What would you say to pathogen testing that's advanced and simple?

Think it would be great to get advanced testing without complexity? Strategic Diagnostics Inc. offers food safety testing products that simplify your whole testing program. Our tests are technically advanced. And they give you simple, accurate, fast solutions that hold up under real-world conditions. There's no need for capital expense or extensive training. That means you'll get accurate results and a lower overall cost.

So give us a call. We've got what you're looking for.

Strategic Diagnostics Inc.
111 Pencader Drive Newark, DE 19702
Phone: 1-800-544-8881 www.sdix.com

IAFP 2006 Exhibitor
The Black Pearl Award is presented annually to a company for its efforts in advancing food safety and quality through consumer program, employee relations, educational activities, adherence to standards and support of the goals and objectives of the International Association for Food Protection. We invite you to nominate your company for this prestigious recognition. Contact the Association office for nomination information.

Presented by
The International Association for Food Protection
Proudly sponsored by
Wilbur S. Feagan and F&H Food Equipment Company

<table>
<thead>
<tr>
<th>Black Pearl Recipients</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006 Ecolab Inc. St. Paul, Minnesota</td>
</tr>
<tr>
<td>2005 DuPont Wilmington, Delaware</td>
</tr>
<tr>
<td>2004 Jack in the Box Inc. San Diego, California</td>
</tr>
<tr>
<td>2002 Darden Restaurants Orlando, Florida</td>
</tr>
<tr>
<td>2001 Walt Disney World Company Lake Buena Vista, Florida</td>
</tr>
<tr>
<td>2000 Zep Manufacturing Company Atlanta, Georgia</td>
</tr>
<tr>
<td>1999 Caravelle Foods Brampton, Ontario, Canada</td>
</tr>
<tr>
<td>1997 Papetti’s of Iowa Food Products, Inc. Lenox, Iowa</td>
</tr>
<tr>
<td>1995 Albertson’s Inc. Boise, Idaho</td>
</tr>
<tr>
<td>1994 H-E-B Grocery Company San Antonio, Texas</td>
</tr>
</tbody>
</table>
ARTICLES

466 Foods Associated with Foodborne Illness Outbreaks from 1990 through 2003
Caroline Smith DeWaal, Giselle Hicks, Kristina Barlow, Lucy Alderton, and Leora Vegosen

474 Correlation of Visual Perceptions of Cleanliness and Reported Cleaning Practices with Measures of Microbial Contamination in Home Refrigerators
Sandria L. Godwin, Fur-Chi Chen, and Richard J. Coppings

481 Effect of Steam Pasteurization/Vacuum Packaging on Physical Properties, Sensory Attributes, Chemical Composition, and Listeria monocytogenes Lethality of Double-packed Frankfurters
R. Y. Murphy and J-F. Meullenet

572 Thoughts on Today’s Food Safety–Fridge Snoopers
Sue Gilbert

ASSOCIATION NEWS
460 Sustaining Members
462 Perspectives from North of the 49th
464 Commentary from the Executive Director
498 New Members

DEPARTMENTS
500 Updates
502 News
507 Industry Products
562 Coming Events
564 Advertising Index
565 Career Services Section

EXTRAS
491 Highlights of the Executive Board Meeting
494 IAFP 2007 Call for Symposia

IAFP 2006
493 Award Winners
513 Committee Meetings
514 Ivan Parkin Lecture
515 John H. Silliker Lecture
516 Preliminary Program
545 Networking Opportunities
546 Event Information
549 Registration Form
550 Workshops
552 Workshop Registration Form
553 Hotel Reservation Form
554 Exhibitors
557 Special Contributors and Sponsors
566 Journal of Food Protection Table of Contents
569 Audiovisual Library Order Form
570 Booklet Order Form
571 Membership Application
Featuring BBL CHROMagar Staph aureus:

- Fast—Identification of Staph aureus in 24 hours as opposed to 48 hours for Baird Parker; and
- Accurate—Sensitivity 100% and specificity 100% in known isolate testing

BD Diagnostics, your source for BD Difco dehydrated broth media for sample preparation and BBL CHROMagar prepared plated media for the rapid detection of food pathogens. For more information, contact BD Diagnostics at 800.638.8663 selection 2, or visit our Web site at www.bd.com/ds.


BBL CHROMagar Listeria has also been approved by Health Canada:

The BBL CHROMagar Family will be among the products featured at the upcoming IAFP 2006 Annual Meeting in Calgary, Alberta, Canada from August 13-16, 2006. Stop by Booths 804 and 805 to see BD Diagnostics entire breadth of line.

<table>
<thead>
<tr>
<th>BBL™ CHROMagar™ Family</th>
<th>Cat. No.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>BBL™ CHROMagar™ Listeria</td>
<td>215085</td>
<td>20 plates</td>
</tr>
<tr>
<td>BBL™ CHROMagar™ 0157</td>
<td>214984</td>
<td>20 plates</td>
</tr>
<tr>
<td>BBL™ CHROMagar™ Salmonella</td>
<td>214983</td>
<td>20 plates</td>
</tr>
<tr>
<td>BBL™ CHROMagar™ Staph aureus</td>
<td>214982</td>
<td>20 plates</td>
</tr>
</tbody>
</table>

AOAC is a trademark of AOAC International. CHROMagar is a trademark of Dr. A. Rambach. Difco is a trademark of Difco Laboratories, Inc., a subsidiary of Becton, Dickinson and Company. BD, BD logo and BBL are trademarks of Becton, Dickinson and Company. ©2006 BD.
Since 1982, Neogen has been a market leader in providing the most comprehensive, best choices for simple, accurate, and supported food safety testing solutions.

With our proven history of standing behind our tests and customers, we’ve earned the trust of the food and feed industries around the block, and around the world. We will work to continue to earn that trust with unparalleled testing products and the best support in the food safety testing industry. We deliver results you can trust.

Please call for a copy of the food safety industry’s most comprehensive product catalog, or for any other food safety need.

800/234-5333 or 517/372-9200
E-mail: foodsafety@neogen.com • www.neogen.com
The mission of the Association is to provide food safety professionals worldwide with a forum to exchange information on protecting the food supply.
<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>GARY R. ACUFF (05)</td>
<td>College Station, TX</td>
</tr>
<tr>
<td>JULIE A. ALBRECHT (06)</td>
<td>Lincoln, NE</td>
</tr>
<tr>
<td>HAROLD BENGSCH (06)</td>
<td>Springfield, MO</td>
</tr>
<tr>
<td>PHILIP BLAGOYEVICH (06)</td>
<td>San Ramon, CA</td>
</tr>
<tr>
<td>TOM G. BOUFFORD (07)</td>
<td>St. Paul, MN</td>
</tr>
<tr>
<td>CHRISTINE BRUHN (06)</td>
<td>Davis, CA</td>
</tr>
<tr>
<td>LLOYD B. BULLERMAN (05)</td>
<td>Lincoln, NE</td>
</tr>
<tr>
<td>DONNA M. CHRISTENSEN (06)</td>
<td>Calgary, Alberta, CAN</td>
</tr>
<tr>
<td>WARREN S. CLARK, JR. (07)</td>
<td>Chicago, IL</td>
</tr>
<tr>
<td>WILLIAM W. COLEMAN, II (05)</td>
<td>Fargo, ND</td>
</tr>
<tr>
<td>NELSON COX (05)</td>
<td>Athens, GA</td>
</tr>
<tr>
<td>CARL S. CUSTER (06)</td>
<td>Washington, D.C.</td>
</tr>
<tr>
<td>RANDY DAGGS (05)</td>
<td>Sun Prairie, WI</td>
</tr>
<tr>
<td>JAMES S. DICKSON (07)</td>
<td>Ames, IA</td>
</tr>
<tr>
<td>DENISE R. EBLEN (06)</td>
<td>Washington, D.C.</td>
</tr>
<tr>
<td>JILL GEBLER (06)</td>
<td>Yarram, Victoria, AU</td>
</tr>
<tr>
<td>DAVID GOMBAS (06)</td>
<td>Washington, D.C.</td>
</tr>
<tr>
<td>ROBERT B. GRAVANI (07)</td>
<td>Ithaca, NY</td>
</tr>
<tr>
<td>BRIAN H. HIMELBLOOM (05)</td>
<td>Kodiak, AK</td>
</tr>
<tr>
<td>JOHN HOLAH (06)</td>
<td>Gloucestershire, U.K.</td>
</tr>
<tr>
<td>SCOTT HOOD (07)</td>
<td>Shoreview, MN</td>
</tr>
<tr>
<td>CHARLES HURBURGH (07)</td>
<td>Ames, IA</td>
</tr>
<tr>
<td>SHERRI L. JENKINS (05)</td>
<td>Greeley, CO</td>
</tr>
<tr>
<td>ELIZABETH M. JOHNSON (06)</td>
<td>Columbia, SC</td>
</tr>
<tr>
<td>PETER KEELING (05)</td>
<td>Ames, IA</td>
</tr>
<tr>
<td>SUSAN KLEIN (07)</td>
<td>Des Moines, IA</td>
</tr>
<tr>
<td>DOUG LORTON (06)</td>
<td>Fulton, KY</td>
</tr>
<tr>
<td>DOUGLAS L. MARSHALL (07)</td>
<td>Mississippi State, MS</td>
</tr>
<tr>
<td>SUSAN K. MCKNIGHT (05)</td>
<td>Northbrook, IL</td>
</tr>
<tr>
<td>LYNN M. MCMULLEN (05)</td>
<td>Edmonton, Alberta, CAN</td>
</tr>
<tr>
<td>JOHN MIDDLETON (06)</td>
<td>Manukau City, Auckland, N.Z.</td>
</tr>
<tr>
<td>STEVEN C. MURPHY (05)</td>
<td>Ithaca, NY</td>
</tr>
<tr>
<td>CATHERINE NETTLES CUTTER (07)</td>
<td>University Park, PA</td>
</tr>
<tr>
<td>CHRISTOPHER B. NEWCOMER (05)</td>
<td>Cincinnati, OH</td>
</tr>
<tr>
<td>DEBBY L. NEWSLOW (06)</td>
<td>Orlando, FL</td>
</tr>
<tr>
<td>OMAR OYARZABAL (05)</td>
<td>Auburn, AL</td>
</tr>
<tr>
<td>FRED PARRISH (07)</td>
<td>Ames, IA</td>
</tr>
<tr>
<td>DARYL S. PAULSON (05)</td>
<td>Bozeman, MT</td>
</tr>
<tr>
<td>RUTH L. PETRAN (07)</td>
<td>Mendota Heights, MN</td>
</tr>
<tr>
<td>DAVID H. PEPER (06)</td>
<td>Sioux City, IA</td>
</tr>
<tr>
<td>HELEN M. PIOTTER (05)</td>
<td>Macy, IN</td>
</tr>
<tr>
<td>MICHAEL M. PULLEN (07)</td>
<td>White Bear Lake, MN</td>
</tr>
<tr>
<td>K. T.RAJKOWSKI (05)</td>
<td>Wyndmoor, PA</td>
</tr>
<tr>
<td>KELLY A. REYNOLDS (05)</td>
<td>Tucson, AZ</td>
</tr>
<tr>
<td>LAWRENCE A. ROTH (06)</td>
<td>Edmonton, Alberta, CAN</td>
</tr>
<tr>
<td>ROBERT L. SANDERS (07)</td>
<td>Pensacola, FL</td>
</tr>
<tr>
<td>KYLE SASAHARA (07)</td>
<td>Long Island City, NY</td>
</tr>
<tr>
<td>RONALD H. SCHMIDT (05)</td>
<td>Gainesville, FL</td>
</tr>
<tr>
<td>JOE SEBRANEK (06)</td>
<td>Ames, IA</td>
</tr>
<tr>
<td>O. PETER SNYDER (07)</td>
<td>St. Paul, MN</td>
</tr>
<tr>
<td>JOHN N. SOFOS (05)</td>
<td>Ft. Collins, CO</td>
</tr>
<tr>
<td>KATHERINE SWANSON (07)</td>
<td>Mendota Heights, MN</td>
</tr>
<tr>
<td>LEO TIMMS (06)</td>
<td>Ames, IA</td>
</tr>
<tr>
<td>E. R. VEDAMUTHU (05)</td>
<td>Rochester, MN</td>
</tr>
</tbody>
</table>
Sustaining Membership provides organizations the opportunity to ally themselves with IAFP in pursuit of Advancing Food Safety Worldwide. This partnership entitles companies to become Members of the leading food safety organization in the world while supporting various educational programs that might not otherwise be possible.
SUSTAINING MEMBERS

3-A Sanitary Standards, Inc., McLean, VA; 703.790.0295
3M Microbiology Products, St. Paul, MN; 612.733.9558
ABC Research Corporation, Gainesville, FL; 352.372.0436
Aerotech P & K Laboratories, Phoenix, AZ; 800.651.4802
ASI Food Safety Consultants, Inc., St. Louis, MO; 800.477.0778
Bentley Instruments, Inc., Chaska, MN; 952.448.7600
Biolog, Inc., Hayward, CA; 510.785.2564
Bio-Rad Laboratories, Hercules, CA; 510.741.5653
Biotrace International, Inc., Bothell, WA; 425.398.7993
Birds Eye Foods, Inc., Green Bay, WI; 920.435.5301
Burger King Corp., Miami, FL; 305.378.3410
Charm Sciences, Inc., Lawrence, MA; 978.687.9200
ConAgra Foods, Omaha, NE; 402.595.6983
DARDEN Restaurants, Inc., Orlando, FL; 407.245.5330
Decagon Devices, Inc., Pullman, WA; 509.332.2756
Deibel Laboratories, Inc., Lincolnwood, IL; 847.329.9900
DeLaval Cleaning Solutions, Kansas City, MO; 816.891.1549
Diversified Laboratory Testing, LLC, Mounds View, MN; 763.785.0484
DonLevy Laboratories, Crown Point, IN; 219.226.0001
DSM Food Specialties USA, Inc., Eaganville, PA; 610.650.8480
Dynal Biotech, Inc., Brown Deer, WI; 800.638.9416
Electrol Specialties Co., South Beloit, IL; 815.389.2291
Elena's, Auburn, Hills, MI; 248.373.1100
EMD Chemicals Inc., Gibbstown, NJ; 856.423.6300
Fisher Scientific, Pittsburgh, PA; 412.490.4488
FoodHandler, Inc., Westbury, NY; 800.338.4433
Food Lion, LLC, Salisbury, NC; 704.633.8250
Food Products Association, Washington, D.C.; 202.639.5985
FOSS North America, Inc., Eden Prairie, MN; 800.547.6275
FP Research and Foundation, Washington, D.C.; 800.355.0983
Health Canada, Ottawa, Ontario, Canada; 613.957.0880
HiMedia Laboratories Pvt. Limited, Mumbai, Maharashtra, India; 91.22.2500.3747
Hygiena, Camarillo, CA; 805.388.8007
IBA, Inc., Milbury, MA; 508.865.6911
Institute for Environmental Health, Lake Forest Park, WA; 206.522.5432
International Fresh-cut Produce Association, Alexandria, VA; 703.299.6282
Iowa State University Food Microbiology Group, Ames, IA; 515.294.4733
JohnsonDiversey, Sharonville, OH; 513.956.4889
Kellogg Company, Battle Creek, MI; 269.961.6235
The Kroger Co., Cincinnati, OH; 513.762.4209
Maxxam Analytics Inc., Mississauga, Ontario, Canada; 905.817.5700
Michelson Laboratories, Inc., Commerce, CA; 562.928.0553
Micro-Smedt, Herentals, Belgium; 32.14230021
Nasco International, Inc., Fort Atkinson, WI; 920.568.5536
The National Food Laboratory, Inc., 925.833.8795, Dublin, CA
Nelson-Jameson, Inc., Marshfield, WI; 715.387.1151
Neogen Corporation, Lansing, MI; 517.372.9200
Nestlé USA, Inc., Dublin, OH; 614.526.5300
NSF International, Ann Arbor, MI; 734.769.8010
Oxoid, Inc., Nepean, Ontario, Canada; 800.267.6391
Penn State University, University Park, PA; 814.865.7535
Polar Tech Industries, Genoa, IL; 815.784.9000
The Procter & Gamble Co., Cincinnati, OH; 513.983.8349
Q Laboratories, Inc., Cincinnati, OH; 513.471.1300
Randolph Associates, Birmingham, AL; 205.595.6455
REMEL, Inc., Lenexa, KS; 800.255.6730
Ross Products, Columbus, OH; 614.624.7040
rtech™ laboratories, St. Paul, MN; 800.328.9687
Seiberling Associates, Inc., Dublin, OH; 614.764.2817
The Steritech Group, Inc., San Diego, CA; 858.535.2040
Strategic Diagnostics Inc., Newark, DE; 302.456.6789
Texas Agricultural Experiment Station, College Station, TX; 979.862.4384
United Fresh Fruit & Vegetable Association, Washington, D.C.; 202.303.3400
Walt Disney World Company, Lake Buena Vista, FL; 407.397.6060
Zep Manufacturing Company, Atlanta, GA; 404.352.1680

JULY 2006 | FOOD PROTECTION TRENDS 461
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 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.

Announcing the 2nd International Association for Food Protection European Symposium on Food Safety

Barcelona Spain

November 30 - December 1, 2006

For more information visit our Web Site at www.foodprotection.org
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!

---

FIND EXACTLY WHAT YOU'RE LOOKING FOR.

Introducing the New IAFP Career Services

Looking for that perfect fit? The New IAFP Career Services is the Food Safety Industry's resource for online employment connections.

For Employers: This easy-to-use resource is designed to help you recruit the most qualified professionals in the industry.

For Job Seekers: Whether you're looking for a new job, or ready to take the next step in your career, we'll help you find the opportunity that's right for you.

To find a job or fill a position, visit http://careers.foodprotection.org today.

http://careers.foodprotection.org
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 (79), and the US Department of Agriculture (USDA) has calculated that the annual economic burden of foodborne illnesses likely exceeds $7 billion (74). 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 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...
TABLE 1. CSPI Food Categories and Subdivisions Summary of Outbreaks and Cases, 1990-2003

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

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, 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

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

<table>
<thead>
<tr>
<th>Category</th>
<th>Subdivision</th>
<th>Outbreaks</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple Foods</td>
<td>Both Total</td>
<td>303</td>
<td>16,969</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>All Categories</th>
<th>Total Outbreaks</th>
<th>Total Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Foods</td>
<td>4,486</td>
<td>138,622</td>
</tr>
<tr>
<td>Grand Total</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 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) (75). 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
**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

---

*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.

---

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

- Seafood: 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 scombrototoxic 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 and alfalfa sprouts. 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% (3,237/28,315) 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 15.
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.* and *Salmonella spp.*, and another 35% (172/476) were caused by *Bacillus cereus*, *Clostridium perfringens* and *Staphylococcus aureus*. Norovirus was linked to an additional 1.9% (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 (275/316) 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 3,280 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 critical 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 scombrotxin 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 (71). 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 35% 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 (217), 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 scombrototoxin 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*, *Campsyllobacter* 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 alike. Such measures could greatly improve the consistency of outbreak reporting and the usefulness of such data in protecting public health.

REFERENCES


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

SANDRIA L. GODWIN,1,2 FUR-CHI CHEN,3 and RICHARD J. COPPINGS3
1Department of Family & Consumer Sciences; Tennessee State University, 3500 John Merritt Blvd., Nashville, TN 37209, USA; 2Institute of Agricultural and Environmental Research, Tennessee State University, 3500 John Merritt Blvd., Nashville, TN 37209, USA

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 cm² areas of each refrigerator were swabbed with sterile buffer. A microbial ATP (mATP) bioluminescence 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.
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 indicators 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 (11). 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 microaluminometer 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 eukaryotic 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°, 10° to 10°, 10° to 10°, 10° to 10°, and > 10° CFU/100cm², based on the data from our previous study (11). 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 1% 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)*

<table>
<thead>
<tr>
<th>Cleanliness</th>
<th>Fullness</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 very clean</td>
<td>29.0</td>
<td>13.0</td>
</tr>
<tr>
<td>2 clean</td>
<td>48.5</td>
<td>31.6</td>
</tr>
<tr>
<td>3 slightly dirty</td>
<td>20.4</td>
<td>36.1</td>
</tr>
<tr>
<td>4 dirty</td>
<td>2.0</td>
<td>19.3</td>
</tr>
</tbody>
</table>

*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)

<table>
<thead>
<tr>
<th>Refrigerator Location</th>
<th>Cleanliness</th>
<th>Fullness</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door shelves</td>
<td>1.83 ± .06A</td>
<td>3.14 ± .08B</td>
<td>2.03 ± .07A</td>
</tr>
<tr>
<td>Upper compartment</td>
<td>1.90 ± .06A</td>
<td>2.56 ± .07A</td>
<td>2.39 ± .07B</td>
</tr>
<tr>
<td>Middle compartment</td>
<td>1.96 ± .06A</td>
<td>2.48 ± .07A</td>
<td>2.49 ± .06B</td>
</tr>
<tr>
<td>Lower compartment</td>
<td>2.03 ± .07A</td>
<td>2.32 ± .08A</td>
<td>2.31 ± .07B</td>
</tr>
<tr>
<td>Vegetable bins</td>
<td>2.05 ± .06A</td>
<td>2.37 ± .08A</td>
<td>1.97 ± .07A</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Location in Refrigerator</th>
<th>ATP Concentration [RLU]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ND*</td>
</tr>
<tr>
<td>Top shelf</td>
<td>25.0</td>
</tr>
<tr>
<td>Middle shelf</td>
<td>19.2</td>
</tr>
<tr>
<td>Meat area</td>
<td>40.2</td>
</tr>
<tr>
<td>Bottom shelf</td>
<td>31.0</td>
</tr>
<tr>
<td>Vegetable bin</td>
<td>14.0</td>
</tr>
</tbody>
</table>

*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
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 recorded 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 (5431 ± 1916 and 300 ± 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 (70). 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.
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>
<thead>
<tr>
<th>Activity</th>
<th>Very Often</th>
<th>Often</th>
<th>Occasionally</th>
<th>Rarely</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean up spills</td>
<td>49.0</td>
<td>27.9</td>
<td>19.7</td>
<td>2.0</td>
<td>1.4</td>
</tr>
<tr>
<td>Wipe off outside</td>
<td>9.5</td>
<td>45.6</td>
<td>36.1</td>
<td>4.8</td>
<td>4.1</td>
</tr>
<tr>
<td>Empty &amp; clean door</td>
<td>0.7</td>
<td>11.6</td>
<td>61.6</td>
<td>18.4</td>
<td>7.5</td>
</tr>
<tr>
<td>Wash the shelves</td>
<td>2.7</td>
<td>30.6</td>
<td>54.4</td>
<td>8.8</td>
<td>3.4</td>
</tr>
<tr>
<td>Wash veggie bins</td>
<td>3.4</td>
<td>21.1</td>
<td>62.6</td>
<td>8.2</td>
<td>4.8</td>
</tr>
<tr>
<td>Empty &amp; clean all</td>
<td>0</td>
<td>5.4</td>
<td>44.2</td>
<td>34.0</td>
<td>16.3</td>
</tr>
<tr>
<td>Use cleaning compound</td>
<td>10.2</td>
<td>20.4</td>
<td>39.5</td>
<td>8.2</td>
<td>21.8</td>
</tr>
</tbody>
</table>

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

A

B

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

This research was supported by USDA Project TENX-0001-FSHNT23. We express our appreciation for the cooperative assistance of the Sensory Analysis Center, Kansas State University.

REFERENCES

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

R. Y. MURPHY,* and J-F. MEULLENET²

1728 Rolling Hills Dr., Fayetteville, AR 72703, USA
²Department of Food Science, University of Arkansas, Fayetteville, AR 72701, USA

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 log₁₀ 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.
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 (68%) 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, 1,890 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 from food categories that have very high predicted relative risk rankings for contributing, retail, and household environments. 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. Therefore, L. monocytogenes can be 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 pH of water purge, color of water purge in frankfurter packages, turbidity of water purge were evaluated for frankfurters packaged in double layer arrangements by using steam pasteurization/vacuum-packaging technology and comparing the results with those of currently used vacuum packaging technology.

MATERIAL AND METHODS

Frankfurters

Fully cooked frankfurters (26 mm diameter x 127 mm length) were observed from a processor. The ingredients of the frankfurters included beef, casein, 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 was 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 x 104 mm width x 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 was 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 (Accumat 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 colorimeter (Minolta CR-300, Japan). This color space is often referred to simply as Lc*h*. 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 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(L0.447h°/Y). The system is the same as the CIELab color space, except that it describes the location of a color in space with 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 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(L0.447h°/Y). The system is the same as the CIELab color space, except that it describes the location of a color in space with 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 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.

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 5 days. For steam pasteurization/vacuum packaging, a packaging 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/ife/majors.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.

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 10⁶ CFU/ml.

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, Aanalyst 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.
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

<table>
<thead>
<tr>
<th>Water Purge in Frankfurter Packages</th>
<th>Steam Pasteurization/Vacuum Packaging</th>
<th>Vacuum Packaging Only (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.5 s of steam</td>
<td>3 s of steam</td>
</tr>
<tr>
<td>right after packaging</td>
<td>5.3 ± 2.7</td>
<td>6.5 ± 2.4</td>
</tr>
<tr>
<td>after stored at 4°C for 24 h</td>
<td>8.0 ± 3.2</td>
<td>8.5 ± 3.6</td>
</tr>
<tr>
<td>after stored at 4°C for 7 days</td>
<td>10.2 ± 2.8</td>
<td>12.6 ± 2.5</td>
</tr>
<tr>
<td>after stored at 4°C for 14 days</td>
<td>11.5 ± 3.1</td>
<td>13.4 ± 2.2</td>
</tr>
<tr>
<td>commercially vacuum-packaged</td>
<td>not applicable</td>
<td></td>
</tr>
<tr>
<td>after stored at 4°C for 24 h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>commercially vacuum-packaged</td>
<td>not applicable</td>
<td></td>
</tr>
<tr>
<td>after stored at 4°C for 7 days</td>
<td>not applicable</td>
<td></td>
</tr>
<tr>
<td>from retail store 38th day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>before the use-by date</td>
<td></td>
<td></td>
</tr>
<tr>
<td>on the label!</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Steam Pasteurization/Vacuum Packaging</th>
<th>Vacuum Packaging Only</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.5 s of steam</td>
<td>3 s of steam</td>
</tr>
<tr>
<td>pH</td>
<td>6.08 ± 0.14</td>
<td>6.09 ± 0.15</td>
</tr>
<tr>
<td>Color of frankfurters</td>
<td>L = 56.2 ± 2.5</td>
<td>L = 56.5 ± 2.1</td>
</tr>
<tr>
<td></td>
<td>c = 30.7 ± 1.7</td>
<td>c = 30.8 ± 1.4</td>
</tr>
<tr>
<td></td>
<td>h° = 50.9 ± 2.1</td>
<td>h° = 50.4 ± 18</td>
</tr>
<tr>
<td>Color of water purge</td>
<td>L = 32.7 ± 0.9</td>
<td>L = 31.9 ± 0.9</td>
</tr>
<tr>
<td></td>
<td>c = 4.5 ± 0.1±</td>
<td>c = 3.9 ± 0.3°</td>
</tr>
<tr>
<td></td>
<td>h° = 93.4 ± 0.7°</td>
<td>h° = 94.5 ± 1.2°</td>
</tr>
<tr>
<td>Turbidity of water</td>
<td>1.681 ± 0.231°</td>
<td>1.480 ± 0.144°</td>
</tr>
<tr>
<td>purge (g/100 ml)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total force of shear (N)</td>
<td>5.5 ± 0.6</td>
<td>5.3 ± 0.7</td>
</tr>
<tr>
<td>Total energy of shear (N•mm)</td>
<td>78.4 ± 8.4</td>
<td>75.4 ± 9.8</td>
</tr>
<tr>
<td>Total force of compression (N)</td>
<td>576.4 ± 13.1</td>
<td>551.7 ± 35.5</td>
</tr>
<tr>
<td>Total energy of compression (N•mm)</td>
<td>5236.5 ± 263.1</td>
<td>5307.5 ± 508.8</td>
</tr>
</tbody>
</table>

Significant differences α = 0.05 were indicated by different superscripts a or b across the same row. Where not indicated, no significant differences were found at α = 0.05 between steam pasteurization/vacuum 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

<table>
<thead>
<tr>
<th>Sensory Attributes</th>
<th>Steam Pasteurization/Vacuum Packaging</th>
<th>Vacuum Packaging Only</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.5 s of steam</td>
<td>3 s of steam</td>
</tr>
<tr>
<td></td>
<td>3 d at 4°C</td>
<td>6 d at 4°C</td>
</tr>
<tr>
<td>sweet (basic taste)</td>
<td>1.5 ± 1.5</td>
<td>1.5 ± 1.5</td>
</tr>
<tr>
<td>salt (basic taste)</td>
<td>14.5 ± 2.5</td>
<td>13.9 ± 2.8</td>
</tr>
<tr>
<td>sour (basic taste)</td>
<td>0.0 ± 0.0</td>
<td>0.0 ± 0.0</td>
</tr>
<tr>
<td>smoke (aromatics)</td>
<td>3.7 ± 1.7</td>
<td>3.8 ± 1.2</td>
</tr>
<tr>
<td>cooked fat (aromatics)</td>
<td>4.0 ± 1.7</td>
<td>4.0 ± 1.7</td>
</tr>
<tr>
<td>cooked meat (aromatics)</td>
<td>4.7 ± 1.0</td>
<td>4.6 ± 1.0</td>
</tr>
<tr>
<td>astringent (1st bite)</td>
<td>4.4 ± 2.4</td>
<td>4.2 ± 2.4</td>
</tr>
<tr>
<td>phosphate (1st bite)</td>
<td>1.1 ± 1.1</td>
<td>1.1 ± 1.1</td>
</tr>
<tr>
<td>other (aromatics)</td>
<td>0.0 ± 0.0</td>
<td>0.0 ± 0.0</td>
</tr>
<tr>
<td>sweet (aftertaste)</td>
<td>0.3 ± 0.6</td>
<td>0.5 ± 0.5</td>
</tr>
<tr>
<td>salt (aftertaste)</td>
<td>8.3 ± 3.8</td>
<td>8.0 ± 3.8</td>
</tr>
<tr>
<td>sour (aftertaste)</td>
<td>0.0 ± 0.0</td>
<td>0.0 ± 0.0</td>
</tr>
<tr>
<td>smoke (aftertaste)</td>
<td>2.5 ± 1.5</td>
<td>2.6 ± 1.6</td>
</tr>
<tr>
<td>cooked fat (aftertaste)</td>
<td>2.8 ± 1.9</td>
<td>2.8 ± 1.9</td>
</tr>
<tr>
<td>cooked meat (aftertaste)</td>
<td>2.7 ± 1.6</td>
<td>3.2 ± 1.4</td>
</tr>
<tr>
<td>other (aftertaste)</td>
<td>0.0 ± 0.0</td>
<td>0.0 ± 0.0</td>
</tr>
<tr>
<td>springiness</td>
<td>8.3 ± 1.4</td>
<td>8.7 ± 1.4</td>
</tr>
<tr>
<td>cohesiveness</td>
<td>5.8 ± 1.1</td>
<td>6.0 ± 1.2</td>
</tr>
<tr>
<td>hardness</td>
<td>5.1 ± 0.4</td>
<td>5.2 ± 0.5</td>
</tr>
<tr>
<td>denseness</td>
<td>7.2 ± 1.4</td>
<td>7.2 ± 1.5</td>
</tr>
<tr>
<td>moisture release</td>
<td>2.6 ± 1.1</td>
<td>2.6 ± 1.0</td>
</tr>
<tr>
<td>number of chews</td>
<td>18.1 ± 4.5</td>
<td>17.5 ± 4.3</td>
</tr>
<tr>
<td>moistness of mass</td>
<td>10.3 ± 1.8</td>
<td>10.2 ± 1.4</td>
</tr>
<tr>
<td>hardness of mass</td>
<td>4.2 ± 0.8</td>
<td>4.2 ± 0.8</td>
</tr>
<tr>
<td>cohesiveness of mass</td>
<td>6.7 ± 1.2</td>
<td>6.9 ± 0.9</td>
</tr>
<tr>
<td>loose particles</td>
<td>4.4 ± 1.8</td>
<td>4.4 ± 1.7</td>
</tr>
<tr>
<td>oily/greasy film</td>
<td>5.8 ± 1.6</td>
<td>5.7 ± 1.8</td>
</tr>
<tr>
<td>inside color</td>
<td>4.5 ± 1.0</td>
<td>5.5 ± 1.0</td>
</tr>
<tr>
<td>outside color</td>
<td>9.0 ± 1.4</td>
<td>9.5 ± 1.0</td>
</tr>
</tbody>
</table>

**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 (0.69 Ford 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).
genes on the frankfurters after each treat ducted. In each trial, a minimum of 60 Data analysis were expressed as CFU (colony processed. The survivors of L. monocyto pounds (480 links) of frankfurters were face 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 tech-

nology, there was no significant (α = 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 α = 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 (α = 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>
<thead>
<tr>
<th>TABLE 4. Chemical composition of frankfurters packaged by steam pasteurization/vacuum packaging technology or by vacuum packaging only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition</td>
</tr>
<tr>
<td>Fat (%)</td>
</tr>
<tr>
<td>Protein (%)</td>
</tr>
<tr>
<td>Moisture (%)</td>
</tr>
<tr>
<td>Salt (%)</td>
</tr>
<tr>
<td>Ash (%)</td>
</tr>
<tr>
<td>Calcium (mg/100 g)</td>
</tr>
</tbody>
</table>

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 cm² 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).
TABLE 5. Free fatty acids in frankfurters packaged by steam pasteurization/vacuum packaging technology or by vacuum packaging only

<table>
<thead>
<tr>
<th>Fatty Acid</th>
<th>Steam Pasteurization/Vacuum Packaging</th>
<th>Vacuum Packaging Only</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.5 s of steam</td>
<td>3 s of steam</td>
</tr>
<tr>
<td>Butyric (%)</td>
<td>&lt; 0.1</td>
<td>&lt; 0.1</td>
</tr>
<tr>
<td>Capric (%)</td>
<td>&lt; 0.1</td>
<td>&lt; 0.1</td>
</tr>
<tr>
<td>Caprylic (%)</td>
<td>&lt; 0.1</td>
<td>&lt; 0.1</td>
</tr>
<tr>
<td>Lauric (%)</td>
<td>&lt; 0.1</td>
<td>&lt; 0.1</td>
</tr>
<tr>
<td>Linoleic (%)</td>
<td>0.49 ± 0.04</td>
<td>0.40 ± 0.02</td>
</tr>
<tr>
<td>Linolenic (%)</td>
<td>&lt; 0.1</td>
<td>&lt; 0.1</td>
</tr>
<tr>
<td>Myristic (%)</td>
<td>0.88 ± 0.13</td>
<td>0.74 ± 0.06</td>
</tr>
<tr>
<td>Myristoleic (%)</td>
<td>0.39 ± 0.09</td>
<td>0.34 ± 0.04</td>
</tr>
<tr>
<td>Oleic (%)</td>
<td>17.13 ± 1.53</td>
<td>14.20 ± 0.26</td>
</tr>
<tr>
<td>Palmitic (%)</td>
<td>6.79 ± 0.72</td>
<td>5.62 ± 0.21</td>
</tr>
<tr>
<td>Palmitoleic (%)</td>
<td>1.20 ± 0.13</td>
<td>1.01 ± 0.04</td>
</tr>
<tr>
<td>Stearic (%)</td>
<td>3.95 ± 0.41</td>
<td>3.15 ± 0.06</td>
</tr>
</tbody>
</table>

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 (α = 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 14.10, which was about 50% 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 (α = 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 frankfurter...
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/cm².

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/cm².

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 (α = 0.05) differences were found in 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 (α = 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 (α = 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 (α = 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 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/
L. monocytogenes numbers were reduced more than 3 log\textsubscript{10} CFU/cm\textsuperscript{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\textsubscript{10} reductions of L. monocytogenes were also obtained on the single-layer packaged frankfurters by use of steam pasteurization/vacuum packaging technology (79). 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\textsubscript{10} CFU/cm\textsuperscript{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\textsubscript{10} CFU/cm\textsuperscript{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 different 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 Deibl 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**


Better Safety Than Sorry.

Introducing the New Online Graduate Certificate in Food Safety Risk Analysis

Highlights:
- 12 credit graduate certificate
- Four 10-week online courses
- Can be completed in 12 months

Focus
- Risk management
- Risk communication
- Risk assessments as they apply to food processing systems

Offered by the University of Maryland’s Office of Professional Studies in conjunction with the Department of Nutrition & Food Science and the Joint Institute for Food Safety and Applied Nutrition (JIFSAN), the new Graduate Certificate of Professional Studies in Food Safety Risk Analysis is one of the few food science programs that include risk analysis in its curriculum. Visit http://www.jifsan.umd.edu/pd for a full list of JIFSAN’s food safety risk analysis courses. Register today!

For best consideration, apply online before July 15.

For more information:
Single Point of Contact (SPOC) Office of Professional Studies 877.989.SPOC (7762) 301.314.3572

www.professionalstudies.umd.edu
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
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.

NOW ISN'T THE TIME TO THINK OF THE DAMAGE A RECALL WOULD DO TO YOUR BRAND

For more information please contact:
Marketing.CTS.US@sgs.com
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 SYMPOSIAS 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
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:

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
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 Sao Paulo
Sao Paulo

Cecilia Martins
University of Sao Paulo
Sao Paulo

Thais Santos
Food Technology Institute
Campinas, Sao Paulo

Rosana Dos Sotos
Instituto Tecnologia De Alimentos
Campinas, Sao Paulo

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

Christine Barthe
Min. Agriculture, Pecheries
Et Alimentation
Quebec

David Brookes
Lakehead University
Thunder Bay, Ontario

Karen R. Conrad
Canadian Food Inspection Agency
London, Ontario

Elizabeth Hillyer
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
Lakeside Research
Brooks, Alberta

Jan H. Pennington
Canadian Food Inspection Agency
Dartmouth, Nova Scotia

Brae V. Surgeoner
University of Guelph
Guelph, Ontario

Joel Walkty
University of Manitoba
Winnipeg, Manitoba

Lisa A. Weih
Fraser Health Authority
Langley, British Columbia

FRANCE
Isabelle Desforges
bioMérieux
Marcy-L’Etoile

Raffaella Giardino
bioMérieux
Marcy-L’Etoile

INDIA
Ravinder N. Sabarwal
Pestmortem
Gandhidham, Gujarat

JAPAN
Ayumi Hidaka
Osaka City University
Osaka

Bon Kimura
Tokyo University of Marine Science
and Technology
Tokyo

NEW ZEALAND
John A. Hudson
ESR Ltd.
Christchurch, Canterbury

SOUTH KOREA
Hae-Yeong Kim
Kyung Hee University
Yogin, Kyung-Ki Do

Young-Ho Kim
Korea Food Research Institute
Songnam-Si, Gyonggi-Do

Jong-Kyung Lee
Korea Food Research Institute
Gyunggi-do

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

Eun-Jeong Nam
Chung-Ang University
Ansung, Gyunggi-Do

UNITED KINGDOM
Norashikin Ab. Aziz
University of Birmingham
Birmingham, West Midlands

Panagiotis Chamos
University of Lincoln
Lincoln

Hugh Griffiths
University of Wales Institute Cardiff
Cardiff, Wales
<table>
<thead>
<tr>
<th>Location</th>
<th>Name</th>
<th>Organization/University</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEW MEMBERS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Andrew Hall</td>
<td>University of Wales Institute Cardiff</td>
<td>Cardiff, Wales</td>
</tr>
<tr>
<td></td>
<td>Karin Mehauden</td>
<td>University of Birmingham</td>
<td>Birmingham, West Midland</td>
</tr>
<tr>
<td>UNITED STATES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALABAMA</td>
<td>Shanta L. Adeeb</td>
<td>Tuskegee University</td>
<td>Tuskegee</td>
</tr>
<tr>
<td></td>
<td>George A. Baker</td>
<td>R. L. Zeigler Co., Inc.</td>
<td>Selma</td>
</tr>
<tr>
<td>CALIFORNIA</td>
<td>Wilfred A. Sumner</td>
<td>Scientific Certification Systems</td>
<td>Emeryville</td>
</tr>
<tr>
<td></td>
<td>Dawn Dowell</td>
<td>AOAC International</td>
<td>Columbus</td>
</tr>
<tr>
<td>GEORGIA</td>
<td>Camelia Grosulescu</td>
<td>Illinois Institute of Technology</td>
<td>Chicago</td>
</tr>
<tr>
<td></td>
<td>Akash Gupta</td>
<td>National Center for Food Safety &amp; Technology</td>
<td>Summit-Argo</td>
</tr>
<tr>
<td>KANSAS</td>
<td>Michelle Roberts</td>
<td>Kansas State University</td>
<td>Manhattan</td>
</tr>
<tr>
<td>MICHIGAN</td>
<td>Debi Foti</td>
<td>Neogen Corporation</td>
<td>Lansing</td>
</tr>
<tr>
<td></td>
<td>Linda Xuan Peng</td>
<td>Neogen Corporation</td>
<td>Lansing</td>
</tr>
<tr>
<td></td>
<td>Janet A. Phelps</td>
<td>Genesee Co. Health Dept.</td>
<td>Flint</td>
</tr>
<tr>
<td>MISSISSIPPI</td>
<td>Chastity Nails</td>
<td>Plumrose USA</td>
<td>Booneville</td>
</tr>
<tr>
<td>MISSOURI</td>
<td>Chad K. Foster</td>
<td>Hickory Co. Health Dept.</td>
<td>Hermitage</td>
</tr>
<tr>
<td>NEBRASKA</td>
<td>Andreia Bianchini</td>
<td>University of Nebraska-Lincoln</td>
<td>Lincoln</td>
</tr>
<tr>
<td>NEW YORK</td>
<td>Melissa Mundo</td>
<td>Cornell University</td>
<td>Geneva</td>
</tr>
<tr>
<td>NORTH CAROLINA</td>
<td>Melissa T. Scherpereel</td>
<td>North Carolina State University</td>
<td>Raleigh</td>
</tr>
<tr>
<td>OHIO</td>
<td>Mustafa Vurma</td>
<td>Ohio State University</td>
<td>Columbus</td>
</tr>
<tr>
<td></td>
<td>Joy Waite</td>
<td>Ohio State University</td>
<td>Columbus</td>
</tr>
<tr>
<td>OREGON</td>
<td>Daniel G. Paredes – Sabja</td>
<td>Oregon State University</td>
<td>Corvallis</td>
</tr>
<tr>
<td></td>
<td>Margaret Timm</td>
<td>Oregon Health &amp; Science University</td>
<td>Portland</td>
</tr>
<tr>
<td>TEXAS</td>
<td>Howard W. Depoy</td>
<td>Borden Milk Products LP</td>
<td>Conroe</td>
</tr>
<tr>
<td></td>
<td>Tiffany Musquiz</td>
<td>Texas A&amp;M University</td>
<td>College Station</td>
</tr>
<tr>
<td></td>
<td>Brian Neal</td>
<td>VIP Foods</td>
<td>Fort Worth</td>
</tr>
<tr>
<td>WASHINGTON</td>
<td>Rebekah Burdick</td>
<td>Institute of Environmental Health</td>
<td>Lake Forest</td>
</tr>
<tr>
<td></td>
<td>Clandia Coles</td>
<td>Washington State Dept. of Agriculture</td>
<td>Olympia</td>
</tr>
<tr>
<td>WISCONSIN</td>
<td>Greg Schultz</td>
<td>Schweigert Foods</td>
<td>Green Bay</td>
</tr>
<tr>
<td>WYOMING</td>
<td>Jennifer Chase</td>
<td>University of Wyoming</td>
<td>Laramie</td>
</tr>
</tbody>
</table>
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 Nowasco 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.

---

**Attention Students**

Mark your calendar to attend the SPDG Student Mixer at IAFP 2006

Hyatt Regency Calgary
Tuesday, August 15
7:00 p.m. - 9:00 p.m.
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 Environmental 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 Conference 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 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 (IPPA), 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, bringing 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 Giclaz, WG vice president, science and technology.


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 ground-breaking 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 presents data 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 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.
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"!

The publishers do not warrant, either expressly or by implication, the factual accuracy of the products or descriptions herein, nor do they so warrant any views or opinions offered by the manufacturer of said articles and products.
taminants that could negatively impact a food or beverage processing operation.

"Since the introduction of Water-Shed®, 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
312.970.5885
Anoka, MN
www.hoffmanonline.com

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/reproducible vacuum control with 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.

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

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' 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 Schärer 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”!
Zep Manufacturing Company, a leader in food and beverage sanitation, proudly announces a revolutionary breakthrough in chemical sourcing alternatives – **Apex**. The **Apex** line is designed specifically for the discerning buyer who is searching for value-added programs that deliver continuous improvement. Call 1-877-I-BUY-ZEP (1-877-428-9937) then dial 5, 2, and “5173#”, or email zepfood@zepmfg.com for a free “value-check” sanitation audit, or contact your local ZepRep for more information.

**Apex** – Stay at the top of the food chain without hurting your bottom line.
Today's Dairy Farmers Require Accurate Milk Sampling For Maximum Profits

You work hard to run a clean and healthy dairy operation. Get maximum profits for all that effort by using the QMI Line and Tank Sampling System. The benefits are:

- Precise composite sampling to aid in mastitis control
- Contamination-free sampling resulting in accurate bacterial counts
- Reliable sampling to measure milk fat and protein

As you know, your testing is only as good as your sampling.

For more information, contact:

QMI
426 Hayward Avenue North
Oakdale, MN 55128
Phone: 651.501.2337
Fax: 651.501.5797
E-mail address: qmi2@aol.com

Manufactured under license from Galloway Company, Neenah, WI, USA. QMI products are protected by the following U.S. Patents: 4,914,517; 5,086,813; 5,289,359; other patents pending.

Quality Management, Inc.
## Committee Meetings
### Sunday, August 13

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

*See Program Book for final schedule

The IAFP Committee Meetings are open for everyone to attend!

### SATURDAY, AUGUST 12

<table>
<thead>
<tr>
<th>TIMES</th>
<th>COMMITTEE MEETING</th>
<th>ROOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>3:00 p.m. - 4:00 p.m.</td>
<td>Past Presidents'</td>
<td>Walker</td>
</tr>
<tr>
<td>3:00 p.m. - 4:30 p.m.</td>
<td>Membership</td>
<td>Bannerman</td>
</tr>
</tbody>
</table>

Refreshments sponsored by

![Springer](image)
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)
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.
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, Edmonton, AB, 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 Design 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 Enrichment Protocols Containing Specific Bacteriophage Reduce False Positive and Negative Results in Food Pathogen Detection Methods — JAMES W. STEAVE, Meredith Sutzko, and George B. Teaney, Strategic Diagnostics Inc., Newark, DE, USA

T1-02 Enrichment Time, Media Ratios, and Immunomagnetic 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 Andalaro, H. Kirk White, and Lance Bolton, DuPont Qualicon, Wilmington, DE, USA

T1-03 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 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 Joaquín, Yichun Xu, and James W. Stave, Strategic Diagnostics Inc., Newark, DE, USA

T1-05 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 Evaluation of the Oxoid Biochemical Identification System (OBS) Salmonella Colony Confirmation Test for Use in Veterinary Laboratories — ROB DAVIES, Malcolm Taylor, and Kath Speed, Veterinary Laboratories Agency — Weybridge, New Haw, Addlestone, Surrey, UK

10:00 Break

T1-07 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 Verification of the Reliability of the Time Temperature Integrators Made from the α-amylase of Bacillus amyloliquefaciens for Assuring the Safety of Various Thermal Processes — KARIN MEHAUDEN, Karin Mehauden, Philip W. Cox, Serafin 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
Monday a.m. continued

T1-09 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 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 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


P01 Food Toxicology, Education, and General Microbiology Poster Session

P01-01 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

P01-02 Effect of Coffee Cherries Storage after Harvest before the Beginning of Drying on Contamination by Fungi and in 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 Wisconsin-Madison, Food Research Institute, Madison, WI, USA

P01-03 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

P01-04 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

P01-05 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 Tsuji, Yuka Katayama, Yasuuki Tsukamasa, and Ken-ichi Kawasaki, Kinki University, Nara, Japan


P01-07 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

P01-08 Detection of Allergens: Considerations for Selecting the Method of Analysis — STEPHEN GARRET, Helen Jones, Debra Smith, John Holah, and Helen Brown, Campden & Chorleywood Food Research Association Group, Chipping Campden, Gloucestershire, UK

P01-09 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

P01-10 Immunochromatography Using Colloidal Gold-antibody Probe 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

P01-11 Detection and Quantification of Genetically Modified Soya Using the Warnex™ Real-time PCR System — LINA THERIEN, Francis Deshaies, Marie-Josée Gaulin, Martin P. Nadeau, and Yvan P. Côté, Warnex Research Inc., Laval, QC, Canada

P01-12 Safety Assessment of Herbicide-resistance Genetically Modified Red Pepper (Capsicum annum) and Perilla Seeds (Perilla frutescens) in Mice — IN HYE KIM, Jae Young Shim, 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

P01-13 Withdrawn

P01-14 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

P01-15 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

P01-16 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 — SAA 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 — MILRED 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 Deolores 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 Hwang, Vijay K. Juneja, Steven C. Ingham, Barbara H. Ingham, Dennis R. Buege, and John B. Luchansky, USDA-ARS-ERIC, Wyndmoor, PA, USA

P1-26 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


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

P1-29 Evaluation of the Transfer of Listeria monocytogenes from Surfaces to Foods — ANDRES RODRIGUEZ and Lynne A. McLandsborough, University of Massachusetts, Amherst, MA, 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 JINRUI CHEN, University of Georgia, Griffin, GA, USA

P1-32 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 Effect of Growth Temperature and Growth Phase on the Inactivation of Listeria monocytogenes in Whole Milk by High Pressure Processing — MELINDA M. HAYMAN, Rameswamy 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 Crab-meat and in Broth as a Function of Temperature — SO Y. EOM, Sung J. Koo, and Ki S. Yoon, Kyunghee University, Seoul, Korea

P1-38 Determination of Enterobacter sakazakii in Powdered Infant Formula, Reconstituted and Utensils Used in Baby’s Bottle Preparation — ROSANA FRANCISCO SIQUEIRDOS SANTOS, Neusely da Silva, Valéria Christina Amstalden Junqueira, José Luiz Pereira, and Renato Abeilar Romeiro Gomes, Instituto Tecnologia de Alimentos, São Paulo, Brazil
Monday a.m. continued

P1-39 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 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 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 — MARYLYN 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, Thais Santos, Rosana Santos, Nutrition College - Pontificia Universidade Católica de Campinas, Campinas, São Paulo, Brazil

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

P1-52 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, Sailing Xu, Peter Kingshott, Viibeke 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 MARTINEZ, José M. Lorenzo, Inmaculada Franco, and Javier Carballo, University of Vigo, Ourense, Spain

P1-55 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 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, 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  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 Kim, 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


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 LAWLO, 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; VAY 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 Evaluation of a Process Specific Information
1:30 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 Understanding the Implementation of Enhanced Hazard Analysis — ADRIAN PETERS, Louise Fielding and Leanne Ellis, University of Wales Institute, Cardiff, School of Applied Sciences, Western Ave., Cardiff, Wales, UK

T2-03 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 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 Level of Adoption of HACCP and ISO 9000 within the Mexican Pork Industry — EMA MALDONADO-DIEZ-GONZALEZ, Galina, Yunatzi Martin Del Campo, Fernando Tuz, Miguel Angel Galina, Yuniati Martin del Campo, Fernando Pérez-Gil, Guilleramo Ruiz, and Leticia Reyes, Instituto Nacional de Ciencias Médicas y Nutrición Salvador Zubirán, Distrito Federal, México

T2-06 The GAPsNET: Farm Food Safety at Your fingertips — KARIN A.K. ROSBERG, Elizabeth A Bihn, and T. Musgrove, USDA-ARS, Wyndmoor, PA, USA

T2-07 Microbial Population Dynamics in Hot-drinks
3:30 Vending Machines — ANDREW HALL, Katie Short, DSC

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

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

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

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

T2-12 Effect of the Refrigerated and Frozen-storage on Microbiological Change in Soft Raw and Pasteurized Milk Goat Cheese — CLAUDIA BUYS, University of Pretoria, Pretoria, Gauteng, South Africa

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 3D 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 Bossard, 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, Jung 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 SELBY, 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
Monday p.m. continued

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


P2-11 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 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 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 Russel, Kristine Zierke, University of Wisconsin-Madison, Madison, WI, USA

P2-15 An Examination of the Relationships between Foodborne Pathogens and Implicated Food Vehicles — ELIZABETH HILLYER, Judy Greig, Hugh Griffiths, Louise Fielding, Neil Burton, and Adrian Peters, University of Wales Institute Cardiff, Cardiff, Wales, UK

P2-16 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 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. Garcia, Vanessa Rafaela, 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 — Corin Specha, Roger Stephan, and CLAUDIO ZWEIFEL, Institute for Food Safety and Hygiene, Vetsuisse Faculty University of Zurich, Zurich, Switzerland


P2-24 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


P2-27 Dissemination of *Salmonella* Enteritidis in a Commercial Chicken Production Chain: Phenotypic and Genotypic Characterization — CRISTIANO ANDRIGHETO, VINÍCIOS B. RIBEIRO, ELSA M. MAMIZUKA, MARISA LANDGRAF, Bernadette D.G.M. FRANCO, and MARIA-TERESA DESTRO, University of São Paulo, São Paulo, Brazil

P2-28 Development of a Mathematical Model to Describe the Growth of *Salmonella* spp. in Raw Poultry Stored under Aerobic Conditions — SILVIA DOMÍNGUEZ and DONALD W. SCHEFFNER, 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  Microbiological Quality of Beef and Pork Carcasses
DSC  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 McMeekan, 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 Gilbreath, 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-
Tsun, 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 0157: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 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 0157: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 Car-
casses, 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
Monday p.m. continued

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

P2-52 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, FTSI, Beltsville, MD, USA

P2-54 Evaluation of the Incubation Temperature, Time and Composting 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 Use of Fluorescent Surrogate Organisms for Enteric Pathogens in Validation of Carcass Decontamination Treatments — TAYLOR 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 DELAQUISS, 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 DELAQUISS, 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/ECB-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
T03 Pathogens and Antimicrobials
Glen 206

Convenors: Wendy Maduff and Fred Breidt

T03-01 Antimicrobial Activities of Plant Compounds against \textit{Escherichia coli} O157:H7 and \textit{Salmonella} Enterica Serovar Hador 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

T03-02 Effect of Microencapsulated \textit{Lactobacillus reuteri} on \textit{Escherichia coli} O157:H7 in Dry Fermented Sausages — PARTHIBAN MUTHUKUMARASAMY and Richard Holley, Canadian Meat Council, Ottawa, ON, Canada

T03-03 New Primer Set Improves Detection of \textit{Escherichia coli} O157:H7 from Environmental Samples — WENDY MADUFF and Trevor Suslow, University of California at Davis, Davis, CA, USA

T03-04 Multi-drug Resistance Profiles of Generic \textit{Escherichia coli} from Commercial and Natural (Organic) Bovine Feedlot Lagoon Water — MINDI RUSSELL and Daniel Y.C. Fung, Kansas State University, Manhattan, KS, USA

T03-05 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


T03-07 Population Genetics of Virulence Potential in 10:30 Environmental Reservoirs of \textit{Vibrio vulnificus} — L. Joaana Neves, Maria Chatzidaki-Livanis, Michael A. Hubbard, Katrina Gordon, Valerie J. Harwood, and ANITA C. WRIGHT, University of Florida, Gainesville, FL, USA

T03-08 Quantitative Determination and Toxicogenicity of \textit{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

T03-09 Destruction of Bacterial Pathogens in Non-heated Acidified Vegetable Products — FRED BREIDT, USDA-ARS and NC State University, Raleigh, NC, USA

T03-10 Role of Biofilm Growth in \textit{Campylobacter jejuni} — NICOLE BARAN, Carney Matheson, Heidi Schraft, Lakehead University, Thunder Bay, ON, Canada

T03-11 Effect of Chitosans and Chitooligosaccharides upon Growth of Microorganisms Contaminating Foods — JIAO C. FERNANDES, Sandra Borges, Tania Ribas, Freni K. Tavaaria, José A. Lopes da Silva, Manuela E. Pintado, and F. Xavier Malcata, Escola Superior de Biotecnologia, Universidade Católica Portuguesa, Porto, Portugal

T03-12 Effects of Seasonality on the Pre-Harvest \textit{Escherichia coli} Prevalence of Fresh Fruits and Vegetables — Francisco Díez-Gonzalez, Dorinda S. Alcaine, E.B. Fugett, 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

P03-01 Pellicle Formation in Hot-smoking of Salmon: Smoke Decreases Survivability of \textit{Listeria} and \textit{Staphylococcus} Species — BRIAN H. HIMELBLOOM, Thomathu S. Shetty, and Chuck Crapo, University of Alaska Fairbanks, School of Fisheries and Ocean Sciences, Fishery Industrial Technology Center, Kodiak, AK, USA

P03-02 Influence of Processing Steps in Cold-smoked Fish Production on Survival and Growth of \textit{Listeria monocytogenes} — CISSE HEDEGAARD HANSEN, Annemarie Wichmann-Hansen, Mona Mohr, Birte Fonnesbech Vogel, and Lone Gram, Danish Institute for Fisheries Research, Soltofts Plads, Kgs. Lyngby, DK, Denmark

P03-03 Survival of \textit{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

P03-04 \textit{Listeria monocytogenes} in Herring Production — PREVALENCE AND MOLECULAR TYPING — SIGRUN GUDMUNSDOTTIR and Birna Gudbjörnsdóttir, Icelandic Fisheries Laboratories, Reykjavik, Iceland

P03-05 Study of the Efficacy of Peroxyacetic Acid, Chlorine Dioxide and Ozone for Inactivating \textit{Vibrio para-haemolyticus} and \textit{Escherichia coli} on Black Tiger Shrimp (\textit{Penacus monodon}) — WARAPA MAHA KARNCHANAKUL and Indun Dewi Pusita, Kasetsart University, Jatujak District, Bangkok, Thailand

P03-06 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

P03-07 Prevalence and Numbers of \textit{Vibrio para-haemolyticus} in Korea Retail Oysters as a Function of Environmental Factors — JONG-KYUNG LEE, Da-Wa Jung, 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  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, Saltofts 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  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, Joséé 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 Benchik, 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 — GLORIA 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
Tuesday a.m. continued

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 Balubilano, 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, Alisdaire McMeelchan, 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 Khopaboobool, 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 Immuno-magnetic Separation for the Detection of Campylobacter jejuni in Chicken under Aerobic Conditions — PUSSADEE TANGWATCHARIN, Suganya Chanthachum, Prapaporn Khopaboobool, 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 Rohier, 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 ‘Reaveal’ 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-Arco, IL, 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 VADIS 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. JECHEOREK, 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 — GREGORY 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. Odumneru, University of Guelph, Guelph, ON, Canada

P3-56 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 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 Auchtenerlonie, 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 Thérése Lescure, Cidem Itter, 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 for 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 — VERONIQUE K. PETROVA, Todd M. Silk, and Catherine W. Donnelly, University of Vermont, Burlington, VT, USA

P3-69 Use of Procedures Incorporating a Repair Step to Isoalate Escherichia coli O157:H7 from Ground Beef — CARLOS G. LEON-VELARDE, Mark Barbour, Spencer Hochstetler, Jared Veronick, and Joseph A. Odumneru, University of Guelph, Guelph, ON, Canada

P3-70 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 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 — ANDREYA 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 IAFF 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-RODRIGUEZ, 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 Recomtaination 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 IAFF Foundation
Organizer: Roger Brauningr
Convenors: Albert F. Chambers and Roger Brauningr
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 GRENAWITZ, 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 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 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 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 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 An International Outbreak of Salmonella Linked to Pet Treats — LORRAINE MCINTYRE, S. Brisdon, L. Wilcott, L. Liu, P. J. Fryer & Q. Zhao, University of Birmingham, Birmingham, West Midlands, UK

T4-06 A Risk Assessment Model of Enterobacter sakazakii in Powdered Infant Formula — THOMAS P. OSCAR, USDA-ARS, University of Maryland Eastern Shore, Princess Anne, MD, US

T4-07 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 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 Database on Breakdowns in Food Safety — ROY BETTS and Mike Stringer, Campden & Chorleywood Food Research Association, Chipping Campden, Gloucestershire, UK

T4-10 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 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 Alcicylobacillus spp. — SU-SEN CHANG and Dong-Hyun Kang, 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.) — DIKE O. UKUKU, and William F. Fett, USDA-ARS-ERRC, Wyndmoor, PA, USA

P4-03 Role of E. coli O157:H7 on the Survival of Salmonella spp. on Cantaloupe Rind and Decontamination with Sanitizers — KATHLEEN T. RAJKOWSKI, USDA-ARS-ERRC-FSITRU, Wyndmoor, PA, USA

P4-04 Moisture, Seed Coat Characteristics, and Disinfection of Artificially Inoculated Alfalfa Seeds — EDGAR VILLALPANDO-ARTEAGA, Nanci Martinez-Gonzalez, Elisa Cabrera-Diaz, Cristina Martinez-Cárdenas, Porfirio Gutiérrez-González, and OFELIA RODRÍGUEZ-GARCÍA, Universidad de Guadalajara, Guadalajara, Jalisco, México

P4-05 Survival of Salmonella spp. on Whole and Minimally Processed Mangoes — ALMA SOLTERO-SÁNCHEZ, Liliana Martínez-Chávez, Alejandro Castillo, Nanci Martinez-Gonzales, 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 — Xiaoning 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 Survival and Growth of *Salmonella Enteritidis* DSC 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 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, CA, USA

P4-17 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 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 Hypochlorite 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 Martinez-Cárdenas, Ofelia Rodriguez-García, and NANNY E. MARTINEZ-GONZALES, 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-García, Alejandro Castillo, and NANNY 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 Fate of *Listeria monocytogenes* and *Salmonella* spp. on Irradiated Minimally Processed Organic Watercress during Refrigerated Shelf Life — CECILIA GERALDES MARTINS, Tatiana Pacheco Nunes, Kátia Leani Oliveira de Souza, Bernadette Dora Gombossy de Melo Franco, Maria Teresa Destro, Beatrix Hutzler, and Mariza Landgraf, University of São Paulo, São Paulo, Brazil

P4-25 Effect of Irradiation on Flavanoid Content and Radio-resistance of *Listeria monocytogenes* on Arugula — Tatiana Pacheco Nunes, Cecilia Geraldes Martins, Maria Inês Genovese, Bernadette Dora Gombossy de Melo Franco, Maria Teresa Destro, Beatrix Hutzler, and MARIZA LANDGRAF, University of São Paulo, São Paulo, Brazil

P4-26 Comparative Inactivation of Foodborne Viruses on Fresh Produce — VIVIANA FINO and Kalmia Kniel, University of Delaware, Newark, DE, USA

P4-27 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
Tuesday p.m. continued

P4-51 The Role of $^{18}$-dependent and $^{18}$-independent DSC 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 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 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 CZUPRYSKI, 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 Quantitative Analysis of the Growth and Attachment of 

_SALMONELLA TYPHIMURIUM_ Mutants during the Alfalfa 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_

_Sponsored by The IAFP Foundation_

_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 Environmental 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 The Health Belief Model as a Framework for Food Safety — MARY ROSEMAN and Janet Kurzynske, University of Kentucky, Lexington, KY, USA
T5-02 Exploring the Role of Risk Perception and Sociodemographic Factors on the Use of Thermometers in Food Preparation — KOFI ADU-NUYAKO, Ralph Okafor, and Jeremiah Richey, North Carolina Agricultural and Technical State University, Greensboro, NC, USA
T5-03 Foodservice Manager Credentialing: Effects on Food Safety and Health Inspection Scores — MARGARET BINKLEY, Douglas Nelson, Barbara Almanza, Richard Ghiiselli, and Joseph Ismail, Texas Tech University, Lubbock, TX, USA
T5-04 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 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 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 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
T5-09 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 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 Coloring Fruit and Vegetable Food Safety Education—ELIZABETH A. BHN, Donna L. Scott, Robert B. Gravani, and Karin A.K. Rosberg, Cornell University, Ithaca, NY, USA
Wednesday a.m. continued

T5-12 Recruiting in the Digital Age: How to Promote
11:45 Poultry Science and Food Science to Generation
DSC 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 Effect of Temperature and Storage Time on the
8:30 Fate of Listeria monocytogenes on Inoculated
DSC Salami — CATHERINE A. SIMPSON, Ifigenia
Geornaras, and John N. Sofos, Colorado State
University, Fort Collins, CO, USA

T6-02 Effects of Low Equal Molar Concentrations of
8:45 Three Food Grade Acids on Listeria monocytogenes
DSC in Bologna — GIANNA DUTAN and John N. Sofos,
Colorado State University, Fort Collins, CO, USA

T6-03 Modeling to Predict the Growth/No Growth and
9:00 Selected Growth Limit Boundaries of Listeria
DSC 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 Control of Listeria monocytogenes on Frankfurters
9:15 Formulated without Lactate by Dipping in Sodium
DSC Lactate before and after Inoculation — BUFFY A.
STOHs, Beth Ann Crotzer-Dodson, and Daniel Y.C.
Fung, Kansas State University, Manhattan, KS, USA

T6-05 Effects and Interactions of Sodium Dicacetate,
9:30 Sodium Diacetate, and Pediocin on the Thermal
DSC Inactivation of Starved Cells of Listeria mono-
cytogenes on the Surface of Bologna — CAMELIA
GROSULESCU, Vijay K. Juneja, and Sadhana
Ravishankar, Illinois Institute of Technology,
Chicago, IL, USA

T6-06 Use of Octanoic Acid as a Post-lethality Treatment
9:45 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 Impact of Nitrite on Detection of Listeria mono-
cytogenes in Selected Ready-to-Eat Meat and
DSC Seafood Products — DAVID NYACHUBA and
Catherine Donnelly, The University of Vermont,
Burlington, VT, USA

T6-08 Interaction of Pseudomonas putida and Listeria
10:45 monocytogenes in Mixed Culture Biofilms —
DSC GREG KEPKA and Heidi Schraft, Lakehead
University, Thunder Bay, ON, Canada

T6-09 CtsR and Its Interaction with Sigma B are Required
11:00 for Heat Tolerance, Motility, and Host Cell Invasion
DSC in Listeria monocytogenes — YUEWEI HU, Ute
Schwab, Martin Wiedmann, and Kathryn J. Boor,
Cornell University, Ithaca, NY, USA

T6-10 A Method to Detect Significant Clusters in
11:15 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 Sensitivity and Inclusivity of a Listeria Genus PCR
11:30 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

PS-01 Molecular Characterization of Toxigenic Staphy-
lococcus 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

PS-02 Enterobacter sakazakii in Milk Kitchens of
Maternities in São Paulo State, Brazil — MARIA-
TERESA DESTRO, Gabriela Palcich; Cintia Gillio;
Mariza Landgraf; Bernadette D.G.M. Franco,
University of São Paulo, São Paulo, Brazil

PS-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 Admin-
istration, Seoul, Korea

PS-04 Estimation of the Burden of Gastroenteric Diseases
in Miyagi Prefecture, Japan — KUNIHIRO KUBOTA,
Hajime Toyofuku, Fumiko Kasuga, Emiko Iwasaki,
Tomomi Nakubo, Yoshimitsu Ohtomo, Katsumi
Nakase, Yoshinori Mizoguchi, Frederic J. Angulo,
and Kaoru Morikawa, National Institute of Health
Sciences, Tokyo, Japan

PS-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 SANCHEZ
MENDOZA, and Armida Zuniga, Public Health
Laboratory of Hidalgo State, Hidalgo, Mexico

PS-06 Probabilistic Risk Assessment for Viral Foodborne
Disease — AMIR HOSSEIN MOKHTARI, Christina
Moore, Lee-Ann Jaykus, North Carolina State
University, Raleigh, NC, USA

PS-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
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

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

Predictive Modeling on the Growth of Bacillus cereus in Various Cereal Grains — 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

Prevalence and Characterization of Listeria monocytogenes in Minas Frescal Cheese — LINA CASALE ARAGON-ALEGRO, Patricia Kary Noda, Daniela Mayumi Horota, Mariza Landgraf; Bernadette D.G.M. Franco, and Maria Teresa Destro, University of Sao Paulo, Sao Paulo, Brazil

Effect of Nisin-EDTA on Kinetics of Growth and Inhibition of Listeria monocytogenes and Mesophilic Aerobic Bacteria in Apple Cider — DIKE O. UKUKU and Li Han Huang, USDA-ARS-ERRC, Wyndmoor, PA, USA

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

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

Efficacy of Lactic Acid Alone or Combined with Sodium Lauryl Sulfate for Control of Listeria monocytogenes in Vacuum-packaged Franks made with or without Sodium Lactate — OLEKSANDR BYELASHOV, Aubreya Mendonca, and Joseph Sebranek, Colorado State University, Fort Collins, CO, USA

Effect of Antimicrobials, Point of Inoculation and Home Storage Conditions on Listeria monocytogenes Growth on Commercial Uncured Turkey Breast — ALEXANDRA LIANOU, Ilfigena Geornaras, Patricia A. Kendall, Keith E. Belk, John A. Scanga, Gary C. Smith, and John N. Sofos, Colorado State University, Fort Collins, CO, USA

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
PS-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. Gazinsky, University of Massachusetts, Amherst, MA, USA

PS-31 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

PS-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

PS-33 The Antilisterial Effects of Decanol in Ready-to-Eat Meat Products, Bologna and Country Ham — HESHAM A. ELGAALLI, Melissa C. Newman, and Thomas R. Hamilton-Kemp, University of Kentucky, Lexington, KY, USA

PS-34 Bactericidal Activity of Methanobactin Combined with Various Surfactants against Listeria monocytogenes Scott A — CLINTON JOHNSON, Aubrey Mendonca, and Alan DiSilipito, Iowa State University, Ames, IA, USA

PS-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

PS-36 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


PS-38 Fate of Bacillus anthracis (Sterne) in Pasteurized Whole Liquid Egg Stored at Different Temperatures and Cooked Using a Commercial Grill — ANNA PORTO-FETT, Jose R. Brito, Peggy Tomasula, and John B. Luchansky, USDA-ARS, Wyndmoor, PA, USA

PS-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

PS-40 Effects and Interactions of Temperature, Sodium Lactate, Sodium Diacate 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

PS-41 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

PS-42 Effect of Modified Atmosphere Packaging on Irradiated Ground Beef — JOHN NOVAK and James Yuan, American Air Liquide, Countryside, IL, USA

PS-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

PS-44 Inactivation of Barotolerant Listeria monocytogenes in Fat Emulsions by Tert-Butylhydroquinone and High-pressure Processing — YOONKYUNG CHUNG, Mustafa Vurma, Evan Turek, Ahmed E. Yousef, The Ohio State University, Columbus, OH, USA

PS-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

PS-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

PS-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

PS-48 Bacteriocidal Effects of CaO (Scallop-shell Powder) on Foodborne Pathogenic Bacteria — JI-HYE YEON and Sang-Do Ha, Chung-Ang University, Gyunggido, South Korea

PS-49 Antimicrobial Effects of Concrete Coated with Polyurethane Containing Different Concentration of Copper Oxide against Listeria monocytogenes at Different Temperatures — AISHA ABU SHEIBI and Marlene Janes, United Arab Emirates University, Al Ain, United Arab Emirates

PS-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

PS-51 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
PS-52 Withdrawn

PS-53 Thymol, Carvacrol and Potassium Sorbate Combinations as Antimicrobial Agents — AURELIO LOPEZ-MALO, Rebeca García-García, Stella M. Alzamora, Enrique Palou, and Aurelio López-Malo, Universidad de las Américas, Cholula, Puebla, México

PS-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

PS-55 Evaluation of the Listericidal Effect of Oregano Essential Oil and Nisin in Fresh Pork Sausages — Monika F. Krüger, 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

PS-56 Antimicrobial Properties of Phenolic Compounds from Sorghum — Norah Khadambi, Geybi Duodu and ELNA BUYS, University of Pretoria, Pretoria, Gauteng, South Africa

PS-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

PS-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

PS-59 Enhancing Antimicrobial Activity of Lysozyme against Listeria monocytogenes Using Immuno-nanoparticles — HUA YANG, Adrienne Wimbrow, and Xiuping Jiang, Clemson University, Clemson, SC, USA

PS-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

PS-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, CanBionc Inc., Edmonton, AB, Canada

PS-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, CanBionc Inc., Edmonton, AB, Canada

PS-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

PS-64 Antifungal Agents from Lactic Acid Bacteria — ANDREIA BIANCHINI and Lloyd B. Bullerman, University of Nebraska-Lincoln, Lincoln, NE, USA

PS-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

PS-66 Complex Coacervation May Reduce Antimicrobial Activity of Chitosan — CHRISTINA SCHEIDIG and Jochen Weiss, University of Massachusetts, Amherst, MA, USA

PS-67 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

PS-68 Susceptibility of CDC Reactor Grown Listeria monocytogenes and Escherichia coli O157:H7 Biofilms to Eugenol and Carvacrol Encapsulated in Surfactant Micelles — DARÍO PEREZ-CONESA, Lynne A. McLandsborough, and Jochen Weiss, University of Massachusetts, Amherst, MA, USA

PS-69 Effect of Antimicrobials Eugenol and Carvacrol Encapsulated in Surfactant Micelles on Listeria monocytogenes and Escherichia coli O157:H7 Colony Biofilm Growth — DARÍO PEREZ-CONESA, Lynne A. McLandsborough, and Jochen Weiss, University of Massachusetts, Amherst, MA, USA

PS-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

PS-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

PS-72 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

PS-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

PS-74 Preparation of Endotoxin-free Bacteriophages for Use as Food Grade Antimicrobials — JENNIFER CHASE and Lawrence Goodridge, University of Wyoming, Laramie, WY, USA

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/New Zealand — 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


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 New 0157: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 Coyoacan, 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 Government’s Perspective on Water HACCP — TOM GRAHAM, Canadian Food Inspection Agency, Guelph, ON, Canada
2:30 HACCP Requirements in the Asian/Pacific Aquaculture Industry with Regard to Water Safety and Quality — PETER HIBBARD, Quality Seafood Inspection Darden Restaurants—Western Hemisphere, Oviedo, 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

Convenors: Lawrence Goodridge and Bassam Annous

T7-01 Factors Affecting Attachment of 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 Compost Tea from a Food Safety Perspective
1:45 LINDSAY ARTHUR, Sandra Jones, Hugh Martin, and DSC Grant Campbell, Ontario Ministry of Agriculture, Food and Rural Affairs, Guelph, ON, Canada

T7-03 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 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 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. Duhe, USDA-ARS-WRRC, Albany, CA, USA

T7-06 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 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.
You can't afford to guess at how clean your vegetables are. The standards for fresh-cut fruits and vegetables are becoming more stringent due to the recent rise of industry outbreaks, and you need a proven product to consistently meet those standards. You need Tsunami® 100.

*Tsunami 100 is the ONLY EPA-registered antimicrobial water additive product on the market that reduces pathogens in process water. It reduces 99.9% of Escherichia coli O157:H7; Listeria monocytogenes and Salmonella enterica in fruit and vegetable processing waters. It also provides control of spoilage and decay causing non-public health organisms present on the surface of post-harvest, fresh-cut, and processed fruits and vegetables.

Be confident you've got the most effective process in place for proven food quality with Tsunami 100. Find out more about how Tsunami and Ecolab can help you by calling 1-800-392-3392.
IAFP 2006
Networking Opportunities

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 prestigious 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. SILIKER 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.
**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, eavesdropping 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 beautiful Banff! This tour features the spray of cool waterfalls, an 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 on board 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 times! 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 dinosaurs 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 Bbq. 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

JULY 2006 | FOOD PROTECTION TRENDS 547
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.

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 7:00 p.m. – 9:00 p.m.
Sponsored by Kraft Foods
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 Ranch 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**

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 Attendee’s 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**

<table>
<thead>
<tr>
<th>REGISTRATION FEES:</th>
<th>MEMBERS</th>
<th>NONMEMBERS</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registration</td>
<td>$ 395 ($445 late)</td>
<td>$ 397 ($447 late)</td>
<td></td>
</tr>
<tr>
<td>Associate Student Member</td>
<td>$ 80 ($90 late)</td>
<td>Not Available</td>
<td></td>
</tr>
<tr>
<td>Retired Association Member</td>
<td>$ 80 ($90 late)</td>
<td>Not Available</td>
<td></td>
</tr>
<tr>
<td>One Day Registration* Mon.  Tues.  Wed.</td>
<td>$ 215 ($240 late)</td>
<td>$ 330 ($355 late)</td>
<td></td>
</tr>
<tr>
<td>Spouse/Companion* (Name):</td>
<td>$ 55 ($55 late)</td>
<td>$ 55 ($55 late)</td>
<td></td>
</tr>
<tr>
<td>Children 14 &amp; Under* (Names):</td>
<td>$ 25 ($25 late)</td>
<td>$ 25 ($25 late)</td>
<td></td>
</tr>
<tr>
<td>&quot;Awards Banquet not included Additional Awards Banquet Ticket (Wednesday, 8/16)</td>
<td>FREE</td>
<td>FREE</td>
<td></td>
</tr>
<tr>
<td>Student Luncheon (Sunday, 8/13)</td>
<td>$ 50 ($60 late)</td>
<td>$ 50 ($60 late)</td>
<td></td>
</tr>
<tr>
<td>$ 4 ($15 late)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NEW IAFP FOUNDATION FUNDRAISERS:**

**Tuesday, 8/15**
- Murder Mystery Dinner at The Deane House  
  $ 130 ($140 late)
- Dinner at The Ranch  
  $ 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) | $ 60 ($70 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:**

☐ Check Enclosed

Credit Card #
Expiration Date
Name on Card
Signature

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

**TOTAL AMOUNT ENCLOSED $**

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

**EXHIBITORS DO NOT USE THIS FORM**
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 upgrade 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

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

Intended Audience
Laboratory personnel or microbiologists in small to medium sized laboratories or companies
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

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
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

Payment must be received by July 21, 2006 to avoid late registration rates.

<table>
<thead>
<tr>
<th>WORKSHOP 1</th>
<th>WORKSHOP 2</th>
<th>WORKSHOP 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Rate</td>
<td>Late Rate</td>
<td>Early Rate</td>
</tr>
<tr>
<td>IAFP Member</td>
<td>$295.00</td>
<td>IAFP Member</td>
</tr>
<tr>
<td>NonMember</td>
<td>$395.00</td>
<td>NonMember</td>
</tr>
</tbody>
</table>

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

Signature

Expiry date

Total Amount Enclosed

US Funds on US Bank $
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 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: __________________________

Email address: __________________________ Zip/Postal Code: __________________________

Daytime Ph: __________________ Fax: __________________

HOTEL SELECTION
Please select hotel from list below in order of preference (ie. 1st, 2nd, 3rd choice etc.).

<table>
<thead>
<tr>
<th>CHOICE</th>
<th>HOTEL</th>
<th>RATES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Calgary Marriott</td>
<td>$174.00 CAD</td>
</tr>
<tr>
<td>2nd</td>
<td>Fairmont Palliser</td>
<td>$195.00 CAD</td>
</tr>
<tr>
<td>3rd</td>
<td>Hyatt Regency</td>
<td>$175.00 CAD</td>
</tr>
</tbody>
</table>

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
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.chemunex.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.bsiamerica.com
Phone: 800.862.4977

BTF Precise Microbiology, Inc.
www.btfbio.com
Phone: 412.267.3073

Canadian Meat Business
www.wecomunications.ca
Phone: 800.344.7055

Canadian On-Farm Food Safety Working Group (COFFSWG) – Canadian Federation of Agriculture
Phone: 613.236.3633

CanTest Ltd.
www.can-test.com
Phone: 800.665.8566

Center for Food Safety and Applied Nutrition, US FDA
www.cfsan.fda.gov
Phone: 301.436.2127

Carm 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.elisystems.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
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
Student Fundraiser!

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.

Please return order form to:

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

IAFP SPDG Shirt Order Form

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mailing Address</td>
<td></td>
</tr>
<tr>
<td>City</td>
<td>State/Province</td>
</tr>
<tr>
<td>Telephone</td>
<td>Fax</td>
</tr>
<tr>
<td>Quantity</td>
<td>T-shirts</td>
</tr>
<tr>
<td>Polo shirts</td>
<td>S</td>
</tr>
</tbody>
</table>

PAYMENT OPTIONS:  
☐ Check or Money Order Enclosed  
TOTAL AMOUNT ENCLOSED $  
US FUNDS on US BANK

Credit Card #
Name on Card
Signature:  Expiration Date
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
- Ivan Parkin Lecture
- 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:

- 3-Month Membership “Cheese of the Month Club”
- Mickey Mouse Statue
- PepsiCo Gift Bag
- Assorted Wines
- Cow Parade Figurines
- Food Microbiology Fundamentals and Frontiers
- Godiva Chocolate Gift Basket
- Pearl Necklace
- McCormick Spice Rack
- Train Set

Complete the form and send it in today.

<table>
<thead>
<tr>
<th>Description of Auction Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated Value</td>
</tr>
<tr>
<td>Name of Donor</td>
</tr>
<tr>
<td>Company (if relevant)</td>
</tr>
<tr>
<td>Mailing Address (Please specify: Home ☐ Work ☐)</td>
</tr>
<tr>
<td>City</td>
</tr>
<tr>
<td>Postal Code/Zip + 4</td>
</tr>
<tr>
<td>Telephone #</td>
</tr>
<tr>
<td>E-mail</td>
</tr>
</tbody>
</table>

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

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®!
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 Ranch
Tuesday, August 15 • 6:30 p.m. – 10:00 p.m.

The flavors and traditions of Alberta’s ranching heritage live on at The Ranch Restaurant. Originally built in 1886 by William Roper Hull as the headquarters of The Bow Valley Ranch, 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 Ranch 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.

- 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.


SEPTEMBER

- 5-9, China Brew & Beverage 2006, China International Exhibition Centre, Beijing, China. For more information, call 852.2865.2633; E-mail: elaine@bif.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.


- 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: scrn4@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.


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: advince@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 sfizz@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 Borar at 712.754.2511 ext. 33; E-mail: borarp@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
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.
Now Get 3-A SSI Standards Subscriptions Online
with company-wide, multi-user access right from your desktop!

Two Industry Leaders Join Forces
3-A Sanitary Standards Inc., a leader in standards for food sanitation and hygiene, has joined forces with Techstreet, a leader in online information delivery services, to bring you 3-A SSI standard subscriptions online — an economical, efficient way to provide your whole company with just the standards you need — precisely when and where you need them.

The Benefits to You
- Company-wide, multi-user access to all 3-A SSI standards in electronic PDF format
- Always up-to-date — new and revised editions are automatically included
- Immediate access, 24x7x365, from any worldwide location with internet access
- Customized subscriptions let you buy just the standards you need
- Comprehensive reporting of usage and performance
- No IT integration required, no new software or hardware is necessary

The Value to Your Organization
- Increase productivity and efficiency
- Shorten product time to market
- Decrease internal and external costs
- Facilitate better and faster decision-making
- Improve quality and safety
- Eliminate redundant spending
- Guarantee current information and eliminate rework from using outdated information

3-A SSI Standards
online 24/7 • always current
www.3-a.org/standards/standards.htm

To learn more, obtain price quotes, or register for the 3-A SSI subscriptions service, please contact Techstreet at 800.699.9277 or send E-mail to subscriptions@techstreet.com. Outside the US and Canada, call 734.302.7801 or fax your request to 734.302.7811.
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.

International Association for Food Protection

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.

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.
The Table of Contents from the Journal of Food Protection is being provided as a Member benefit. If you do not receive JFP, but would like to add it to your Membership contact the Association office.

Journal of Food Protection

Vol. 69  June 2006

566  FOOD PROTECTION TRENDS  |  JULY 2006

Molecular Characterization of Escherichia coli O157:H7}
How is this publication thinking about the future?

By becoming part of the past.
We'd like to congratulate this publication for choosing to be accessible with Bell & Howell Information and Learning. It is available in one or more of the following formats:

- Online, via the ProQuest® information service
- Microform
- Electronically, on CD-ROM and/or magnetic tape

For more information, call 800-521-0600 or 734-761-4700, ext 2888
www.infolearning.com
TAKE FOOD SAFETY TO NEW HEIGHTS!

Register today!

Workshops, plenary and breakout sessions, demonstrations, poster presentations, and exhibits.

Earn CEUs!
Exhibit!

Network!
Sponsor!

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.

Member #
First Name __________ Last Name __________
Company ____________________________
Mailing Address ____________________________________________

Please specify: ☐ Home ☐ Work
City __________________________
Postal Code/Zip + 4 __________
Telephone # __________________________

E-Mail __________________________

PLEASE CHECK BOX NEXT TO YOUR VIDEO CHOICE

DAIRY
☐ F2010 Close Encounters of the Bull Kind
☐ F2011 Controlling Food Microorganisms in Dairy
☐ F2012 HACCP Training for Dairy Employees

ENVIRONMENTAL
☐ F2013 Food Safety: The HACCP Way

FOOD
☐ F2014 Food Safety: From Farm to Table

OTHER

(Available)
**BOOKLET ORDER FORM**

**SHIP TO:**
Member # ____________________________
First Name ___ M.I. ___ Last Name ________
Company ____________________________ Job Title ____________________________
Mailing Address ____________________________
Please specify: Home Work
City ____________________________ State or Province ____________________________
Postal Code/Zip + 4 ____________________________ Country ____________________________
Telephone # ____________________________ Fax # ____________________________
E-Mail ____________________________

**BOOKLETS:**

<table>
<thead>
<tr>
<th>QUANTITY</th>
<th>DESCRIPTION</th>
<th>MEMBER OR GOVT PRICE</th>
<th>NON-MEMBER PRICE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Procedures to Investigate Waterborne Illness—2nd Edition</td>
<td>$12.00</td>
<td>$24.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Procedures to Investigate Foodborne Illness—5th Edition</td>
<td>12.00</td>
<td>24.00</td>
<td></td>
</tr>
</tbody>
</table>

**SHIPPING AND HANDLING** – $3.00 (US) $5.00 (Outside US) Each additional booklet $1.50

*Multiple copies available at reduced prices.*
Phone our office for pricing information on quantities of 25 or more.

**OTHER PUBLICATIONS:**

<table>
<thead>
<tr>
<th>QUANTITY</th>
<th>DESCRIPTION</th>
<th>MEMBER OR GOVT PRICE</th>
<th>NON-MEMBER PRICE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>International Food Safety Icons CD</em></td>
<td>$25.00</td>
<td>$25.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pocket Guide to Dairy Sanitation (minimum order of 10)</td>
<td>$.75</td>
<td>$1.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Before Disaster Strikes...A Guide to Food Safety in the Home (minimum order of 10)</td>
<td>.75</td>
<td>1.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Before Disaster Strikes... Spanish language version – (minimum order of 10)</td>
<td>.75</td>
<td>1.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Food Safety at Temporary Events (minimum order of 10)</td>
<td>.75</td>
<td>1.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Food Safety at Temporary Events – Spanish language version – (minimum order of 10)</td>
<td>.75</td>
<td>1.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Annual Meeting Abstract Book Supplement (year requested)</em></td>
<td>25.00</td>
<td>25.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>IAFP History 1911-2000</em></td>
<td>25.00</td>
<td>25.00</td>
<td></td>
</tr>
</tbody>
</table>

**SHIPPING AND HANDLING** – per 10 – $2.50 (US) $3.50 (Outside US)

*Includes shipping and handling

**PAYMENT:**
Payment must be enclosed for order to be processed *US FUNDS on US BANK

☐ Check or Money Order Enclosed
☐ Credit Card Enclosed

CREDIT CARD # ____________________________
EXP. DATE ____________________________
SIGNATURE ____________________________

**TOTAL ORDER AMOUNT**
Prices effective through August 31, 2006

**4 EASY WAYS TO ORDER**

PHONE 800.369.6337; 515.276.3344
MAIL 6200 Aurora Ave., Suite 200W
Des Moines, IA 50322-2864, USA
WEB SITE www.foodprotection.org

570 FOOD PROTECTION TRENDS | JULY 2006
MEMBERSHIP APPLICATION

MEMBERSHIP DATA:
Prefix (Prof. Dr. Mr. Ms.)
First Name ___________________________  M.I. ___________________________ Last Name ___________________________
Company ___________________________  Job Title ___________________________
Mailing Address ___________________________
Please specify: Home  Work
City ___________________________  State or Province ___________________________
Postal Code/Zip + 4 ___________________________  Country ___________________________
Telephone # ___________________________  Fax # ___________________________
E-Mail ___________________________

MEMBERSHIP CATEGORIES:

MEMBERSHIPS  US  Canada/Mexico  International

☐ Membership with JFP & FPT – BEST VALUE! $185.00 $220.00 $265.00
  12 issues of the Journal of Food Protection
  and Food Protection Trends
  ☐ add JFP Online $36.00 $36.00 $36.00

☐ Membership with FPT $100.00 $115.00 $130.00
  12 issues of Food Protection Trends
  ☐ add JFP Online $36.00 $36.00 $36.00

☐ *Student Membership with JFP Online (no print copy) $48.00 $48.00 $48.00
  ☐ add JFP Online $36.00 $36.00 $36.00

☐ *Student Membership with FPT & FPT $92.50 $127.50 $172.50

☐ *Student Membership with JFP $50.00 $70.00 $100.00

☐ *Student Membership with FPT $50.00 $65.00 $80.00
  ☐ add JFP Online $36.00 $36.00 $36.00

*Must be a full-time student. Student verification must accompany this form.

SUSTAINING MEMBERSHIPS
Recognition for your organization and many other benefits. JFP Online included.

☐ GOLD $5,000.00
☐ SILVER $2,500.00
☐ SUSTAINING $750.00

PAYMENT:
Payment must be enclosed for order to be processed • US FUNDS on US BANK

☐ Check Enclosed  ☐ MasterCard  ☐ VISA  ☐ American Express  ☐ Discover  ☐ Diner’s Club

TOTAL MEMBERSHIP PAYMENT $ ___________________________

CREDIT CARD # ___________________________
EXP. DATE ___________________________
SIGNATURE ___________________________

INTERNATIONAL ASSOCIATION FOR FOOD PROTECTION

4 EASY WAYS TO JOIN
PHONE 800.369.6377; 515.276.3344  FAX 515.276.8655  MAIL 6200 Aurora Ave., Suite 200W
Des Moines, IA 50322-2864, USA  WEB SITE www.foodprotection.org

JULY 2006 | FOOD PROTECTION TRENDS 571
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?”

Continued on page 563
MOST SUPPLIERS OFFER THE BASICS

WE CAN BRING MORE TO THE TABLE

Fisher can help you formulate the unique solution that best fits your lab supply needs. We offer smart choices that help drive cost savings, increase your productivity, and get products to market faster—allowing you to focus on your customers.

- One-stop shopping for all your product needs
- Easy-to-use e-commerce interface and online ordering systems
- Streamlined, no-hassle delivery of the products you need, when you need them
- National account management and services

We offer a comprehensive selection of food diagnostics and testing products to support the needs of food research, safety, quality and sanitation operations. And we carry cutting-edge products from leading manufacturers such as Remel/Oxoid, MicroBiologics, Corning, Millipore, Hygiena, Astoria Pacific, Metrohm Peak and more!

Contact Fisher and let us show you what we can bring to your table.

ONE SOURCE—INFINITE SOLUTIONS
The picture is clearer. Doubt has been diminished. The food testing revolution has begun.

BAX SYSTEM Q7 THE POWER TO DO MORE

1-800-863-6842 Qualicon.com
powered by Applied Biosystems

The miracles of science