MEMORIAL

British Columbia Food Protection Association

BEST AFFILIATE ANNUAL MEETING

Missouri Milk, Food and Environmental Health Association

BEST AFFILIATE EDUCATIONAL CONFERENCE

Florida Association for Food Protection

BEST AFFILIATE COMMUNICATION MATERIALS

Ontario Food Protection Association

AFFILIATE MEMBERSHIP ACHIEVEMENT

Kentucky Association of Milk, Food and Environmental Sanitarians

Call for Symposia
IAFP 2007

July 8–11
Lake Buena Vista, Florida

The Program Committee invites International Association for Food Protection Members and other interested individuals to submit a symposium proposal for presentation during IAFP 2007, July 8-11, 2007 in Lake Buena Vista, Florida.

WHAT IS A SYMPOSIUM?

A symposium is an organized, 3 1/2-hour session emphasizing a central theme relating to food safety and usually consists of six presenters each giving 30-minute presentations with a 30-minute break between the third and fourth presentation. Short symposia with three or four 30-minute presentations are also possible. Round-table discussion forums, which are 90 minutes in length with 2–3 brief presentations (10–15 minutes each), a formal question and answer session, followed by time for audience participation, are also acceptable.

Symposia may include a discussion emphasizing a scientific aspect of a common food safety and quality topic, issues of general interest relating to food safety and microbiological quality, a report of recent developments, an update of state-of-the-art methodologies, or a discussion of basic and applied research in a given area. The material covered should include current work and the newest findings. Symposia will be evaluated by the Program Committee for relevance to current science and to Association Members. Proposals may be prepared by individuals, groups of individuals, committees, or professional development groups (PDGs).

SUBMISSION INSTRUCTIONS

To submit a symposium proposal, read all the information on this page, paying close attention to the "Symposium Selection Procedure" on the next page, then complete the "Symposium Proposal." Follow all instructions when making a submission. Your suggested presenters need not be confirmed at this stage, only identified.

SYMPOSIUM PROPOSAL DEADLINE

Send symposium proposals to the Association office no later than August 7, 2006 or submit to the IAFP registration desk at IAFP 2006 by Tuesday, August 15, 2006 at 10:00 a.m. At the submitter's option, the submitter may discuss their proposal with the Program Committee at 7:00 a.m. on Wednesday, August 16. The Program Committee will review submitted symposia at the conclusion of the IAFP 2006 Annual Meeting to decide which symposia will be selected for further development. Organizers will be notified as to the status of their proposal by September 29, 2006. Symposia selected for further development should be completed and sent to the IAFP office by January 16, 2007. **FINAL DECISIONS ABOUT ACCEPTANCE AND CONTENT OF SYMPOSIA FOR PRESENTATION AT IAFP 2007 WILL BE MADE BY THE PROGRAM COMMITTEE DURING THEIR JANUARY 2007 MEETING.** Symposia organizers and potential moderators and speakers should understand that not all symposia selected for further development will be accepted as submitted. The IAFP Program Committee reserves the right to reject poorly organized symposia, and/or to review symposia, including proposed subjects and speakers, and make modifications based on providing the most comprehensive and balanced forum. The organizer will be notified of the final results by February 28, 2007.

PRESENTERS WHO ARE NOT MEMBERS

The International Association for Food Protection does not reimburse invited presenters for travel, hotel, or other expenses incurred during the Annual Meeting. However, invited presenters who are not Association members will receive a complimentary Annual Meeting registration. Presenters who are Association Members are expected to pay normal registration fees.

ASSOCIATION FOUNDATION SPONSORSHIP

The International Association for Food Protection Foundation has limited funds for travel sponsorship of presenters. After final acceptance of the symposium (February 2007), symposia organizers may make requests in writing to the Executive Director. Requests are reviewed on an individual and first-come-first-served basis. The maximum funding grant will be $750 per presenter ($1,250 if outside North America). Organizers are welcome to seek funding from other sources and the Association will provide recognition for these groups in our program materials. Organizers are asked to inform the Association if they obtain outside funding.

SYMPOSIUM SELECTION PROCEDURE

The primary focus of the symposium selection procedure is to provide a balanced educational program for attendees of the IAFP Annual Meeting. To achieve this goal, symposia may be combined or modified by the Program Committee during their August 2006 or February 2007 review, as appropriate, to prevent overlap of topics among competing symposia. The Program Committee also reserves the right to suggest alternative speakers and/or topics in an effort to round out symposia or discussion forums. During the symposia selection process, only the most relevant and promising symposia proposed by groups and individuals will be selected for further development.

Guidelines for tentative acceptance:

1. Proposed symposia must be pertinent to IAFP Members and PDGs. Priority will be given to symposia that address one or more of the following program areas:
   - Safety and Microbial Quality of Foods (dairy, meat and poultry, seafood, produce, water)
   - Viruses and Parasites, Retail Food Safety, Epidemiology and Public Health
   - Non-Microbiology Food Safety Issues (food toxicology, allergens, chemical contaminants)
   - General-Applied Food Safety Microbiology (for example, advances in sanitation, lab methods, quality assurance, food safety systems)
   - General-Food Protection for the Future (risk analysis, emerging pathogens, biotechnology, predictive models, etc.)
   - Developments in Food Safety Education
   - Other pertinent food protection topics may be considered if space is available
2. In addition to addressing pertinent program areas, symposia accepted for further development should:
   - Be new, emerging and/or address areas not covered in last 2 years
   - If covered in last 2 years, provide new information that warrants another symposium
3. Symposium submissions must include:
   - Titles that clearly convey the topics to be covered
   - Topics that are unique to prevent overlap of basic information among speakers
   - Names of suggested speakers from a variety of backgrounds, such as industry, regulatory, academic researchers, or consumer perspective (as appropriate)
   - Suggested speakers who are knowledgeable and good communicators
4. Special consideration will be given to symposium submissions that:
   - Are directly applicable or provide viable safety options for food manufacturers, including small to medium size manufacturers
   - Bring an international (outside of North America) focus or viewpoint to the meeting
   - Attract/involve students
   - Attract/involve local affiliate members who would not otherwise attend the Annual Meeting (e.g., regional specialties like shellfish issues for Gulf States)
   - Would attract members of a new PDG or program area that IAFP is trying to develop or encourage
5. Other considerations for selecting symposia for further development:
   - Proposals must be submitted to the IAFP office by August 7, 2006 or the IAFP registration desk at IAFP 2006 by 10:00 a.m. on Tuesday, August 15, 2006
   - The Program Committee reserves the right to limit the number of sessions devoted to a single program area to provide a balanced program

- If relevant topics are proposed by more than one submission, the Program Committee will make the final decision to combine or modify symposia as appropriate to avoid overlap of topics among competing symposia. In this case, organizers may be asked to work with one another to combine symposia
- Due to space and time limitations, only the most relevant and promising proposals (as modified by the Program Committee) will be selected for further development as full sessions (typically consisting of six 30-minute presentations), short sessions (typically consisting of three or four 30-minute presentations) or roundtable discussions (90 minutes in length with two or three brief presentations and question and answer session). Again, the Program Committee will make final decisions regarding symposia format and length
- Three sessions will be reserved for symposia sponsored by our partner, the International Life Science Institute North America (ILSI, N.A.). The ILSI N.A. symposia address topics that are of general interest to IAFP meeting attendees, focus on emerging food safety issues and technologies, and provide a global perspective
- Additional sessions may be added at the discretion of the Program Committee to accommodate emerging issues

6. Final decisions on symposia selection will be made at the January 2007 Program Committee Meeting.
    - Symposia recommended for further development should be submitted, in finalized form, to the IAFP office by January 16, 2007. This includes symposium title, abstract, convener and speaker information (name, contact information, and proposed title of presentation). Organizers are encouraged to contact and get preliminary confirmation from speakers in advance of submitting the final symposium application. However, full confirmation of speakers, and acceptance of symposia, will be provided after the January 2007 Program Committee meeting (organizers will be notified by February 28, 2007). The IAFP Program Committee reserves the right to review symposia, including proposed subjects and speakers, and make modifications in order to provide the most comprehensive and balanced program. Invited symposium speakers need to be aware of this when they are contacted.

WHO TO CONTACT:

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Symposium Proposal
IAFP 2007

July 8–11
Lake Buena Vista, Florida

Title: _____

Organizer's Name: _____

Committee or PDG Submitting Proposal: _____

Address: _____

Phone: _____ Fax: _____ E-mail: _____

Topic — Suggested Presenter, Affiliation (Example: 1. HACCP Implementation — John Smith, University of Georgia)

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

Suggested Convenors: _____

Topic Area:

- ❒ Food Safety/Microbial Quality (list commodities) _____
- ❒ Foodborne Viruses and Parasites
- ❒ Retail Food Safety
- ❒ Epidemiology and Public Health
- ❒ Food Safety (Non-Microbiology Issues)
- ❒ General – Advances in Technology Applications
- ❒ General – Emerging Issues
- ❒ Education
- ❒ Other _____

Attach a short statement describing the relevance of the symposium to IAFP attendees and how this symposium is unique compared to topics previously presented at IAFP 2006 and IAFP 2005.

Signature of Organizer: _____

Submit by August 7, 2006 to:

IAFP — Symposium Proposal
6200 Aurora Ave., Suite 200W
Des Moines, IA 50322-2864, USA

or

Submit in person during IAFP 2006
to the IAFP registration desk by
Tuesday, August 15, 2006 at 10:00 a.m.

or Contact:

Tamara Ford
International Association for Food Protection
6200 Aurora Ave., Suite 200W
Des Moines, IA 50322-2864, USA
Phone: 800.369.6337; 515.276.3344
Fax: 515.276.8655
E-mail: tford@foodprotection.org

NEW MEMBERS

AUSTRALIA

Jennifer M. Green
PathWest, Food Hygiene Lab
Nedlands

BRAZIL

Lina Aragon-Alegro
University of São Paulo
São Paulo

Cecilia Martins
University of São Paulo
São Paulo

Thais Santos
Food Technology Institute
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CANADA

Lindsay J. Arthur
Ontario Ministry of Agriculture, Food & Rural Affairs
Guelph, Ontario

Christine Barthe
Min. Agriculture, Pecheries Et Alimentation
Quebec

David Brookes
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University of Guelph
Owen Sound, Ontario

Kellie Jackson
Alberta Food Processors Association
Calgary, Alberta

Greg Kepka
Lakehead University
Thunder Bay, Ontario

Susan S. Lee
University of Guelph
Guelph, Ontario

Parthiban Muthukumarasamy
Canadian Meat Council
Ottawa, Ontario

Tina O'Rielly
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Guelph, Ontario

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Winnipeg, Manitoba

Lisa A. Weih
Fraser Health Authority
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bioMérieux
Marcy-L'Etoile

Raffaella Giardino
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Songnam-Si, Gyoungi-Do

Jong-Kyung Lee
Korea Food Research Institute
Gyunggi-do

Min Jeong Lee
Chung-Ang University
Ansung, Gyunggi-Do

Eun-Jeong Nam
Kyungpook National University
Daegu, Gyeonbuk

Ji-Hye Yeon
Chung-Ang University
Ansung, Gyunggi-Do

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University of Birmingham
Birmingham, West Midlands

Panagiotis Chanos
University of Lincoln
Lincoln

Hugh Griffiths
University of Wales Institute Cardiff
Cardiff, Wales

NEW MEMBERS

Andrew Hall
University of Wales Institute Cardiff
Cardiff, Wales

Karin Mehauden
University of Birmingham
Birmingham, West Midland

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ALABAMA

Shanta L. Adeeb
Tuskegee University
Tuskegee

George A. Baker
R. L. Zeigler Co., Inc.
Selma

CALIFORNIA

Wilfred A. Sumner
Scientific Certification Systems
Emeryville

GEORGIA

Dawn Dowell
AOAC International
Columbus

ILLINOIS

Camelia Grosulescu
Illinois Institute of Technology
Chicago

Akash Gupta
National Center for Food Safety & Technology
Summit-Argo

KANSAS

Michelle Roberts
Kansas State University
Manhattan

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Neogen Corporation
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Linda Xuan Peng
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Flint

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Chastity Nails
Plumrose USA
Booneville

MISSOURI

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Hermitage

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Lincoln

NEW YORK

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Cornell University
Geneva

NORTH CAROLINA

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WASHINGTON

Rebekah Burdick
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Lake Forest

Clandia Coles
Washington State Dept. of Agriculture
Olympia

WISCONSIN

Greg Schultz
Schweigert Foods
Green Bay

WYOMING

Jennifer Chase
University of Wyoming
Laramie

UPDATES

Leslie K. Thompson Joins Silliker

Leslie K. Thompson, Ph.D., has been named operations manager for the Silliker Food Science Center in South Holland, IL. In this position, she is responsible for laboratory products, methods development, lab quality assurance, and operations. Prior to joining Silliker, she served as a R&D project leader for International Fiber Corporation, a functional ingredients company.

Todd Dechter was appointed auditing account manager for Silliker, Inc. He previously worked for Qantas and TECRA International in Australia, and Mother Parkers Tea and Coffee and General Spice in the USA.

Dianne West was named auditing client service manager for Silliker, Inc. A member of the Homewood, IL-based organization since 2003, she previously served as a food safety manager for JR Simplot and food engineer for Yoplait.

Dr. Brian Farkas is New Associate Department Head at North Carolina State University

When Dr. Donn Ward was promoted to head for the department of food science, the position of associate department head became vacant. After careful consideration, Dr. Brian Farkas was selected to be the new associate department head. Dr. Farkas assumed leadership for the overall departmental teaching function. These responsibilities include being the department's "Teaching Champion" with respect to long-term planning, assessment and leading efforts for curriculum integration and coordination.

Glazer's Appoints Thom Rowen President for the State of Iowa

Glazer's president Jerry Cargill announced that Thom Rowen has been appointed president of Glazer's operations for the state of Iowa, effective June 1, 2006. He replaces Doug Howell, who has been appointed general manager for spirits in Louisiana.

Thom Rowen, currently general manager for Glazer's of Iowa's Pinnacle Division, has 18 years of beverage industry experience. Before coming to Glazer's in 2003, he was an area sales manager for both Canandaigua Wine Company and Seagram Beverage Company. He also worked for Coca Cola as an operational marketing manager. Rowen has a B.S. degree in business administration and management from Northern Arizona University.

Thomas E. Ferguson Elected President of the Hydraulic Institute

Flowserve Corp., a provider of fluid motion and control products and services, announces that Thomas E. Ferguson has been elected president of the Hydraulic Institute for 2006–2007. He will also serve as a member of the board of directors.

Mr. Ferguson, an industry veteran, is a vice president of Flowserve Corp. and president of Flowserve Pumps. He has more than 24 years of experience in the flow control industry, including more than 15 years with Flowserve and one of its predecessor companies, BW/IP International.

Prior to serving as president of Flowserve Pumps, a position he has held since 2003, Ferguson was president of Flowserve Flow Solutions. Before that, he spent nine years in various sales, marketing, technical and general management positions within Flow Solutions.

Ferguson began his career with BW/IP in 1987, where he held positions in sales and marketing in the seals and pump divisions. He has also held key positions in the oil-field services sector, including nine years in sales, marketing and technical roles with companies such as Nowsco Well Service, Ltd. (now part of BJ Services), BJ Hughes (now part of Baker Hughes), and Zwick Energy Research.

Ferguson holds a B.S. degree in industrial distribution and technology from Texas A&M University. He also attended the University of Southern California Executive Management Program.

Jeffrey Schlosser Joins Computerway Food Systems

Jeffrey Schlosser has joined Computerway Food Systems as a service engineer.

Mr. Schlosser is responsible for the installation and service of inline weighing, inventory control and scale labeling systems. He attended ECPI College of Technology. Mr. Schlosser served in the United States Air Force from 1994 to 1998.

Sargento Foods Names New Engineering Director and Senior Sales Manager

Sargento Foods Inc. has announced the promotion of Brian Kaufman, who is now the engineering director of Natural Cuts.

In this new position, the 44-year-old will manage anything that deals with natural cheeses from an engineering standpoint.

Before joining the Sargento family in 1996, Mr. Kaufman was a project engineer at Hayssen Packaging Machinery for 11 years. His previous role at Curt G. Joa Inc. was as an electrical project engineer for paper converting machinery.

Sargento Foods Inc. has also announced the hiring of Michael Lieber as senior sales manager in the Great Plains and Rocky Mountain regions.

Before joining the Sargento family recently, Lieber held a number of different roles during his 19 years of service at ConAgra Foods in Brookfield, WI. He also spent time at Beatrice Cheese (1987–91), The Masterson Company (1985–87) and Trinity Memorial Hospital (1983–85).

IZZE® Beverage Company Names John Bello Chairman of the Board

Founder and former CEO of SoBe John Bello, steps into leadership role at sparkling juice company IZZE Beverage Company to chairman of the board. Mr. Bello, who joined IZZE's board of directors in the fall of 2005, is also a partner with Sherbrooke Capital, the venture capital group that led the $6.35 million equity-financing round for IZZE in early 2005.

Bello is an operating partner at Sherbrooke Capital where he works directly with portfolio company management teams to formulate and execute strategy. In 1995, Bello founded South Beach Beverage Company, the maker of nutritionally enhanced teas and juices marketed under the brand name SoBe, where he was also CEO. The company was sold to PepsiCo in 2001 for $370 million. In 2001, Ernst and Young named Bello National Entrepreneur of the Year, in the Consumer Products category for his work with SoBe. Prior to founding SoBe, he spent 14 years at National Football League Properties, the marketing arm of the NFL. As president, Bello is credited with building NFL Properties into a sports marketing leader and creating the model by which every major sports league now operates. Bello holds an M.B.A. from the Amos Tuck School at Dartmouth College where he was an Edward Tuck Scholar, and graduated cum laude from Tufts University with a B.A. in history.

International Association for Food Protection® NEWS

Multnomah County, Oregon Selected 2006 Crumbine Award Winner

The Multnomah County, Oregon Environmental Health Services has been selected as the recipient of the 2006 Samuel J. Crumbine Consumer Protection Award for Excellence in Food Protection.

For over 50 years, the Crumbine Award, named for one of the United States most renowned public health sanitarians, has been presented to a local public health unit by a jury of leading environmental health officials and public health sanitarians and is the most prestigious recognition that a public health unit can receive. Crumbine winners serve as models for other public health and safety programs across the nation.

"Multnomah County's application exemplified what a local environmental health jurisdiction can do, in spite of limited resources, to properly respond to emerging environmental health needs of its community and to more effectively prevent foodborne illness," stated Ben Gale, director of the County of Santa Clara, CA, Department of Environmental (2003 Crumbine Award Winner) and chair of the 2006 jury.

Lillian Shirley, director of Multnomah County Health Department expressed her appreciation to be a recipient of the prestigious award on behalf of Multnomah County Envirormental Health, Environmental Health Specialists and other team members. "This award acknowledges our commitment to maximizing resources, preventing foodborne illness and protecting the public health of developing diverse and innovative approaches that meet community needs."

Multnomah County will receive the Crumbine Award at the Annual Education Confernece of the National Environmental Health Association, June 25–28 in San Antonio, TX.

The Crumbine Award is supported by 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., International Association for Food Protection, International Food Safety Council, National Association of County and City Health Officials, National Environmental Health Association, National Sanitation Foundation International and Underwriters Laboratories Inc.

Turkey Trips Don't Aggravate Contamination

When it's time to load the turkeys on the truck for the trip from the farm to the slaughter, they're not always happy travelers. But unlike hogs and broilers who make similar trips, the turkeys are not more contaminated with *Salmonella* after the journey.

To find out why, a Food Safety Consortium research team of Scott Hurd, Marcos Rostagno, Darrell Trampel and Irene Wesley at Iowa State University and the USDA-ARS National Animal Disease Center followed up on an earlier investigation.

The previous study, also conducted by ISU and NADC by Hurd, Rostagno and James McKean, demonstrated that lairage and transportation increase *Salmonella* prevalence in hogs.

"We started sampling turkeys on the farm before they went to slaughter," explained Wesley. "As birds were loaded they were crated and moved to the slaughterhouse. When the birds were transported and rested, just before they went to slaughter, we tested them again."

The researchers looked at the results before and after transport from six turkey farms. It turns out that upon arrival at the plant, the prevalence of *Salmonella* in the turkeys actually decreased (although not in statistically significant amounts), the opposite of what usually happens to their counterparts among broilers and hogs.

The researchers believe the difference in the results may be because turkeys remain in their transport crates but hogs are transported, unloaded and moved to holding pens.

"The hogs wait in the holding pen and rest there until it's their turn to go to slaughter," Wesley said. "And the holding pen was probably occupied by hogs shedding *Salmonella*. And those hogs go into the pen that's been contaminated. Therefore, they have a good opportunity to pick up *Salmonella*."

The turkeys don't mingle with each other during their journey. They stay in their crates until unloaded directly to the slaughter line at the processing plant, keeping them healthier. Wesley noted that the results indicate that with transportation and holding not a factor in turkeys' health, samples collected at the farm level will be an accurate measure of their overall health with regard to *Salmonella*.

The researchers did find an increase in *Campylobacter* among the turkeys following transport in the birds' crops and gall bladders. But transportation itself isn't necessarily the cause.

"When we went to abattoir I noticed that the gall bladders are going to rupture," Wesley said. "They're huge because the birds haven't eaten. I attribute the amount of *Campylobacter* in the gall bladder to the simple physical expansion of the gall bladder." As for the *Campylobacter* in the crop, Wesley said sampling of the birds may have inadvertently dislodged more of the bacterium that lives close to the crop's tissue.

"Any increased levels of *Campylobacter* in the turkeys could most likely be prevented by adding probiotics to the birds' feed a week before slaughter," Wesley explained.

Cryptosporidium Outbreak Linked to Interactive Water Feature, UK: Importance of Guidelines

A need for national guidelines relating to interactive water features was highlighted following three outbreaks of cryptosporidiosis in the United Kingdom, all of which were related to public water features. In August 2003 the Health Protection Agency South West of England was notified of an outbreak of cryptosporidiosis associated with an interactive water feature designed for water play within an adventure park. The water feature was implicated following samples with a high coliform count and the presence of fecal coliforms.

A case was defined as any child (younger than 16 years of age) who had visited the park during August and who subsequently had gastrointestinal symptoms and a fecal sample positive for *Cryptosporidium*. Seventy-one children were identified in the cohort.

This outbreak of cryptosporidiosis was characterized by a very high attack rate (89%), relatively severe in duration (median 8 days) and had a relatively high hospital admission (16% of cases). The epidemic curve was consistent with a point source of infection, which corresponded to the date 80% of the cohort visited the park. This outbreak has similarities to two other cryptosporidiosis outbreaks reported in England in 2003 that involved public water features. These outbreaks raise issues about the operation and maintenance of water-based recreational attractions that very often involve children. The paper reflects on the basic control measures that can be taken and highlights the need for guidelines, especially since such attractions are becoming increasingly common. The Pool Water Treatment Advisory Group has now produced guidelines.

Foodborne Illness Cost Calculator

The Economic Research Service (ERS) estimates of the costs of illness and premature death for a number of foodborne illnesses have been used in regulatory cost-benefit and impact analyses. Like all cost estimates, the ERS estimates include assumptions about disease incidence, outcome severity, and the level of medical, productivity, and disutility costs. Changes to any of these assumptions could change the cost estimates and, as a result, change the way policymakers rank risks, prioritize spending, and formulate food safety policies.

The Foodborne Illness Cost Calculator provides information on the assumptions behind foodborne illness cost estimates — and gives you a chance to make your own assumptions and calculate your own cost estimates.

Users can examine the impact of different assumptions on cost estimates and risk rankings, and change these assumptions to reflect any specific information about disease incidence, medical costs, productivity losses, or disutility. By changing the number of cases assumption, you can calculate the costs of foodborne illness for a particular state or region, or for a particular foodborne illness outbreak.

For more information, contact: Paul Frenzen, Web administration: webadmin@ers.usda.gov.

Industry Groups Release Lettuce Safety Guidance Document

In a joint effort to help the fresh produce industry ensure the highest levels of food safety, the International Fresh-cut Produce Association (IFPA), Produce Marketing Association (PMA), United Fresh Fruit & Vegetable Association (United) and Western Growers (WG) has released the Commodity Specific Food Safety Guidelines for the Lettuce and Leafy Greens Supply Chain.

Developed by a group of leading produce food safety experts and representatives of operations within the industry, the document provides food safety guidance for the entire lettuce and leafy greens supply chain, including production and harvest, postharvest, fresh-cut and value added, distribution, and end-user handling operations. The document identifies specific food safety guidance to lettuce growers, shippers, packers, processors,

transportation providers, retailers, and foodservice operators.

"United, PMA, IFPA, WG and our industry partners have made food safety our top priority. We are committed to continual improvement of produce safe-handling practices and suggest that all companies involved in the lettuce and leafy greens supply chain consider the recommendations contained within these guidelines," said Dr. Jim Gorny, vice president of quality assurance and technology for United and editor-in-chief of the guidance document.

IFPA, PMA, United, WG and industry partners also support educational outreach efforts to assure awareness and use of available lettuce and leafy greens food safety information. In addition, these leading produce trade organizations will work together to review and implement these and other important produce industry food safety guidelines.

"Our organizations are committed to the common goal of assuring consumer confidence in the safety of fresh fruits and vegetables. Everyone in the supply chain is responsible for food safety. Our industry takes this charge very seriously and is proud of the contribution we make to the health of consumers by providing foods that are not only safe but essential for good health," said Kathy Means, PMA vice president of government relations.

"With this unprecedented, collaborative effort among industry members, academic experts and government, the fresh produce industry has made important strides in food safety. We believe the development of these safe handling practices represents notable progress toward our goal of zero illnesses, and we will continue to work as a united industry to reach that target," said David Gombas, Ph.D., vice president of technical services for IFPA.

"This first edition of the Commodity Specific Food Safety Guidance is an important part of a comprehensive approach to further enhancing the safety of the food supply. Our trade associations are also collaborating to improve communication between government and industry food safety experts, bring meaningful education and outreach to the industry and support research to improve food safety. The guidelines are a living, breathing document and will be updated periodically to reflect changing industry practice or new scientific knowledge," said Hank Giclas, WG vice president, science and technology.

The document, Commodity Specific Food Safety Guidelines for the Lettuce and Leafy Greens Supply Chain, is available at www.fresh-cuts.org, www.pma.com, www.uffva.org and www.wga.com the respective Web sites of IFPA, PMA, United and WG.

Food Safety Experts Accuse the Media of Creating Food Scares

European food safety experts accuse the media of being solely culpable for producing a food scare or crisis. Consumers on the other hand appear less negative about media influences and motives.

Both groups believe that the media plays a crucial role in communicating food safety issues. These are some of the outcomes of a first study carried out by five European research institutes as part of the project SAFE FOODS, an EU-sponsored research project on food safety.

The research results will be published in *Appetite*, an international research journal specializing in behavioral nutrition. These results are based on a series of discussions with consumers and food safety experts in five countries (Denmark, Germany, Greece, Slovenia and UK). In the study participated: Wageningen University and Research Centre (WUR), The Netherlands; Agricultural University of Athens (AUA), Greece; Institute of Food Research (IFR), United Kingdom; The Royal Veterinary and Agricultural University (KVL), Denmark; Dialogik gGmbH, and Germany.

The results show that food safety experts believe that the media functions too much as "agenda setter," focusing on food safety problems for a period of time and then letting these fade away, causing consumers to think they are no longer pertinent.

Another result is that the public is suspicious of how priorities are set in food risk management. Consumers are concerned that economic interests prevail over consumer health. An example is BSE, where both experts and consumers argued that the primary motivation of politicians was to protect export markets.

The general feeling within the expert community is that consumers lack essential knowledge about a variety of food-related issues. Hence, during the discussions, they often stressed the importance of consumer education. Consumers on the other hand already reported an information overload.

USDA-ARS Microbial Food Safety Unit Receives FPA Food Safety Award

The United States Department of Agriculture-Agricultural Research Service (USDA ARS) Microbial Food Safety Research Unit (MFS) is the 2006 recipient of the FPA Food Safety Award, in recognition of its dedication and many contributions to improving food safety.

The purpose of FPA's Award is to honor individuals or organizations who have demonstrated a long-standing commitment to improving the safety of food. The

recipient of this award must possess at least 10 years of service in the food safety arena and have successfully demonstrated sustained contributions in research, education and information transfer. In addition, the recipient must display innovative and effective strategies to promote a safer food supply while solving significant food safety problems.

MFS is recognized as one of the premier food safety research groups in the world. This highly productive unit of USDA ARS includes a staff of 18 Ph.D.-level scientists and 35 support scientists that have generated over 400 publications, including 150 peer-reviewed research papers over just the past four years. MFS has a long history of providing both regulatory agencies and industry with key research that has been critical to advancing food safety in the US.

The Pathogen Modeling Program (PMP) is an example of the pivotal work MFS has done in food safety research. MFS scientists developed a user-friendly PMP that enables food processors to assess the microbial risks of a food and estimate consequences of process failures. An estimated 30% of the US food industry now uses this PMP to help further ensure the safety of newly formulated products.

MFS was a pioneering force in studying the ecology of *Listeria monocytogenes* in frankfurter processing facilities and in exploring potential solutions for minimizing its growth. The MFS has also conducted groundbreaking studies to help sequence the genome of *L. monocytogenes*, which will help scientists determine how the organism causes illness as well as how to better control this pathogen.

"FPA is proud to recognize the considerable contributions the Microbial Food Safety Research Unit has made to food safety," said Dr. Craig Henry, FPA's senior vice president of scientific and regulatory affairs and chief science officer. "On behalf of FPA and all our members, I congratulate MFS for the tremendous work it has done, and continues to do, to help enhance the safety of our food supply."

Third-party Auditing Programs Significantly Reduce Chance of Foodborne Illness at Restaurants, Steritech Study Shows

In conjunction with the start of the restaurant industry's largest trade show, the National Restaurant Association's Restaurant, Hotel & Motel Supply Show, The Steritech Group, Inc. has released its annual Food Safety Audit Trend Report, an in-depth third-party study of food safety practices at over 800 restaurants across the United States. The full report was released to the public on Steritech's Web site on May 19th.

"Our research continues to show exciting improvements in restaurant food safety. Operators are discovering the value of rigorously measuring and managing food safety and quality at the restaurant level and all the way up through the supply chain," said Mark Jarvis, chief executive officer of Steritech.

The Food Safety Audit Trend Report is a review of audit data from a group of 807 full-service restaurant locations. The research tracks improvement over the course of a year, based on results from an initial audit and a follow-up audit a year later. The standard audit format used in this research conforms closely to The US Food and Drug Administration (FDA) Food Code.

The study evaluates the practices associated with 7 major categories, 5 of which have been used by the FDA in similar studies. Data are grouped according to the US Centers for Disease Control and Prevention's (CDC) ranking of those factors most commonly associated with foodborne illness outbreaks: (1) improper holding temperature; (2) poor personal hygiene; (3) inadequate cooking; (4) contaminated equipment; and (5) food from unsafe sources. In addition, the study presents data in two other categories: (1) other critical issues; and (2) non-critical issues. In total, the research reviews 24 critical line items – those practices or behaviors that could lead directly to foodborne illness – and 12 non-critical items – those that are not likely to cause foodborne illness directly but indicate an area of concern.

This year's study also incorporates data that tracked the time of day when violations occurred and revealed several interesting trends.

Overall, the report shows improvement in 30 of 36 of the line items, with substantial decreases in violations in many areas, substantiating the benefits of establishing a formalized food safety program that places emphasis on educating employees on corrective actions. In three line items, no change was reported. A few of the notable results are listed below.

Critical Violations

- A 39.8% decrease in the potential for contamination of food, a line item that deals with the reduction of the likelihood of cross-contamination between raw and ready-to-eat foods and other types of potential contamination.
- A 33.8% decrease in the number of violations of resulting from improper handwashing practices.
- A 29.4% decrease in the number of violations related to food contact surfaces and utensils being in good condition.

Non-Critical Violations

- A 26.7% decrease in violations of potentially hazardous foods being thawed properly.

- An 18.4% improvement in in-use utensils being properly handled and stored.
- A 13.8% reduction in violations related to the proper stocking and condition of handwashing facilities.

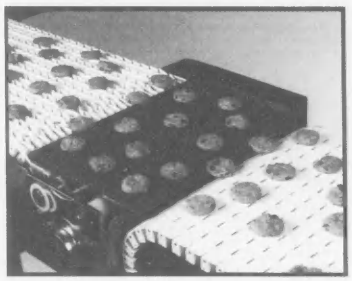
Several other trends deserve attention, including the substantial number of violations for cold potentially hazardous food being held at temperatures higher than 41°F. While a small improvement was noted in this area, just under 50% of locations experienced a violation related to this issue. In addition, the holding of hot potentially hazardous foods was an area in which violations actually increased in the study. These results suggest that further worker education and management engagement are needed to correct holding temperature issues. Improper holding temperature is the number one factor most commonly associated with foodborne illness, according to the CDC.

Handwashing and maintaining adequate handwashing facilities both remain important challenges for food establishments, as data from the study reveals. However, many of the line items associated with handwashing and handwashing facilities experience dramatic decreases with the implementation of a food safety program, indicating that education can play a significant role in reducing these types of violations. An uptick in outbreaks associated with norovirus proves that these issues are not far from the spotlight, however, and food-service operators must remain diligent in enforcing proper handwashing practices.

The time of day study revealed a marked increase in several critical violations in later parts of the day. Again, improper holding temperatures topped the list, with the percentage of violations of both cold and hot holding of potentially hazardous foods increasing during audits performed in the lunch, afternoon and evening time periods. The overall percentage of violations increased during later audit times in the areas of handwashing and handwashing facility maintenance, storage of chemicals, potential for contamination of food, and proper storage of clean utensils.

"Consumer confidence has been shaken by widespread and growing public health concerns. Restoring confidence is the shared responsibility of all restaurant operators, and clearly there is progress being made," says Jarvis.

INDUSTRY PRODUCTS



SpanTech LLC

SpanTech's MicroSpan® Transfer, the Powered Plastic Chain Transfer That Provides Smoother Product Transport Than Roller Transfers

SpanTech LLC offers the MicroSpan® Transfer as an alternative to roller transfers. This powered transfer features a tight-knit MicroSpan® chain providing a stable, flexible base for the smooth transport of even small, delicate products. It maintains product orientation and has a maximum speed of 140 feet per minute. The stainless steel construction along with the MicroSpan® plastic chain is ideal for washdown applications and can be either slave-driven by another conveyor or independently driven. Both ends of the transfer have a profile height of just 14 mm (.55 inches) so smooth transfers are assured. Plus, because it is sprocket-driven, there are no tracking problems as with standard belt-type conveyors. Multiple chain widths are available for a variety of applications.

SpanTech LLC
270.651.9166
Glasgow, KY
www.spantechllc.com

DuPont Crop Protection Announces New Tool to Help Food Chain Partners Find Solutions

DuPont Crop Protection has announced the formation of DuPont™ SmoothTrade™ Solutions, a new and innovative information tool for partners in the food supply chain. This tool is a cutting-edge resource which provides answers to questions on residues, maximum residue levels (MRLs), and the best crop protection solution for a given crop and environment. The SmoothTrade™ Solutions provides growers and exporters with MRL and residue information to support their crop protection decisions.

The electronic mail address is smoothtrade@fra.dupont.com. Send a question and the DuPont Crop Protection Team of agriculture experts will provide an answer quickly and free of charge. Potential users include farmers, distributors, retailers, importers, exporters, media and regulatory agencies.

DuPont Crop Protection
302.999.5393
Wilmington, DE
www.dupont.com

High-density Floor-Trak™ System from Eagle

Eagle Foodservice Equipment's High-Density Floor-Trak™ System is a versatile track-and-skate system that enables foodservice operators to consolidate and optimize the storage of foodstuffs and other items.

The system is easy to install and is designed to accommodate most popular makes and brands of wire shelving products (post heights up to 86 inches) or high density polymer LIFESTOR® shelving units. The LIFESTOR® high-density polymer shelf sections feature MICROGARD®, an antimicrobial agent that retards the growth of bacteria, mold and mildew on shelf services.

The low-profile, non-corrosive roller track is constructed of ultra-durable stainless steel and high-performance anodized aluminum components. Industrial-grade bearings allow loaded shelving units to glide effortlessly over the tracks for smooth sailing each time, every time. Specially engineered shock-absorbing end-stops ensure that the shelving is always securely braked at the end of the track line. The system's open construction easily accommodates for the use of cart covers, if desired.

Eagle's new Floor-Trak™ system easily accommodates the installation of add-on tracks and shelving units as storage requirements grow. The systems can also be doubled up end-to-end without impeding rollability.

Eagle Foodservice Equipment
800.441.8440
Clayton, DE
www.eaglegrp.com

Hoffman Expands Washdown Enclosure Line with 304 Stainless Steel Ceiling-Mount

Hoffman continues its product innovation to serve the needs of food and beverage processors by offering a new 4X stainless steel ceiling-mount enclosure. This enclosure is specifically designed to eliminate pooling water that may harbor con-

Be sure to mention, "I read about it in *Food Protection Trends*"!

taminants that could negatively impact a food or beverage processing operation.

"Since the introduction of WaterShed®, Hoffman has had a special interest in providing outstanding equipment protection solutions to withstand food and beverage processing harsh environments," noted Mark Saunders, Hoffman product manager. "The introduction of the Ceiling-mount Enclosure addresses a long-held concern that cleaning fluids become trapped in traditional ceiling-mounted JIC enclosures. Because these enclosures are typically high above the production floor, they're difficult to physically inspect to ensure no fluids can accumulate and provide breeding areas for germs and bacteria."

The Ceiling-mount Enclosure incorporates a unique cover design that eliminates pooling liquids, speeding line changeovers and reducing the opportunity for contamination. Additionally, captivated screw covers provide a smoother surface than typical clamp cover enclosures, supporting a more thorough washdown. Constructed of 304 stainless steel, this enclosure features foam-in-place gasketing and sealed screw wells to assure a UL Type 4X seal.

"Balancing the need for equipment protection and sanitation has been a challenge for many manufacturers," noted Saunders. "With the introduction of the Ceiling-mount Enclosure, food and beverage manufacturers can feel confident that their lines can operate trouble free, because the controls are well protected and potential contamination is minimized."

Hoffman
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Anoka, MN
www.hoffmanonline.com

ATS Rheosystems

New Twin Bore Capillary Rheometer

The new RheoCapillary from ATS RheoSystems is one of the most technically advanced laboratory capillary rheometers for the determination of the flow behavior of a wide range of materials and the benefits of a twinbore system.

The computer-controlled instrument offers testing abilities to measure shear viscosity, extensional viscosity, wallslip, melt fracture and rupture with a variety of dies and accessories.

The two-level software offers standard test control functionality as well as scientific evaluation capabilities for a better understanding of the data. Its ergonomic design allows easy access and experimentation.

The Twin Bore Design allows fast measurements and high flexibility. The RheoCapillary showed the best precision in round robin tests (NPL London). High Precision is achieved through the use of tungsten carbide dies, multi-point calibration and high precision transducers and amplifiers.

Also featured are Extensional Viscosity Measurement by convergent flow, hyperbolic die or precision-melt strength system with optional extrudate profile measurement. In addition, High Temperature Uniformity is maintained across the entire two samples.

ATS Rheosystems
609.298.2522
Bordentown, NJ
www.atsrheosystems.com

Flowserve Introduces the IPS Tempo Intelligent Pump System

Flowserve, a provider of fluid motion and control products and services, has introduced IPS Tempo™, a pre-engineered intelligent pump optimization, control and protection system. Designed by the rotating equipment experts at Flowserve, IPS Tempo improves performance, lowers total cost of ownership, reduces power consumption up to 50 percent, and improves Mean Time Between Repair (MTBR).

IPS Tempo helps eliminate costly downtime and expensive repairs caused by dry running, blocked lines, pump overloads, closed suction or discharge valves, cavitation, and excessive wear or rubbing. Users can program IPS Tempo to respond to process and condition variables to protect pump equipment against adverse operating conditions, thereby optimizing plant output and pump availability and lowering total cost of ownership.

IPS Tempo adjusts pump operations for flow, pressure, temperature, and fluid level changes. The system monitors process variables and pump power, and offers extensive condition monitoring and control.

IPS Tempo incorporates variable frequency drive (VFD) technology, pump-specific optimization software, an industrial grade electric drive, and an intuitive menu-driven user interface to provide superior protection, reliability, and the ease of use not possible with other VFDs or pump control systems. It integrates a unique, pump-specific user interface, a quick-start setup and configuration, soft-start and soft-stop capability, and pre-engineered pump protection features into one complete and easy-to-use package.

IPS Tempo features the most common pump-specific parameters built into its setup, including capacity and head, making implementation fast, reliable and easy. Users can configure IPS Tempo in less than 30 minutes, a fraction of the time it would take to set up a typical VFD.

IPS Tempo is ideal for critical pump applications as well as ones with varying system parameters, such as tank car unloading and multi-service pumps. Applicable markets include chemical, petrochemical, refining, water, mining, and general industry.

Flowserve Pumps
800.728.PUMP
Dallas, TX
www.flowserve.com

2 Torr Chemical Duty Programmable Self-Cleaning Dry Vacuum System

Welch introduces the latest in dry vacuum pump and vacuum control technology for your laboratory. The new intelligent self-cleaner is a fully integrated vacuum pump and controller. The intuitive design incorporates a numeric keypad and electronic variable control valve for precise/reproduceable vacuum control with

Gardner Denver Welch Vacuum Technology

programmable dual set points, timer, memory, repeat and anti-bumping functions. The corrosion-resistant PTFE (oil-free) diaphragm pump and distinctive self-cleaning purge that automatically runs for two minutes at shutdown to rid the pump of residue — ensures longer diaphragm service life and reduced downtime by cleaning the pump at the correct time… when the process is finished.

Welch's new *walk-away* 2 Torr Self-Cleaning Dry Vacuum System is ideal to use with a rotary evaporator for stripping high-boiling-point solvents <160°C such as DMF or low-boiling point solvents such as methylene chloride when using the integrated vacuum controller.

The system's patent-pending two-stage, flexible diaphragm pump resists chemical vapors thanks to fluorinated plastics used on all wetted surfaces—including the diaphragm itself.

This pump is oil-free yet delivers a vacuum to 2 Torr (2.7 mbar, 266 Pa) with a free air displacement of 35L/min. (1.2 CFM).

The Programmable Self-Cleaning Dry Vacuum System is fully equipped with several added protective features. Features include a glass inlet separator that helps prevent the pump from ingesting liquids or particulates; a fully integrated vacuum controller that can store up to five program settings to allow hand free operation; and an exhaust separator that collects any liquid droplets or particulates flushed from the pump during the purge cycle.

An adjustable vacuum control knob, numeric key pad and up/down arrows ensure precise vacuum control. A feature especially useful when pumping low-boiling point solvents to minimize foaming or bumping within a flask is the one touch bumping/anti-foaming button.

System includes easy-to-read lighted display screen, ease of use control knob and numeric key pad to quickly set and forget in either auto or manual modes, an intake and exhaust capture jars, and an automatic fresh air purge that cleans the system after each use and extends the life of the diaphragms.

Gardner Denver Welch Vacuum Technology
847.676.8800
Skokie, IL
www.welchvacuum.com

PBI-Dansensor Metallized Film for Packaging Food and Pharmaceutical Products is More Easily Tested to Meet Specific Barrier Properties Desired

While packagers generally agree that metallized films provide superior barrier properties, developing the appropriate barrier structure to handle a specific product requires extensive testing. Dr. Wolfgang Decker of VAST Films, utilizes the LYSSY oxygen and water vapor tester from PBI-Dansensor to assure that the film, like a finely tuned instrument, is adjusted to provide optimum barrier characteristics.

Be sure to mention, "I read about it in *Food Protection Trends*"!

Content and characteristics of the product determine the level of barrier required. The packager must select a particular film based on how it achieves the barrier level desired. With the increase in Modified Atmosphere Packaging (MAP) metallized films prevent changes in flavor and texture of fully cooked and partially prepared foods, which require protection to avoid becoming spoiled, stale or rancid.

While some products require an oxygen-free barrier, others need a moisture-free barrier, and still others seek a controlled transmission rate of oxygen, moisture or both. Dr. Decker, a pioneer in developing new barrier material applications, depends on PBI-Dansensor LYSSY OPT 5000 oxygen tester and the PBI-Dansensor L-80 moisture vapor permeability tester for fast, accurate, reproducible readings from a single sample.

"When testing metallized film for packaging food or pharmaceutical products," Dr. Decker notes. Results are 20 to 30% faster for testing high barrier materials on the LYSSY moisture tester because it doesn't require equalization. And the testing range is much larger–higher in permeability for higher sensitivity testing. We also do low barrier tests, especially for produce items in which we seek films with high permeability of oxygen. Other equipment offered range limitations that are no problem to the PBI-Dansensor equipment.

The high sensitivity, versatility and ease of use make the OPT-5000 Oxygen Permeability Tester especially well-suited for laboratory tests. An operator inserts the sample and selects a test program from the touch-screen to get a real-time oxygen transmission rate (OTR) reading. There is no need for grease or other messy, difficult-to-handle lubricant fixatives.

PBI-Dansensor America, Inc.
201.251.6490
Glen Rock, NJ
www.pbidansensor.com

Advanced Instruments

Advanced Instruments' Fluorophos Test System Gains Unanimous Approval as Full International Standard Method – IDF 155, ISO 11816, and CEN

Advanced Instruments' Fluorophos® Test System – a rapid, extremely sensitive fluorimetric method for assessing alkaline phosphatase (ALP) in milk and milk products – has received unanimous approval as a full international standard method by The International Dairy Federation (IDF 155), the International Standards Organization, (ISO 11816), and CEN European Standards Organization.

As a result, the Fluorophos Test System is today the only 3-minute fluorimetric method with multiple international approvals for accuracy over a range of ALP levels, including low values, for milk from cows (whole, semi-skimmed, skimmed and flavored) as well as from sheep and goats.

The approvals are the result of an extensive 3-year study that included the circulation of samples to thirteen laboratories from seven countries – USA, UK, France, Norway, Italy, The Netherlands and Switzerland. The final standards awarding the Fluorophos Test System the international approvals were published in April.

Many processors use the Fluorophos system to test pasteurized milk on an hourly basis to consistently demonstrate very low ALP values and show that the milk has been properly pasteurized and not re-contaminated by raw milk. The system can be used to monitor and verify pasteurizer performance over time, giving plant managers an early warning and detection system to reduce unnecessary maintenance expenses.

The Fluorophos system provides sensitivity to 0.003% raw milk. Unlike the Scharer method of visual ALP colorimetric testing (which no longer complies with US Food and Drug Administration pasteurization testing requirements), the Fluorophos test monitors the pasteurization of many different dairy products, including cow, sheep, and goat milk, flavored and cultured products, and cheeses. The instrument is robust, the cost per test is low, and the system comes equipped with stable, assayed calibrators and quality control materials to assure optimal method performance. The system is also approved by the Interstate Milk Shippers and AOAC.

The results of the seven-countries study was published in the *Journal of Food Protection*, 68(5), 2005, pp.1047–1053, (Harding F. & Garry E., Collaborative evaluation of a fluorimetric method for measuring alkaline phosphatase activity in cow's, sheep's and goat's milk).

Advanced Instruments
781.320.9000
Norwood, MA
www.aicompanies.com

Be sure to mention, "I read about it in *Food Protection Trends*"!

Committee Meetings

Sunday, August 13

TIMES	COMMITTEE MEETING	ROOM
7:00 a.m. – 10:00 a.m.	Affiliate Council	Stephen
8:00 a.m. – 5:00 p.m.	Committee on Control of Foodborne Illness	Walker
9:00 a.m. – 11:00 a.m.	Applied Laboratory Methods	Imperial 8
9:00 a.m. – 11:00 a.m.	Beverage	Imperial 9
9:00 a.m. – 11:00 a.m.	Food Safety Education	Imperial 6
9:00 a.m. – 11:00 a.m.	Viral and Parasitic Foodborne Disease	Imperial 2
9:00 a.m. – 11:00 a.m.	Food Toxicology and Food Allergens	Imperial 3
10:00 a.m. – 12:00 p.m.	3-A Committee on Sanitary Procedures	Imperial 1
10:00 a.m. – 12:00 p.m.	*JFP* Management	Imperial 4
10:00 a.m. – 12:00 p.m.	Microbial Risk Analysis	Imperial 7
10:00 a.m. – 12:00 p.m.	Retail Food Safety and Quality	Imperial 5
11:00 a.m. – 12:00 p.m.	Awards	Imperial 2
11:00 a.m. – 12:00 p.m.	Constitution and Bylaws	Imperial 3
12:00 p.m. – 1:30 p.m.	Student	Stephen
1:00 p.m. – 3:00 p.m.	Audiovisual Library	Imperial 1
1:00 p.m. – 3:00 p.m.	Food Law	Imperial 9
1:00 p.m. – 3:00 p.m.	Fruit and Vegetable Safety and Quality	Imperial 8
1:00 p.m. – 3:00 p.m.	Seafood Safety and Quality	Imperial 2
1:00 p.m. – 3:00 p.m.	Food Hygiene and Sanitation	Imperial 7
2:00 p.m. – 4:00 p.m.	Dairy Quality and Safety	Imperial 3
2:00 p.m. – 4:00 p.m.	*FPT* Management	Imperial 6
2:00 p.m. – 4:00 p.m.	Meat and Poultry Safety and Quality	Imperial 5
2:00 p.m. – 4:00 p.m.	Water Safety and Quality	Imperial 4
3:00 p.m. – 4:30 p.m.	Foundation	Imperial 7
3:30 p.m. – 4:30 p.m.	Nominating	Imperial 9

*See Program Book for final schedule

The IAFP Committee Meetings are open for everyone to attend!

SATURDAY, AUGUST 12

TIMES	COMMITTEE MEETING	ROOM
3:00 p.m. - 4:00 p.m.	Past Presidents'	Walker
3:00 p.m. - 4:30 p.m.	Membership	Bannerman

IAFP 2006
93rd Annual Meeting
August 13-16
Calgary
Alberta Canada

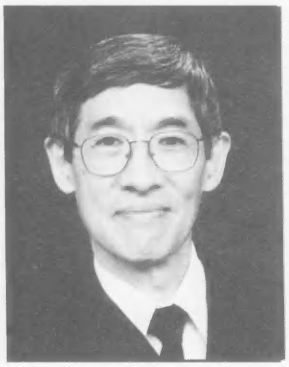
Ivan Parkin Lecture

Sunday, August 13
6:00 p.m.

"A Progress Paradox: If We Have the Safest Food Supply, Why am I Working so Hard?"

Dr. Arthur P. Liang

Acting Associate Director for Food Safety
National Center for Zoonotic, Vectorborne, and Enteric Diseases
Centers for Disease Control and Prevention
Atlanta, Georgia



Dr. Arthur Liang is director of the Food Safety Office, at the Centers for Disease Control and Prevention, National Center for Infectious Diseases (CDC/NCID). He is a former CDC Epidemic Intelligence Service officer and former chief of the Communicable Disease Division at the Hawaii Department of Health. Dr. Liang currently serves on the Executive Committee of the National Advisory Committee on Microbiological Criteria for Foods (NACMCF) and is the CDC advisor to the Board of Directors of the Association of Food and Drug Officials (AFDO). He is also a member of the Preventive Medicine Residency Advisory Committee for the Walter Reed Army Institute of Research, a fellow and member of the Board of Regents of the American College of Preventive Medicine. He is board certified in General Preventive Medicine and Public Health. Dr. Liang earned his BA from Oberlin College, an MPH in International Health and Epidemiology from the University of Hawaii, and his MD from the University of Maryland.

Join us at the Wine and Cheese Reception in the Exhibit Hall following the Ivan Parkin Lecture.

(The Wine and Cheese Reception is sponsored by Kraft Foods)

IAFP 2006
93rd Annual Meeting
August 13-16
Calgary
Alberta Canada

John H. Silliker Lecture

Wednesday, August 16
3:45 p.m.

"Rising From the Ocean Bottom – The Evolution of Microbiology in the Food Industry"

Dr. William H. Sperber

Senior Corporate Microbiologist
Cargill, Inc.
Wayzata, Minnesota

On a wintry Wisconsin afternoon in 1941, a future microbiologist drew his first breath and cried, "I hope you washed your hands!" Some years later, after completing undergraduate majors in zoology and chemistry, William Sperber earned his M. S. (1967) and Ph.D. (1969) degrees in microbiology from the University of Wisconsin at Madison. In his subsequent employment with major food companies he has become one of the world's experts in designing and controlling the microbiological safety and quality of foods.

Several of Dr. Sperber's innovations in graduate school were the development of M-Broth and the Enrichment-Serology procedure for *Salmonella* detection, which became a forerunner of ELISA-based technologies. At Best Foods in 1970, twelve years before the Tylenol® incident, he led the development of the first tamper-evident packaging feature for a consumer food product. Hired in 1972 to conduct the first hazard analyses for consumer food products in Pillsbury's novel HACCP system, Dr. Sperber led Pillsbury's microbiology and food safety programs until 1995. At that time he joined Cargill, where he remains employed today on a post-retirement basis as Senior Corporate Microbiologist and "Global Ambassador for Food Safety," promoting principles of food safety and public health, beginning with the most important principle, "Wash Your Hands!"

A former chair of the IFT Division of Food Microbiology and the Food Microbiology Research Conference, Dr. Sperber was appointed five times by the US Secretary of Agriculture to the National Advisory Committee on Microbiological Criteria for Foods. The author of numerous publications and presentations, he is currently developing several book chapters and co-editing a new Compendium on the Microbiological Spoilage of Foods and Beverages, still "trying to make the world safer for people who eat." Bill and his wife, Renate, enjoy gardening, bicycling, books, music, and travel.

IAFP 2006 Preliminary Program

SUNDAY EVENING, AUGUST 13

6:00 p.m. – 7:00 p.m.

OPENING SESSION –*Macleod ABC*

Ivan Parkin Lecture – A Progress Paradox: If We Have the Safest Food Supply, Why am I Working So Hard?
Dr. Arthur P. Liang, Acting Associate Director for Food Safety, National Center for Zoonotic, Vectorborne, and Enteric Diseases, Centers for Disease Control and Prevention, Atlanta, GA.

Wine and Cheese Reception to follow in the Exhibit Hall.

MONDAY MORNING, AUGUST 14

8:30 a.m. – 12:00 p.m.

S01 Making Foods Safer: How Outbreaks Can Influence Change
Macleod A
Organizer: Ben Chapman
Convenors: Ben Chapman and Laura Bauermeister

8:30 Lessons Learned from Outbreak Investigations: Barriers and Management Suggestions — JACK GUZEWICH, FDA-CFSAN, College Park, MD, USA

9:00 Food Safety in the US: Does Litigation Help? — WILLIAM MARLER, Marler Clark LLP PS, Seattle, WA, USA

9:30 Cleaning Up After an Outbreak: A Case Study of an Industry Response — CHRISTOPHER LEE, Dickie, McCamey & Chilcote, P.C., Pittsburgh, PA, USA

10:00 Break

10:30 Preventing Outbreaks: Creating a Culture of Food Safety — STEVEN GROVER, Burger King Brands, Miami, FL, USA

11:00 Post-Outbreak Consumer Fallout — CHRISTINE BRUHN, University of California-Davis, Davis, CA, USA

11:30 What Makes a Good Story? Media Reaction to Outbreaks — DOUG POWELL, University of Guelph, Guelph, ON, Canada

11:45 Panel Discussion

S02 Bacterial Resistance to Antimicrobials: Current Trends and Future Perspectives
Macleod BC
Organizers: Sadhana Ravishanker and Vijay Juneja
Convenors: Sadhana Ravishanker and Vijay Juneja

8:30 Antimicrobial Resistance in Bacteria–A Global Issue — DAVID WHITE, FDA-NARMS, Laurel, MD, USA

9:00 Incidence of Antimicrobial Resistant Pathogens in Ready-to-Eat Foods — PAULA CRAY, USDA, Athens, GA, USA

9:30 Mechanisms of Antimicrobial Resistance in Bacteria — SIDDHARTHA THAKUR, FDA Center for Veterinary Medicine, Laurel, MD, USA

10:00 Break

10:30 Detection Methods for Testing Resistance/ Susceptibility Genes in Bacteria — YANHONG LIU, USDA-ARS-ERRC, Wyndmoor, PA, USA

11:00 Antibiotic Resistance of Bacteria in Meat Animal Species — KENNETH BISCHOFF, USDA-ARS-NCAUR, Peoria, IL, USA

11:30 Potential for Resistance to Antimicrobial Hurdles — JOHN SOFOS, Colorado State University, Fort Collins, CO, USA

S03 The Canadian Approach to Food Safety
Macleod D
Organizer: Albert Chambers
Convenors: Dawn Lawrence and Heather Holland

8:30 The Canadian Approach to On-Farm Food Safety – An Overview — DAWN LAWRENCE, Canadian Quality Assurance-For Canadian Hog Producers, Eatonia, SK, Canada

9:00 Developing an On-Farm Food Safety Program – Aquaculture — MELISSA STRUTHERS, Canadian Aquaculture Industry Alliance, Torbay, Newfoundland, Canada

9:30 Implementing an On-Farm Food Safety Program – The Canadian Milk Quality Program — BILL LAING, Canadian Quality Milk Coordinator–Alberta, Edmonton, AB, Canada

10:00 Break

Subject to change

10:30 Developing a HACCP-based Food Safety Program for Retail Outlets — JUSTIN SHERWOOD, Canadian Council of Grocery Distributors, Calgary, AB, Canada

11:00 Implementing the Repacking and Wholesale Food Safety Program for Fresh Fruits and Vegetables — HEATHER HOLLAND, Canadian Produce Marketing Association, Ottawa, ON, Canada

11:30 Official Recognition of HACCP-based Programs — WARREN SMANDYCH, Canadian Food Inspection Agency, Calgary, AB, Canada

S04 Verification of Sanitary Design of Food Equipment
Glen 201–202
Organizers: Ron Schmidt and Philip Wolff
Convenors: Ron Schmidt and Philip Wolff

8:30 United States Third Party Standards and Auditing Programs — F. TRACY SCHONROCK, 3-A Steering Committee Chair, Fairfax Station, VA, USA

9:00 European Third Party Standards and Auditing Programs — JOHN HOLAH, Campden & Chorleywood Food Research Association, Gloucestershire, UK

9:30 FDA Standards and Auditing Programs — STEVEN SIMS, US-FDA-Milk Safety Branch, College Park, MD, USA

10:00 Break

10:30 USDA Standards and Auditing Programs — PHILIP WOLFF, USDA-AMS-Dairy Grading Branch, Washington, D.C., USA

11:00 Role of Equipment Desing in HACCP Programs — PAT JOHNSON, Ontario Ministry of Agriculture, Food and Rural Affairs, Guelph, ON, Canada

11:30 Panel Discussion

S05 Practical Risk Assessment in the Food Industry
Glen 203–204
Sponsored by The IAFP Foundation
Organizers: John Bassett and Trish Desmarchelier
Convenors: John Bassett and Trish Desmarchelier

8:30 Opportunities Provided by Risk Assessment–A Dairy Industry View— MICHAEL DONKIN, Fonterra Co-operative Group Ltd., Palmerston North, New Zealand

9:00 Assessing Risk Industry Wide – The Meat Industry as an Example — JOHN SUMNER, IAN JENSON, Meat & Livestock Australia, North Sydney, NSW, Australia

9:30 Practical Tools for Achieving High Food Safety — ALEJANDRO MAZZOTTA, McDonald's Corporation, Oak Brook, IL, USA

10:00 Break

10:30 Specific Product and Process Microbiological Risk Analysis — ROY P. BETTS, Campden & Chorleywood Food Research Association, Gloucestershire, UK

11:00 Raw Material Risks and Specifications — TIM JACKSON, Nestec Ltd., Vevey, Switzerland

11:30 Optimizing Thermal Processing Using Risk Assessment Techniques — JOHN BASSETT, Unilever Colworth, Sharnbrook, UK

T01 Applied Laboratory Methods and Meat and Poultry Technical Session
Glen 206
Convenors: Tubby Veary and Julian Cox

T1-01 8:30 Enrichment Protocols Containing Specific Bacteriophage Reduce False Positive and Negative Results in Food Pathogen Detection Methods — JAMES W. STAVE, Meredith Sutzko, and George B. Teaney, Strategic Diagnostics Inc., Newark, DE, USA

T1-02 8:45 Enrichment Time, Media Ratios, and Immuno-magnetic Separation as Factors in the Rapid Detection of Very Low Levels of *Escherichia coli* O157:H7 in 375 g Trim Samples — F. MORGAN WALLACE, Bridget Andaloro, H. Kirk White, and Lance Bolton, DuPont Qualicon, Wilmington, DE, USA

T1-03 9:00 Comparison of Two Enrichment Broths for the Recovery of *Campylobacter* spp. from Carcass Rinses from Several Commercial Processing Plants — J. STAN BAILEY, Paula J. Fedorka-Cray, L. Jason Richardson, Nelson A. Cox, Mark A. Harrison, and Julian M. Cox, USDA-ARS, Athens, GA, USA

T1-04 9:15 A New Immunochromatographic Strip-based Method for the Determination of *Salmonella* in Meat and Poultry — MARK T. MULDOON, George B. Teaney, Jingkun Li, Dale V. Onisk, Tony Joaquin, Yichun Xu, and James W. Stave, Strategic Diagnostics Inc., Newark, DE, USA

T1-05 9:30 Detection of *Salmonella* in Chicken Carcass Rinses Using a Chromogenic Agar Plating Medium — JULIAN COX and Stan Bailey, The University of New South Wales, Sydney, NSW, Australia

T1-06 9:45 Evaluation of the Oxoid Biochemical Identification System (OBIS) *Salmonella* Colony Confirmation Test for Use in Veteriary Laboratories — ROB DAVIES, Malcolm Taylor, and Kath Speed, Veterinary Laboratories Agency – Weybridge, New Haw, Addlestone, Surrey, UK

10:00 Break

T1-07 10:30 Validation of a New Alternative Automated Immunoassay Method for the Simultaneous Detection of *Listeria monocytogenes* and *Listeria* Species in Food and Environmental Samples — VINCENT ATRACHE, Virginie Ewe, Jean Michel Pradel, Jean Louis Pittet, Vincent Atrache, bioMérieux, Marcy l'Etoile, France

T1-08 10:45 DSC Verification of the Reliability of the Time Temperature Integrators Made from the á-amylase of the *Bacillus amyloliquefaciens* for Assuring the Safety of Various Thermal Processes — KARIN MEHAUDEN, Karin Mehauden , Philip W. Cox , Serafim Bakalis , Mark J. Simmons , Gary S. Tucker , Peter J. Fryer, University of Birmingham (Chemical Engineering Dept.), University of Birmingham, Edgbaston Campus, Birmingham, West Midland, UK

T1-09 11:00 A Comparison of Pulsed-field Gel Electrophoresis Patterns Obtained from FSIS Routine and Intensified Verification Testing Programs for *Listeria monocytogenes*, 2002–2005—KRISTINA BARLOW, Peter Evans, Victor Cook, Nisha Oatman, Kitty Pupedis, Neelam Narang, USDA-FSIS, Washington, D.C., USA

T1-10 11:15 Quantitative Transfer of *Listeria monocytogenes* from Conveyor Belt Materials to Deli Ham—ZHINONG YAN, Ewen C.D. Todd, and Elliot T. Ryser, Michigan State University, East Lansing, MI, USA

T1-11 11:30 DSC Identification of an Effective Strategy for Microbiological Reduction on Cattle Hides—BRANDON CARLSON, Mitch Bowling, John Ruby, John Scanga, Keith Belk, John Sofos, Gina Bellinger, Wendy Warren-Serna, Bill Centrella, Sharon Wood, Rod Bowling, and Gary Smith, Colorado State University, Center for Red Meat Safety, Fort Collins, CO, USA

T1-12 11:45 Controlling *Listeria monocytogenes* on Ready-to-Eat Meat and Poultry Products Using Antimycotic Agents—KATHLEEN A. GLASS, Kristine Zierke, Lindsey M. McDonnell, Rob Rassel, University of Wisconsin-Madison, Food Research Institute, Madison, WI, USA

P01 Food Toxicology, Education, and General Microbiology Poster Session
Exhibit Hall
9:30 a.m.–1:30 p.m.

Authors present 10:00 a.m.–12:00 p.m.
Convenors: To Be Determined

P1-01 Analysis of Beauvericin and Unusual Enniatins Co-produced by *Fusarium oxysporum* FB1501 — Hyuk-Hwan Song, Sang-Do Ha, and CHAN LEE, Chung-Ang University, Gyunggi-Do, South Korea

P1-02 Effect of Coffee Cherries Storage after Harvest before the Beginning of Drying on Contamination by Fungi and the Relationship to Ochratoxin A Production — IRENE KOUADIO, N.G. Agbo, A. Lebrihi, R. Mathieu, A. Pfohl-Leszkowiz, M. Dosso, and G.J. Nemlin, University of Abidjan-Cocody, Abidjan, Côte D'Ivoire

P1-03 Histamine Contents of Fermented Fish Products in Taiwan and Isolation of Histamine-forming Bacteria — YUNG-HSIANG TSAI, Chueh-Yueh Lin, Liang-Tan Chien, Tsong-Ming Lee, Cheng-I Wei, and Deng-Fwu Hwang, Tajen University, Pingtung, Taiwan

P1-04 The Exploratory Data on Furan Content in Canned Food Products and Coffee in the Korean Local Market — Hyeoung-Min Kim, Seung-Yong Cho, Kwang-Gun Lee, and YOUNG-SIG PARK, Korea University, Seoul, Korea

P1-05 Trial of the Quality Control in Mercury Contents by Using Tail Meat of Full-cycle Cultured Bluefin Tuna — MASASHI ANDO, Masashi Nakao, Manabu Seoka, Masashiro Nakatani, Mami Ando, Tadashi Tsujisawa, Yuka Katayama, Yasuyuki Tsukamasa, and Ken-ichi Kawasaki, Kinki University, Nara, Japan

P1-06 Quantification of Amygdalin in Various Seeds and Nuts Using ELISA — SOO-JUNG LEE, A-Yeon Cho, Eun-Hee Keum, Mi-Seon Lee, Dong-Eun Sung, Kyu-Il Kim, Jun-Ho Chung, and Sang-Suk Oh, Ewha wamans University, Seoul, Korea

P1-07 Development of Immunoassay-based Test for the Detection of Hazelnut Residue in Food Products — MOHAMED ABOUZIED, Michael Carroll, and Mark A. Mozola, and SUSAN L. HEFLE, Neogen Corporation, Lansing, MI, USA

P1-08 Detection of Allergens: Considerations for Selecting the Method of Analysis — STEPHEN GARRETT, Helen Jones, Debra Smith, John Holah, and Helen Brown, Campden & Chorleywood Food Research Association Group, Chipping Campden, Gloucestershire, UK

P1-09 Simultaneous Detection Immunochromatography Using Two Colloidal Gold-Antibody Probe for the Detection of Aflatoxin B1 and Ochratoxin A in Grain and Feed Samples — WON BO SHIM, Ji-Young Kim, Jin-Kil Choi, Jung-Hyun Je, Ju-Mi Choi, Seon-Ja Park, Sung-Jo Kang, and Duck-Hwa Chung, Gyeong Sang National University, Jinju, Gyeongnam, Korea

P1-10 Immunochromatography Using Colloidal Gold-antibody Prove for the Detection of Aflatoxin B1 in Grain and Feed Samples — WON BO SHIM, Zheng-You Yang, Ji-Young Kim, Jin-Kil Choi, Jung-Hyun Je, Ju-Mi Choi, Seon-Ja Park, and Duck-Hwa Chung, Gyeong Sang National University, Jinju, Gyeongnam, Korea

P1-11 Detection and Quantification of Genetically Modified Soya Using the Warnex™ Real-time PCR System — LINA THÉRIEN, Francis Deshaies, Marie-Josée Gaulin, Martin P. Nadeau, and Yvan P. Côté, Warnex Research Inc., Laval, QC, Canada

P1-12 Safety Assessment of Herbicide-resistance Genetically Modified Red Pepper (*Capsicum annuum*) and Perilla Seeds (*Perilla frutesncens*) in Mice — IN HYE KIM, Jae Young Shim, Ji Hea, Heon Ok Lee, Ju Seop Kang, Jae Hyun Kim, and Ae Son Om, Hanyang University, Dept. Food & Nutrition, College of Human Ecology, Seoul, Korea

P1-13 Withdrawn

P1-14 Synchronous Comparison of Risk Perceptions Concerning Food Safety of European and United States Consumers — CRAIG HARRIS, Andrew Knight, and Michelle Worosz, Michigan State University, East Lansing, MI, USA

P1-15 Consumer Perceptions of Food Safety and the Effectiveness of the Food Safety System — Craig K. Harris, ANDREW J. KNIGHT, Ewen Todd, and Michelle R. Worosz, Michigan State University, East Lansing, MI, USA

P1-16 FightBAC!® Food Handler Training for In-home Child Care Providers Using a Self-study Format — JUDY A. HARRISON, Melissa P. Mixon, and Diane W. Bales, University of Georgia, Athens, GA, USA

P1-17 Local Provision of Consumer Food Safety Education in the UK — ELIZABETH C. REDMOND and Christopher Griffith, Food Research and Consultancy, University of Wales Institute, Cardiff, Cardiff, Wales, CF52YB, UK

P1-18 Consumer Experience of Food Safety Interventions in the UK: Potential for Behavioral Change — ELIZABETH C. REDMOND, Christopher Griffith, Suzanne King, and Mark Dyball, Food Research and Consultancy, University of Wales Institute, Cardiff, Cardiff, Wales, UK

P1-19 Together, Sharing Food Safely in American Indian Communities — PATRICIA E. AUNE and Wanda Agnew, United Tribes Technical College, Bismarck, ND, USA

P1-20 Identification of Products Showing Detectable Differences in Microbial Indicator Counts in Low Socioeconomic Status (LSES) Markets Versus High Socioeconomic Status (HSES) Markets — Nonye Uddoh and JENNIFER J. QUINLAN, Drexel University, Philadelphia, PA, USA

P1-21 Congruence of Own-checking System Evaluations Performed by Food Safety Authorities — SAIJA JOKELA, Anu Tulokas, and Janne Lundén, Dept. of Food and Environmental Hygiene, Faculty of Veterinary Medicine, University of Helsinki, Helsinki, Finland

P1-22 Security of Food in United States' Child Nutrition Program Settings: Survey Results — MILDRED CODY, Virginia O'Leary, and Charlotte Oakley, Georgia State University, Atlanta, GA, USA

P1-23 To Open Date or Not to Open Date – What is Industry Doing and Why? — AYLIN SERTKAYA, Ayesha Berlind, Dominic J. Mancini, and Cristina R. McLaughlin, Eastern Research Group, Inc., Lexington, MA, USA

P1-24 Consumer Knowledge and Use of Dates on Product Packaging: Results of a Web-based Survey — KATHERINE KOSA, Sheryl Cates, Shawn Karns, Sandria Godwin, and Delores Chambers, RTI International, Research Triangle Park, NC, USA

P1-25 Microbial Quality of Treated and Untreated Apple Cider Produced in New Jersey Following the FDA Juice HACCP Rule — KARLA M. MENDOZA, William Tietjen, and Donald W. Schaffner, Rutgers, The State University of New Jersey, New Brunswick, NJ, USA

P1-26 DSC Hazard Analysis for Foods and Environments in Korean-style Restaurants — EUN-JEONG NAM, O. Peter Snyder, Young-Jae Kang, and Yeon-Kyung Lee, Kyungpook National University, Gyeonbuk, South Korea

P1-27 Field Assessment of Sanitation Management Practices in School Foodservice Operations in Seoul, Korea — KYUNG RYU, Yu-Kyoung Goh, Ji-Hyun Lee, Ki-Hwan Park, Kyung Ryu, and Dongnam Health College, Suwon, Gyeonggi-do, South Korea

P1-28 Incidence of *Listeria monocytogenes* in Minimally Processed Fruits and Vegetables from the City of Campinas-SP, Brazil — THAÍS BELO ANACLETO DOS SANTOS, Neusely da Silva, Valéria Christina Amstalden Junqueira, and José Luiz Pereira, Food Technology Institute, Campinas, São Pãulo, Brazil

P1-29 DSC Evaluation of the Transfer of *Listeria monocytogenes* from Surfaces to Foods —ANDRES RODRIGUEZ and Lynne A. McLandsborough, University of Massachusetts, Amherst, MA, USA

P1-30 Fate of *Listeria monocytogenes* and *Escherichia coli* O157:H7 in Soudjouk-style Fermented Semidry Sausage — ANNA C. S PORTO-FETT, Cheng-An Hwang, Vijay K. Juneja, Steven C. Ingham, Barbara H. Ingham, Dennis R. Buege, and John B. Luchansky, USDA-ARS-ERRC, Wyndmoor, PA, USA

P1-31 The Survivability of *Listeria monocytogenes* and Spoilage Microorganisms during Processing and Storage of Wara, a Southwestern Nigerian Soft Cheese — Victoria O. Adetunji, David O. Alonge, and JINRU CHEN, University of Georgia, Griffin, GA, USA

P1-32 DSC Survival of Healthy and Stressed *Listeria monocytogenes* on Stainless Steel after Desiccation — LINDSEY A KESKINEN, Keith L. Vorst, Ewen C. D. Todd, and Elliot T. Ryser, Michigan State University, East Lansing, MI, USA

P1-33 Response of *Listeria* spp. to Pulsed-UV Light Sterilization and Starvation in Physiological Saline — N'JERE AUSTIN and Leonard L. Williams, Alabama A&M University, Huntsville, AL, USA

P1-34 Model Drain System for Biofilm Formation by *Listeria monocytogenes* and Resident Microorganism from a Seafood Processing Plant — JUN CAO and Lynne A. McLandsborough, University of Massachusetts, Amherst, MA, USA

P1-35 DSC Effect of Growth Temperature and Growth Phase on the Inactivation of *Listeria monocytogenes* in Whole Milk by High Pressure Processing — MELINDA M. HAYMAN, Ramaswamy C. Anantheswaran, and Stephen J. Knabel, The Pennsylvania State University, University Park, PA, USA

P1-36 Role of the uvrA Gene in the Growth and Survival of *Listeria monocytogenes* under UV Irradiation and Acid and Bile Stress — SO HYUN KIM, Lisa Gorski, James Reynolds, Edith Orozco, Sarah Fielding, Yong Ho Park, and Monica K. Borucki, Seoul National University, Seoul, Korea

P1-37 Effect of Sanitizer Stress Response on the Growth Kinetics of *L. monocytogenes* on Imitation Crabmeat and in Broth as a Function of Temperature — SO Y. EOM, Sung J. Koo, and Ki S. Yoon, Kyunghee University, Seoul, Korea

P1-38 DSC Determination of *Enterobacter sakazakii* in Powdered Infant Formula, Reconstituted and Utensils Used in Baby's Bottle Preparation — ROSANA FRANSICO SIQUEIRDOS SANTOS, Neusely da Silva, Valéria Christina Amstalden Junqueira, José Luiz Pereira, and Renato Abeilar Romeiro Gomes, Instituto Tecnologia de Alimentos, São Pãulo, Brazil

P1-39 DSC Survival of *Enterobacter sakazakii* in Powdered Infant Formula as Affected by Water Activity and Temperature — JOSHUA B. GURTLER and Larry R. Beuchat, University of Georgia, Griffin, GA, USA

P1-40 DSC Effect of Metabolic Stress on the Resistance of *Enterobacter sakazakii* to Chlorine Sanitizers — DIANA CAROLINA NAAR and F. Ann Draughon, The University of Tennessee, Knoxville, TN, USA

P1-41 Biofilm Formation among Isolates of *Enterobacter sakazakii* — Genisis I. Dancer, PEI-CHUN CHEN, and Dong-Hyun Kang, Washington State University, Pullman, WA, USA

P1-42 Resistance Characteristics of *Enterobacter sakazakii* — Genisis I. Dancer, PEI-CHUN CHEN, and Dong-Hyun Kang, Washington State University, Pullman, WA, USA

P1-43 DSC Desiccation Resistance of *Enterobacter sakazakii* — AKASH GUPTA, Samuel Palumbo, and Sadhana Ravishankar, National Center for Food Safety and Technology, Summit-Argo, IL, USA

P1-44 Efficacy of Uv-C Light for the Inactivation of Some Microorganisms on the Surface of Fresh Pear — Marcela Schenk, Sandra Guerrero, and STELLA MARIS ALZAMORA, University of Buenos Aires, Natural and Exact Sciences School, Ciudad Universitaria, 1428 Ciudad autónoma de Buenos Aires, Buenos Aires, Argentina

P1-45 Lethality of Chlorine, Chlorine Dioxide, and a Commerical Produce Sanitizer to *Bacillus cereus* and *Pseudomonas* in a Liquid Detergent, on Stainless Steel, and in Biofilm — AUDREY C. KRESKE, Jee-Hoon Ryu, Charles A. Pettigrew, and Larry R. Beuchat, University of Georgia, Griffin, GA, USA

P1-46 Effect of Temperature and Nutrient Status on Adherence of Clinical and Environmental *Listeria monocytogenes* Strains to Food Grade Stainless Steel Coupons — Allana N. Loder, Martin Kalmokoff, and LISBETH TRUELSTRUP HANSEN, Dalhousie University, Halifax, NS, Canada

P1-47 Characterization of Shiga toxin-producing *Escherichia coli* Strains Isolated from Swine Feces — PINA M. FRATAMICO, Lori K. Bagi, Arvind Bhagwat, and Paula J. Fedorka-Cray, USDA-ARS-ERRC, Wyndmoor, PA, USA

P1-48 Inactivation of *Salmonella* in Manure-based Composts with Varying C:N Ratios — MARILYN ERICKSON, Jean Liao, Li Ma, Xiuping Jiang, and Michael P. Doyle, University of Georgia, Griffin, GA, USA

P1-49 Effects of Low-Dose Irradiation on Survival of *Escherichia coli* O157:H7, *Salmonella*, and MS2 Bacteriophage on Fresh Mint (*Mentha piperita* L.) — Wei-Yea Hsu, AMY SIMONNE, and Pongphen Jitareerat, University of Florida, Gainesville, FL, USA

P1-50 Utilization of Chlorine Dioxide for Microbial Control of Minimally Processed Cheiro Verde — SILVANA SREBERNICH, Thaís Santos, Rosana Santos, Nutrition College - Pontifícia Universidade Católica de Campinas, Campinas, São Paulo, Brazil

P1-51 Utilization of Chitosan for Microbial Control in Minimally Processed "Cheiro Verde" — SILVANA SREBERNICH, Érica Carvalho, and Marcela Sicalhone, Nutrition College - Pontifícia Universidade Católica de Campinas, Campinas, São Paulo, Brazil

P1-52 DSC Retail Ready-to-Eat Luncheon Meats Packages as a Potential Source of Foodborne Pathogens — WILLIE J. TAYLOR, F. Ann Draughon, Philipus Pangloli, Harry Richards, Stephen P. Oliver, David A. Golden, and John R. Mount, The University of Tennessee, Knoxville, TN, USA

P1-53 Attachment of *Pseudomonas fluorescens* AH2 to Stainless Steel Surfaces is Reduced by Conditioning with Fractions of Fish Extract — NETE BERNBOM, Rikke Louise Meyer, Sailong Xu, Peter Kingshott, Vibeke Barkholt, Henrik Hauch Nielsen Flemming Besenbacher & Lone Gram, Danish Institute for Fisheries Research, Kgs. Lyngby, DK-2800, Denmark

P1-54 Growth of Heated *Bacillus cereus* in Nutrient Broth and Food Extracts— SIDONIA MARTÍNEZ, Josè M. Lorenzo, Inmaculada Franco, and Javier Carballo, University of Vigo, Ourense, Spain

P1-55 DSC Comparison of Barosensitive and Baroresistant Strains of *Lactobacillus plantarum* and *Lactobacillus fermentum* by Investigating the Impact of Dose Response and Kinetic Parameters, Buffer Composition and Buffer pH — JOY WAITE and Ahmed Yousef, The Ohio State University, Parker Food Science and Technology Bldg., Columbus, OH, USA

P1-56 DSC Intrinsic and Extrinsic Effects of Sporulation Conditions on Heat Resistance of *Clostridium sporogenes* PA3679 — WEI-YI WENDY LU, Hyun-Jung Chung, Juming Tang, and Dong-Hyun Kang, Washington State University, Washington State University, Pullman, WA, USA

P1-57 Quantifying the Distribution of Sub-Lethal Injury in Thermally Heated *Salmonella* Population — Danilo T. Campos, BRADLEY P. MARKS, and Elliot T. Ryser, Michigan State University, East Lansing, MI, USA

P1-58 Pathogenic *Enterobacteriaceae* and Aerobic Bacteria Isolates from Domestic Refrigerators — AGNES KILONZO-NTHENGE, Fur-Chi Chen, and Sandria L. Godwin, Tennessee State University, Nashville, TN, USA

P1-59 Factors Related to Food Worker Hand Hygiene Practices — LAURA GREEN and Carol Selman, RTI International, CDC, Atlanta, GA, USA

P1-60 Hazard Analysis for Raw Food Materials of School Foodservices through Supply Chains — KI-HWAN PARK, Ji-Hyun Lee, Shin Young Park, Sang-Do Ha and Kyung Ryu, Chung-Ang University, Kyeonggi, South Korea

P1-61 Bacterial Occurrence on Tabletops and in Dishcloths Used to Wipe Down Tabletops in Public Restaurants and Bars —MARIA YEPIZ-GOMEZ, Kelly R. Bright, and Charles P. Gerba, The University of Arizona, Tucson, AZ, USA

P1-62 Food Workers' Awareness of and Performance in Sanitation and Customers' Satisfaction with Sanitation at Large Restaurants in Korea —You-Hwa Park, So-Yoon Jeon, Yoon-Hwa Kim, O. Peter Snyder, YEON-KYUNG LEE, Kyungpook National University, Daegu, South Korea

P1-63 Microbiological Survey of Ready-to-Eat Prepared Foods, Preparation Utensils and Food Contact Surfaces in Retail Delicatessens — Claire Christison, Denise Lindsay and ALEX VON HOLY, University of the Witwatersrand, Johannesburg, Gauteng, South Africa

P1-64 Bacterial Counts and Scanning Electron Microscopy of Cleaning Tools and Gloves Associated with Ready-to-Eat Food Preparation Environments — Claire Christison, Denise Lindsay and ALEX VON HOLY, University of the Witwatersrand, Johannesburg, Gauteng, South Africa

P1-65 Microbiological Characterization of Water and Ice Used by Provincially Regulated Abattoirs in Ontario — ABDULLAHI MAHDI, Robert Hayes, Kristy Symon, Gabriel Ferdinand, Robert Vanderwoude, Pat Johnson, and Tom Baker, Ontario Ministry of Agriculture, Food and Rural Affairs, Guelph, ON, Canada

P1-66 Microbiological Survey of a Fish Processing Factory in Johannesburg, South Africa — DENISE LINDSAY, Johan Harmse, and Alex von Holy, University of the Witwatersrand, Johannesburg, Gauteng, South Africa

P1-67 DSC *Salmonella* Status of Beef Cattle after Grazing on Hog Manure Treated Pasture — JOEL WALKTY, Kim H. Ominski, Mario Tenuta, Greg Blank and Richard A. Holley, University of Manitoba, Winnipeg, MB, Canada

P1-68 Growth Inhibitory Effects of Kimchi (Korean Traditional Fermented Vegetable Products) against Foodborne Pathogens — DONG-HWA SHIN, Jian-Bin Zheng, Do-Yeong Jeong, Eun-Jeong Jeong, and Yong-Suk Kima, Faculty of Biotechnology (Food Science & Technology Major), Chonbuk National University, Chonbuk, Korea

P1-69 Isolation and Survival Characteristics of *Bacillus cereus* in Fermented Hot Pepper-soybean Paste (Kochujang) — DONG-HWA SHIN, Yong-Sun Ahna, Yong-Suk Kimb, and Pyeong-Hwa Jeong, Faculty of Biotechnology (Food Science & Technology Major), Chonbuk National University, Chonbuk, Korea

P1-70 Moulds, Yeasts and Aerobic Plate Counts in Various Herbal Teas and Coffee Substitutes — VALERIE TOURNAS and E. J. Katsoudas, FDA-CFSAN, College Park, MD, USA

P1-71 Isolation and Growth Pattern of Foodborne Pathogenic Bacteria from Seafoods and Korean Packaged Meals in South Korea — SOON HAN KIM, Mi Gyeong Kim, Yeong-Min Sin, Hyun-Suk Oh, Seung-Hwan Kim, Jung Sook Cho, and Gi-Sub Rhim, Testing and Analysis Team, Gyeonbuk, Korea

MONDAY AFTERNOON, AUGUST 14

1:30 p.m. – 5:00 p.m.

S06 Foodborne Viruses and Foodborne Viral Infections: Disease Burden, Epidemiology, Detection, and Transmission
Macleod A
Sponsored by ISLI North America Technical Committee on Food Microbiology
Organizer: Catherine Nnoka
Convenors: Lee-Ann Jaykus, Les Smoot, and Martin Wiedmann

1:30 Foodborne Viruses: Introduction to the Topic and Disease Burden, Epidemiology, and Attribution — STEPHAN MONROE, CDC, Atlanta, GA, USA

2:00 Foodborne Transmission of Viruses and Regulatory Approaches — JACK GUZEWICH, FDA-CFSAN, College Park, MD, USA

2:30 Surveillance for Foodborne Viral Infection: A European Perspective — MARION KOOPMANS, National Institute of Public Health and the Environment, The Netherlands

3:00 Break

3:30 Harmonization of Sampling, Detection, and Subtyping Methods for Foodborne Viruses — DAVID LEES, CEFAS Weymouth Laboratory, Weymouth, Dorset, UK

4:00 Survival and Persistence of Enteric Foodborne Viruses on Fresh Fruit and Vegetables — GAIL GREENING, Institute of Environmental Science and Research, Ltd., Porirua, New Zealand

4:30 The Impact of Virus Survival, Persistence, and Transfer on the Transmission and Risk of Foodborne Disease — LEE-ANN JAYKUS, North Carolina State University, Raleigh, NC, USA

S07 Surrogate Microorganisms: Selection, Use, and Validation
Macleod BC
Sponsored by The IAFP Foundation
Organizers: Jeffrey Kornacki and Vickie Lewandowski
Convenors: Jeffrey Kornacki and Peter Slade

1:30 Surrogate Microorganism Overview — PETER SLADE, National Center for Food Safety & Technology, Moffet Center, Summit-Argo, IL, USA

2:00 Selection and Validation of Surrogate Microorganisms— BASSAM ANNOUS, USDA-ARS-ERRC, Wyndmoor, PA, USA

2:30 Development of Surrogate Microorganisms for Use in Meat Systems — JAMES DICKSON, Iowa State University, Ames, IA, USA

3:00 Break

3:30 Surrogates for Viral Pathogens: Selection, Validation, and Use — EFSTATHIA PAPAFRAGKOU, North Carolina State University, Raleigh, NC, USA

4:00 Industry Case Studies, Applied Use of Surrogate Microorganisms — TIMOTHY FREIER, Cargill, Minneapolis, MN, USA

4:30 Industry Case Studies, Applied Use of Surrogate Microorganisms — JEFFREY KORNACKI, Kornacki Microbiology Solutions, LLC, McFarland, WI, USA

S08 Spores, Spores, and More Spores...What is Spoiling My RTD Beverage? Is It *Alicyclobacillus* or Heat Resistant Mold?

Macleod D
Sponsored by The IAFP Foundation

Organizers: Indaue Mello-Hall and Kathleen Lawlor
Convenors: Indaue Mello-Hall and Kathleen Lawlor

1:30 Beverage Spoilage Organisms: The Usual and Unusual Suspects — JEFF SEMANCHEK, Kraft Foods, Tarrytown, NY, USA

2:00 What We Know about *Alicyclobacillus*: An Australian Perspective — NANCY JENSEN, Food Science Australia, North Ryde, NSW, Australia

2:30 *Alicyclobacillus* in Beverages: Spoilage Potential and Mitigation Approaches — YUHUAN CHEN, Food Products Association, Washington, D.C., USA

3:00 Break

3:30 Total Systems Approach to Control *Alicyclobacillus* spp. in the Beverage Industry — KATHLEEN LAWLOR, PepsiCo, Valhalla, NY, USA

4:00 Update on Methods for Detecting and Identifying Heat Resistant Mold in Beverages — AILSA HOCKING, Food Science Australia, North Ryde, NSW, Australia

4:30 Heat Resistant Molds in High Acid Beverages: The Quest for Effective Control Strategies — JAY SCHUMAN, PepsiCo/QTG, Barrington, IL, USA

RT1 Issues Regarding Raw Milk Sales and Consumption

Glen 201–202
Sponsored by The IAFP Foundation

Organizer: Ron Schmidt
Convenors: Ron Schmidt and Todd Pritchard

1:30 What are Risks/Benefits of Consuming Raw Milk? — TODD PRITCHARD, University of Vermont, Burlington, VT, USA

1:45 Viewpoint: Regulatory Perspectives on Raw Milk in the United States — CLAUDIA COLES, Washington State DPA, Olympia, WA, USA

2:00 Viewpoint: Regulatory Perspectives on Raw Milk Sales in Canada — VANESSA TAYLOR, Ontario Ministry of Agricultre, Food and Rural Affairs, Guelph, ON

2:15 Viewpoint: The Case for Raw Milk — TBD

2:30 Viewpoint: The Case for Raw Milk — TBD

2:45 Question: What are Consumer Issues with Regard to Raw Milk Consumption? — TBD

3:00 Break

RT2 Refrigerated Ready-to-Eat (RTE) Foods: Microbiological Concerns and Control Measures

Glen 201–202

Organizers: Cheng-An Hwang, Richard Whiting, and Don Zink
Convenors: Cheng-An Hwang, Richard Whiting, and Don Zink

3:30 Cases of Listeriosis from RTE Food Can be Significantly Reduced through Product Formulation and Environmental Sampling — DANIEL ENGELJOHN, FSIS-USDA, Washington, D.C., USA

3:45 Non-proteolytic *Clostridium botulinum* May be a Potential Safety Issue in Refrigerated Vacuum-Packaged RTE Foods — JENNY SCOTT, Food Products Association, Washington, D.C., USA

4:00 Warning Lables and Limited Shelf Life are Not an Effective Control to Ensure Food Safety of RTE Foods. They Might Help in Certain Situations, But as a General Rule, Will Not Ensure Safety — GEORGE EVANCHO, Campbell Soup Company, Camden, NJ, USA

4:15 Roundtable Discussions — CHENG-AN HWANG, USDA-ARS-ERRC, Wyndmoor, PA, USA — Moderator Questioners: DENNIS SEMAN, Oscar Mayer Foods, Madison, WI, USA; VIJAY JUNEJA, USDA-ARS-ERRC, Wyndmoor, PA, USA; KATHERINE SWANSON, Ecolab Inc., St. Paul, MN, USA

S09 BioSecurity at Retail

Glen 203–204
Sponsored by The IAFP Foundation

Organizer: Charles Seaman
Convenors: Larry Hood and James Marsden

1:30 Is Retail Food Really at Risk? — FRANK BUSTA, University of Minnesota, St. Paul, MN, USA

2:00 Before the Backdoor — DAVID PARK, Food Defense LLC, Philmont, VA, USA

2:30 On the Inside – Spotting the Vulnerabilities — STEVEN GROVER, Burger King Brands, Miami, FL, USA

3:00 Break

3:30 Guarding the Gate — ROD WHEELER, AIB, Manhattan, KS, USA

4:00 When the Unthinkable Happens — RON BOTTRELL, Hill & Knowlton, Chicago, IL, USA

4:30 Circle of Trust — Customer Expectations — JEAN KINSEY, University of Minnesota, St. Paul, MN, USA

T02 Education and Dairy

Glen 206

Convenors: Patricia Johnson and Karin Rosberg

T2-01 1:30 Evaluation of a Process Specific Information Resource to Assist SME Food Manufacturers with Hazard Analysis — ADRIAN PETERS, Louise Fielding and Leanne Ellis, University of Wales Institute, Cardiff, School of Applied Sciences, Western Ave., Cardiff, Wales, UK

T2-02 1:45 Understanding the Implementation of Enhanced Food Safety Controls among Non-federally Registered Food Processors in Ontario — VALERIA NETTO, Spencer Henson and Patricia Johnson, University of Guelph, Guelph, ON, Canada

T2-03 2:00 Staging the Implementation of HACCP among Small and Medium-sized Food Processing Establishments in Ontario — PATRICIA JOHNSON, Troy Jenner, Cynthia Menyhart, Molly Elliott and Gwen McBride, Ontario Ministry of Agriculture, Food and Rural Affairs, Guelph, ON, Canada

T2-04 2:15 Development of Egg HACCP Programs in Egg Processing and Further Processing Facilities — LAURA J. BAUERMEISTER and Shelly R. McKee, Auburn University, Auburn, AL, USA

T2-05 2:30 Level of Adoption of HACCP and ISO 9000 within the Mexican Pork Industry — EMA MALDONADO-SIMAN, Bertha Alicia Hernández-Rodríguez, Rafael Núñez-Domínguez, Agustín Ruíz-Flores, Mariano González-Alcorta, Universidad Autonoma Chapingo, Texcoco, Mexico

T2-06 2:45 The GAPsNET: Farm Food Safety at Your Fingertips — KARIN A.K. ROSBERG, Elizabeth A Bihn, and Robert B. Gravani, Dept. of Food Science, Cornell University, B 8B Stocking Hall, Ithaca, NY, USA

3:00 Break

T2-07 3:30 DSC Microbial Population Dynamics in Hot-drinks Vending Machines — ANDREW HALL, Katie Short, Mike Saltmarsh, Louise Fielding, and Adrian Peters, University of Wales Institute, Cardiff, Wales, UK

T2-08 3:45 Thermal Inactivation of *Bacillus anthracis* Spores in Milk — SA XU, Theodore P. Labuza and Francisco Diez-Gonzalez, Food Science and Nutrition Dept., Univerisity of Minnesota, St Paul, MN, USA

T2-09 4:00 Microbial Food Safety Assessment of Cream Cheese — VICKIE LEWANDOWSKI, (Kraft Foods); Ann Marie McNamara (Silliker Laboratories); David Crownover (Silliker Laboratories), Kraft Foods, NA, Glenview, IL, USA

T2-10 4:15 Survival and Growth of Foodborne Microorganisms in Processed and Individually Wrapped Cheese Slices — NIGEL HARPER, Brent Wing, Travis Selby, Yingchang Han, Krista Schultze, and Richard Linton, Purdue University, West Lafayette, IN, USA

T2-11 4:30 Using Photo Novels in Farm Worker Education and Training — ROBERT B. GRAVANI and Elizabeth A. Bihn, Cornell University, Ithaca, NY, USA

T2-12 4:45 Effect of the Refrigerated and Frozen-storage on Microbiological Change in Soft Raw and Pasteurized Milk Goat Cheese — CLAUDIA DELGADILLO PUGA, Fernando Tuz, Miguel Angel Galina, Yunatzi Martín del Campo, Fernando Pérez-Gil, Guillermo Ruiz, and Leticia Reyes, Instituto Nacional de Ciencias Médicas y Nutrición Salvador Zubirán, Distrito Federal, México

P02 Dairy, Meat and Poultry Poster Session

Exhibit Hall

2:00 p.m.–6:00 p.m.

Authors present 3:00 p.m.–5:00 p.m.

Convenors: To Be Determined

P2-01 Evaluation of the Detection of Microbial Contamination in UHT Dairy Beverages Comparing the Standard 7-Day Plating Method to a Rapid Method Utilizing the BacT/ALERT® Microbial Detection System — PATRICIA L. RULE, bioMérieux, Durham, NC, USA

P2-02 Detection and Characterization of *Listeria monocytogenes* in São Jorge Cheesemaking Milk, Whey, Curd and Cheese Via Phenotypic and Genotypic Methods — JOSE MARCELINO KONGO and F. Xavier Malcata, Departamento de Biologia - Universidade dos Açores, Rua da Mãe de Deus, 13-A, Ponta Delgada, Açores, Portugal

P2-03 *Mycobacterium avium* subsp. *paratuberculosis* Prevalence Studies in Bulk Tank Raw Milk and Slaughtered Healthy Dairy Cows in Switzerland Using an F57 Sequence-based Real-time PCR Assay — TAURAI TASARA, Corinne Bosshard, and Roger Stephan, University of Zurich, Winterthurerstrasse, Zurich, Switzerland

P2-04 Combinations of Pasteurization Treatments and Hydrogen Peroxide to Inactivate Bacterial Spores in Milk and Dairy Products — LINDSEY M. MCDONNELL, Kathleen A. Glass, Rob Rassel, and Eric A. Johnson, University of Wisconsin-Madison, Food Research Institute, Madison, WI, USA

P2-05 Determination of Classical and Newly Defined Staphylococcal Enterotoxin Genes from Bovine Raw Milk in Korea — SUN YOUNG HWANG, Young Kyung Park, Nam Hoon Kwon, So Hyun Kim, Wonki Bae, Hye Cheong Koo, Woo Kyung Jung, Jun Man Kim, Yong Ho Park, Dept. of Microbiology and KRF Zoonotic Disease Institute, College of Veterinary Medicine and School of Agricultural Biotechnology, Seoul National University, Seoul, Korea

P2-06 Effects of Cool Water Washing of Shell Eggs on Pathogen Detection — DEANA R. JONES, Michael T. Musgrove, A. Brooke Caudill, and Patricia A. Curtis, USDA-ARS, Athens, GA, USA

P2-07 Effect of the Lactoperoxidase System on *Listeria monocytogenes* in Goat Milk and Goat Milk Cottage Cheese — Onneile Mariba and ELNA BUYS, University of Pretoria, Pretoria, Gauteng, South Africa

P2-08 Prevalence and Types of *Listeria monocytogenes* in Queso Fresco Cheese Processed in Sonora, Mexico — Martha Diaz-Cinco, Claudia Iniguez-Palomares, Evelia Acedo-Felix, Humberto Gonzalez-Rios, JEFFREY E. CALL, and John B. Luchansky, USDA-ARS, Wyndmoor, PA, USA

P2-09 Introduction of Lemon Juice into the Production of Wara, A West African Soft Cheese — Victoria O. Adetunji, David O. Alonge, Rakesh K. Singh, and JINRU CHEN, University of Georgia, Griffin, GA, USA

P2-10 Prevalence and Antibiotic Resistance of *Salmonella* Isolates Recovered from Finishing Swine Herds and Slaughter Facilities in Southern Brazil — Jalusa D. Kich, Arlei Coldebella, Nelson Morés, PINA M. FRATAMICO, Jeffrey E. Call, John B. Luchansky, and Paula Fedorka-Cray, USDA-ARS-ERRC, Wyndmoor, PA, USA

P2-11 DSC Use of Carbon Monoxide Combined with Carbon Dioxide for Modified Atmosphere Packaging of Fresh Pre-rigor Pork Sausage to Improve Shelf Life — ANGELA LAURY and Joseph Sebranek, Iowa State University, Ames, IA, USA

P2-12 DSC Validation of Heat Acid Coagulated Fresh Hispanic Cheese Manufacture Process to Achieve a 5-log Reduction of *Listeria monocytogenes* and *Escherichia coli* O157:H7 — MARC DRUART, Dennis J. D'Amico, and Catherine W. Donnelly, University of Vermont, Burlington, VT, USA

P2-13 DSC The 60-day Aging Requirement Does not Ensure Safety of Bloomy Rind Cheese Manufactured from Raw or Pasteurized Milk when *L. monocytogenes* are Introduced as Post-processing Contaminants — DENNIS J. D'AMICO, Marc Druart, and Catherine W. Donnelly, University of Vermont, Burlington, VT, USA

P2-14 Effect of Cooling Rate on Pathogen Survival in Yogurt— KATHLEEN A. GLASS, Lindsey M. McDonnell, Rob Rassell, Kristine Zierke, University of Wisconsin-Madison, Madison, WI, USA

P2-15 DSC An Examination of the Relationships between Foodborne Pathogens and Implicated Food Vehicles — ELIZABETH HILLYER, Judy Greig, University of Guelph, Guelph, ON, Canada

P2-16 DSC Ecology and Transmission of *Bacillus* and Related Sporeformers Present in Dairy Production Systems — JASON HUCK, Rob Ralyea, Kathryn Boor, Cornell University, Ithaca, NY, USA

P2-17 DSC Diversity of Bacterial Communities Associated with Cold-water Dispenser Systems — HUGH GRIFFITHS, Louise Fielding, Neil Burton, and Adrian Peters, University of Wales Institute Cardiff, Cardiff, Wales, UK

P2-18 Antimicrobial Resistance of *Staphylococcus aureus*, *Streptococcus* spp. and *Enterococcus* spp. Isolated from Bovine Milk in Korea — YOUNG KYUNG PARK, Sun Young Hwang, So Hyun Kim, Woo Kyung Jung, Won Ki Bae, Hye Cheong Koo, Jun Man Kim, Nam Hoon Kwon, Yong Ho Park, Seoul National University, Seoul, Korea

P2-19 Metabolic Activity of Probiotic Bacteria in Whey Cheese Matrices: Extension of Shelf Life — FRANCISCO MALCATA, Ana R. Madureira, Ana E. Pintado, Ana M. Gomes, Ana C. Freitas, and Manuela E. Pintado, Escola Superior de Biotecnologia, Porto, Portugal

P2-20 Evolution of Qualitative and Quantitative Profile of Yeasts in (Organic) Ewe's Raw Milk Cheese, According to Feeding Regime and throughout Ripening — FRANCISCO MALCATA, Maria C. García, Vanessa Ralha, and Manuela Pintado, Escola Superior de Biotecnologia, Porto, Portugal

P2-21 Monitoring of Different Microbiological Parameters in Semi-hard Raw Milk Cheese Produced by Bio-farms in Switzerland — CLAUDIO ZWEIFEL, Martina Rusch, Sabrina Corti, and Roger Stephan, Institute for Food Safety and Hygiene, Vetsuisse Faculty University of Zurich, Winterthurerstrasse 272, Zurich, 8057, Switzerland

P2-22 Microbiological Contamination of Pig Carcasses at Different Stages of Slaughter in Two EU-approved Abattoirs — Corsin Spescha, Roger Stephan, and CLAUDIO ZWEIFEL, Institute for Food Safety and Hygiene, Vetsuisse Faculty University of Zurich, Zurich, Switzerland

P2-23 Implementation of Quality Management Systems among Mexican Sausage-Making Industries — EMA MALDONADO-SIMAN, Pedro Arturo Martínez-Hernández, Fernando Copado-Bueno, and Ángel Juárez Zarate, Universidad Autonoma Chapingo, Texcoco, Mexico

P2-24 DSC Migration of *Salmonella* spp. into Whole-muscle Pork Roasts during Marination — ADRIANA VELASQUEZ, Alicia Orta-Ramirez, Alden M. Booren, Bradley P. Marks, and Elliot T. Ryser, Michigan State University, East Lansing, MI, USA

P2-25 Effect of Beef Physical Structure on *Salmonella* Thermal Inactivation — MARIA MOGOLLÓN, Bradley P. Marks, Alicia Orta-Ramirez, Alden M. Booren, and Elliot T. Ryser, Michigan State University, East Lansing, MI, USA

P2-26 Efficacy of Potassium Sorbate Formulated Antimicrobial Product against *Salmonella* spp. and the Extending Shelf Life on Poultry Carcasses — Coral-Martínez Miguel, Gamboa-Gómez Amalia, M. de los Ángeles Olea-Rodríguez, M. Refugio Torres-Vitela, Gerardo Guzmán-Gómez, Alvaro García-Ayala, JULIA A. PÉREZ MONTAÑO, Universidad de Guadalajara, Guadalajara, Jalisco, México

P2-27 Dissemination of *Salmonella* Enteritidis in a Commercial Chicken Production Chain: Phenotypic and Genotypic Characterization — Cristiano Andrigheto, Vinicius B. Ribeiro, Elsa M. Mamizuka, Mariza Landgraf, Bernadette D.G.M. Franco, and MARIA-TERESA DESTRO, University of São Paulo, São Paulo, Brazil

P2-28 DSC Development of a Mathematical Model to Describe the Growth of *Salmonella* spp. in Raw Poultry Stored under Aerobic Conditions — SILVIA DOMINGUEZ and Donald W. Schaffner, Rutgers, The State University of New Jersey, New Brunswick, NJ, USA

P2-29 Reduction of *Listeria monocytogenes* and *Salmonella* on Chicken Skin by *Pseudomonas* Biosurfactants — Jessica A. Bentley and GARY A. DYKES, Food Science Australia, Brisbane, Queensland, Australia

P2-30 DSC Microbiological Quality of Beef and Pork Carcasses Processed by Four Small and Very Small Meat Processing Plants in Georgia — SUVANG TRIVEDI, A. Estes Reynolds, and Jinru Chen, University of Georgia, Griffin, GA, USA

P2-31 Microbial Populations and Pathogen Incidence of Poultry Carcasses, Carcass Parts, Necks, and Giblets following Processing — MARISSA LOPES, R. O'Connor, J.D. Stopforth, B. Kottapalli, R. Suhalim, and M. Samadpour, IEH Laboratories & Consulting Group, Seattle, WA, USA

P2-32 Detection of *Campylobacter* spp. from Broiler Chicken Related Samples Using BAX® and Conventional ISO Culture — LISA K. WILLIAMS, Alisdair McMeechan, Frieda Jorgensen, Tamsin Baalham, and Laura Ward, Health Protection Agency, University of Bristol, Langford, Bristol, UK

P2-33 Thermal Inactivation of Newcastle Disease Virus (Ulster Strain) in Chicken Meat: Determination of Dt and Z Values — COLLEEN THOMAS and David E. Swayne, USDA-Southeast Poultry Research Laboratory, Athens, GA, USA

P2-34 Inactivation of Avian Influenza Virus (AIV) in Disinfectants and in Egg Products (Mayonnaise) — NOBUHIRO SASHIHARA, Mineo Hasegawa, Hiroshi Ito, and Toshihiro Ito, Q.P. Corporation, Fuchu, Tokyo, Japan

P2-35 Food Safety Practices and Technologies Used by United States Poultry Slaughter Plants: Results of a National Mail Survey — Sheryl Cates, SHAWN KARNS, Catherine Viator, Mary Muth, Ronald Meekhof, RTI International, Research Triangle Park, NC, USA

P2-36 Distribution of *Salmonella* Enteritidis within Shell Eggs, Inoculated from Different Sides and Incubated with or without Rotation — NAGAR BRAR, Sadhana Ravishankar, Gregory J. Fleischman, National Center for Food Safety and Technology, Summit-Argo, IL, USA

P2-37 A Retail Survey of Brazilian Milk and Minas Frescal Cheese and the Corresponding Dairy Plant Producing These Products to Determine the Prevalence and Sources of *Listeria monocytogenes* and to Implement Corrective Measures — JOSE R. F. BRITO, E. M. P. Santos, E. F. Arcuri, C. C. Lange, M. A. V. P. Brito, G. N. Souza, and J. B. Luchansky, USDA-ARS-ERRC & Embrapa-Labex, Wyndmoor, PA, USA

P2-38 Characterization of *Enterobacter* spp. Isolated from Shell Eggs Using Pulsed-field Gel Electrophoresis — JOSE R. BRITO, Stefanie Evans Gilbreth, Michael T. Musgrove, Jeffrey E. Call, and John B. Luchansky, USDA-ARS-ERRC & Embrapa-Labex, Wyndmoor, PA, USA

P2-39 Identification of Yeasts Isolated from Commercial Shell Eggs Stored at Refrigerated Temperatures — MICHAEL T. MUSGROVE, Deana R. Jones, Arthur Hinton, Jr., Kimberly D. Ingram, and Julie K. Northcutt, USDA-ARS, Egg Safety and Quality Research Unit, Athens, GA, USA

P2-40 Thermal Inactivation and Injury of Freeze-stressed *Campylobacter jejuni* in Ground Chicken — SAUMYA BHADURI, USDA-ARS-ERRC, Wyndmoor, PA, USA

P2-41 Development and Validation of an Isothermal-based Pathogen Growth Prediction Tool for Evaluating Non-isothermal Processing of Raw Pork — Greg M. Burnham, Melody A. Fanslau, Donald W. Schaffner, Barbara H. Ingham, Dennis R. Buege, and STEVEN C. INGHAM, University of Wisconsin - Madison, Madison, WI, USA

P2-42 Survival of *Campylobacter jejuni* on Vacuum-packed Beef and Pork at Refrigerated Temperatures — Balamurugan Sampathkumar, LYNDA BAKER, and Frances M. Nattress, Agriculture and Agri-Food Canada, Lacombe, AB, Canada

P2-43 Enzyme-linked Immunosorbent Assay (ELISA) for Detection of Poultry Content in Heat-processed Meat — Kamil Gajewski, Qinchun Rao, and YUN-HWA HSIEH, Florida State University, Tallahassee, FL, USA

P2-44 Food Safety Practices and Technologies Used by United States' Meat Slaughter Plants: Results of a National Mail Survey — SHERYL CATES, Shawn Karns, Catherine Viator, Mary Muth, and Ronald Meekhof, RTI International, Research Triangle Park, NC, USA

P2-45 Further Characterization of *E. coli* O157:H7 Strains from Ground Beef Isolated by the Food Safety and Inspection Service — ROBERT PHILLIPS, Marcus Head, and Douglas Abbott, USDA-FSIS, Athens, GA USA

P2-46 Effect of Individual and Multiple-sequential Interventions on Microbial Populations during Processing of Poultry Carcasses and Parts — JARRET D. STOPFORTH, R. O'Connor, M. Lopes, B. Kottapalli, R. Suhalim, and M. Samadpour, IEH Laboratories & Consulting Group, Seattle, WA, USA

P2-47 Baseline Incidence of *Escherichia coli* O157:H7, Enterohemorrhagic *E. coli* (EHEC), and *Salmonella* in/on Beef Carcasses, Trim, Ground Beef, and Variety Meats — JARRET STOPFORTH, R. Suhalim, C. Smith, B. Kottapalli, M. Lopes, and M. Samadpour, IEH Laboratories & Consulting Group, Seattle, WA, USA

P2-48 Effect of Individual Interventions on Beef Carcasses, Hearts, and Heads during Beef Processing — JARRET STOPFORTH, B. Kottapalli, M. Lopes, and M. Samadpour, IEH Laboratories & Consulting Group, Seattle, WA, USA

P2-49 Identification of Microflora Associated with "Blown-Pack" Spoilage of Ground Beef Chubs during Refrigerated Storage — BALA KOTTAPALLI, D. Gadomski, J.D. Stopforth, C. Smith, G. Ma, A. Scotti, and M. Samadpour, IEH Laboratories & Consulting Group, Seattle, WA, USA

P2-50 Pathogen Reduction in Smokehouse Versus Dehydrator-prepared Beef Jerky — Worawut Rakiti, MARK A. HARRISON, Ruth A. Morrow, Rakesh K. Singh, Judy A. Harrison, and Nepal Singh, University of Georgia, Athens, GA, USA

P2-51 Biogenic Amine Content Related to Physico-chemical Parameters and Microbial Counts in Spanish Traditional Sausages — José M. Lorenzo, SIDONIA MARTÍNEZ, Iinmaculada Franco and Javier Carballo, University of Vigo, Ourense, Spain

P2-52 DSC Validation of *Escherichia coli* O157:H7 in Direct Acidified Venison Summer Sausage — MICHELLE N. ROBERTS and Kelly J.K. Getty, Kansas State University, Dept. of Animal Sciences & Industry, Food Science Institute, Manhattan, KS, USA

P2-53 Effectiveness of Bacteriophage in Reducing *Escherichia coli* O157:H7 on Beef Steaks and in Ground Beef Slurries — MANAN SHARMA, Jitu Patel, Alexander Sulakvelidze, and Cheryl Mudd, Food Technology and Safety Laboratory, ANRI, USDA-ARS, FTSL, Beltsville, MD, USA

P2-54 Evaluation of the Incubation Temperature, Time and Compositing on the Detection of *E. coli* O157:H7 in Raw Ground Beef Using the VIP Immunoprecipitate Assay as a Screening Method — Patti Wilson, TARA LANDRY, and Krista Graham, Canadian Food Inspection Agency, Microbiology Laboratory, Dartmouth, NS, Canada

P2-55 Detection of Bovine Central Nervous System Tissue in Retail Meat Products by Real-Time RT-PCR — EVA RENCOV and Pavel Krcmar, Veterinary Research Institute, Czech Republic

P2-56 Evaluation of Acid and Thermal Resistance Properties of Fluorescent-marked Nonpathogenic *Escherichia coli* Strains for Use as Surrogates for Enteric Pathogens — ELISA CABRERA-DIAZ, Tiffany M. Musquiz, Lisa M. Lucia, James S. Dickson and Gary R. Acuff, Texas A&M University, College Station, TX, USA

P2-57 DSC Use of Fluorescent Surrogate Organisms for Enteric Pathogens in Validation of Carcass Decontamination Treatments — TIFFANY M. MUSQUIZ, Lisa M. Lucia, Elisa Cabrera-Diaz, Alejandro Castillo, James S. Dickson, and Gary R. Acuff, Texas A&M University, College Station, TX, USA

P2-58 *Listeria innocua* as a Surrogate for *Listeria monocytogenes* for Aerosol Studies — GUODONG ZHANG, Li Ma, Omar A. Oyarzabal, and Michael P. Doyle, University of Georgia, Center for Food Safety, Griffin, GA, USA

P2-59 Host Range of *Listeria*-specific Bacteriophage from the Environment of Turkey Processing Plants in the United States — JAE-WON KIM and Sophia Kathariou, North Carolina State University, Raleigh, NC, USA

P2-60 Molecular Epidemiology of *Listeria monocytogenes* Isolated from Brazilian Poultry Abattoirs — EB CHIARINI, Maria T. Destro, Jeff Farber, and Franco Pagotto, University of São Paulo, São Paulo, Brazil

P2-61 Comparative Growth of *Listeria monocytogenes* on Ham Slices and in Ham Juice — MONTSERRAT H. ITURRIAGA and Mark L. Tamplin, Microbial Food Safety Research Unit, USDA-ARS, Wyndmoor, PA, USA

P2-62 Control by Competitive Bacteria of *Listeria monocytogenes* in Biofilms and *Listeria* sp. in Floor Drains in a Ready-to-Eat Poultry Processing Plant — TONG ZHAO, Teresa C. Podtburg, Ping Zhao, David A. Baker, Bruce Cords, and Michael P. Doyle, University of Georgia, Griffin, GA, USA

P2-63 Multiple Antibiotic Resistances of *Escherichia coli* Isolated from Commercial Broiler Chicken Farms — PASCAL DELAQUIS, Susan Bach, Peter Toivonen and Frank Kappel, Agriculture and Agri-Food Canada, Summerland, BC, Canada

P2-64 Antibiotic Resistance of *Enterococcus* spp. Isolated from Broiler Chicken Farms Using Antimicrobial Agents as Growth Promoters — Moussa Sory Diarra, Heidi Rempel, James Takizawa, Jane Pritchard, PASCAL DELAQUIS, Susan Bach, Ed Topp, Agriculture and Agri-Food Canada, Summerland, BC, Canada

P2-65 Comparison of Retail Raw Chicken Carcasses Bought from Two Different Grocery Stores for Total *Campylobacter* and Total Ciprofloxacin-resistant *Campylobacter* Loads in 2005 — Ramakrishna Nannapaneni, Keith C. Wiggins, Robert Story, Josh Saldivar and MICHAEL G. JOHNSON, University of Arkansas, Dept. of Food Science, Fayetteville, AR, USA

P2-66 Contamination of the Surface of Beef Carcasses with *Mycobacterium avium* subsp. *paratuberculosis* — JON MEADUS, W. J. Meadus, P. Duff, M. Badoni, and C.O. Gill, AAFC-Lacombe, Lacombe, AB, Canada

P2-67 Culture of *Mycobacterium avium* subsp. *paratuberculosis* from Edible Tissues of Johne's Infected Cattle — DORN L. CLARK JR., Jeff J. Koziczkowski, and Jay L. E. Ellingson, Marshfield Clinic Laboratories – Food Safety Services, Marshfield, WI, USA

P2-68 The Use of a Novel Sample Preparation and PCR/ECD-based Assay for the Detection of *Mycobacterium avium* Subspecies *paratuberculosis* — LAUREN SAEED, Alisha Upwall, Mike Pyne, Michael Mathews, Patrick Williams, AnzenBio, Salt Lake City, CA, USA

P2-69 The Effects of PH-enhancement on Consumer Ratings of Various Meat Products — MIKE HESSE, Andrew Everts, Duane Wulf, Robert Maddock, SDSU, BPI Technology Inc., Dakota Dunes, SD, USA

TUESDAY MORNING, AUGUST 15

8:30 a.m. – 12:00 p.m.

S10 Disaster Preparedness Response

Macleod A

Sponsored by The IAFP Foundation

Organizers: Dale Grinstead and Zeb Blanton, Jr.
Convenors: Dale Grinstead and Zeb Blanton, Jr.

8:30 Disaster Preparedness — CANDACE JACOBS, H-E-B, San Antonio, TX, USA

9:00 Assessing the Damage — ART JOHNSON, Canstar Restorations, Port Coquitlam, BC, Canada

9:30 Food Safety Issues That Arise after a Disaster — H. WAYNE DERSTINE, Enviromental Administrator, Tallahassee, FL, USA

10:00 Break

10:30 Ready to Reopen — TIM GUTZMAN, Ecolab, Inc., Eagan, MN, USA

11:00 Case Studies — SHIRLEY BOHM, FDA, College Park, MD, USA

11:30 Case Studies — ZEB BLANTON, JR., FL Dept of Agri. & Consumer Serv, Altamonte Springs, FL, USA

S11 Symposium on *Enterobacter sakazakii*

Macleod BC
Sponsored by ILSI N.A.

Organizer: Catherine Nnoka
Convenors: Marguerite A. Neill, Karl E. Olson, and Don L. Zink

8:30 Clinical and Epidemiological Significance of *E. sakazakii* — CHRISTOPHER BRADEN, CDC, Atlanta, GA, USA

9:00 Survival and Growth of *E. sakazakii* in Dry and Reconstituted Infant Formula and Cereal — LARRY BEUCHAT, University of Georgia, Griffin, GA, USA

9:30 Mouse Models to Assess *E. sakazakii* Virulence and Pathogenicity — MARY ALICE SMITH, University of Georgia, Athens, GA, USA

10:00 Break

10:30 Non-primate Animal Models to Assess *E. sakazakii* Virulence and Pathogenicity — JEFFREY M. FARBER, Health Canada, Ottawa, ON, Canada

11:00 Current Approaches to Investigating Cases of *E. sakazakii* — JACK GUZEWICH, FDA-CFSAN, College Park, MD, USA

11:30 Quality Control/Industry Perspectives — KARL OLSON, Abbott Laboratories, Columbus, OH, USA

S12 *Campylobacter* – From Gate to Plate

Macleod D

Organizer: Richard Arsenault
Convenors: Richard Arsenault and Eric Line

8:30 *Campylobacter* – An Emerging (?) Threat to Human Health — MICHAEL C. ROBACH, Cargill, Minneapolis, MN, USA

9:00 New Methods for Detecting and Counting *Campylobacter*, and What This is Telling Us — STAN BAILEY, USDA-ARS-SAA, Athens, GA, USA

9:30 Prevalence of *Campylobacter* at the Farm and the Potential for Antimicrobial Resistance — DOUGLAS INGLIS, Agriculture and Agri-Food Canada, Lethbridge, AB, Canada

10:00 Break

10:30 Industry and *Campylobacter* — TBD

11:00 New Technologies for Pre-Harvest Control of *Campylobacter* — ERIC LINE, USDA-ARS-PMSRU, Athens, GA, USA

11:30 New and Existing Technologies for Control of *Campylobacter* in Poultry Processing Plants — MARK BERRANG, USDA-ARS, Athens, GA, USA

S13 Hygiene and Sanitation Solutions to Manage Evolving Risks

Glen 201–202

Organizers: Larry Mendes and Chris Remus
Convenors: Larry Mendes and Chris Remus

8:30 Evolution of Risks and Solutions — KATHERINE SWANSON, Ecolab, Inc., St. Paul, MN, USA

9:00 Technical Aspects of Cleaning — CHARLES GIAMBRONE, Rochester Midland, New Hope, PA, USA

9:30 Challenges of a Cleaning Program — DWAIN LEASER, ConAgra Foods, Overland Park, KS, USA

10:00 Break

10:30 Measuring the Cleaning Program — DENNIS BOGART, Randolph and Associates, Birmingham, AL, USA

11:00 Contract Cleaning – Pros and Cons — JAMES SHARPE, Aramark Facility Services, Downers Grove, IL, USA

11:30 Time – How to Make Sanitation More Efficient — MICHAEL HANSCHKE, JohnsonDiversey, Sharonville, OH, USA

S14 International Food Law – A Global Overview

Glen 203–204

Organizers: Gordon Hayburn and Louise Fielding
Convenors: Louise Fielding and Anna Lammerding

8:30 Key Food Safety Legislation and Enforcement Practices in Europe — GORDON HAYBURN, University of Wales, Cardiff, Cardiff, Wales, UK

9:00 Key Food Safety Legislation and Enforcement Practices in USA — FREDERICK DEGNAN, King & Spalding, Washington, D.C., USA

9:30 Key Food Safety Legislation and Enforcement Practices in Canada — RONALD DOERING, Gowling Lafleur Henderson LLP, Ottawa, ON, Canada

10:00 Break

10:30 Key Food Safety Legislation and Enforcement Practices in Brazil — MARIZA LANDGRAF, Av. Prof. Lineu Prestes, São Paulo, São Paulo, Brazil

11:00 Key Food Stafey Legislation and Enforcement Practices in Africa — FRANCINA MAKHOANE, University of the Witwatersrand, Johannesburg, Gauteng, South Africa

11:30 Key Food Safety Legislation and Enforcement Practices in Australia — MARION HEALY, Food Standards Australia New Zealand, Canberra, MC, ACT, Australia

T03 Pathogens and Antimicrobials

Glen 206

Convenors: Wendy Maduff and Fred Breidt

T3-01 8:30 Antimicrobial Activities of Plant Compounds against *Escherichia coli* O157: H7 and *Salmonella* Enterica Serovar Hadar in Tomato and Vegetable Juices and in a Tomato/Pectin Edible Film Formulation—MENDEL FRIEDMAN, Philip R. Henika, Carl W. Olsen, Roberto J. Avena Bustillos, and Tara McHugh, USDA-ARS-WRRC, Albany, CA, USA

T3-02 8:45 DSC Effect of Microencapsulated *Lactobacillus reuteri* on *Escherichia coli* O157:H7 in Dry Fermented Sausages—PARTHIBAN MUTHUKUMARASAMY and Richard Holley, Canadian Meat Council, Ottawa, ON, Canada

T3-03 9:00 DSC New Primer Set Improves Detection of *Escherichia coli* O157:H7 from Environmental Samples—WENDY MADUFF and Trevor Suslow, University of California at Davis, Davis, CA, USA

T3-04 9:15 DSC Multi-drug Resistance Profiles of Generic *Escherichia coli* from Commercial and Natural (Organic) Bovine Feedlot Lagoon Water—MINDI RUSSELL and Daniel Y.C. Fung, Kansas State University, Manhattan, KS, USA

T3-05 9:30 DSC A Comparative Analysis of the Effects of Pasteurization and High Pressure Processing on the Stability and Infectivity of Bovine Rotavirus—DAYNA SWIATEK, Alvin Lee, Enzo Palombo, John Coventry, and Carl Kirkwood, University of Melbourne, Kensington, Victoria, Australia

T3-06 9:45 DSC Subtyping of *Salmonella* Enterica subsp. Enterica Serotypes from Human and Cattle Clinical Isolates in New York State Region by Pulsed-Field Gel Electrophoresis and Serotyping—YESIM SOYER, D. Schoonmaker-Bopp, S.D. Alcaine, E.B. Fugett, L.D. Warnick, P. McDonough, N.B. Dumas, Y. Grohn and M. Wiedmann, Cornell University, Ithaca, NY, USA

10:00 Break

T3-07 10:30 Population Genetics of Virulence Potential in Environmental Reservoirs of *Vibrio vulnificus*—Maria Chatzidaki-Livanis, Michael A. Hubbard, Katrina Gordon, Valerie J. Harwood, and ANITA C. WRIGHT, University of Florida, Gainesville, FL, USA

T3-08 10:45 Quantitative Determination and Toxigenicity of *Bacillus* Species Associated with Raw and Cooked Rice—Mi-Hwa Oh and JULIAN COX, The University of New South Wales, Food Science and Technology, Sydney, NSW, 2052, Australia

T3-09 11:00 Destruction of Bacterial Pathogens in Non-heated Acidified Vegetable Products—FRED BREIDT, USDA-ARS and NC State University, Raleigh, NC, USA

T3-10 11:15 DSC Role of Biofilm Growth in *Campylobacter jejuni* Oxidative Stress Response—DAVID BROOKES, Nicole Baran, Carney Matheson, Heidi Schraft, Lakehead University, Thunder Bay, ON, Canada

T3-11 11:30 DSC Effect of Chitosans and Chitoligosaccharides upon Growth of Microorganisms Contaminating Foods—JOÃO C. FERNANDES, Sandra Borges, Tânia Ribas, Freni K. Tavaria, José A. Lopes da Silva, Manuela E. Pintado, and F. Xavier Malcata, Escola Superior de Biotecnologia, Universidade Católica Portuguesa, Porto, Portugal

T3-12 11:45 Effects of Seasonality on the Pre-Harvest *Escherichia coli* Prevalence of Fresh Fruits and Vegetables—Francisco Diez-Gonzalez, Dorinda Speh, and AVIK MUKHERJEE, University of Minnesota, St. Paul, MN, USA

P03 Seafood and Applied Laboratory Methods Poster Session

Exhibit Hall

9:30 a.m.–1:30 p.m.

Authors present 10:00 a.m–12:00 p.m.

Convenors: To Be Determined

P3-01 Pellicle Formation in Hot-smoking of Salmon: Smoke Decreases Survivability of *Listeria* and *Staphylococcus* Species — BRIAN H. HIMELBLOOM, Thombathu S. Shetty, and Chuck Crapo, University of Alaska Fairbanks, School of Fisheries and Ocean Sciences, Fishery Industrial Technology Center, Kodiak, AK, USA

P3-02 Influence of Processing Steps in Cold-smoked Fish Production on Survival and Growth of *Listeria monocytogenes* — CISSE HEDEGAARD HANSEN, Annemarie Wichmann-Hansen, Mona Mohr, Birte Fonnesbech Vogel, and Lone Gram, Danish Institute for Fisheries Research, Søltofts Plads, Kgs. Lyngby, DK, Denmark

P3-03 Survival of *Listeria monocytogenes* on the Surface of Domestic Raw Shrimp Stored at Frozen Temperatures with a Cetylpyridinium Chloride Wash — Tracie Dupard, Marlene E. Janes, RICHELLE L. BEVERLY, and Jon Bell, Louisiana State University, Baton Rouge, LA, USA

P3-04 *Listeria monocytogenes* in Herring Production — Prevalence and Molecular Typing — SIGRUN GUDMUNDSDÓTTIR and Birna Gudbjörnsdóttir, Icelandic Fisheries Laboratories, Reykjavik, Iceland

P3-05 Study of the Efficacy of Peroxyacetic Acid, Chlorine Dioxide and Ozone for Inactivating *Vibrio parahaemolyticus* and *Escherichia coli* on Black Tiger Shrimp (*Penacus monodon*) — WARAPA MAHAKARNCHANAKUL and Indun Dewi Pusita, Kasetsart University, Jatujak District, Bangkok, Thailand

P3-06 DSC The Response of Human Viruses and Viral Surrogates in Oyster Slurry to Hydrostatic Pressure — JENNIFER L. CASCARINO, Dongsheng Guan, Dallas G. Hoover, and Kalmia E. Kniel, University of Delaware, Newark, DE, USA

P3-07 Prevalence and Numbers of *Vibro parahaemolyticus* in Korea Retail Oysters as a Function of Environmental Factors — JONG-KYUNG LEE, Da-Wa Jung, Kisun Yoon, Byung-Hak Ahn, Seong-Kwan Cha, Yunji Kim, and Se-Wook Oh, Korea Food Research Institute, Kyunggi-do, Korea

P3-08 Change of Hygienic Quality and Freshness in Tuna Treated with Electrolyzed Water and Carbon Monoxide Gas during Refrigerated and Frozen Storage — YU-RU HUANG, Chyuan-Yuan Shiau, Yen-Con Hung, and Deng-Fwu Hwang, National Taiwan Ocean University, Keelung, Taiwan

P3-09 *Vibrio vulnificus*-related Deaths and Illnesses, 1996–2005 — CAROLINE SMITH DEWAAL and Kendra Johnson, Center for Science in the Public Interest, Washington, D.C., USA

P3-10 DSC Multi-locus Sequencing Used for Identification of a New Species of *Morganella* Associated with Outbreaks of Histamine Poisoning — JETTE EMBORG, Paw Dalgaard, and Peter Ahrens, Danish Institute for Fisheries Research, Søltofts Plads, Kgs. Lyngby, Denmark

P3-11 Microbial Quality of *Oreochromis niloticus* (Bolti) and Water of River Nile and El-Ebrahemyah Canal at Assuit City — ABDUL-RAOUF M. USAMA, Al-Azhar University, Assuit, Egypt

P3-12 Effects of Seasonality on the Pre-Harvest *Escherichia coli* Prevalence of Fresh Fruits and Vegetables—Francisco Diez-Gonzalez, Dorinda Speh, and AVIK MUKHERJEE, University of Minnesota, St. Paul, MN, USA

P3-13 Rapid Detection of the *Vibrio cholerae* ctx Gene in Food Enrichments Using Real Time PCR — WILLIS FEDIO, George Blackstone, Lynne Kikuta-Oshima, Chitra Wendakoon, Timothy McGrath, and Angelo DePaola, New Mexico State University, Las Cruces, NM, USA

P3-14 Enumerating Chromogenic Agar Plates Using the Color QCount Automated Colony Counter — EILEEN GARRY, Grace Ouattara, Patrick Williams, and Meredith Pesta, Spiral Biotech, Inc., Norwood, MA, USA

P3-15 DSC Induction of Guaiacol Production in *Alicyclobacillus acidoterrestris* ATCC 49025 by Different Carbon Sources — SU-SEN CHANG and Dong-Hyun Kang, Washington State University, Pullman, WA, USA

P3-16 Comparison of KV Method with Conventional HPLC Method for Detecting Guaiacol from *Alicyclobacillus* spp. — Susen Chang and Dong-Hyun Kang, Washington State University, Pullman, WA, USA

P3-17 Development of ELISA and Immunochromatographic Assay for the Detection of Chloramphenicol Residues in Animal Plasma, Tissues, and Milk — Jinwook Jang, CEJIN CHA, Dongjin Ha, Yong Jin, Chang-Hoon Han, and Mun-Han Lee, Seoul National University, Seoul South Korea

P3-18 Immunomagnetic Capture and Detection of *Yersinia pestis* from Milk — GEORGE C. PAOLI, Lynn G. Kleina, and Shu-I Tu, USDA-ARS-ERRC, Wyndmoor, PA, USA

P3-19 Rapid Cell Lysis for DNA Isolation and Amplification from Common Food Pathogens — PATRICK WILLIAMS, Mike Pyne, Michael Mathews, Lauren Saeed, and Alisha Upwall, AnzenBio, Salt Lake City, UT, USA

P3-20 Optimization and Validation of Improved Culture and Molecular Methods for the Detection of *Shigella* spp. in Fresh Vegetables and Fruits, and Softshell Clams —KARINE SEYER, Josée Houle, Yvon-Louis Trottier, and José Riva, Canadian Food Inspection Agency, St. Hyacinthe, QC, Canada

P3-21 Evaluation of Multiplex PCR of *Salmonella* spp., *Listeria monocytogenes*, and *Escherichia coli* O157:H7 in Various Food Samples — SUSUMU KAWASAKI, Naoko Horikoshi, Yukio Okada, Kazuko Takeshita, Takashi Sameshima, and Shinichi Kawamoto, National Food Research Institute, Tsukuba, Ibaraki, Japan

P3-22 The Detection of *Enterobacter sakazakii* and Other *Enterobacteriaceae* from Milk Powders Using Paramagnetic Cationic Particles — John Murray, Nicole Prentice, ADRIAN PARTON, and Paul Hall, Matrix MicroScience, Inc., Golden, CO, USA

P3-23 Sanitizer Efficacy When Tested in Suspension and on Surfaces against Food-associated Bacteria and the Potential for Development of Resistance — Shadi Riazi and KARL R. MATTHEWS, Rutgers, The State University of New Jersey, New Brunswick, NJ, USA

P3-24 Simultaneous Determination of Synthetic Steroids Using Biochip Array Technology — JOANNA TENNANT, El Ouard Benchikh, Jack McConnell, Jonathan Porter, Peter Fitzgerald, and Ivan McConnell, Randox Laboratories Ltd., Crumlin, Northern Ireland, UK

P3-25 Rapid Automated Method for the Detection of *Alicyclobacillus* — Debra L. Foti and RUTH FIRSTENBERG-EDEN, Biosys, Inc., Ann Arbor, MI, USA

P3-26 Rapid Concentration Method for Enteric Virus Detection on Berries — GLÒRIA SÁNCHEZ MORAGAS, Sophie Butot, and Thierry Putallaz, Nestlé Research Center, Lausanne, Switzerland

P3-27 Development and Comparison of Primers and TaqMan Probes for Hepatitis A Virus (HAV) Detection and Quantification by Real-time-RT-PCR — EVELYNE GUEVREMONT, Elyse Poitras, Danielle Leblanc, Alain Houde, Carole Simard, and Yvon-Louis Trottier, Food Research and Development Centre, Hyacinthe, QC, Canada

P3-28 Comparison of Methods for the Detection of Norovirus in Stool Samples — Solange E. Ngazoa, Safaa Lamhoujeb, Ismail Fliss, and JULIE JEAN, University Laval, Dept. Food Science and Nutrition, Quebec, QC, Canada

P3-29 Evaluation of the Compact Dry YM for the Enumeration of Yeasts and Molds — HIDEMASA KODAKA, Shingo Mizuochi, Hajime Teramura, and Tadanobu Nirazuka, Nissui Pharmaceutical Co. Ltd., Yuki, Ibaraki, Japan

P3-30 Yeast and Mold by PCR: Minimizing Time to Result — FRANK R. BURNS, Lois Fleck, and Kimberly S. Austin, Dupont Qualicon, ESL 400/2233, Wilmington, DE, USA

P3-31 Direct Quantification of *Campylobacter* in Poultry Rinses by the Warnex™ Rapid Pathogen Detection System — DANIEL PLANTE, Alexandre Hébert, Diane Valois, Isabelle Robillard, Nancy Dallaire, Mireille Picard, Luc Blanchard, Eliane Ubalijoro, Martin P. Nadeau and Yvan P. Côté., Warnex Research Inc., Laval, QC, Canada

P3-32 Counting *Campylobacter* spp.: Performance Comparison of Two Selective Agars — LISA K. WILLIAMS, Nicola C. Elviss, Alisdair McMeechan, and Tom J. Humphrey, Health Protection Agency, University of Bristol, Langford, Bristol, UK

P3-33 Resuscitation of Non-stressed or Stressed *Campylobacter jejuni* in Different Enrichment Broths — PUSSADEE TANGWATCHARIN, Suganya Chanthachum, Prapaporn Khopaibool, and Mansel W. Griffiths, Prince of Songkla University, Dept. of Food Technology, Faculty of Agro-Industry, Hat Yai, Songkhla, Thailand

P3-34 A Combination of Enrichment Broth and Immunomagnetic Separation for the Detection of *Campylobacter jejuni* in Chicken under Aerobic Conditions — PUSSADEE TANGWATCHARIN, Suganya Chanthachum, Prapaporn Khopaibool, and Mansel W. Griffiths, Prince of Songkla University, Hat Yai, Songkhla, Thailand

P3-35 Rapid Automated Detection of *Salmonella* Organisms — LEORA A. SHELEF and Timothy J. Smith, Wayne State University, Dept. of Nutrition and Food Science, Detroit, MI, USA

P3-36 RAPID´*Salmonella*: New EN ISO 16140 Validated Rapid Chromogenic Detection Method for *Salmonella* spp. in Food and Feeding Stuffs — CHRISTOPHE CORDEVANT, Jean-Pierre Facon, Sandrine Gary, Maryse Rannou, and Daniele Sohier, ADRIA Developpement, Quimper, France; Bio-Rad Laboratories, Marnes-la-Coquette, France

P3-37 The Use of Lateral Flow Immunoassay Devices with Serotype Specific Monoclonal Antibodies in the Development of *Salmonella* Enrichment Media — JINGKUN LI, Tony Joaquim, Yichun Xu, George Teaney, Mark Muldoon, Dale Onisk, and Jim Stave, Strategic Diagnostics, Inc., Newark, DE, USA

P3-38 Multistate Outbreaks of *Salmonella* Typhimurium Infection Associated with Cake Batter Ice Cream — GUODONG ZHANG, Li Ma, Balasubr Swaminathan, Stephanie Wedel and Michael P. Doyle, University of Georgia, Griffin, GA, USA

P3-39 Comparison of Reveal® for *Salmonella* Enteritidis, FDA Culture Method and Selective Media for Recovery of *Salmonella* Enteritidis from Broiler Flock Environments — LEI ZHANG, Zhinong Yan, and Elliot T. Ryser, Michigan State University, East Lansing, MI, USA

P3-40 Evaluation of a New Chromogenic Plating Medium for the Isolation and Presumptive Identification of *Salmonella* — JAMES STRINGER, Richard Bovill, and Peter Stephens, Oxoid Ltd., Basingstoke, Hampshire, UK

P3-41 Sensitive and Specific Detection of *Salmonella* from Ground Beef and Potato Salad Samples within Eight Hours — BENJAMIN R. WARREN, Hyun-Gyun Yuk, and Keith R. Schneider, University of Florida, Gainesville, FL, USA

P3-42 Multi-plex Detection of *Salmonella* spp., *E. coli* O157 and SEB Using Bio-nanotransduction — JOSH R. BRANEN and A. Larry Branen, University of Idaho, Post Falls, ID, USA

P3-43 Evaluation of Two Real-time PCR Systems for the Detection and Confirmation of *E. coli* O157:H7 and *Salmonella* in Sprout Irrigation Water — NICOLE MAKS, Brian Parisi, Peter J. Slade, and Tong-Jen Fu, National Center for Food Safety and Technology, Summit-Argo, IL, USA

P3-44 Application of a Biosensor for Rapid Detection of *E. coli* O157:H7 Contamination in Food — KEVIN J. MODARRESS, Iwona Mielzynska, Qiao-xi Zheng, and Thomas G. Hazel, Innovative Biosensors, Inc., College Park, MD, USA

P3-45 Withdrawn

P3-46 A Preliminary Study of Environmental *Escherichia coli* Source Tracking by Microarray — WENDY MADUFF and Trevor Suslow, University of California Davis, Davis, CA, USA

P3-47 An Independent Comparison of the USDA/FSIS Reference Method to the USDA /FSIS Reference Method Incorporating the VIDAS® Immuno-Concentration *E. coli* O157 Procedure for the Isolation and Recovery of *E. coli* O157:H7 from Raw Ground Beef — AMY C. REMES, Robert P. Jechorek, and Amanda L. Kaufer, rtech Laboratories, St. Paul, MN, USA

P3-48 An Independent Comparison of the bioMérieux TEMPO® EC Method to the Petrifilm™ *E. coli*-Coliform Count Plate Method (AOAC Official Method 991.14) for the Enumeration of *E. coli* in Food Products — ROBERT P. JECHOREK, Amy C. Remes, and Amanda L. Kaufer, rtech laboratories, St. Paul, MN, USA

P3-49 A Comparative Evaluation of the MPN Method with Plating Methods for the Enumeration of *Escherichia coli* in Spiked Cold Smoked Salmon Fillets — MARIA DOREY and Patti Wilson, Canadian Food Inspection Agency, Dartmouth, NS, Canada

P3-50 Comparison of Results Between Two International Standard Methods (ISO 16649) and the TEMPO EC Test for the Quantification of *Escherichia coli* from Chilled and Frozen Foods — Christopher L. Baylis, Rebecca A. Green, and ROY P. BETTS, Campden & Chorleywood Food Research Association, Chipping Campden, Gloucestershire, UK

P3-51 Evaluation of the TEMPO System to the FDA/BAM Reference Method and an Alternative Plating Method for the Enumeration of Total Viable Count, *Escherichia coli* and Coliforms in Foods — GRÉGORY DEVULDER, Remy Deschomets, and Pierre-Jean Cotte-Pattat, bioMérieux, Marcy-l'Etoile, France

P3-52 Identification and Quantification of Unknown Enterohemorrhagic *E. coli* (EHEC) Isolates by Multiplex Real-time PCR Assay: A Multi-laboratory Study — KEN J. YOSHITOMI, Karen C. Jinneman, Stephen D. Weagant, George M. Blackstone, and Todd M. Bozicevich, FDA, Bothell, WA, USA

P3-53 Rapid and Effective Method to Improve Detection and Isolation of *E. coli* O157:H7 from Fresh Produce — SUNEE HIMATHONGKHAM, Jenny Yee, Henry Lau, Andrew Lin, and David Lau, California Dept. of Health Services, Richmond, CA, USA

P3-54 *Escherichia coli* O Antigen Typing Using DNA Microarrays — YANHONG LIU and Pina Fratamico, USDA-ARS-ERRC, Wyndmoor, PA, USA

P3-55 Evaluation of the Envisio™ *E. coli* O157 Test System for the Detection of *Escherichia coli* O157:H7 from Ground Beef — CARLOS G. LEON-VELARDE, Mark Barbour, Spencer Hochstetler, Jared Veronick, and Joseph A. Odumeru, University of Guelph, Guelph, ON, Canada

P3-56 DSC Optimization of *Escherichia coli* O157:H7 tRNA Extraction for Microarray Analysis — KRISTINA K. CARTER, Julia S. Gouffon, and David A. Golden, The University of Tennessee, Knoxville, TN, USA

P3-57 Duplex Fluorescence Real-time PCR for Detection and Quantification of *Escherichia coli* Harboring Heat-stable Enterotoxin Genes in Foods — AYUMI HIDAKA, Tomoko Hokyo, Jun Ogasawara, Atsushi Hase, and Yoshikazu Nishikawa, Osaka City University, Sumiyoshi-ku, Osaka, Japan

P3-58 DSC The Application of Acid Shock as a Selective Step to Isolate Enterohemorrhagic *Escherichia coli* — JULIE KURUC, Alan Olstein, and Francisco Diez-Gonzalez, Dept. of Food Science and Nutrition, University of Minnesota, St. Paul, MN, USA

P3-59 Cloth-based Hybridization Array System for the Identification of *Escherichia coli* O157:H7 — AMALIA MARTINEZ-PEREZ, Pamela Auchterlonie, and Burton W. Blais, Canadian Food Inspection Agency, Ottawa, ON, Canada

P3-60 Comparison of the TEMPO EC with the Traditional MPN Method for Enumeration of *E. coli* — DENISE HUGHES, Cindy Vo, and Selina Begum, DH Micro Consulting, Peelwood, NSW, Australia

P3-61 Comparison of Commercial Test Kits to Screen for *E. coli* O157:H7 in Media — NEELAM NARANG and John B. Luchansky, USDA-FSIS-Outbreaks Eastern Lab, Athens, GA, USA

P3-62 Comparison of an Automated Method, TEMPO® CC for the Enumeration of Coliforms in Food with the Reference Method (FDA/BAM) and Petrifilm™ Method — JOHN MILLS and Marie Thérèse Lescure, Cidem Ilter, bioMérieux, Hazelwood, MO, USA

P3-63 The Recovery of *Enterobacter sakazakii* Using a New Enrichment Broth — Lawrence Restaino, WILLIAM C. LIONBERG, Elon W. Frampton, and Anthony L. Restaino, R & F Laboratories, Inc., Downers Grove, IL, USA

P3-64 A Multi-Chromogenic Agar for the Dual Detection of Nonpathogenic and Pathogenic *Listeria* Species — Lawrence Restaino, WILLIAM C. LIONBERG, Elon W. Frampton, and Anthony L. Restaino, R & F Laboratories, Inc., Downers Grove, IL, USA

P3-65 A Comparison Study of the VIDAS® *Listeria* Species Xpress (LSX) with Ottaviani Agosti Agar (OAA) Method to the USDA/FSIS and AOAC Official Methods for the Specific Detection of *Listeria* Species in Meat and Dairy Products — RONALD L. JOHNSON, Denise Hughes, and Ann Marie McNamara, bioMérieux, Hazelwood, MO, USA

P3-66 Use of 1-ply Composite Tissues in an Automated Optical Assay for Recovery of *Listeria* from Stainless Steel, High-density Polyethylene, and Environmental Samples — ZHINONG YAN, Keith Vorst, and Elliot T. Ryser, Michigan State University, East Lansing, MI, USA

P3-67 Evaluation of Chromogenic Media for the Isolation and Identification of *Listeria monocytogenes* and Other *Listeria* Species — CARMEL YOUNG and Patti Wilson, Canadian Food Inspection Agency, Dartmouth, NS, Canada

P3-68 One-step Enrichment for Detection of *Listeria* spp. in Environmental and Food Samples by DNA Hybridization — XUAN PENG, Susan Alles, Jerry Koroniotis, Erin Love, and Mark Mozola, Neogen Corporation, Lansing, MI, USA

P3-69 DSC Use of Procedures Incorporating a Repair Step Results in Improved Detection of *Listeria* in Food Processing Plant Environmental Samples — VERA K. PETROVA, Todd M. Silk, and Catherine W. Donnelly, University of Vermont, Burlington, VT, USA

P3-70 DSC Comparison of *Listeria monocytogenes* Recovery from Hot Dogs Using the Pulsifier and Stomacher Sample Processors — LAURA A. R. MUNSON and Daniel Y. C. Fung, Kansas State University, Manhattan, KS, USA

P3-71 DSC Evaluation of 3M™ Petrifilm™ Environmental *Listeria* Plates and Three Enrichment Broths for Recovery of *Listeria monocytogenes* Injured by Acid — CHRISTOPHER SMART, Errol Groves, and Catherine Donnelly, University of Vermont, Burlington, VT, USA

TUESDAY AFTERNOON, AUGUST 15

12:15 p.m. – 1:00 p.m.

IAFP Business Meeting–*Macleod D*

TUESDAY AFTERNOON, AUGUST 15

1:30 p.m. – 5:00 p.m.

S15 Foodborne Disease Update
Macleod A
Sponsored by The IAFP Foundation

Organizer: Jack Guzewich
Convenors: Jack Guzewich and Jeff Farrar

1:30 *Salmonella* Enteritidis Outbreak Linked to Mung Bean Sprouts — ANDREA ELLIS, CIDPC, Public Health Agency of Canada, Guelph, Ontario, Canada

2:00 The Effect of California Regulations to Require Treatment of Gulf Coast Shellfish — JEFF FARRAR, California Dept of Health Services, Sacramento, CA, USA

2:30 Control Strategies for Reducing *Vibrio* Illness — JOHN PAINTER, CDC-CID, Atlanta, GA, USA

3:00 Break

3:30 2005 *Cyclospora* Outbreaks in Florida — ROBERT A. HAMMOND, Florida Dept. of Health, Tallahassee, FL, USA

4:00 2005 *Cyclospora* Outbreaks in Canada — BRENT DIXON, Health Canada, Ottawa, ON, Canada

4:30 FDA's Traceback and Environmental Investigations Following the *Cyclospora* Outbreaks — JACK GUZEWICH, FDA-CFSAN, College Park, MD, USA

S16 Contamination of Ready-to-Eat Foods: Transfer and Risk: *Listeria monocytogenes* and Other Microorganisms

Macleod BC
Sponsored by National Alliance for Food Safety and Security and The IAFP Foundation

Organizers: Ewen Todd and Ann Draughon
Convenors: Ewen Todd and John Holah

1:30 A Collaborative Risk Assessment of *Listeria monocytogenes* in RTE Processed Meat and Poultry Products Based on 8,000 Samples Collected from Four FoodNet Sites — ANN DRAUGHON, The University of Tennessee, Knoxville, TN, USA

2:00 Consumer-phase *Listeria monocytogenes* Risk Assessment in Deli Meats — LEE-ANN JAYKUS, North Carolina State University, Raleigh, NC, USA

2:30 Modeling *Listeria monocytogenes* Cross Contamination in Retail Food — FERNANDO PEREZ-RODRÍGUEZ, Universidad de Cordoba, Cordoba, Spain

3:00 Break

3:30 Assessment of Microbial Contamination Transfer to Ready-to-Eat Foods from Contamination Transfer Vectors — DEBRA SMITH, Campden & Chorleywood Food Research Association, Chipping Campden, Gloucestershire, UK

4:00 Quantifying Recontamintaion through Air, Biofilms and Cross Contamination in the Kitchen — ESTHER VAN ASSELT, RIVM, Bilthoven, The Netherlands

4:30 Transfer of *Listeria monocytogenes* in Deli Meats through Slicing Machines and Conveyor Belts — EWEN TODD, Michigan State University, East Lansing, MI, USA

S17 Role and Application of International Standards in Supporting Food Safety Management and Testing

Macleod D
Sponsored by The IAFP Foundation

Organizer: Roger Brauninger
Convenors: Albert F. Chambers and Roger Brauninger

1:30 ISO 22000 – New Standards for Food Safety Management — ALBERT CHAMBERS, Monachus Consulting, Ottawa, ON, Canada

2:00 Food Safety Management Systems – Audit and Certification Requirement (ISO 22003) — CHRISTINE BEDILLION, NSF International, Ann Arbor, MI, USA

2:30 Implementing ISO 22000 — TBD

3:00 Break

3:30 ISO 17025 Laboratory Accreditation Implementation Process — ROGER BRAUNINGER, The American Association for Laboratory Accreditation (A2LA), Frederick, MD, USA

3:45 An FDA Laboratory's Experience with ISO 17025 Laboratory Accreditation — CATHY BURNS, FDA-ORA-DHHS, Denver District Laboratory, Denver, CO, USA

4:05 A Commercial Testing Laboratory's Experience with ISO 17025 Accreditation — MOLLY MILLS, rtech Analytical Laboratories, St. Paul, MN, USA

S18 A New Crack at Egg Safety: From the Hen House to Your House

Glen 201–202

Organizer: Michael Musgrove
Convenors: Michael Musgrove and Patricia Curtis

1:30 New Regulations: FDA Perspective — GERARDO RAMIREZ, FDA, College Park, MD, USA

2:00 Risk Analysis and New Regulations: FSIS Perspective — HEEJONE LATIMER, USDA-FSIS, Washington, D.C., USA

2:30 Overview of Egg Industry — HILARY SHALLO THESMAR, Egg Safety Center, Washington, D.C., USA

3:00 Break

3:30 Effects of Shell Egg Processing — MICHAEL MUSGROVE, USDA-ARS, Athens, GA, USA

4:00 Shell Egg Processing Plant Sanitation — DEANA JONES, USDA-ARS, RRC, Athens, GA, USA

4:30 Pathogens of Concern/Control and Mitigation — RICHARD GAST, USDA-ARS, Athens, GA, USA

S19 Cleaning and Sanitation for Retail Food Safety–Identifying the Issues

Glen 203–204

Organizers: Dale Grinstead and O. Peter Snyder
Convenors: Dale Grinstead and O. Peter Snyder

1:30 Risk Associated with Improper Cleaning and Sanitation at the Food Retail Level — DONALD SCHAFFNER, Rutgers, The State University of New Jersey, New Brunswick, NJ, USA

2:00 C&S for Grocery Retail — TBD

2:30 C&S for Food Service Retailers — C. HAROLD KING, Chick-fil-A Food Safety, Atlanta, GA, USA

3:00 Break

3:30 Retail Regulatory Update — SHIRLEY BOHM, FDA, College Park, MD, USA

4:00 Retail Sanitary Design — HARRY GRENAWITZKE, National Sanitation Foundation, Ann Arbor, MI, USA

4:30 Retail C&S Training — RALPH NELLER, JohnsonDiversey, Sharonville, OH, USA

T04 Risk Assessment and Epidemiology

Glen 206

Convenors: Heejeong Latimer and Emma Hartnett

T4-01 1:30 Food Safety and Food Defense Simulation: A Realistic Approach — WILLETTE M. CRAWFORD, ANGELA M. VALADEZ, Karen Chong , Aparna Kothapalli , David Schroeder, Tejas Bhatt, Chih-hui Hsieh, Alok Chaturvedi, and Richard Linton, Purdue University, West Lafayette, IN, USA

T4-02 1:45 On-farm Risk: Prevalence of Zoonotic *Giardia* and *Cryptosporidium* in Adult Dairy Cows in Seven Eastern States — JAMES TROUT, Monica Santin, and Ronald Fayer, USDA-ARS-ANRI, Beltsville, MD, USA

T4-03 2:00 Generic Exposure Assessment Model of *Salmonella* spp. in Poultry — HEEJEONG LATIMER, Greg Paoli, Emma Hartnett, Neal Golden, Abdel-Razak Kadry, and Janell Kause, USDA-FSIS, Washington, D.C., USA

T4-04 2:15 Predictive Model for Growth of *Salmonella* Typhimurium DT104 Ground Chicken Breast Meat — THOMAS P. OSCAR, USDA-ARS, University of Maryland Eastern Shore, Princess Anne, MD, US

T4-05 2:30 An International Outbreak of *Salmonella* Linked to Pet Treats — LORRAINE MCINTYRE, S. Brisdon, L. Wilcott, L. MacDougall, E. Galanis, L. Crowe, R. Baer, L. Gustafson, A. Paccagnella, R. Sevigny, L. Chui, D. Everett, D. MacDonald, A. Ellis, R. Colindres and F. Angulo, BC Centre for Disease Control, Vancouver, BC, Canada

T4-06 2:45 A Risk Assessment Model of *Enterobacter sakazakii* in Powdered Infant Formula — Greg Paoli, EMMA HARTNETT, and Todd Ruthman, Decisionalysis Risk Consultants, Ottawa, ON, Canada

3:00 Break

T4-07 3:30 The 'Fermi Solution' – A Potential Tool in Estimating the Number of Victims in Food Poisoning Outbreaks — MICHA PELEG, Mark D. Normand, Joseph Horowitz, and Maria G. Corradini, University of Massachusetts, Amherst, MA, USA

T4-08 3:45 Accounting for Hypothetical Variability (Over Stratification) Inflates Uncertainty in Risk Assessment: The Case of Analyzing BSE Surveillance in Low Prevalence Countries — MARK POWELL, Aaron Scott, and Eric Ebel, USDA, Washington D.C., USA

T4-09 4:00 Database on Breakdowns in Food Safety — ROY BETTS and Mike Stringer, Campden & Chorleywood Food Research Association, Chipping Campden, Gloucestershire, UK

T4-10 4:15 Calculation of Lot Rejection Rates and Risk Reduction through the Application of Microbiological Criteria — GREG PAOLI and Emma Hartnett, Decisionalysis Risk Consultants, Inc., Ottawa, ON, Canada

T4-11 4:30 DSC Investigation of Using NI-P-PTFE Coating to Minimize Cleaning Time of Tomato Fouling Deposit — NORASHIKIN AB. AZIZ, W. Liu, P. J. Fryer & Q. Zhao, University of Birmingham, Birmingham, West Midlands, UK

P04 Pathogens and Produce Poster Session

Exhibit Hall

2:00 p.m. – 6:00 p.m.

Authors present 3:00 p.m.–5:00 p.m.

Convenors: To Be Determined

P4-01 Evaluation of Differences among Guaiacol Producing and Non-Guaiacol Producing *Alicyclobacillus* spp. — SU-SEN CHANG and Dong-Hyun Kang, Washington State University, Washington State University, Pullman, WA, USA

P4-02 Effect of Background Microflora and Temperature on the Behavior of *Salmonella* Enterica on Cilantro (*Coriandrum sativum* L.) — ERIKA A. NERI-HERRERA, Naaxielii Serna-Villagomez, Scott E. Martin, Graciela W. Padua, and Montserrat Hernandez-Iturriaga, Universidad Autonoma de Queretaro, Queretaro, Mexico

P4-03 DSC Role of *E. coli* O157:H7 O Side Chain on Cell Hydrophobicity, Charge and Attachment to Lettuce — RENEE BOYER, Susan Sumner, Robert Williams, and Kali Kniel, Virginia Polytechnic Institute and State University, Blacksburg, VA, USA

P4-04 Cell Surface Charge and Hydrophobicity of Sixteen *Salmonella* Serovars on Attachment to Cantaloupe Rind and Decontamination with Sanitizers — DIKE O. UKUKU, and William F. Fett, USDA-ARS-ERRC, Wyndmoor, PA, USA

P4-05 Moisture, Seed Coat Characteristics, and Disinfection of Artificially Inoculated Alfalfa Seeds — KATHLEEN T. RAJKOWSKI, USDA-ARS-ERRC-FSITRU, Wyndmoor, PA, USA

P4-06 Misting Effects on Microbial Growth of Retail Produce — Amy Volkman, Kara Behlke, Soley Quinlin, David Giruad, Sam Beattie, and JULIE A. ALBRECHT, University of Nebraska-Lincoln, Lincoln, NE, USA

P4-07 Factors Affecting the Recovery of *Salmonella* spp. and *E. coli* O157:H7 from the Surface of Cantaloupe — Edgar Villalpando-Arteaga, Nanci Martínez-Gonzales, Elisa Cabrera-Diaz, Cristina Martínez-Cárdenas, Porfirio Gutiérrez-González, and OFELIA RODRÍGUEZ-GARCÍA, Universidad de Guadalajara, Guadalajara, Jalisco, México

P4-08 Survival of *Salmonella* spp. on Whole and Minimally Processed Mangoes — Alma Soltero-Sánchez, Liliana Martínez-Chávez, Alejandro Castillo, Nanci Martínez-Gonzáles, Porfirio Gutiérrez-González, and OFELIA RODRÍGUEZ-GARCÍA, Universidad de Guadalajara, Guadalajara, Jalisco, México

P4-09 Internalization of *Salmonella* ser. Typhimurium into Mango Pulp and Its Prevention by Chlorine and Copper Ions — CRISTOBAL CHAIDEZ, Gladys Chavez, Manuel Baez, Celida Rodriguez, and Marcela Soto, Centro de Investigacion en Alimentacion y Desarrollo, Culiacan, Sinaloa, Mexico

P4-10 Interaction of *Salmonella* with Pre- and Post-Harvest Tomato Fruit — Xiaoqing Shi, Magdalena Kostrzynska, and KEITH WARRINER, University of Guelph, Guelph, ON, Canada

P4-11 Potential Sources of *Salmonella* Contamination on Tomatoes Grown in Hydroponic Greenhouses in Mexico — LEOPOLDO OROZCO R., Mark L. Tamplin, Pina M. Fratamico, Jeffrey E. Call, John B. Luchansky, and Eduardo F. Escartin, Universidad Autonoma de Queretaro, Queretaro, Mexico

P4-12 DSC Survival and Growth of *Salmonella* Enteritidis PT 30 in Almond Orchard Soils — MICHELLE D. DANYLUK, Mamie Nozawa-Inoue, Krassimira R. Hristova, Kate M. Scow, and Linda J. Harris, University of California-Davis, Davis, CA, USA

P4-13 Fate of Vancomycin-resistant *Enterococci* during Active Composting on Farm — XIUPING JIANG, Andrew Daane, Pingfang Liang, and Marion Shepherd, Clemson University, Clemson, SC, USA

P4-14 DSC Cryotolerance, Attachment, and Recoverability of *Escherichia coli* O157:H7 and Selected Surrogates from Romaine Lettuce Leaf Surfaces — JIN KYUNG KIM and Mark A. Harrison, University of Georgia, Athens, GA, USA

P4-15 Dry Heat Treatment for Non-Pathogenic Surrogate Cultures for *Salmonella* Enteritidis on Whole Almonds — ERDOGAN CEYLAN, Guangwei Huang, and Ann Marie McNamara, Silliker Inc., South Holland, IL, USA

P4-16 Reduction of *Salmonella* Enteritidis PT 30 on In-shell Almonds Using Gaseous Propylene Oxide — WEN-XIAN DU, Shirin J. Abd, Michelle D. Danyluk, and Linda J. Harris, University of California, Davis, Davis, CA, USA

P4-17 DSC The Effect of Pre-treatments on the Reduction of *Salmonella* Enteritidis PT 30 on Almonds during Dry Roasting — BRIAN U. KIM and Linda J. Harris, University of California-Davis, Davis, CA, USA

P4-18 DSC Effects of Sanitization Treatments and Storage Temperature on Survival and Growth of *Listeria* and *E. coli* on Fresh-cut Vegetables — GILLIAN A. FRANCIS and David O'Beirne, University of Limerick, Food Science Research Centre, Dept. of Life Sciences, Limerick, Ireland

P4-19 Effectiveness of a Simple Chlorine Dioxide Method for Controlling *Listeria monocytogenes*, *Pseudomonas aeruginosa*, *Salmonella* Typhimurium, *Staphylococcus aureus*, and *Yersinia enterocolitica* on Blueberries — Byungchul Kim and VIVIAN WU, The University of Maine, Orono, ME, USA

P4-20 Comparison of Treatment of Fresh-cut Produce with Sodium Hychlorite and Calcium Hypochlorite for Effects on Microbiological and Sensory Quality — Jennifer L. Simmons, Jee-Hoon Ryu, and LARRY R. BEUCHAT, University of Georgia, Griffin, GA, USA

P4-21 Comparison of Lactic Acid and Hypochlorite Treatments for Reducing *Listeria monocytogenes* on the Surface of Fresh Mangoes — Arias-Orozco Berenice, Cristina Martínez-Cárdenas, Ofelia Rodríguez-García, and NANCI E. MARTÍNEZ-GONZÁLES, Universidad de Guadalajara, Guadalajara, Jalisco, México

P4-22 Comparison of Treatments for Reducing *Salmonella* and *Escherichia coli* O157:H7 on the Surface of Fresh Fruits — Edith Vargas-Morales, Liliana Martínez-Chávez, Cristina Martínez-Cárdenas, M. Ofelia Rodríguez-Garciá, Alejandro Castillo, and NANCI MARTINEZ-GONZALES, Universidad de Guadalajara, Guadalajara, Jalisco, México

P4-23 Evaluation of Ionizing Radiation for the Inactivation of *Salmonella* Enterica in Cilantro (*Coriandrum sativum* L.) —NAAXIELII SERNA-VILLAGOMEZ, Erika Alejandra Neri-Herrera, Scott E. Martin, Graciela Wild-Padua, and Montserrat Hernandez-Iturriaga, Centro Universitario, Queretaro, Mexico

P4-24 DSC Fate of *Listeria monocytogenes* and *Salmonella* spp. on Irradiated Minimally Processed Organic Watercress during Refrigerated Shelf Life — CECÍLIA GERALDES MARTINS, Tatiana Pacheco Nunes, Kátia Leani Oliveira de Souza, Bernadette Dora Gombossy de Melo Franco, Maria Teresa Destro, Beatriz Hutzler, and Mariza Landgraf, University of São Paulo, São Paulo, Brazil

P4-25 Effect of Irradiation on Flavonoid Content and Radio-resistance of *Listeria monocytogenes* on Arugula — Tatiana Pacheco Nunes, Cecília Geraldes Martins, Maria Inês Genovese, Bernadette Dora Gombossy de Melo Franco, Maria Teresa Destro, Beatriz Hutzler, and MARIZA LANDGRAF, University of São Paulo, São Paulo, Brazil

P4-26 DSC Comparative Inactivation of Foodborne Viruses on Fresh Produce — VIVIANA FINO and Kalmia Kniel, University of Delaware, Newark, DE, USA

P4-27 DSC Reduction of Salmonellae Inoculated onto Different Tomato Surfaces by Gaseous Chlorine Dioxide — ARPAN BHAGAT and Richard Linton, Purdue University, West Lafayette, IN, USA

P4-28 Development of a Pilot-scale Continuous Flow Process for Sanitizing Lettuce by Aqueous Ozone — MUSTAFA VURMA, Jin-Gab Kim, Luis A. Rodriguez-Romo, and Ahmed E. Yousef, The Ohio State University, Columbus, OH, USA

P4-29 Eliminating *Salmonella* Enterica on Alfalfa and Mung Bean Sprouts by Acid and Heat Treatments — AREF KALANTARI, Aref Kalantari, Edwina Westbrook, and Steven Pao, Virginia State University, Petersburg, VA, USA

P4-30 Efficacy of High Pressure Processing in Combination with Antimicrobials for the Reduction of *Escherichia coli* O157:H7 and *Salmonella* in Apple Juice and Orange Juice — BROOKE M. WHITNEY, Robert C. Williams, Joseph E. Marcy, and Joseph D. Eifert, Virginia Polytechnic Institute and State University, Cary, NC, USA

P4-31 Inactivation of *Escherichia coli* O157:H7 in Apple Juice as Affected by Cranberry Juice Concentration and Holding Temperature — ASHLEY S. PEDIGO, Faith J. Critzer, and David A. Golden. The University of Tennessee, Knoxville, TN, USA

P4-32 Microbiological Safety of Retail Pre-packaged Mixed Salads for *Listeria monocytogenes* — CHRISTINE L. LITTLE, Fiona Taylor, Satnam K. Sagoo, Health Protection Agency, London, UK

P4-33 Hygenic-sanitary Conditions of Minimally Processed Fruits and Vegetables Marketed in Campinas, SP, Brazil — THAÍS BELO ANACLETO DOS SANTOS; Neusely Da Silva, Valeria Christina Amstalden Junqueira, and Jose Luiz Pereira, Food Technology Institute, São Paulo, Brazil

P4-34 *Salmonella* Surveillance in Mexico, 2002–2005: Results from a Four-state Network — MUSSARET B. ZAIDI, Patrick F. McDermott, Freddy Campos, Jesus Contreras, Gloria Figueroa, Susannah K. Hubert, Estela Lopez, Gabriela Vazquez, Celia Alpuche, Maria Teresa Estrada, Juan J. Calva, and Linda Tollefson, Departamento de Investigacion, Hospital General O'Horan, Merida, Yucatan, Mexico

P4-35 Enumeration of *Salmonella* in Raw Retail Meat in Yucatan, Mexico —MUSSARET B. ZAIDI, Freddy Campos, and Carolina Perez, Departamento de Investigacion, Hospital General O'Horan, Merida, Yucatan, Mexico

P4-36 Isolation of *Enterobacter sakazakii* from Sunsik (Traditional Korean Ready-to-Eat Food) — SE-WOOK OH, Jae-Won Choi, Yun-Ji Kim, and Jong-Kyung Lee, Korea Food Research Institute, Sungnam-si, Kyunggi-do, Korea

P4-37 Growth and Persistence of *L. monocytogenes* Strains on the Model Plant *Arabidopsis thaliana* and Prevalence of *Listeria* spp. on Plant Matter in Natural Environments — SARA MILILLO, Martin Wiedmann, and Kathryn Boor, Cornell University, Ithaca, NY, USA

P4-38 Susceptibility of *Enterococci* Faecium and *Enterococcus* Faecalis Associated with Dairy Cattle: A Pilot Study — Terry Miller, H TROUTT, Carol Maddox, Nohra Mateus-Pinilla, and Theodore Lock, University of Illinois, U-C, Urbana, IL, USA

P4-39 Comparison of Occurrence of Four Major Foodborne Pathogens on Swine Farms in Four States — Philipus Pangloli, Carl D. Doane, David D. Rasmussen, Andres Rodriguez, Willie Taylor, and F. ANN DRAUGHON, The University of Tennessee, Knoxville, TN, USA

P4-40 The Effect of Swine Production System on Bacterial Prevalence and Antibiotic Resistance — BRENDA S. PATTON, Wayne R. Cast, Matt E. Kocher, John O. Matthews, Ronald W. Griffith, Howard S. Hurd, and James S. Dickson, Iowa State University, Ames, IA, USA

P4-41 Dissemination of Clonal Strains of *Campylobacter* Resistant to Multiple Antimicrobial Drugs among Retail Chickens in Korea — WONKI BAE, Jun-Man Kim, Jun-Bae Hong, Katie N. Kaya, Thomas E. Besser, and Yong Ho Park, Seoul National University, Seoul, Korea

P4-42 pVir Plasmid and Tetracycline Resistance of *Campylobacter jejuni* Isolates from Poultry, Meat and Humans in Korea — JUN MAN KIM, Won Ki Bae, Hye Cheong Koo, So Hyun Kim, Woo Kyung Jung, Young Kyung Park, Sun Young Hwang, Sook Shin, and Yong Ho Park, Seoul National University, Seoul, Korea

P4-43 Phenotypic and Genotypic Characterization of *Enterobacter sakazakii* — RAQUEL LENATI, Karine Hébert, Yuntong Kou, Sarah McIlwham, Kevin Tyler, Jeff Farber, and Franco Pagotto, University of Ottawa, Ottawa, ON, Canada

P4-44 Development of a Non-primate Animal Model for *Enterobacter sakazakii* — RAQUEL LENATI, Min Lin, Jeff Farber, Franco Pagotto, University of Ottawa and Health Canada, Ottawa, ON, Canada

P4-45 Detection of Norovirus in a Small Community Groundwater Source — CHRISTINE BARTHE, O. Laroche, P. Payment, A. Locas, P. Ward, and Alain Houde, Ministère de l'Agriculture, Ste-Foy, QC, Canada

P4-46 Survival of Human Norovirus on Fresh Lettuce using Real-time Quantitative RT-PCR and Two-step RT-PCR —Solange E. Ngazoa and JULIE JEAN, University Laval, Quebec, QC, Canada

P4-47 Characterization of *Salmonella* spp. Isolated from Pre- and Post-Chill Whole Broiler Carcasses — SALINA PARVEEN, Maryam Taabodi, Tagelsir Mohamed, Jurgen Schwarz, Susannah Hubert, David White, and Tom Oscar, University of Maryland Eastern Shore, Princess Anne, MD, USA

P4-48 Prevalence of Class 1 Integrons and Antibiotic Resistance Patterns of Enteric Bacteria in Broiler Chickens in Thailand and the United States — SUMALEE LIAMTHONG, Alan Mathew, and Eddie Jarboe, The University of Tennessee, Knoxville, TN, USA

P4-49 Growth Characteristics and Susceptibility to 1% Lactic Acid of Nalidixic Acid Resistant Mutants of *Salmonella* Typhimurium Developed from a Single Wild-type Strain — KAREN KILLINGER MANN, Brian San Francisco, Michael Galyean, and Mindy Brashears, Texas Tech University, Lubbock, TX, USA

P4-50 Insertional Mutagenesis of *Listeria monocytogenes* 568 Reveals Genes That Contribute to Elevated Thermotolerance — TIM ELLS and Elisbeth Truelstrup Hansen, Atlantic Food and Horticulture Research Centre, Agriculture and Agri-Food Canada, Kentville, NS, Canada

P4-51 DSC The Role of σ^B-dependent and σ^B-independent Mechanisms of *Listeria monocytogenes* during Cold Shock and Growth at Low Temperature —YVONNE CHAN CHAN, Kathryn J. Boor, and Martin Wiedmann, Cornell University, Ithaca, NY, USA

P4-52 DSC Exposure of Nutrient Deprived *Listeria monocytogenes* Cells to Food Preservative Stress in the Presence or Absence of Oxygen —BWALYA LUNGU and Michael G. Johnson, University of Arkansas, Fayetteville, AR, USA

P4-53 One-year Starvation-stressed Cells of *Listeria monocytogenes* Scott A Serotype 4b Invade Human Cell Line Caco-2 — RAMAKRISHNA NANNAPANENI, Keith C. Wiggins, Robert Story, Aubrey F. Mendonca, and Michael G. Johnson, University of Arkansas, Fayetteville, AR, USA

P4-54 DSC Molecular Characterization of "Unusual" *Listeria monocytogenes* from Brazilian Poultry Slaughterhouses — EB CHIARINI, Maria T. Destro, Jeff Farber, and Franco Pagotto, University of São Paulo, São Paulo, Brazil

P4-55 Distribution of Epidemic Clonal Genetic Markers among *Listeria monocytogenes* 4b Strains and Correlation with Molecular Subtypes — GIOVANNA FRANCIOSA, Concetta Scalfaro, Antonella Maugliani, Francesca Floridi, Antonietta Gattuso, and Paolo Aureli, Istituto Superiore di Sanità (Italian National Institute of Health), Rome, Italy

P4-56 The Role of *Listeria monocytogenes* Serotype 4b Antigens in the Pathogenesis of Listeriosis — Nancy Faith, Sophia Kathariou, Brien Neudeck, John Luchansky, and CHARLES CZUPRYNSKI, University of Wisconsin-Madison, Madison, WI, USA

P4-57 Induction of Apoptosis in an In Vitro HEp-2 Cell Model by *Listeria* spp. — LEONARD L. WILLIAMS, Alabama A&M University, Huntsville, AL, USA

P4-58 Stability of *Escherichia coli* O157:H7 in Sub-optimal Conditions as Monitored by Multilocus Variable Number Tandem Repeat Analysis — MICHAEL COOLEY, Diana Chao, and Robert Mandrel, USDA-ARS, Albany, CA, USA

P4-59 Oxygen Consumption Rate of *Campylobacter jejuni* during Growth and Survival under Various Oxygen Levels — CHIN-YI CHEN, George Paoli, and Peter Irwin, USDA-ARS-ERRC, Wyndmoor, PA, USA

P4-60 Quorum Sensing and Stress Resistance Relationship in *Salmonella* — YOHAN YOON and John N. Sofos, Colorado State University, Fort Collins, USA

P4-61 Invasiveness and Intracellular Growth of Multi-drug-Resistant *Salmonella* and Other Pathogens in Caco-2 Cells — SHIN-HEE KIM and Cheng-i Wei, University of Maryland, College Park, MD, USA

P4-62 Generation of Accessory Gene Regulator Variants in *Staphylococcus aureus* Biofilms — JEREMY YARWOOD, Kara Paquette, Esther Volper, and E. Peter Greenberg, 3M Corporate Research, St. Paul, MN, USA

P4-63 DSC Quantitative Analysis of the Growth and Attachment of *Salmonella* Typhimurium Mutants during the Alfalfa Seed Sprouting Process — BIN LIU and Donald W. Schaffner, Rutgers, The State University of New Jersey, New Brunswick, NJ, USA

P4-64 Microbiological and Toxicological Safety of Dried Spices and Herbs at Import, Production, Retail and Catering Establishments in the UK —SATNAM SAGOO, Christine Little, Melody Greenwood, Health Protection Agency – Centre for Infection, London, UK

P4-65 The Importance of Strain Validation Prior to Experimental Use of Nalidixic Acid-resistant *Salmonella* Typhimurium: Alterations in Serotype and Multi-Drug Resistance — KAREN KILLINGER MANN and Mindy Brashears, Texas Tech. University, Lubbock, TX, USA

WEDNESDAY MORNING, AUGUST 16

8:30 a.m. – 12:00 p.m.

S20 Public Health and Environmental Impact Assessments in the Aftermath of Hurricanes Katrina and Rita

Macleod A
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Organizers: Angelo DePaola and Marlene E. Janes
Convenors: Angelo DePaola and Marlene E. Janes

8:30 Impact of 2005 Hurricanes on Louisiana's Seafood Industry and Public Health — JON BELL, Louisiana State University, Baton Rouge, LA, USA

9:00 Overview of the Federal Response to Hurricanes Katrina and Rita — JEFFREY BIGLER, US-EPA – 4305T, Washington, D.C., USA

9:30 Potential Effects on Human and Ecosystem Health from Short-term Contamination of Coastal Beaches and Freshwater Systems by Hurricanes Katrina and Rita —DONNA MYERS-USGS, Reston, VA, USA

10:00 Break

10:30 Pollutant Concentration Changes in Environmenmtal Samples Associated with 2005 Hurricanes — GUNNAR LAUENSTEIN, NOAA, Silver Spring, MD, USA

11:00 FDA Assessment of Seafood Safety in Louisiana in the Aftermath of Hurricanes Katrina and Rita, 2005 — ROBERT DICKEY, FDA-Gulf Coast Seafood Laboratory, Dauphin Island, AL, USA

11:30 Eye of the Storm: Impact of 2005 Hurricanes on Gulf Coast Oyster Harvest and Human *Vibrio* Illnesses — JOHN PAINTER, CDC, Atlanta, GA, USA

S21 Assuring Microbiological Safety of Organic Products

Macleod BC

Organizer: Harshavardhan Thippareddi
Convenors: Harshavardhan Thippareddi and Ewen C.D. Todd

8:30 Organic Foods – What are They and the Global Market — EWEN TODD, Michigan State University, East Lansing, MI, USA

9:00 Making It Organic – Regulations Guiding Organic Production and Processing —HARSHAVARDHAN THIPPAREDDI, University of Nebraska-Lincoln, Lincoln, NE, USA

9:30 Food Safety Challenges in Organic Milk and Milk-based Products and Assuring Their Safety — CRAIG HARRIS, Michigan State University, East Lansing, MI, USA

10:00 Break

10:30 Food Safety Challenges in Organic Fresh and Processed Meat and Poultry Products and Assuring Their Safety —STAN BAILEY, USDA-ARS-SAA, Athens, GA, USA

11:00 Food Safety Challenges in Organic Fruits and Vegetables and Assuring Their Safety — TREVOR SUSLOW, University of California, Davis, CA, USA

11:30 Cleaning and Sanitation of Processing Operations to Assure Safety of Organic Products — FRANCISCO DIEZ-GONZALEZ, University of Minnesota, St. Paul, MN, USA

S22 *Salmonella*: The Saga Continues

Macleod D
Sponsored by ILSI N.A.

Organizer: Catherine Nnoka
Convenors: Stan Bailey and Paul Hall

8:30 Trends on Foods Associated with Outbreaks of Salmonellosis — MICHAEL LYNCH, CDC, Atlanta, GA, USA

9:00 *Salmonella* Control in Broiler Chickens – The US Department of Agriculture, Food Safety and Inspection Service Perspective — DANIEL ENGELJOHN, USDA, Washington, D.C., USA

9:30 Poultry Industry Efforts to Control *Salmonella* in Chickens — TBD

10:00 Break

10:30 Ecology, Physiological and Genetic Factors Associated with the Survival and Growth of *Salmonella* on or within Tomatoes — KEITH WARRINER, University of Guelph, Guelph, ON, Canada

11:00 Antimicrobial Resistance Trends in *Salmonella* — PAULA FEDORKA-CRAY, USDA-ARS, Athens, GA, USA

11:30 *Salmonella* – International Perspectives — MARTA HUGAS, European Food Safety Authority, Parma, Italy

T05 Education

Glen 203–204

Convenors: Sheri Cates and Mary Roseman

T5-01 8:30 The Health Belief Model as a Framework for Analyzing Food Safety — MARY ROSEMAN and Janet Kurzynske, University of Kentucky, Lexington, KY, USA

T5-02 8:45 Exploring the Role of Risk Perception and Socio-demographic Factors on the Use of Thermometers in Food Preparation — KOFI ADU-NYAKO, Ralph Okafor, and Jeremiah Richey, North Carolina Agricultural and Technical State University, Greensboro, NC, USA

T5-03 9:00 Foodservice Manager Credentialing: Effects on Food Safety and Health Inspection Scores — MARGARET BINKLEY, Douglas Nelson, Barbara Almanza, Richard Ghiselli, and Joseph Ismail, Texas Tech University, Lubbock, TX, USA

T5-04 9:15 Examining the Exam — Food Safety Training and Certification for School Food Service Personnel — RITA BRENNAN OLSON and Elena Carbone, Massachusetts Dept. of Education, Malden, MA, USA

T5-05 9:30 DSC Operational and Individual Self-reported Behavior Change among University Employees and Residents in Response to a Norovirus Outbreak — BRAE SURGEONER, Benjamin Chapman, and Douglas Powell, University of Guelph, Dept. of Plant Agriculture, Guelph, ON, Canada

T5-06 9:45 An Evaluation of Inter-auditor Reliability within an Accredited Food Safety Program — DAVID LLOYD, University of Wales Institute, Cardiff, 200 Western Ave., Cardiff, Wales, UK

10:00 Break

T5-07 10:30 Consumers' Need for and Use of Information on Restaurant Food Safety — DENISE WORSFOLD and C. Griffith, University of Wales Institute of Cardiff, Western Ave., Cardiff, Wales, UK

T5-08 10:45 Consumer Storage Practices for Refrigerated Ready-to-Eat Foods: Results of a Web-based Survey of Pregnant Women, Seniors, and the Remaining Population — SHERYL CATES, Katherine Kosa, Shawn Karns, Sandria Godwin, and Delores Chambers, RTI International, Research Triangle Park, NC, USA

T5-09 11:00 Understanding Food Safety Information Needs: Using an Information Service as a Research Tool — SARAH WILSON, Douglas Powell, Carole Buteau, Linda Corso, and Marnie Webb, University of Guelph, Guelph, ON, Canada

T5-10 11:15 Music Enhances a Food Service Food Safety Curriculum for High School Students — SANDRA MCCURDY, Cindy Schmiege, and Heather Newell, School of Family and Consumer Sciences, University of Idaho, Moscow, ID, USA

T5-11 11:30 Coloring Fruit and Vegetable Food Safety Education—ELIZABETH A. BIHN, Donna L. Scott, Robert B. Gravani, and Karin A.K. Rosberg, Cornell University, Ithaca, NY, USA

T5-12 11:45 DSC Recruiting in the Digital Age: How to Promote Poultry Science and Food Science to Generation Y—VANESSA KRETZSCHMAR-MCCLUSKEY, P.A. Curtis, and S.R. McKee, Auburn University, Auburn, AL, USA

T06 Pathogens and Antimicrobials–*Listeria*

Glen 206

Convenors: Ron Weiss and Scott Burnett

T6-01 8:30 DSC Effect of Temperature and Storage Time on the Fate of *Listeria monocytogenes* on Inoculated Salami — CATHERINE A. SIMPSON, Ifigenia Geornaras, and John N. Sofos, Colorado State University, Fort Collins, CO, USA

T6-02 8:45 DSC Effects of Low Equal Molar Concentrations of Three Food Grade Acids on *Listeria monocytogenes* in Bologna — GIANNA DUTAN and John N. Sofos, Colorado State University, Fort Collins, CO, USA

T6-03 9:00 DSC Modeling to Predict the Growth/No Growth and Selected Growth Limit Boundaries of *Listeria monocytogenes* in Ready-to-Eat Products as a Function of Lactic Acid Concentration, Dipping Time, and Storage Temperature — YOHAN YOON, Patricia A. Kendall, Keith E. Belk, John A. Scanga, Gary C. Smith, and John N. Sofos, Colorado State University, Fort Collins, CO, USA

T6-04 9:15 DSC Control of *Listeria monocytogenes* on Frankfurters Formulated without Lactate by Dipping in Sodium Lactate before and after Inoculation — BUFFY A. STOHS, Beth Ann Crozier-Dodson, and Daniel Y.C. Fung, Kansas State University, Manhattan, KS, USA

T6-05 9:30 DSC Effects and Interactions of Sodium Lactate, Sodium Diacetate, and Pediocin on the Thermal Inactivation of Starved Cells of *Listeria monocytogenes* on the Surface of Bologna — CAMELIA GROSULESCU, Vijay K. Juneja, and Sadhana Ravishankar, Illinois Institute of Technology, Chicago, IL, USA

T6-06 9:45 Use of Octanoic Acid as a Post-lethality Treatment to Reduce *Listeria monocytogenes* on Ready-to-Eat Meat and Poultry Products — SCOTT L. BURNETT, Jocelyn H. Chopskie, Teresa C. Podtburg, and Timothy A. Gutzmann, Ecolab, Inc., Eagan, MN, USA

10:00 Break

T6-07 10:30 DSC Impact of Nitrite on Detection of *Listeria monocytogenes* in Selected Ready-to-Eat Meat and Seafood Products — DAVID NYACHUBA and Catherine Donnelly, The University of Vermont, Burlington, VT, USA

T6-08 10:45 DSC Interaction of *Pseudomonas putida* and *Listeria monocytogenes* in Mixed Culture Biofilms — GREG KEPKA and Heidi Schraft, Lakehead University, Thunder Bay, ON, Canada

T6-09 11:00 DSC CtsR and Its Interaction with Sigma B are Required for Heat Tolerance, Motility, and Host Cell Invasion in *Listeria monocytogenes* —YUEWEI HU, Ute Schwab, Martin Wiedmann, and Kathryn J. Boor, Cornell University, Ithaca, NY, USA

T6-10 11:15 A Method to Detect Significant Clusters in Phylogenies Shows That *Listeria monocytogenes* Contains Clonal Groups with Distinct Ecological Preferences — KENDRA K. NIGHTINGALE, Katy Lyles, Rasmus Nielsen, and Martin Wiedmann, Cornell University, Stocking Hall, Ithaca, NY, USA

T6-11 11:30 Sensitivity and Inclusivity of a *Listeria* Genus PCR Detection Assay Using a Novel Bacteriophage Derived Cell Binding Domain (CBD) and Phage Endolysin Lysis — DANIEL R. DEMARCO, Frederick Cooling, Keith Wing, and Stephen Varkey, DuPont Qualicon, Wilmington, DE, USA

P05 Risk Assessment and Antimicrobials

Exhibit Hall

9:30 p.m. – 1:30 p.m.

Authors present 10:00 a.m.–12:00 p.m.

Convenors: To Be Determined

P5-01 Molecular Characterization of Toxigenic *Staphylococcus aureus* with Ready-to-Eat Foods in Korea — MINSEON KOO, Nari Lee, Su Kyung Oh, Yong Sun Cho, Dong-Bin Shin, Jeong Ok Cha, and Yeong Seon Lee, Korea Food Research Institute, Kyunggi-Do, Korea

P5-02 *Enterobacter sakazakii* in Milk Kitchens of Maternities in São Paulo State, Brazil — MARIA-TERESA DESTRO, Gabriela Palcich; Cíntia Gillio; Mariza Landgraf; Bernadette D.G.M. Franco, University of São Paulo, São Paulo, Brazil

P5-03 Monitoring and Risk Assessment of Foodborne Pathogens in Foods (in Korea) — KISUNG KWON, In-Gyun Hwang, Hyo-Sun Kwak, Mi-Gyeong Kim, Jong-Seok Park, Gun-Young Lee, Young-Ho Koh, and Ji-Yoon Lee, Korea Food and Drug Administration, Seoul, Korea

P5-04 Estimation of the Burden of Gastroenteric Diseases in Miyagi Prefecture, Japan — KUNIHIRO KUBOTA, Hajime Toyofuku, Fumiko Kasuga, Emiko Iwasaki, Tomomi Nokubo, Yoshimitsu Ohtomo, Katsumi Nakase, Yoshinori Mizoguchi, Frederic J. Angulo, and Kaoru Morikawa, National Institute of Health Sciences, Tokyo, Japan

P5-05 Detection of *Brucella* spp. in Cheese Samples, by Nested-PCR at Hidalgo State, Mexico — Juan Carlos Gallaga, Elizabeth Castelazo, Ma. De Lourdes Sánchez, MIROSLAVA SÁNCHEZ MENDOZA, and Armida Zúñiga, Public Health Laboratory of Hidalgo State, Hidalgo, Mexico

P5-06 Probabilistic Risk Assessment for Viral Foodborne Disease — AMIR HOSSEIN MOKHTARI, Christina Moore, Lee-Ann Jaykus, North Carolina State University, Raleigh, NC, USA

P5-07 Pre-harvest Control Factors Affecting Prevalence of Shiga Toxin-producing *Escherichia coli* in Feedlot Cattle — HUSSEIN S. HUSSEIN, Laurie M. Bollinger, and Edward R. Atwill, University of Nevada-Reno, Reno, NV, USA

P5-08 Tracking *Salmonella* Typhimurium ST1 from Contaminated Poultry Feed to a Cluster of Human Salmonellosis — ROGER COOK, Rosemary Whyte, Maurice Wilson and Steve Hathaway, New Zealand Food Safety Authority, Wellington, New Zealand

P5-09 Prevalence and Characterization of *Bacillus cereus* Isolated from Cereal Grains in Korea — YOUNG-BAE PARK, Bimal Kumar Khen, Young-Kook Kim, Jae-Ho Choi, Ki-Ja Bae, Young-Hwan Shim, and Deog-Hwan Oh, Kangwon National University, Kangwon, South Korea

P5-10 Predictive Modeling on the Growth of *Bacillus cereus* in Various Cereal Grains — YOUNG PARK, Young-Bae Park, Bimal Kumar Khen, Young-Kook Kim, Jae-Ho Choi, Ki-Ja Bae, Young-Hwan Shim, Deog-Hwan Oh, Kangwon National University, Kangwon, South Korea

P5-11 DSC Fate of *Listeria monocytogenes* in Minas Frescal Cheese — LINA CASALE ARAGON-ALEGRO, Patrícia Kary Noda, Daniela Mayumi Horota, Mariza Landgraf; Bernadette D.G.M. Franco, and Maria Teresa Destro, University of São Paulo, São Paulo, Brazil

P5-12 Enterotoxin Production by *Bacillus cereus* Strains and Prevalence and Characterization of *Listeria* Species Isolated from Ricotta Cheese — LUCIANA MARIA RAMIRES ESPER and Arnaldo Yoshiteru Kuaye, UNICAMP-Universidade Estadual de Campinas, São Paulo, Brazil

P5-13 DSC *Enterobacter sakazakii* Infection in CD-1 Neonatal Mice — ARENA N. RICHARDSON, Sonya Lambert, and Mary Alice Smith, University of Georgia, Athens, GA, USA

P5-14 Association of Autoinducer-2-like Activity with Heat and Acid Resistance of *Escherichia coli* O157:H7 — YOHAN YOON and John N. Sofos, Colorado State, Fort Collins, CO, USA

P5-15 Challenge of Cooked and Packed Rice with *Clostridium botulinum* Spores, Using Post-process and In-process Methods — YUKIFUMI KONAGAYA, Hiroshi Urakami, Jun Hoshino, Atsushi Kobayashi, Akihiko Sasagawa, Akira Yamazaki and Nobumasa Tanaka, Niigata University of Pharmacy and Applied Life Science, Niigata, Japan

P5-16 DSC Development and Validation of a Tertiary Model for Predicting Growth Kinetics of *Listeria monocytogenes* Scott A — KHALED A. ABOU-ZEID, Kisun S. Yoon, Tom P. Oscar, Jurgen G. Schwarz, Khaled Nassar, Fawzy M. Hashem, and Richard C. Whiting, University of Maryland Eastern Shore, Princess Anne, MD, USA

P5-17 A Dynamic Approach to Predicting Bacterial Inactivation during High Hydrostatic Pressure Treatment — SHIGENOBU KOSEKI and Kazutaka Yamamoto, National Food Research Institute, Tsukuba, Ibaraki, Japan

P5-18 A Novel Mathematical Modeling Approach to Determine Inactivation of *Listeria monocytogenes* F4244 and *Escherichia coli* O157:H7 C7927 Exposed to Gaseous Chlorine Dioxide — TRAVIS SELBY, Carlos Corvalan, Nirupama Vaidya, Yingchang Han, Zhengjun Xue, and Richard Linton, Purdue University, West Lafayette, IN, USA

P5-19 DSC Comparison of Primary Predictive Models to Study the Growth Variability of *Listeria monocytogenes* Ribotypes at Low Temperature — AMIT PAL, Francisco Diez, and Theodore P. Labuza, University of Minnesota, St. Paul, MN, USA

P5-20 Transfer Coefficients and Predictive Models for *Listeria monocytogenes* Transfer during Slicing of Deli Meats — KEITH L. VORST, Gary J. Burgess, Ewen C.D. Todd, and Elliot T. Ryser, California Polytechnic State University, Industrial Technology San Luis Obispo, CA, USA

P5-21 Modeling Hand Hygiene: The Influence of Biological and Psychological Factors on Illness Rate — DONALD W. SCHAFFNER, David R. Macinga, and James W. Arbogast, Rutgers, The State University of New Jersey, New Brunswick, NJ, USA

P5-22 Molecular Typing of *Staphylococcus aureus* Isolated from Food Handlers of Food Processing Plants — Maria Consuelo Vanegas, AIDA JULIANA MARTÍNEZ, and Mayra Medrano, Universidad de los Andes, Bogotá, Colombia

P5-23 An In-home Investigation of the Conditions under Which Refrigerated Foods are Stored — SANDRIA L. GODWIN, Fur-chi Chen, Richard Coppings, Cindy Thompson, Lou Pearson, Delores Chambers, and Edgar Chambers IV, Tennessee State University, Nashville, TN, USA

P5-24 Temperature Control of Meat during Transport and Retail Display —ROSEMARY WHYTE, Nicola King, and Peter van der Logt, NZFSA, Institute of Environmental Science and Research, Christchurch, New Zealand

P5-25 Effect of Nisin-EDTA on Kinetics of Growth and Inhibition of *Listeria monocytogenes* and Mesophilic Aerobic Bacteria in Apple Cider — DIKE O. UKUKU and Lihan Huang, USDA-ARS-ERRC, Wyndmoor, PA, USA

P5-26 DSC The Survival of *Listeria* spp. on Poultry Skin in the Presence of Lactic Acid Bacteria — KRISHAUN N. CALDWELL and Leonard L. Williams, Alabama A&M University, Normal, AL, USA

P5-27 DSC Efficacy of Lactic Acid Alone or Combined with Sodium Lauryl or Combined with Sodium Lauryl Sulfate for Control of *Listeria monocytogenes* in Vacuum-packaged Franfurters Made with or without Sodium Lactate — OLEKSANDR BYELASHOV, Aubreay Mendonca, and Joseph Sebranek, Colorado State University, Fort Collins, CO, USA

P5-28 Effect of Antimicrobials, Point of Inoculation and Home Storage Conditions on *Listeria monocytogenes* Growth on Commercial Uncured Turkey Breast — ALEXANDRA LIANOU, Ifigenia Geornaras, Patricia A. Kendall, Keith E. Belk, John A. Scanga, Gary C. Smith, and John N. Sofos, Colorado State University, Fort Collins, CO, USA

P5-29 Antimicrobial Activity of Lauric Arginate and Benzoic Acid against *Listeria monocytogenes* and *Escherichia coli* O157:H7 — SYLVIA GAYSINSKY, P. Michael Davidson, and Jochen Weiss, University of Massachusetts, Amherst, MA, USA

P5-30 Formation of Mixed Micelles Improves Antimicrobial Activity of Lauric Arginate against *Listeria monocytogenes* and *Escherichia coli* O157:H7 at Elevated pH —JOCHEN WEISS, David Rosales, and S. Gaysinsky, University of Massachusetts, Amherst, MA, USA

P5-31 DSC Antimicrobial Efficacy of Cranberry or Grape Seed Extract Alone or Combined with Sodium Lauryl Sulfate against *Listeria monocytogenes* in Vacuum-packaged Frankfurters at 4°C — NATALIA WEINSETEL, Natalia Weinsetel and Aubrey Mendonca, Iowa State University, Ames, IA, USA

P5-32 Antimicrobial Effectiveness of Sodium Phytate against *Listeria monocytogenes* in Laboratory Media — MAKUBA LIHONO, Makuba A. Lihono and Aubrey F. Mendonca, University of Arkansas at Pine Bluff, Pine Bluff, AR, USA

P5-33 The Antilisterial Effects of Decanol in Ready-to-Eat Meat Products, Bologna and Country Ham — HESHAM A. ELGAALI, Melissa C. Newman, and Thomas R. Hamilton-Kemp, University of Kentucky, Lexington, KY, USA

P5-34 Bactericidal Activity of Methanobactin Combined with Various Surfactants against *Listeria monocytogenes* Scott A — CLINTON JOHNSON, Aubrey Mendonca, and Alan DiSpirito, Iowa State University, Ames, IA, USA

P5-35 Combined Effectiveness of Lactic Acid and Sodium Lauryl Sulfate in Destroying *Salmonella* Enteritidis, *Escherichia coli* O157:H7 and *Listeria monocytogenes* on Raw Whole Almonds — AUBREY MENDONCA, Oleksandr Byelashov, Lawrence Goodridge, and John Lopes, Iowa State University, Ames, IA, USA

P5-36 DSC Reduction of *Bacillus cereus* in Cooked Rice Treated with Sanitizers and Disinfectants — MIN JEONG LEE, Yong-Soo Kim, Dong-Ho Bae, and Sang-Do Ha, Chung-Ang University, Gyunggi-Do, South Korea

P5-37 Effects and Interactions of pH and Water Activity (a_w) on the Thermal Resistance of *Listeria monocytogenes* F4258: Examining the Impact of Acid Adaptation — SHARON G. EDELSON-MAMMEL, Richard C. Whiting, Sam W. Joseph, and Robert L. Buchanan, HHS/FDA/CFSAN/OPDF/DDES, College Park, MD, USA

P5-38 Fate of *Bacillus anthracis* (Sterne) in Pasteurized Whole Liquid Egg Stored at Different Temperatures and Cooked Using a Commercial Grill — ANNA PORTO-FETT, José R. Brito, Peggy Tomasula, and John B. Luchansky, USDA-ARS, Wyndmoor, PA, USA

P5-39 The Thermal Resistance of *Yersinia pseudotuberculosis* in Apple and Orange Juice and Its Relationship to pH — ROBERT GERDES, Arlette Shazer, Susanne Keller, and John Larkin, National Center for Food Safety and Technology, Summit-Argo, IL, USA

P5-40 Effects and Interactions of Temperature, Sodium Lactate, Sodium Diacetate and Pediocin on the Starved Cells of *Listeria monocytogenes* — PRAVEENA MUNUKURU, Vijay K. Juneja, and Sadhana Ravishankar, National Center for Food Safety and Technology, Chicago, IL, USA

P5-41 DSC Efficacy of Ultraviolet Light and Citric Acid to Reduce *Listeria monocytogenes* in Chill Brine — PRITI PARIKH, Robert Williams, Joseph Eifert, and Joseph Marcy, Virginia Polytechnic Institute and State University, Blacksburg, VA, USA

P5-42 Effect of Modified Atmosphere Packaging on Irradiated Ground Beef — JOHN NOVAK and James Yuan, American Air Liquide, Countryside, IL, USA

P5-43 Differentiation of *Escherichia coli* O157:H7 Processing-resistant Isogenic Mutants Recovered from High-pressure Processed Apple Juice by Fourier-Transform Infrared Spectroscopy — Aaron S. Malone, LUIS A. RODRIGUEZ-ROMO, Nathan A. Baldauf, Luis E. Rodriguez-Saona, and A.E. Yousef, The Ohio State University, Columbus, OH, USA

P5-44 Inactivation of Barotolerant *Listeria monocytogenes* in Fat Emulsions by Tert-Butylhydroquinone and High-pressure Processing — YOON-KYUNG CHUNG, Mustafa Vurma, Evan Turek, Ahmed E. Yousef, The Ohio State University, Columbus, OH, USA

P5-45 Use of Bromine Chemistry during Poultry Immersion Chilling (Post-chill Tank, Supplemental Chiller, and Combination of the Two) — JAMES L. MCNAUGHTON and Michael S. Roberts, Solution BioSciences, Inc., Salisbury, MD, USA

P5-46 Inactivation of Coccidian Parasites by Water Purification Chemicals and Treatment Device for Campers and Hikers — MARILYN B. LEE and Eng-Hong Lee, Ryerson University, Toronto, ON, Canada

P5-47 Reduction of Foodborne Bacterial Pathogens by Silver/Zinc Antimicrobial Coatings on Stainless Steel — KELLY R. BRIGHT and Charles P. Gerba, The University of Arizona, Tucson, AZ, USA

P5-48 DSC Bacteriocidal Effects of CaO (Scallop-shell Powder) on Foodborne Pathogenic Bacteria — JI-HYE YEON and Sang-Do Ha, Chung-Ang University, Gyunggi-Do, South Korea

P5-49 Antimicrobial Effects of Concrete Coated with Polyurethane Containing Different Concentration of Copper Oxide against *Listeria monocytogene* at Different Temperatures — AISHA ABUSHELAIBI and Marlene Janes, United Arab Emirates University, Al Ain, United Arab Emirates

P5-50 Survival of Stationary Phase and Acid-adapted *Escherichia coli* O157:H7 in Single Strength Lemon and Lime Juice — ELENA ENACHE, Yuhuan Chen, and Philip Elliott, Food Products Association, Washington, D.C., USA

P5-51 DSC Antimicrobial Effects of Dehydrated Powder and Essential Oil of Clove and Cinnamon against *Salmonella* Enteritidis in Eggnog — NAGAR BRAR and Sadhana Ravishankar, National Center for Food Safety and Technology, Summit-Argo, IL, USA

P5-52 Withdrawn

P5-53 Thymol, Carvacrol and Potassium Sorbate Combinations as Antimicrobial Agents — AURELIO LÓPEZ-MALO, Rebeca García-García, Stella M. Alzamora, Enrique Palou, and Aurelio López-Malo, Universidad de las Américas, Cholula, Puebla, México

P5-54 Cinnamon, Orange and Grapefruit Essential Oil Vapors as Antimycotic Agents in Bread — Jaime Barreto, Fernanda San Martin, Enrique Palou, and AURELIO LOPEZ-MALO, Universidad de las Américas, Cholula, Puebla, Mexico

P5-55 Evaluation of the Listericidal Effect of Oregano Essential Oil and Nisin in Fresh Pork Sausages — Monika F. Kruger, Janine P.L. Silva, Kátia G.C. Lima, Paulo S. Costa Sobrinho, Maria T. Destro, Mariza Landgraf, BERNADETTE D.G.M. FRANCO, University of São Paulo, São Paulo, Brazil

P5-56 Antimicrobial Properties of Phenolic Compounds from Sorghum — Norah Khadambi, Geybi Duodu and ELNA BUYS, University of Pretoria, Pretoria, Gauteng, South Africa

P5-57 Application of Allyl Isothiocyanate to Control *Escherichia coli* O157:H7 in Dry Fermented Sausages — PEDRO A. CHACON and Richard A. Holley, University of Manitoba, Winnipeg, MB, Canada

P5-58 The Efficacy of Absolute Fx, a Natural Peptide-Based Antimicrobial with Broad-spectrum Antimicrobial against *Listeria monocytogenes*, *Salmonella*, and *Escherichia coli* — ENUE SICAIROS, Kelly Bright, and Charles Gerba, The University of Arizona, Tucson, AZ, USA

P5-59 Enhancing Antimicrobial Activity of Lysozyme against *Listeria monocytogenes* Using Immuno-nanoparticles — HUA YANG, Adrienne Wimbrow, and Xiuping Jiang, Clemson University, Clemson, SC, USA

P5-60 IgY as a Natural Food Preservative for Meat Safety — HISHAM KARAMI, Won I. Cho, Min S. Song, Hoon H. Sunwoo, and Jeong S. Sim, University of Alberta, Edmonton, AB, Canada

P5-61 Comparison of Lactate-diacetate and a Biopreservative for Control of *Listeria monocytogenes* on Vacuum-packaged Wieners — DENISE R. RIVARD, Michael E. Stiles, David C. Smith and Lynn M. McMullen, CanBiocin Inc., Edmonton, AB, Canada

P5-62 *Carnobacterium maltaromaticum* CB1 Preserves Sensory Quality of Raw Sausage and Prevents Growth of Inoculated *Listeria monocytogenes* — DENISE RIVARD, Michael E. Stiles, David C. Smith, Lorraine G. Tam, and Lynn M. McMullen, CanBiocin Inc., Edmonton, AB, Canada

P5-63 Isolation of *Bacillus subtilis* from Meju (Fermented Soybean Cake) and Its Effect on the Growth and Aflatoxin Production of *Aspergillus parasiticus* — JONG-GYU KIM, Dept. of Public Health, Keimyung University, Daegu, Gyeonbuk, Korea

P5-64 DSC Antifungal Agents from Lactic Acid Bacteria — ANDREIA BIANCHINI and Lloyd B. Bullerman, University of Nebraska-Lincoln, Lincoln, NE, USA

P5-65 Chitosan Protects Cooked Ground Beef and Turkey against *Clostridium perfringens* Spores during Chilling —VIJAY JUNEJA, Harshvardhan Thippareddi, and Mendel Friedman, USDA-ARS-ERRC, Wyndmoor, PA, USA

P5-66 DSC Complex Coacervation May Reduce Antimicrobial Activity of Chitosan —CHRISTINA SCHEIDIG and Jochen Weiss, University of Massachusetts, Amherst, MA, USA

P5-67 DSC Activity of Bovine Lactoferrin against *Escherichia coli* O157:H7 Strains and Meat Starter Cultures in Broth and During Dry Sausage Manufacture following Its Microencapsulation — ANAS AL-NABULSI and Richard A. Holley, University of Manitoba, Winnipeg, MB, Canada

P5-68 Susceptibility of CDC Reactor Grown *Listeria monocytogenes* and *Escherichia coli* O157:H7 Biofilms to Eugenol and Carvacrol Encapsulated in Surfactant Micelles — DARÍO PÉREZ-CONESA, Lynne A. McLandsborough, and Jochen Weiss, University of Massachusetts, Amherst, MA, USA

P5-69 Effect of Antimicrobials Eugenol and Carvacrol Encapsulated in Surfactant Micelles on *Listeria monocytogenes* and *Escherichia coli* O157:H7 Colony Biofilm Growth — DARIO PEREZ-CONESA, Lynne A. McLandsborough, and Jochen Weiss, University of Massachusetts, Amherst, MA, USA

P5-70 Efficacy of Acidified Sodium Chlorite against *Pseudomonas aeruginosa* and *Burkholderia cepacia* Attached to Conveyor Belt Surfaces — SUSAN MCCARTHY and Farukh Khambaty, FDA-Gulf Coast Seafood Laboratory, Dauphin Island, AL, USA

P5-71 Inactivation and Removal of *Bacillus anthracis* Spores by Commercial Disinfectants — KWANG YOUNG SONG, Kunho Seo, Scott Lee, and Robert E. Brackett, JIFSAN, University of Maryland, College Park, MD, USA

P5-72 DSC Partial Purification and Characterization of the Non-peroxide Antibacterial Agent from Manuka Honey — MELISSA MUNDO, John Churey, and Randy Worobo, Cornell University, Geneva, NY, USA

P5-73 Cloning the Genes Encoding an Antibacterial Peptide Lactoferricin B and Construction of Its Recombinant Vector and Fusion Expression System —Jianzhang Lu, Chunxiao Wang, CHENGCHU LIU, and Jingjing Liu, Shanghai Fisheries University, Shanghai, China

P5-74 DSC Preparation of Endotoxin-free Bacteriophages for Use as Food Grade Antimicrobials — JENNIFER CHASE and Lawrence Goodridge, University of Wyoming, Laramie, WY, USA

P5-75 Suggested Neutralization Guidelines for Validation of Growth Inhibitor Effectiveness in Challenge Testing of Foods — TERESA C. PODTBURG, Sally Foong-Cunninham, and Peter W. Bodnaruk, Ecolab, Inc., Eagan, MN, USA

WEDNESDAY AFTERNOON, AUGUST 16

1:30 p.m. – 3:30 p.m.

S23 How Risk Managers Decide on Microbiological Risks from Different National Perspectives

Macleod A

Organizers: Ewen Todd and Leon Gorris
Convenors: Ewen Todd and Leon Gorris

1:30 Using Risk Assessment Outcomes in Managing Risks in Australia/NewZealand — DEON MAHONEY, Food Standards Australia New Zealand, Canberra, BC, Australia

2:00 Steps Forward to Matured Risk Analysis in Japan — FUMIKO KASUGA, National Institute of Health Sciences, Tokyo, Japan

2:30 Using Risk Assessment Outcomes in Managing Risks in the Food Chain: A UK Perspective — PAUL COOK, Food Standards Agency, London, UK

3:00 The Application of Microbial Risk Assessment Outcomes in Managing Risk: A Canadian Perspective — WILLIAM YAN, Health Canada, Ottawa, ON, Canada

S24 Food Allergen Control at Retail and Food Service

Macleod BC

Organizers: Mark Moorman and Catherine Nnoka
Convenors: Mark Moorman, Catherine Nnoka and Kathleen O'Donnell

1:30 Introduction — KATHLEEN O'DONNELL, Wegmans Food Markets, Inc., Rochester, NY, USA

1:45 Overview of the Burden of Disease/Epidemiology of Food Allergy — HUGH SAMPSON, Mount Sinai School of Medicine, New York, NY, USA

2:00 Overview of the Burden of Disease/Epidemiology of Food Allergy — SCOTT SICHERER, Jaffe Food Allergy Institute, New York, NY, USA

2:15 Preventing Cross Contamination of Foods in the Retail Setting — GALE PRINCE, Kroger Company, Cincinnati, OH, USA

2:30 Preventing Cross Contamination of Foods in the Retail Setting — PAYTON PRUETT, Kroger Company, Cincinnati, OH, USA

2:45 To Be Announced — KATHERINE SWANSON, Ecolab, Inc., St. Paul, MN, USA

3:00 Retail Worker Training and Education for Allergen Handling — FRANK YIANNAS, Walt Disney World Company, Lake Buena Vista, FL, USA

3:15 Customer/Consumer Communication in the Retail Setting — CHRISTINE BRUHN, University of California-Davis, Davis, CA, USA

S25 Hot Topics in Food Safety

Macleod D

Organizers: Jeffrey M. Farber and Stan Bailey
Convenors: Frank Yiannas and Gary R. Acuff

1:30 Avian Influenza Update — DAVID SWAYNE, USDA-ARS-SAA-SPRL, Athens, GA, USA

2:00 Non O157:H7 *E. coli* – What You Need to Know — ROGER JOHNSON, Public Health Agency of Canada, Guelph, ON, Canada

2:30 Food Safety Developments in the EU — CANICE NOLAN, Delegation of the European Commission, Washington, D.C., USA

3:00 Politics of Food Safety — ELSA MURANO, Texas A&M Agriculture, College Station, TX, USA

S26 Quality Control in Research Labs

Glen 201–202
Sponsored by The IAFP Foundation

Organizer: Phyllis Jenkins
Convenors: Phyllis Jenkins and Karen Battista

1:30 Laboratory Quality Programs for a Contract Lab — A Gold Standard — MICHELE SMOOT, Silliker, Inc., Columbus, OH, USA

1:55 Harmonizing Global Laboratory Quality Assurance Requirements — LORALYN LEDENBACH, Kraft Foods, Glenview, IL, USA

2:20 Proficiency Testing as a Tool for Laboratory Quality Assurance — ARLENE FOX, AOAC International, Gaithersburg, MD, USA

2:45 International Standards for Laboratory Quality Systems — CHRISTINA OSCROFT, Campden & Chorleywood Food Research Association, Glos, UK

3:10 Auditing as a Tool for Managing Laboratory Quality — JEFFREY VARCOE, The Schwan Food Company, Marshall, MN, USA

RT3 Water Safety and Quality Roundtable: Global Water – HACCP Issues

Glen 203–204

Organizers: Kathleen Rajkowski and Susan McKnight
Convenors: Kathleen Rajkowski and Susan McKnight

1:30 UK Regulatory HACCP – Water is Regarded as Food — ADRIAN PETERS, University of Wales Institute, Cardiff, Wales, UK

1:45 Water Quality and Safety in Mexican Agriculture and Production Lines — VICTOR MIGUEL GARCIA MORENO, Office of General Agriculture Safety SAGARPA-SENASICA, Col. Del Carmen Coyoacan, Delegacion Coyocan, Mexico

2:00 US Government's Requirement for Water Safety and Quality as It Applies to HACCP and Its Impact on the Food Industry — RITA SCHOENY, US-EPA, Washington, D.C., USA

2:15 Canadian Goverment's Perspective on Water HACCP — TOM GRAHAM, Canadian Food Inspection Agency, Guelph, ON, Canada

2:30 HACCP Requirements in the Asian/Pacific Aquiculture Industry with Regard to Water Safety and Quality — PETER HIBBARD, Quality Seafood Inspection Darden Restaurants–Western Hemisphere, Oveido, FL, USA

2:45 Roundtable Discussion – SUSAN MCKNIGHT, Quality Flow Inc., Northbrook, IL, USA-Moderator Questioners: LARRY COHEN, Kraft Foods Inc., Glenview, IL, USA, PETER KENNEDY, Quality Flow Inc., Northbrook, IL, USA, DR. KATHLEEN RAJKOWSKI, USDA-ARS-ERRC-FSITRU, Wyndmoor, PA, USA

T07 Produce
Glen 206

Convenors: Lawrence Goodridge and Bassam Annous

T7-01 1:30 Factors Affecting Attachment o f *Escherichia coli* O157:H7 to Apple Tissues Peyman Fatemi, Stephen J. Knabel, Luke F. LaBorde, BASSAM A. ANNOUS, and Gerald M. Sapers, ERRC-ARS-USDA, Wyndmoor, PA, USA

T7-02 1:45 DSC Compost Tea from a Food Safety Perspective LINDSAY ARTHUR, Sandra Jones, Hugh Martin, and Grant Campbell, Ontario Ministry of Agriculture, Food and Rural Affairs, Guelph, ON, Canada

T7-03 2:00 Water Pressure Effectively Reduces *Salmonella* Enteritidis on the Surface of Raw Almonds—John Willford, Aubrey Mendonca, and LAWRENCE GOODRIDGE, University of Wyoming, Laramie, WY, USA

T7-04 2:30 The Effect of Ozone and 'Open Air Factor' against Aerosolized and Surface Attached *Micrococcus luteus*—LOUISE FIELDING, Roger Bailey, Andy Young, and Chris Griffith, University of Wales Institute, Cardiff, Cardiff, Wales, UK

T7-05 2:45 Growth of *Listeria monocytogenes* and a Sigma B Mutant in Soil and on Radishes Grown in Contaminated Soil—LISA GORSKI, Denise Flaherty, and Jessica M. Duhé, USDA-ARS-WRRC, Albany, CA, USA

T7-06 3:00 Evaluation of *Citrobacter youngae* as an Environmental Surrogate for Enteric Bacterial Pathogens on Produce—PAULA MARTINS DE FREITAS and Trevor Suslow, University of California, Davis, CA, USA

T7-07 3:15 Persistence of Indicator Bacteria in Agricultural Soils Following Winter Flooding Events—MISTY JOHNSTONE, Paula Martins de Freitas, Steven Koike, Katherine Kammeijer, and Trevor Suslow, University of California, Davis, Davis, CA, USA

WEDNESDAY AFTERNOON, AUGUST 16

3:45 p.m.

JOHN H. SILLIKER LECTURE – *Macleod BC*

Risking From the Ocean Bottom — The Evolution of Microbiology in the Food Industry
Dr. William H. Sperber, Senior Corporate Microbiologist, Cargill, Inc., Wayzata, MN, USA

In Memory of...

William F. Fett
Wyndmoor, PA

IAFP would like to extend our deepest sympathy to the family and friends of William Fett who passed away in May 2006.

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

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IAFP FUNCTIONS

WELCOME RECEPTION–*Hyatt Regency Calgary*
Saturday, August 12 • 4:30 p.m. – 5:30 p.m.
Sponsored by Orkin Commercial Services

Welcome to IAFP 2006 and to the beautiful city of Calgary. Reunite with colleagues from around the world as you socialize and prepare for the leading food safety conference. Everyone is invited!

AFFILIATE RECEPTION–*Hyatt Regency Calgary*
Saturday, August 12 • 5:30 p.m. – 7:00 p.m.

Affiliate Officers and Delegates plan to arrive in time to participate in this educational reception. Watch for additional details.

COMMITTEE MEETINGS–*Hyatt Regency Calgary*
Saturday, August 12 • 3:00 p.m. – 4:30 p.m.
Sunday, August 13 • 7:00 a.m. – 5:00 p.m.
Refreshments Sponsored by Springer New York LLC

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. Everyone is invited to attend.

STUDENT LUNCHEON–*Hyatt Regency Calgary*
Sunday, August 13 • 12:00 p.m. – 1:30 p.m.
Sponsored by Texas A&M Agriculture, Department of Animal Science, Food Safety

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

EDITORIAL BOARD RECEPTION–*Hyatt Regency Calgary*
Sunday, August 13 • 4:30 p.m. – 5:30 p.m.
Editorial Board Members are invited to this reception to be recognized for their service during the year.

OPENING SESSION AND IVAN PARKIN LECTURE–*Telus Convention Centre*
Sunday, August 13 • 6:00 p.m. – 7:00 p.m.

Join us to kick off IAFP 2006 at the Opening Session. Listen to the prestigous Ivan Parkin Lecture delivered by Dr. Arthur P. Liang.

CHEESE AND WINE RECEPTION–*Telus Convention Centre*
Sunday, August 13 • 7:00 p.m. – 9:00 p.m.
Sponsored by Kraft Foods

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

IAFP JOB FAIR–*Telus Convention Centre*
Sunday, August 13 through Wednesday, August 16

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)–*Hyatt Regency Calgary*
Monday, August 14 • 7:00 a.m. – 9:00 a.m.

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

EXHIBIT HALL LUNCH – *NEW!* –*Telus Convention Centre*
Monday, August 14 • 12:00 p.m. – 1:00 p.m.
Sponsored by JohnsonDiversey
Tuesday, August 15 • 12:00 p.m. – 1:00 p.m.
Sponsored by SGS North America

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

EXHIBIT HALL RECEPTIONS–*Telus Convention Centre*
Monday, August 14 • 5:00 p.m. – 6:30 p.m.
Sponsored by DuPont Qualicon
Tuesday, August 15 • 5:00 p.m. – 6:00 p.m. – ***NEW!***

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

PRESIDENT'S RECEPTION (By invitation)–*Hyatt Regency Calgary*
Monday, August 14 • 6:30 p.m. – 7:30 p.m.
Sponsored by Fisher Scientific and REMEL, Inc.

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)–*Hyatt Regency Calgary*
Monday, August 14 • 7:30 p.m. – 10:00 p.m.

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

BUSINESS MEETING–*Telus Convention Centre*
Tuesday, August 15 • 12:15 p.m. – 1:00 p.m.

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

JOHN H. SILLIKER LECTURE–*Telus Convention Centre*
Wednesday, August 16 • 3:45 p.m. – 4:30 p.m.

The John H. Silliker Lecture will be delivered by Dr. William H. Sperber.

AWARDS BANQUET–*Hyatt Regency Calgary*
Wednesday, August 16 • 7:00 p.m. – 9:30 p.m.

Bring IAFP 2006 to a close at the Awards Banquet. Award recipients will be recognized for their outstanding achievements and the gavel will be passed from Dr. Jeffrey Farber to Incoming President Frank Yiannas, M.P.H.

IAFP 2006 Event Information

EVENING EVENTS

NEW – IAFP Foundation Fundraisers

Murder Mystery Dinner at The Deane House
Tuesday, August 15 • 6:30 p.m. – 10:00 p.m.

A short ride from downtown Calgary leads to The Deane House located in the Fort Calgary interpretive site. Nestled on the banks of the Elbow River, the house has maintained its historical authenticity and is a perfect setting for relaxed, casual dining.

The Deane House Mystery from History is a unique, interactive dinner theatre. Characters from the past play out a mystery, loosely based on local history while guests play detective, trying to figure out "who dunnit." During Act I, enjoy a leisurely cocktail in the Captain's Room while the characters mingle with the crowd. The Narrator explains the rules of the game, how the evening will proceed and makes formal introductions. Guests then move to the main dining room where Act II unfolds during soup and salad service… and concludes with a murder. After a sumptuous entrée, explore the house, eaves-dropping and listening for further clues. As the curtain comes down on Act III, return to the dining room where dessert is served. At this point "guesses" are revealed and the murder is solved.

Dinner at The Ranche
Tuesday, August 15 • 6:30 p.m. – 10:00 p.m.

The flavors and traditions of Alberta's ranching heritage live on at The Ranche Restaurant. Originally built in 1886 by William Roper Hull as the headquarters of The Bow Valley Ranche, it was sold in 1902 to Patrick Burns, one of the founding members of the Calgary Stampede. This intriguing historic house was once one of Southern Alberta's grandest private residences and today it is home to one of Calgary's finest and most creative restaurants – a unique setting within the city.

Located in Fish Creek Provincial Park, the Ranche is acclaimed for its commitment to exceptional dining experiences. Executive Chef Alistair Barnes and his team offer discriminating dinners, fresh baked bread, the finest meat, poultry and fish, naturally raised game (from their own game ranch!), fresh vegetables and mouth-watering desserts.

A portion of your registration fee from the two IAFP Foundation Fundraising activities will be donated to the Foundation.

GOLF TOURNAMENT

Golf Tournament at The Links of GlenEagles
Saturday, August 12 • 7:30 a.m. – 4:00 p.m.

Join your friends and colleagues for a relaxing round of golf, Canadian Rocky style, before IAFP 2006. From the very first tee at The Links of GlenEagles, you know you've made the right choice for your day of golf. On every hole there are panoramic Rocky Mountain views as a backdrop to one of Canada's most superb golf courses. At The Links of GlenEagles you will find a pristine course – lush green fairways, the brilliant white sand bunkers and exciting changes in elevation.

Designer Les Furber, one of Canada's greatest golf designers, carved this course into the rugged foothills just as they run up to the Rocky Mountains. Portions of the course run along a cliff some 200 feet above the Bow River Valley. The course offers a grand visual experience as well as a golfing adventure. It's a round you will talk about for months afterward.

Price includes transportation, greens fees with cart, range balls, lunch and prizes.

DAYTIME TOURS

The Best of Lake Louise and Banff
Saturday, August 12 • 8:00 a.m. – 5:00 p.m.

For over a century, explorers have been making the trip to the incredible towering mountain peaks and icy blue glaciers, which are the highlights of Banff National Park. As you depart the urban city of Calgary, you will pass through the rolling wheat fields and into the foothills before entering the majestic beauty of the Canadian Rockies. Once in Banff National Park, the journey continues along the winding Bow Valley Parkway passing Hole-in-the-Wall, Johnston Canyon and magnificent Castle Mountain. At Lake Louise, enjoy free time to discover this special place with outdoor pursuits: hike, rent a canoe, or try horseback riding. If you prefer, the Fairmont Chateau Lake Louise has various shops, lounges, restaurants, and fabulous architecture that will impress for hours. The rich history and beauty of Lake Louise will last in memory for years to come! Rejoin the group to enjoy a delicious lunch before departing the Chateau for the second half of the tour.

The next part of the adventure in the Rockies leads to beautiful Banff! This tour features the spray of cool waterfalls, an optional ascent up a mountain, a taste of local history and a chance to spy on wildlife – complete in one afternoon! To start, feel the power of the Bow Falls and the beauty that surrounds it just below the Fairmont Banff Springs Hotel. Continue exploring some of the best views in town – Surprise Corner on Tunnel Mountain Drive, the Hoodoos (oddly shaped pillars of glacial rock) and Mount Norquay's winding road. Next stop at the Cave and Basin Centennial Center – the birthplace of Canada's national parks where the guide will provide interesting tidbits on Banff's rich natural and human history. Before returning to Calgary, enjoy some free time to explore the many unique cafes, boutiques, and shops in downtown Banff or take a relaxing stroll through the tranquil Cascade gardens.

Optional: For those not wanting to stop downtown, the coach will continue on to Sulphur Mountain where guests can take the gondola up to the 7,500 foot summit of the mountain and enjoy a panoramic view of the entire Bow Valley as well as explore the interpretive trail that winds atop the mountain. Gondola admission is not included in the tour price.

The Complete Calgary Tour

Sunday, August 13 • 10:00 a.m. – 4:00 p.m.

Spend today exploring the exciting attractions of Calgary. This thriving business center combines the friendly atmosphere of the old west with the aggressive style of a modern cosmopolitan center. The day will be highlighted by stops at historical locations, unique neighborhoods and scenic viewpoints. Start at the Calgary Tower that features spectacular views of Calgary and the Canadian Rockies as well as a new glass floor attraction. Visit Heritage Park where the sights and sounds of Canada's exciting pioneer west has been recreated; enjoy a tour onboard an authentic steam train followed by lunch in one of the historical buildings. Last, make a stop at Canada Olympic Park, an internationally-renowned winter training facility and home to the world's largest Olympic Hall of Fame!

Drumheller and the Badlands

Monday, August 14 • 8:00 a.m. – 4:00 p.m.

Wind whines through the stubble of brush over a dry valley, its whispers joined only by the incessant creaking of crickets and the occasional clacking of grasshoppers' wings. This is the Badlands of Alberta! As the landscape changes, you will feel as though you've stepped back in time – way back to prehistoric time! The highlight of this tour will be at the Royal Tyrrell Museum of Paleontology in Drumheller. This museum is a major exhibition and research center, and one of the largest paleontological museums in the world. It displays more than 200 dinosaur specimens, the largest number under one roof anywhere. Most of the dinos on display were found in Alberta; the majority just outside in Dinosaur Provincial Park and Drumheller. Following a tour of the museum, enjoy the unique landscape of some of the many self-guided trails and a leisurely lunch.

Art Walk

Tuesday, August 15 • 10:00 a.m. – 1:30 p.m. (Lunch not included)

Downtown Calgary isn't all concrete and glass – it's also home to some of Calgary's best-known art galleries. These gems will be explored on a walking tour of downtown. Stops will include the Stephen Lowe Art Gallery featuring Western and Asian fine art paintings and sculptures by more than 65 artists; Diana Paul Galleries, where some of Canada's most renowned contemporary impressionists are featured; Gainsborough Galleries, opened in 1923, the longest-running art gallery in the city; and Wallace Galleries, representing accomplished Canadian and international contemporary visual artists.

The tour will end at Art Central – Calgary's newest addition to the art scene, with three floors of bright open space housing art galleries and artists studios. A short tour highlighting the main attractions on each floor will be followed by a demonstration in one of the artist's studios.

Following the tour, explore Art Central, enjoy a delicious lunch (not included) in one of the trendy downtown restaurants, or continue exploring Calgary's artistic offerings.

Yoga and Cooking Class

Wednesday, August 16 • 9:45 a.m. – 2:00 p.m.

Today is dedicated to the issues of health and vitality that are so prevalent in the Western Canada lifestyle. Start the day with a private session at one of the trendy downtown yoga studios. The local instructor will lead an hour-long vinyasa yoga class. This popular form of yoga focuses on integrating breath and movement, awareness and alignment, and strength and flexibility in daily life. The result is improved circulation, a light and strong body, and a calm mind.

After class, depart for the Cookbook Company, Calgary's culinary hub. The culinary classroom plays host to over 200 cooking classes, wine classes, specialty dinners and workshops each year. The body and mind theme will be carried forward into this culinary adventure with the cooking of a delicious and healthy vegetarian lunch with the local yoga and cooking guru.

POST MEETING ACTIVITY

Outdoor Adventure in Kananaskis

Thursday, August 17 • 8:30 a.m. – 2:30 p.m.

Welcome to the REAL WEST! Transfer by exclusive coach to Kananaskis Country for a morning of activities in the beautiful Canadian Rockies.

Tucked away in the spectacular Kananaskis Valley, Boundary Ranch is the perfect setting for an Alberta Barbecue. Lunch at Boundary Ranch offers the opportunity to relax and watch the trail rides leave the corral, get involved in activities like horseshoes or roping or take a picturesque stroll through the mountains surrounding the ranch. There is always a lot to see and do! Wander through the unique log and cedar facilities and enjoy western hospitality at its finest! Consider the additional activities offered for a small fee. Optional activities:

Biking in Kananaskis
Voyageur Canoe Ride
Kananaskis Hiking Tours
Horseback Trail Ride at Boundary Ranch
Whitewater Rafting on the Kananaskis River

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

MEETING INFORMATION

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

Full Registration includes:

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

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 12, 2006. 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 28, 2006. No refunds will be made after July 28, 2006; however, the registration may be transferred to a colleague with written notification. Refunds will be processed after August 23, 2006. Event and tour tickets purchased are nonrefundable.

International Association for Food Protection®

EXHIBIT HOURS

Sunday, August 13, 2006	7:00 p.m. – 9:00 p.m.
Monday, August 14, 2006	9:30 a.m. – 6:30 p.m.
Tuesday, August 15, 2006	9:30 a.m. – 6:00 p.m.

DAYTIME EVENTS – Lunch included

Saturday, August 12, 2006	8:00 a.m. – 5:00 p.m.
The Best of Lake Louise and Banff	
Sunday, August 13, 2006	10:00 a.m. – 4:00 p.m.
The Complete Calgary Tour	
Monday, August 14, 2006	8:00 a.m. – 4:00 p.m.
Drumheller and the Badlands	
Tuesday, August 15, 2006	10:00 a.m. – 1:30 p.m.
Art Walk (Lunch not included)	
Wednesday, August 16, 2006	9:45 a.m. – 2:00 p.m.
Yoga and Cooking Class	

EVENING EVENTS

Sunday, August 13, 2006

Opening Session	6:00 p.m. – 7:00 p.m.
Cheese and Wine Reception *Sponsored by Kraft Foods*	7:00 p.m. – 9:00 p.m.

Monday, August 14, 2006

Exhibit Hall Reception *Sponsored by DuPont Qualicon*	5:00 p.m. – 6:30 p.m.

Tuesday, August 15, 2006

Exhibit Hall Reception	5:00 p.m. – 6:00 p.m.

NEW – IAFP Foundation Fundraisers

Murder Mystery Dinner at the Deane House	6:30 p.m. – 10:00 p.m.
Dinner at The Ranche	6:30 p.m. – 10:00 p.m.

Wednesday, August 16, 2006

Awards Banquet Reception	6:00 p.m. – 7:00 p.m.
Awards Banquet	7:00 p.m. – 9:30 p.m.

POST MEETING ACTIVITY

Thursday, August 17, 2006

Outdoor Adventure in Kananaskis	8:30 a.m. – 2:30 p.m.

GOLF TOURNAMENT

Saturday, August 12, 2006

Golf Tournament at The Links of GlenEagles	7:30 a.m. – 4:00 p.m.

HOTEL INFORMATION

Hotel reservations can be made online at www.foodprotection.org. See page 553 for additional hotel information.

IAFP 2006 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

Member Number: _____

First name (as it will appear on your badge) _____ Last name _____

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.

❒ 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 12, 2006 TO AVOID LATE REGISTRATION FEES

REGISTRATION FEES:	MEMBERS	NONMEMBERS	TOTAL
Registration	$ 395 ($ 445 late)	$ 597 ($647 late)	
Association Student Member	$ 80 ($ 90 late)	Not Available	
Retired Association Member	$ 80 ($ 90 late)	Not Available	
One Day Registration* ❒ Mon. ❒ Tues. ❒ Wed.	$ 215 ($ 240 late)	$ 330 ($355 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			
Additional Awards Banquet Ticket (Wednesday, 8/16)	$ 50 ($ 60 late)	$ 50 ($ 60 late)	
Student Luncheon (Sunday, 8/13)	$ 4 ($ 15 late)		
NEW IAFP FOUNDATION FUNDRAISERS:		# OF TICKETS	
Tuesday, 8/15			
Murder Mystery Dinner at The Deane House	$ 130 ($140 late)	_____	
Dinner at The Ranche	$ 145 ($155 late)	_____	
DAYTIME EVENTS – Lunch included			
Golf Tournament (Saturday, 8/12)	$ 135 ($145 late)	_____	
The Best of Lake Louise and Banff (Saturday, 8/12)	$ 130 ($140 late)	_____	
The Complete Calgary Tour (Sunday, 8/13)	$ 105 ($115 late)	_____	
Drumheller and the Badlands (Monday, 8/14)	$ 115 ($125 late)	_____	
Art Walk – Lunch not included (Tuesday, 8/15)	$ 42 ($ 52 late)	_____	
Yoga and Cooking Class (Wednesday, 8/16)	$ 90 ($100 late)	_____	
Outdoor Adventure in Kananaskis (Thursday, 8/17)	$ 82 ($ 92 late)	_____	

Optional: Select one activity per person — Qty.

❒ Biking	$ 93	($103 late)	_____
❒ Canoe Ride	$ 56	($ 66 late)	_____
❒ Hiking	$ 51	($ 61 late)	_____
❒ Horseback Riding	$ 57	($ 67 late)	_____
❒ Rafting	$ 61	($ 71 late)	_____

PAYMENT OPTIONS: ❒ VISA ❒ MasterCard ❒

❒ Check Enclosed

TOTAL AMOUNT ENCLOSED $_____
US FUNDS on US BANK

Credit Card #_____

Expiration Date _____

Name on Card _____

Signature _____

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

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

EXHIBITORS DO NOT USE THIS FORM

IAFP 2006 Workshops

WORKSHOP 1	WORKSHOP 2	WORKSHOP 3
Saturday, August 12 8:00 a.m. to 5:00 p.m.	**Saturday, August 12** 8:00 a.m. to 5:00 p.m.	**Friday, August 11** **Saturday, August 12** 8:00 a.m. to 5:00 p.m.
Developing and Improving Your Food Microbiology Laboratory	***Methods, Methods Everywhere but Which is Right for Me? Selection and Verification of Methods***	***Global Food Standards: Food Safety Auditing***

Workshop 1 – Developing and Improving Your Food Microbiology Laboratory

This workshop will present ways to operate a food microbiology laboratory more effectively and efficiently. You will learn in a friendly and interactive environment, the critical elements of a food microbiology testing laboratory. Also, laboratory layout as it applies to efficiency and data quality will be addressed. Workshop participants will learn how to build technical competence through training and the three pillars of quality. Analysis of variables to be considered when determining whether to build or up grade an internal microbiology laboratory including a review of experiences and challenges with in-house testing will be presented. The workshop will include time for a roundtable discussion and a binder of information to reinforce the practical experience gained during the workshop for future use.

Topics:

- Critical Elements of Food Microbiology Testing Laboratories
- Building Technical Competency: Training and the Three Pillars of Quality
- Laboratory Layout Considerations
- Developing an In-House Microbiology Laboratory? Factors to Consider

Intended Audience

Laboratory personnel or microbiologists in small to medium sized laboratories or companies

Instructors:

Donna Christensen, Canadian Food Inspection Agency, Calgary, Alberta, Canada
Dave Evanson, Silliker Inc., Homewood, IL, USA
Timothy Freier, Cargill Corporate Food Safety and Regulatory Affairs, Minneapolis, MN, USA
Jeffrey Kornacki, Ph.D., Kornacki Food Safety Associates, LLC, McFarland, WI, USA

Organizers:

Jeffrey Kornacki, Ph.D., Kornacki Food Safety Associates, LLC, McFarland, WI, USA
Pamela Wilger, M.S., Cargill, Wayzata, MN, USA

Workshop 2 – Methods, Methods Everywhere but Which is Right for Me? Selection and Verification of Methods

Selecting the analytical tool(s) for microbiological analysis that best meets your needs is a critical task. With so many choices, how do you decide? This workshop will teach you everything that you ever wanted to know about selecting a microbiological method that is "fit for purpose." You will experience a demonstration of an AOAC "on-line" learning center and get a better understanding of the various international approaches to method validation schemes. Speakers will address practical considerations in method selection both for large corporate labs, as well as for single manufacturing site labs. The concept of uncertainty of measurement as a key component of method verification will be addressed from a microbiologist's viewpoint. Using the Mexican and Canadian experiences, expectations of accrediting authorities for method verification will also be detailed. There will be ample time provided for open discussion and each of the presentations will include a list of available resources to help the attendees with the decision making process.

Topics:

- Worldwide Method Validation – Have It Your Way – The AOAC RI Learning Center Approach
- Death, Taxes and Uncertainty…A Simple Microbiologist's View
- How to Choose a Method: Practical Considerations
- Expectations of an Accrediting Body – A Canadian Perspective
- Expectations of an Accrediting Body – A Mexican Perspective

Instructors:

Michael Brodsky, Brodsky Consultants, Thornhill, Ontario, Canada
Donna Christensen, Canadian Food Inspection Agency, Calgary, Alberta, Canada
Armida Zuniga-Estrada, Public Health State Laboratory, Pachuca City, Hidalgo, Mexico
Robin Kalinowski, National Center for Food Safety and Technology, Summit Argo, IL, USA
Deborah McKenzie and Maria Nelson, AOAC Research Institute, Gaithersburg, MD, USA

Organizers:

Christine Aleski, Ann Arbor, MI, USA
George Wilson, BD Diagnostics, Sparks, MD, USA

Intended Audience

Microbiologists, Lab supervisors and managers, QA personnel and analysts or anyone responsible for selecting laboratory methods in a food production, processing or analytical environment

Workshop 3 – Global Food Standards: Food Safety Auditing

In today's global food market it is vital that there are food safety standards in place that can be used by companies in determining a supplier base for their foodstuffs. To this end there has been an increase in the development and evolution of Global Food Safety Standards. The recently launched ISO 22000 Standard is the latest in the range of standards. Currently, the most widely used is the British Retail Consortium (BRC) Global Standard–Food. This is used by approved Certification Bodies as the standard to audit against in ensuring a consistent, safe food supply. The Standard covers a wide range of topics including, HACCP, Quality Management Systems, Factory Environment Standards, Product Control, Process Control and Personnel. One of the problems with auditing is ensuring consistency between auditors. This workshop will cover all aspects of both the Standard and auditing techniques to guarantee consistency.

This course is certified by the British Retail Consortium and is recognized as the required Internal Auditor training for any company seeking certification. Successful delegates will receive a recognized certificate.

Topics:

- Summary of the standard
- Global food standard audit concepts
- Types of audit
- The auditor
- Auditor skills
- Audit report writing
- Reporting audit results to management

Instructors:

Gordon Hayburn, University of Wales Institute, Cardiff, UK
Louise Fielding, University of Wales Institute, Cardiff, UK
David Lloyd, University of Wales Institute, Cardiff, UK

Organizer:

Gordon Hayburn, University of Wales Institute, Cardiff, UK

Intended Audience

Quality/Technical managers, Internal Systems auditors, consultants, food safety professionals and academics

IAFP 2006 Workshop Registration Form

- ❑ **Workshop 1 – *Developing and Improving Your Food Microbiology Laboratory* – Saturday, August 12**
- ❑ **Workshop 2 – *Methods, Methods Everywhere but Which is Right for Me? Selection and Verification of Methods* – Saturday, August 12**
- ❑ **Workshop 3 – *Global Food Standards: Food Safety Auditing* – Friday and Saturday, August 11–12**

First Name (will appear on badge)

Last Name

Company | Job Title

Address | City

State/Province | Country | Postal Code/Zip +4

Area Code & Telephone | Fax

E-mail | Member #

❑ **Check Enclosed** ❑ VISA ❑ ❑ MasterCard

Account Number **Total Amount Enclosed** (US Funds on US Bank) $

Signature **Expiration date**

• REGISTRATION •

Payment must be received by July 21, 2006 to avoid late registration rates.

WORKSHOP 1	Early Rate	Late Rate
IAFP Member	$295.00	$370.00
NonMember	$395.00	$470.00

WORKSHOP 2	Early Rate	Late Rate
IAFP Member	$320.00	$395.00
NonMember	$420.00	$495.00

WORKSHOP 3	Early Rate	Late Rate
IAFP Member	$465.00	$540.00
NonMember	$565.00	$640.00

GROUP DISCOUNT:
Register 3 or more people from your company and receive a 15% discount. Registrations must be received as a group.

Refund/Cancellation Policy

Registration fees, less a $50 administrative charge, will be refunded for written cancellations received by July 28, 2006. No refunds will be made after that date; however, the registration may be transferred to a colleague with written notification. Refunds will be processed after August 21, 2006. The workshop may be cancelled if sufficient enrollment is not received by July 21, 2006.

For further information, please contact the Association office at 800.369.6337; 515.276.3344; Fax: 515.276.8655; E-mail: jcattanach@foodprotection.org.

• 4 Easy Ways to Register •

To register, complete the Workshop Registration Form and submit it to the International Association for Food Protection by:

Online: **www.foodprotection.org**

Phone: 800.369.6337; 515.276.3344

Fax: 515.276.8655

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

REQUEST FOR ACCOMMODATIONS

INTERNATIONAL ASSOCIATION FOR FOOD PROTECTION
93rd ANNUAL MEETING
August 13 - 16, 2006
Calgary, Alberta, Canada

INSTRUCTIONS

Online housing will open on **December 1, 2005.**

INTERNET:
Visit the International Association for Food Protection website at **www.foodprotection.org** to make your reservation.

FAX:
Only fully completed forms will be accepted by fax at **403-262-3809**. Use one form per individual request.

MAIL:
Housing forms can be mailed to:
Tourism Calgary IAFP Housing
#200, 238-11 Ave. SE
Calgary, Alberta, Canada T2G 0X8

IMPORTANT

Requests for reservations must be received prior to **July 20, 2006** in order to guarantee convention room prices. You must cancel your room prior to July 20, 2006. Cancellations after July 20th will result in a $25.00 USD cancellation fee.

1. Rooms will be assigned in a first-come, first-served basis. Reservations can be made online or by mail or fax.

2. An acknowledgement of your reservation will be sent to you. Please review all information for accuracy. If you have booked online you will be sent an acknowledgement automatically. For all faxed reservations, a confirmation will be sent within 72 hours of reservations being processed; mailed confirmations will take 10-14 days. You may also check your reservation, regardless of how you have booked, by logging onto www.foodprotection.org and selecting the Passkey housing link. You will not receive a separate confirmation from the hotel.

3. Reservations not secured with a credit card, will require a deposit in Canadian funds to be sent directly to the assigned hotel. You will be advised what hotel to make the money order payable to.

4. Reservation modifications & changes can be made online until **August 7, 2006** or be sent in writing to Tourism Calgary prior to the date above. After August 7, 2006, please contact the hotel directly regarding changes or cancellations.

5. All hotel accommodations will be subject to a 4% Alberta Tourism Levy and a 7% Federal Goods and Services Tax (GST). A 1% Destination Marketing Fee may also apply.

6. All room rates are quoted in Canadian funds.

GUEST INFORMATION

For best availability, make your reservation via internet (www.foodprotection.org) or by fax (403) 262-3809.

Arrival Date _____ Departure Date _____

Attention Exhibitors:
NOTE: Change of exhibit hours. Exhibit hall will close at 6:00 PM on Tuesday with teardown immediately following.

❑ Mr. ❑ Ms. ❑ Mrs.

First Name: _____
Last Name: _____
Address: _____
_____
City/State/Province: _____
Zip/Postal Code: _____ Country: _____
Email address: _____
Daytime Ph: ( ) _____ Fax: ( ) _____

HOTEL SELECTION

Please select hotel from list below in order of preference (ie. 1st, 2nd, 3rd choice etc.).

CHOICE	HOTEL	RATES
_____	Calgary Marriott	$174.00 CAD
_____	Fairmont Palliser	$195.00 CAD
_____	Hyatt Regency	$175.00 CAD

All rooms are standard rooms with one or two beds.

# of Occupants in room _____ List Occupants Names: _____
# of Beds Requested _____ _____
(Note: extra charges will apply for more than two people in a room)

Special Room Requirements:

❑ Disability requiring special services ❑ Non-smoking ❑ Smoking

DEPOSIT INFORMATION

A first night's deposit is mandatory to guarantee rooms. (See instructions & information for other payment options.)

❑ VISA ❑ American Express ❑ Diner's Club ❑ Mastercard

Card Number: _____ Expiry Date: _____
Name on Credit Card: _____
Cardholder's Signature*: _____
**Necessary to process reservations*

Complete and return this form by fax or mail to:
Tourism Calgary - Calgary Convention & Visitors Bureau
200, 238 11 Ave. S.E., Calgary, AB Canada T2G 0X8
Tel: (403) 263-8510 • Fax: (403)262-3809
For more information on Calgary visit:
www.tourismcalgary.com

Tourism CALGARY
CALGARY CONVENTION & VISITORS BUREAU

IAFP 2006 Exhibitors

Companies scheduled to exhibit as of June 2, 2006

Indicates IAFP Sustaining Member

3-A Sanitary Standards, Inc.
www.3-a.org Phone: 703.790.0295

3M Microbiology
www.3m.com/microbiology Phone: 800.328.1671

A2LA (American Association for Laboratory Accreditation)
www.a2la.org Phone: 301.644.3204

Advanced Instruments, Inc.
www.aicompanies.com Phone: 800.225.4034

AES – Chemunex, Inc.
www.aeschemunex.com Phone: 609.497.0166

Alberta Agriculture, Food and Rural Development–Food Safety Division
www.agric.gov.ab.ca/aha Phone: 780.427.4054

American Proficiency Institute
www.foodpt.com Phone: 800.333.0958

Ameritek USA
www.ameritek.org Phone: 800.851.6762

AnzenBio, LLC
www.anzenbio.com Phone: 866.972.5214

AOAC International
www.aoac.org Phone: 800.379.2622

ASI Food Safety Consultants, Inc.
www.asifood.com Phone: 800.477.0778

AssurX, Inc.
www.assurx.com Phone: 408.778.1376

ATCC
www.atcc.org Phone: 800.638.6597

BD Diagnostics
www.bd.com/ds Phone: 410.316.4000

BioControl Systems, Inc.
www.biocontrolsys.com Phone: 800.245.0113

Biolog, Inc.
www.biolog.com Phone: 510.670.3398

bioMérieux, Inc.
www.biomerieux-usa.com Phone: 800.634.7656

Bio-Rad Laboratories
www.foodscience.bio-rad.com Phone: 800.4BIORAD

Biotrace International Inc.
www.biotraceamericas.com Phone: 800.729.7611

Blackwell Publishing
www.blackwellfood.com Phone: 800.862.6657

BSI Management Systems
www.bsiamericas.com Phone: 800.862.4977

BTF Precise Microbiology, Inc.
www.btfbio.com Phone: 412.267.3073

Canadian Meat Business
www.wecommunications.ca Phone: 800.344.7055

Canadian On-Farm Food Safety Working Group (COFFSWG)– Canadian Federation of Agriculture
Phone: 613.236.3633

Cantest Ltd.
www.cantest.com Phone: 800.665.8566

Center for Food Safety and Applied Nutrition, US FDA
www.cfsan.fda.gov Phone: 301.436.2127

Charm Sciences, Inc.
www.charm.com Phone: 800.343.2170

Copan Diagnostics, Inc.
www.copanusa.com Phone: 800.216.4016

CRC Press – Taylor & Francis Group LLC
www.orders@crcpress.com Phone: 800.272.7737

Dalynn Biologicals, Inc.
www.dalynn.com Phone: 888.404.4045

Decagon Devices, Inc.
www.decagon.com Phone: 800.755.2751

Deibel Laboratories
www.deibellabs.com Phone: 847.329.9900

Dil Shad Enterprises
Phone: 92.42.7524001

DSM Food Specialties USA, Inc.
www.dsm-foodspecialties.com Phone: 800.662.4478

DuPont Qualicon
www.qualicon.com Phone: 800.863.6842

Ecolab Inc.
www.ecolab.com Phone: 651.293.2233

Elisa Systems
www.elisasystems.net Phone: 877.599.5583

EMD Chemicals Inc.
www.emdchemicals.com Phone: 800.222.0342

Eurofins Scientific, Inc.
www.eurofinsus.com Phone: 800.880.1037

EXPONENT
www.exponent.com Phone: 888.656.3976


Fisher Scientific
www.fishersci.com Phone: 800.494.6913

Food Allergy Research and Resource Program, University of Nebraska
www.farrp.org Phone: 402.472.4484

Food In Canada
www.foodincanada.com Phone: 416.764.1503

Food Quality Magazine
www.foodquality.com Phone: 215.860.7800

Food Safety Magazine
www.foodsafetymagazine.com Phone: 310.745.0941


Food Safety Net Services
www.food-safetynet.com Phone: 888.525.9788


FoodHandler, Inc.
www.foodhandler.com Phone: 800.338.4433


FOSS North America
www.foss.dk Phone: 800.547.6275

GOJO Industries
www.foodprocessing.gojo.com Phone: 800.321.9647

Guelph Food Technology Centre
www.gftc.ca Phone: 519.821.1246


HiMedia Laboratories Pvt. Ltd
www.himedialabs.com Phone: 91.22.25003747


Hygiena
www.hygienausa.com Phone: 805.388.8007

Idaho Technology, Inc.
www.idahotech.com Phone: 801.736.6354


IEH-Warren Analytical Laboratories
www.iehinc.com Phone: 800.945.6669

International Association for Food Protection
www.foodprotection.org Phone: 800.369.6337

International Association for Food Protection – Student PDG
www.foodprotection.org Phone: 800.369.6337

International Food Hygiene
www.positiveaction.co.uk Phone: 44.13.7724.1724

International Food Information Council Foundation
www.ific.org Phone: 202.296.6540

Joint Institute for Food Safety and Applied Nutrition (JIFSAN)
www.jifsan.umd.edu Phone: 301.405.1696


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SPECIAL EXHIBIT HALL EVENTS

Sunday, July 8, 2007

7:00 p.m. – 9:00 p.m.
Cheese and Wine Reception
Sponsored by Kraft Foods

Monday, July 9, 2007

9:30 a.m. *Pastries and Coffee*
Sponsored by Deibel Laboratories, Inc.

12:00 p.m. – 1:00 p.m.
Lunch in the Exhibit Hall
Sponsored by JohnsonDiversey

3:00 p.m. *Coffee Break*
Sponsored by NSF International

5:00 p.m. – 6:30 p.m.
Exhibit Hall Reception
Sponsored by DuPont Qualicon

Tuesday, July 10, 2007

9:30 a.m. *Pastries and Coffee*

12:00 p.m. – 1:00 p.m.
Lunch in the Exhibit Hall
Sponsored by SGS North America

3:00 p.m. *Coffee Break*
Sponsored by BD Diagnostics

5:00 p.m. – 6:00 p.m.
Exhibit Hall Reception

EXHIBIT HOURS

Sunday, July 8, 2007
7:00 p.m. – 9:00 p.m.

Monday, July 9, 2007
9:30 a.m. – 6:30 p.m.

Tuesday, July 10, 2007
9:30 a.m. – 6:00 p.m.

Hours subject to change. See final program for actual hours

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Purchase an IAFP 2006 T-shirt or Polo Shirt from the Student PDG to help raise money in support of our Students. Pre-ordered T-shirts are $20.00 and Polo shirts are $30.00. Shirts will be available for pick-up from the SPDG booth throughout IAFP 2006. All order forms are due by July 1, 2006.

If you choose to pay by credit card, make sure you include the amount to be charged. If you are paying by check, make checks payable to IAFP and enclose the check with your order form. Please mail order forms for receipt by July 1, 2006 for pre-orders.

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Contribute to the Ninth Annual IAFP Foundation Silent Auction Today!

The Foundation of the International Association for Food Protection will hold its Annual Silent Auction during IAFP 2006, the Association's 93rd Annual Meeting in Calgary, Alberta, Canada, August 13–16, 2006. The Foundation supports:

- Student Travel Scholarships
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- John H. Silliker Lecture (Funded through a contribution from Silliker, Inc.)
- Travel support for exceptional speakers at the Annual Meeting
- Audiovisual Library
- Developing Scientist Competition
- Shipment of *JFP* and *FPT* journals to developing countries through FAO

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

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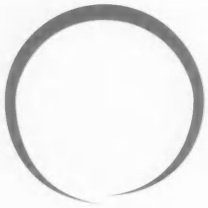
International Association for Food Protection®

The International Association for Food Protection (IAFP) Foundation Fund was established in the 1970s to support the mission of IAFP – "To provide food safety professionals worldwide with a forum to exchange information on protecting the food supply."



IAFP FOUNDATION

Advancing Food Safety Worldwide®

We live in a global economy and the way food is grown, processed, and handled can impact people around the world. From a public health perspective, it often provides unique challenges to food safety professionals. Combine these issues with the complexity of protecting the food supply from food security threats and the challenges seem overwhelming. However, with your support the Foundation can make an impact on these issues. Funds from the Foundation help to sponsor travel for deserving scientists from developing countries to our Annual Meeting, sponsor international workshops, and support the future of food scientists through scholarships for students or funding for students to attend IAFP Annual Meetings.

The Foundation is currently funded through contributions from corporations and individuals. A large portion of the support is provided from the Sustaining Members of IAFP. The Sustaining Membership program is a unique way for organizations to partner with the Association. Contact the Association office if you are interested in this program.

Support from individuals is also crucial in the growth of the Foundation Fund. Contributions of any size make an impact on the programs supported by the IAFP Foundation. Programs currently supported by the Foundation include the following:

- Student Travel Scholarships
- Ivan Parkin Lecture
- John H. Silliker Lecture
  (Funded through a comtribution from Silliker, Inc.)
- Travel support for exceptional speakers at the Annual Meeting
- Audiovisual Library
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Donate Today!

It is the goal of the Association to grow the Foundation to a self-sustaining level of greater than $1.0 million by 2010. This will allow the Foundation to provide additional programs in pursuit of our goal of *Advancing Food Safety Worldwide®*!

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NEW...

IAFP Foundation Fundraisers

Murder Mystery Dinner at The Deane House

Tuesday, August 15 • 6:30 p.m. – 10:00 p.m.

A short ride from downtown Calgary leads to The Deane House located in the Fort Calgary interpretive site. Nestled on the banks of the Elbow River, the house has maintained its historical authenticity and is a perfect setting for relaxed, casual dining.

The Deane House Mystery from History is a unique, interactive dinner theatre. Characters from the past play out a mystery, loosely based on local history while guests play detective, trying to figure out "who dunnit." During Act I, enjoy a leisurely cocktail in the Captain's Room while the characters mingle with the crowd. The Narrator explains the rules of the game, how the evening will proceed and makes formal introductions. Guests then move to the main dining room where Act II unfolds during soup and salad service… and concludes with a murder. After a sumptuous entrée, explore the house, eaves-dropping and listening for further clues. As the curtain comes down on Act III, return to the dining room where dessert is served. At this point "guesses" are revealed and the murder is solved.

Dinner at The Ranche

Tuesday, August 15 • 6:30 p.m. – 10:00 p.m.

The flavors and traditions of Alberta's ranching heritage live on at The Ranche Restaurant. Originally built in 1886 by William Roper Hull as the headquarters of The Bow Valley Ranche, it was sold in 1902 to Patrick Burns, one of the founding members of the Calgary Stampede. This intriguing historic house was once one of Southern Alberta's grandest private residences and today it is home to one of Calgary's finest and most creative restaurants – a unique setting within the city.

Located in Fish Creek Provincial Park, the Ranche is acclaimed for its commitment to exceptional dining experiences. Executive Chef Alistair Barnes and his team offer discriminating dinners, fresh baked bread, the finest meat, poultry and fish, naturally raised game (from their own game ranch!), fresh vegetables and mouth-watering desserts.

A portion of your registration fee from the two IAFP Foundation Fundraising activities will be donated to the Foundation.

To register see the IAFP Registration Form.

COMING EVENTS

AUGUST

- **8–10, Statistical Process Control (SPC) for the Food and Poultry Industry,** University of Georgia, Athens, GA. For more information, contact Eve Mayes at ebmayes@uga.edu or go to www.EFSonline.uga.edu.
- **11–12, IAFP 2006 Workshops,** Calgary, Alberta, Canada.
  Workshop 1: *Developing and Improving Your Food Microbiology Laboratory*
  Workshop 2: *Methods, Methods Everywhere but Which is Right for Me? Selection and Verification of Methods*
  Workshop 3: *Global Food Standards: Food Safety Auditing*
  For more information, see page 552 of this issue or contact Julie Cattanach at 800.369.6337 or E-mail: jcattanach@foodprotection.org.
- **13–16, IAFP 2006 Annual Meeting,** Calgary, Alberta, Canada. For more information, see page 549 of this issue or contact Julie Cattanach at 800.369.6337 or E-mail: jcattanach@foodprotection.org.
- **14–18, Advanced Food Microbiology Short Course,** University of Idaho Dept. of Food Science and Toxicology, Moscow, ID. For more information, contact Paula Peterman at 208.364.6188; E-mail: paulap@uidaho.edu.

SEPTEMBER

- **5–9, China Brew & Beverage 2006,** China International Exhibition Centre, Beijing, China. For more information, call 852.2865.2633; E-mail: elaine@bitf.com.hk.
- **5–12, Food Plant GMP/Sanitation and HACCP Workshops,** Chicago, IL. For more information, contact AIB International at 800.633.5137 or go to www.aibonline.org.
- **15–19, International Symposium on Air Quality and Waste Management for Agriculture,** Omni Interlocken Resort, Broomfield, CO. For more information, go to www.asabe.org.
- **19–21, New York State Association for Food Protection Annual Meeting,** Wyndham Hotel, Syracuse, NY. For more information, contact Steve Murphy at 607.255.2893; E-mail: scm4@cornell.edu.
- **19–21, 3rd International Symposium Milk Genomics & Human Health,** Brussels, Belgium. For more information, contact Jennifer Giambroni at 322.733.9888; E-mail: info@cdrf.org.
- **19–21, Developing and Implementing Food Safety Programs,** Hilton Garden Inn, Baltimore, MD. For more information, call AIB International at 800.633.5137 or go to www.aibonline.org.
- **20, Seventh Annual Illinois Food Safety Symposium,** Hotel Pere Marquette, Peoria, IL. For more information, contact Jayne Nosari at 217.785.2439; E-mail: jnosari@idph.state.il.us.
- **26–28, Washington Association for Food Protection,** Campbells Resort, Lake Chelan, WA. For more information, contact Stephanie Olmsted at 425.455.8953; E-mail: stephanie.olmsted@safeway.com.
- **27–29, 2006 Food Safety Education Conference "Reaching at Risk Audiences and Today's Other Food Safety Challenges,"** Adam's Mark Hotel, Denver, CO. For more information, go to www.fsis.usda.gov/denver2006.

OCTOBER

- **9–13, Wisconsin Cheese Technology Short Course,** University of Wisconsin-Madison, Madison, WI. For more information, contact Dr. Bill Wendorff at 608.263.2015 or go to www.cdr.wisc.edu.
- **10–11, Associated Illinois Milk, Food and Environmental Sanitarians,** Stoney Creek Inn, East Peoria, IL. For more information, contact Steve DiVencenzo at 217.785.2439; E-mail: adivince@idph.state.il.us.
- **10–12, Prerequisites for Food Safety and Security,** The Atherton Hotel, State College, PA. For more information, call 814.865.8301; E-mail: shortcourse@psu.edu.
- **11–13, 2006 Food Safety Conference,** Grand Hyatt Hotel, Washington, D.C. For more information, contact Stacy Fitzgerald-Redd at sfitz@fmi.org.
- **14–17, 26th Food Microbiology Symposium,** University of Wisconsin-River Falls, River Falls, WI. For more information, call 715.425.3704 or go to www.uwrf.edu/food-science.
- **18–19, Iowa Association for Food Protection Annual Meeting,** Quality Inn, Ames, IA. For more information, contact Phyllis Borer at 712.754.2511 ext. 33; E-mail: borerp@ampi.com.
- **25–26, Nano and Microtechnologies in the Food and Health Food Industries,** NH Grand Hotel Krasnapolsky, Amsterdam. For more information, call 44.(0)1786.447520; E-mail: carrie.smith@nano.org.uk.

NOVEMBER

- **1, Ohio Association of Food and Environmental Sanitarians,** Ohio Dept. of Agriculture, Reynoldsburg, OH. For more information, contact Gloria Swick-Brown at 614.466.7760; E-mail: gloria.swick-brown@odh.ohio.gov.
- **4–8, American Public Health Association's 134th Annual Meeting and Expo,** Boston, MA. For more information, call 202.777.APHA or go to www.apha.org.
- **7–8, Cheese Grading and Evaluation Short Course,** University of Wisconsin-Madison, Madison, WI. For more information, contact Dr. Scott Rankin at 608.263.2008 or go to www.cdr.wisc.edu.
- **30–Dec. 1, IAFP's Second European Symposium on Food Safety, "Innovations in Food Safety Management,"** Fira Palace Hotel, Barcelona, Spain. For more information, contact IAFP at 800.369.6337; E-mail: info@foodprotection.org.

IAFP UPCOMING MEETINGS

AUGUST 13-16, 2006
Calgary, Alberta, Canada

JULY 8-11, 2007
Lake Buena Vista, Florida

AUGUST 3-6, 2008
Columbus, Ohio

JULY 12-15, 2009
Grapevine, Texas

Continued from page 572

Another example of localized data used to good effect to drive home food safety messages was a survey performed in Australia. New South Wales Food Authority staff in Sydney literally followed their noses to carry out a survey to find out whether meat was being properly cooked on barbecues and make observations on cross contamination from unsafe barbecue practices. Their noses led staff, over three consecutive weekends, to barbecues being cooked in Sydney's public parks. Temperature readings taken from 198 meat samples at 32 barbecues found that nearly 19 percent were undercooked, and nearly 41 percent of cooks used the same plate for raw and cooked meat, in some cases, even pouring the marinade from the raw meat back over the cooked food. The press release on December 29, 2005 emphasized the food safe message with these gory details and links to safe barbecue tips.

Even a small survey, with local relevance can turn a food safety promotional campaign into a news story – with all the associated free publicity: research that everyone can relate to, think about, and remember.

ACKNOWLEDGMENTS

To Dr. Rob Lake and Rosemary Whyte at ESR, Christchurch, for their contribution to the project and this article, NZFSA for funding of the refrigerator survey and members of the New Zealand Foodsafe Partnership for their assistance.

ADVERTISING INDEX

CAREER SERVICES SECTION

CAREER SERVICES SECTION

List your open positions in *Food Protection Trends*. Special rates for this section provide a cost-effective means for you to reach the leading professionals in the industry. Call today for rate information. Send your job ads to Donna Bahun at dbahun@foodprotection.org or to the Association office: 6200 Aurora Ave., Suite 200W, Des Moines, IA 50322-2864; Phone: 800.369.6337; 515.276.3344; Fax: 515.276.8655.

TITLE: ASSISTANT PROFESSOR

TAGLINE: The Animal Science Department at Texas A&M University is seeking to appoint an Assistant Professor in food microbiology.

DESCRIPTION:

The Texas A&M University Animal Science Department is seeking to recruit an Assistant Professor to develop and teach undergraduate and graduate level courses designed to instruct students in the microbiology of foods, standard microbiological techniques for the isolation and enumeration of spoilage organisms and pathogens in foods, and standard industry techniques of inspection and control. Research will include, but is not limited to, studying quality deterioration, spoilage and public health hazards caused by bacterial growth and survival in foods of animal origin. This research will include the determination of prevalence and characterization of current and emerging food bacterial pathogens as well as microorganisms capable of causing quality deterioration of foods. Research could also include investigating possible methods of control, prevention or elimination of bacteria associated with foods of animal origin. The incumbent is also expected to regularly participate in Extension food safety programs on the local, state and national level and provide expertise to Extension personnel in matters pertaining to food safety and microbiology of foods. Requires a Ph.D. in food science and technology or comparable field, with specialization in food microbiology. A demonstrated record of extramural grant support, teaching effectiveness and publication record, or the ability to develop same is required. Postdoctoral experience will be desirable. Individuals should submit curriculum vitae, summaries of teaching and research goals, selected reprints, and contact information for three references to: Dr. Gary R. Acuff, Professor and Head, Department of Animal Science, 2471 TAMU, Texas A&M University, College Station, TX 77843-2471. Phone (979) 845-1543; fax (979) 845-6433; email: gacuff@tamu.edu. Texas A&M University is an equal opportunity employer and committed to building a culturally diverse educational environment.

IAFP Members

Did you know that you are eligible to place an advertisement if you are unemployed and looking for a new position? As a Member benefit, you may assist your search by running an advertisement touting your qualifications.

Journal of Food Protection®

Official Publication

International Association for Food Protection

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Vol. 69 June 2006 No. 6

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

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- ❒ F2152 Tape 2 – Personnel and Personnel Facilities
- ❒ F2153 Tape 3 – Building and Facilities
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- ❒ F2155 Tape 5 – Production and Process Controls
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THOUGHTS
ON TODAY'S FOOD SAFETY...

Fridge Snoopers

Sue Gilbert, Risk Scientist
Hilary Michie, Science Communicator
The Institute of Environmental Science
and Research Ltd.
Christchurch Science Centre
New Zealand

Effective risk communication should be clear, relevant and memorable.

In this issue of *FPT*, Sandria Godwin and her group in Nashville swabbed refrigerators and showed that the majority, 72 percent, of domestic refrigerators contain viable microbial populations – with meat and veggie bins being the most frequent offenders. This research is invaluable, supporting the need for effective risk communication messages on cleaning refrigerators adequately, regardless of visible grime.

Last year, a refrigerator survey undertaken by the Food Safety Program at the Institute of Environmental Science and Research Ltd. (ESR) for the New Zealand Food Safety Authority (NZFSA) garnered extensive media coverage.

The scientists involved in the study snooped around home fridges and surveyed internal temperatures, finding that 30 percent were operating above the recommended temperature 34° – 41°F (1° – 5°C) with clear implications for the potential growth of food-poisoning bacteria. This finding grabbed the attention of the media. The almost incubator-like conditions in four of the fridges that averaged air temperatures above 48°F (9°C) taken together with the further revelation that one fridge recorded a maximum temperature of 64°F (18°C), added further juicy statistics to fuel the media stories, inspired the creation of cartoon strips, and provided talk-back radio fodder. Regularly checking a fridge thermometer and getting to know your fridge setting mechanisms were the talking point of the nation – albeit briefly. But at least for those few seconds they captured the public's attention.

The New Zealand refrigerator media feeding frenzy began during New Zealand's Foodsafe Week – November 7–13, 2005. New Zealand's food safety mascot, Foodsafe Freddie, — a stripy red and white plate, characterizes the week and dispenses the food safety messages of Clean, Cook, Cover, Chill. Freddie is the inspiration of the Foodsafe Partnership. This collaboration comprises representatives from the NZFSA, the food industry, public health units, consumer groups, New Zealand's Ministry of Health, and staff from ESR, and was created in 1998. The aim is to work together to promote consistent and appropriate food safety messages to consumers.

The theme for November 2005's Foodsafe Week was "Clean," highlighting the importance of handwashing. The first press release "Now go wash your hands" extolled the virtues of washing and drying hands. The refrigerator survey actually formed part of ongoing research into domestic food practices, but was thought to be also worthy of release during Foodsafe Week 2005, and formed the basis of a second press release "Is your fridge safe?" This was intended as a tag-along to the "Clean" theme but not related to hand hygiene. The second press release hit the headlines, and "Clean" was soon to be overshadowed by "Chill," and so the media bombardment began. The result? Nineteen newspaper articles, a smattering of live radio interviews (conducted by nervous food safety scientists), and a television news item. In a small country like New Zealand, saturation point had been reached.

Why did the second release infiltrate public discussion? Local relevance of the data may have been part of the reason. The second press release reported on a small piece of research that covered both the North and South Islands, and urban and rural districts. Everyone could relate to it, even look at their own refrigerator and wonder "Is this one of those warm fridge households?" "Am I risking my own and my family's well being by not checking the fridge temperature?" or even "Is my beer cold enough?"

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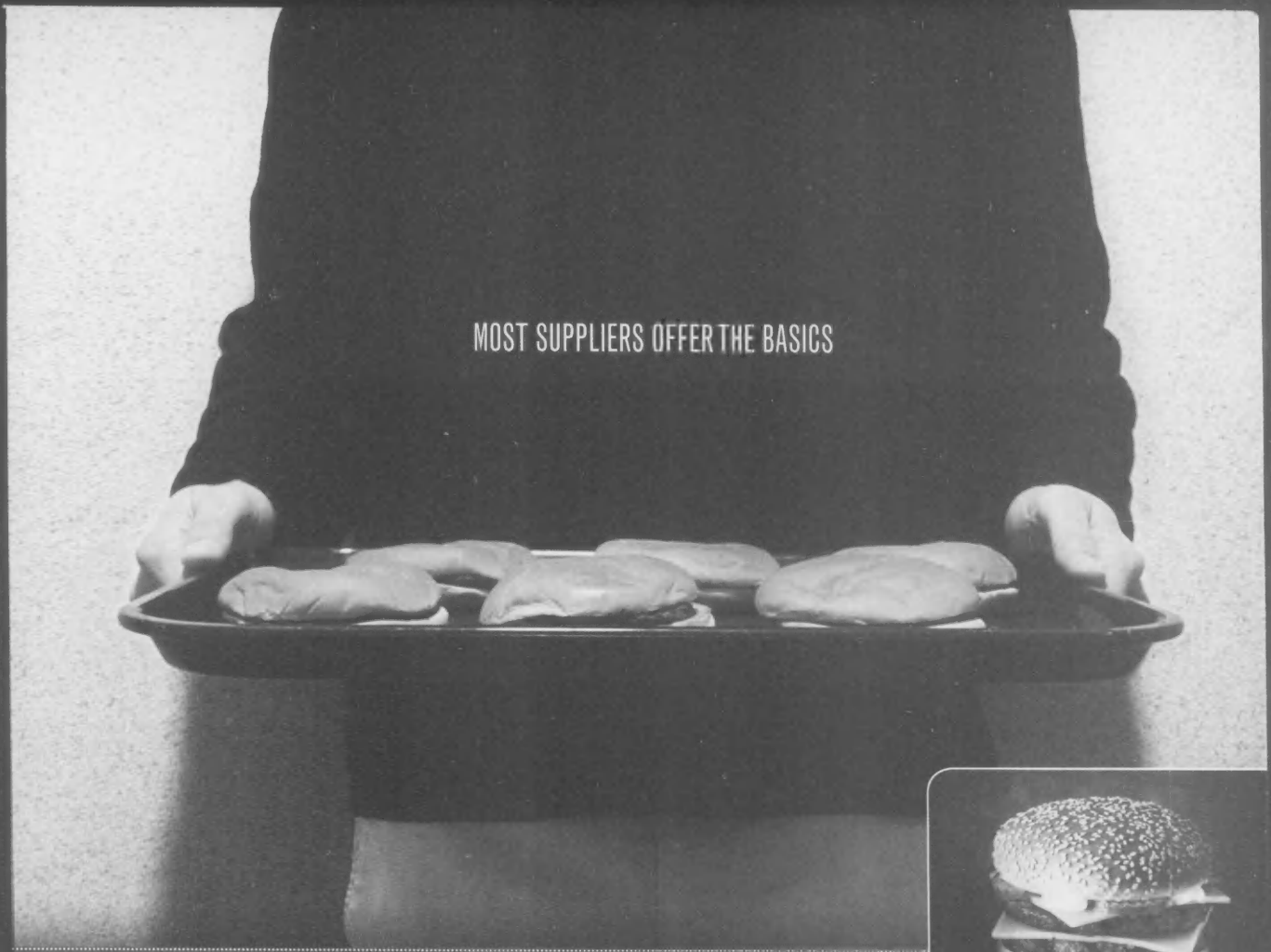

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