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Food Protection Trends

Science and News from the International Association for Food Protection

Rapid Detection of *E. coli* O157 on Beef Samples

Listeria Prevention Practices for Small Cheese Operations

IAFP 2008

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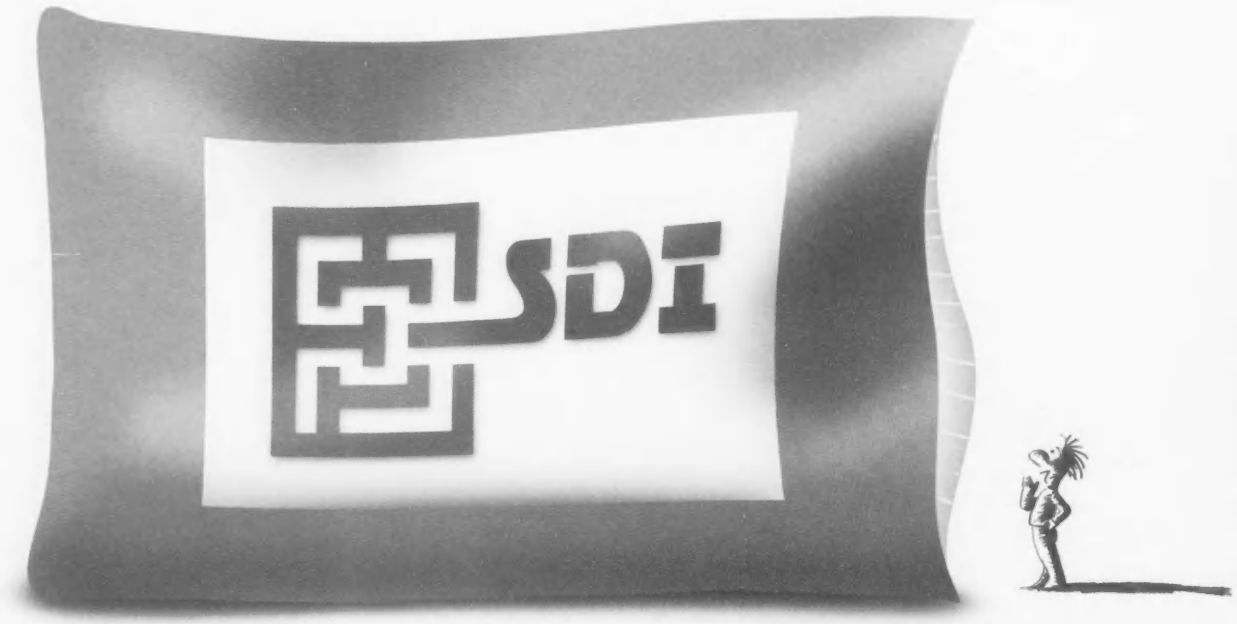

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VOLUME 28, NO. 7

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FOOD PROTECTION TRENDS
SCIENCE AND NEWS FROM THE INTERNATIONAL ASSOCIATION FOR FOOD PROTECTION

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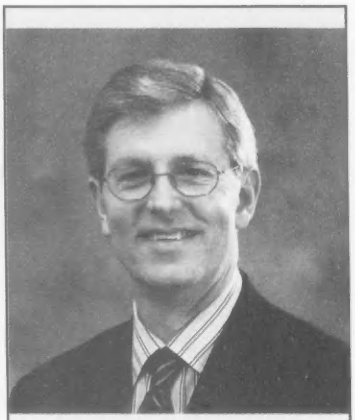


By GARY ACUFF
PRESIDENT

"If we occasionally detect the presence of enteric pathogens in ground beef, why are we not concerned that our process control could be better?"

Why do we love end-product testing so much? We scientists are a logically thinking group, so I guess it just seems to be the logical thing to do. Maybe that is not the reason, however. It apparently doesn't take a Ph.D. to come to that conclusion. Even most consumers, unfamiliar with microbiology, will tell you that if you want to know if food is contaminated, just test it. Unfortunately, as we all know, microbiological sampling of food to detect presence of low levels of pathogens is often unsuccessful. Most bacterial pathogens are not homogenously distributed in our food, so it is difficult to represent the overall level of contamination through the collection of a microbiological sample. In addition, the enteric pathogens that many of us spend our careers fighting, like *Escherichia coli* O157:H7, are most often present in very low numbers in raw foods of animal origin, when there at all. To detect them takes examination of an extremely large number of sample units from a lot, and even then, probability works against us in any associated attempt to ensure food safety. So are low numbers significant? Depends on the pathogens, but for enteric pathogens, presence at almost any level should be of concern. We cannot expect to test food and detect the presence of pathogens unless the contamination level is fairly high and we just happen to be lucky enough to hit a contaminated sample unit. Do you feel lucky?

Back in the 1980s, a group of food microbiologists was tasked with writing microbiological criteria with the goal of ensuring the safety of food. They published their findings in a report entitled *An Evaluation of the Role of Microbiological Criteria in Foods and Food Ingredients*. After much research and lengthy discussion, the group determined that microbiological criteria were insufficient for ensuring safety, primarily for the reasons discussed above. Assuring the safety of food from production through consumption is a complicated process requiring an organized, deliberate approach to preventing and controlling potential hazards rather than detecting them. The authors of the report realized that process control and prevention was the answer, not microbiological criteria, and recommended that the Hazard Analysis Critical Control Point (HACCP) System be adopted to ensure food safety. That system is now widely accepted as the most effective and logical way to produce the safest food possible. Microbiological testing is an active and important part of a functioning HACCP plan, but it is most likely to be effectively used in verification of said plan. Included in verification activities is validation, defined by the National Advisory Committee on Microbiological Criteria for Food as the "element of verification focused on collecting and evaluating scientific and technical information to determine whether the HACCP plan, when properly implemented, will effectively control the defined hazards." Before a HACCP plan can function with any level of assurance, it must be determined that all hazards have been identified and that the plan to control them is scientifically sound and will be effective. Validation, both of individual CCPs as well as the entire HACCP plan, is integral to determining the soundness of a HACCP plan, and it often requires a significant amount of microbiological testing.

Let's talk about raw products for a minute, specifically red meat. Microbiological testing can play a unique role in HACCP plan activities. However, in the production of red meat, it is generally agreed that detection of foodborne pathogens

is not an effective tool for monitoring CCPs within a slaughter/processing HACCP plan. In addition, pathogens are often absent from a carcass and, when present, their uneven distribution makes it difficult to obtain a truly representative sample. In contrast, microbiological testing can be applied within a HACCP plan to validate and verify the effectiveness of carcass decontamination procedures. It is important to note that on-going verification activities are more accurately conducted to verify the effectiveness of the process that will control hazards rather than to verify the safety of the food product. That is, you want to know whether the control procedures are working, whether there are actually pathogens present or not.

So why does the red meat industry spend a "gazillion" dollars sampling their end products for enteric pathogens every year? To ensure safety? I hope that is not what they are thinking, although I often get that impression from hearing comments that testing is the "last line of defense." Sorry, testing is not an intervention. We have known for decades that testing will not ensure safety. I know consumers think testing is the best safety precaution, but as scientists, we know better.

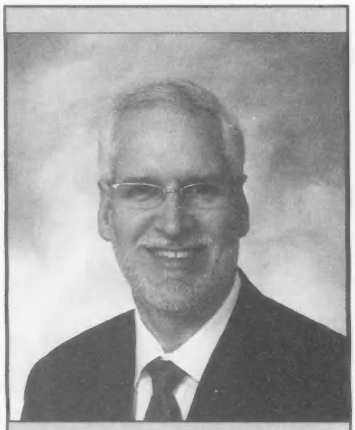
Now don't get me wrong – I am not saying that we should not test food. I am simply saying that we need to test smarter. We need to spend our resources validating our critical control points to make sure they actually do what we say they do. We need to use testing to demonstrate the effectiveness of our HACCP plans and process control. We need to challenge our process control in innovative ways and make sure we are controlling the identified hazards. While validation and verification of HACCP systems may initially seem intimidating, careful thought and planning can make the process logical, reasonable and extremely helpful. Many tools are available to assist, such as rapid and sensitive microbiological tests, extensive publication of research results in the scientific literature and numerous HACCP experts. The human tendency is to find a single tool that works and use it to excess; however, successful validation and verification will most likely be attained through the efficient utilization of as many tools as possible. Continuous, regular challenging of the validity of a HACCP system through verification will only serve to strengthen confidence in the ability of the process to control hazards.

So, I know exactly what some of you are thinking. If product testing is not the answer, why is it we sometimes detect the presence of a pathogen like *E. coli* O157:H7 in ground beef and thereby prevent its entry into the food supply? Isn't that worthwhile? Step back, and view the situation with a broader perspective. Do you really think we are catching all of the lots of ground beef with low levels of O157:H7 that way? It is more likely that we are just randomly detecting the low-level presence of that pathogen through the haphazard selection of a contaminated sample unit. Other lots of ground beef with low levels of contamination probably proceed through to the consumer undetected. But we already knew that, right? That's why we tell consumers to cook to 160°F. And how much time and money did we spend on negative samples to find that one positive? It sure would have been helpful to use those resources for validation of process control. Keep in mind, I am not trying to single out the red meat industry, it is just that I am most familiar with that process, and I don't believe that we have sufficiently validated existing CCPs. I also believe that we could be further down that road except that, in our attempt to meet the demands of regulatory agencies and expectations of a well-meaning but misinformed consumer, we have wasted an enormous amount of time and money testing end products when we could have been improving process control.

Here is the question I believe we should all be asking: If we occasionally detect the presence of enteric pathogens in ground beef, why are we not concerned that our process control could be better? Obviously, the critical control points that we have in place for slaughter/processing are not sufficient to prevent the presence of enteric pathogens in a raw product (if that is even possible), so our testing simply confirms what we already know. We can't possibly be testing to ensure food safety, can we? If that is the case, it is a shame, because we have known that doesn't work for a long time now. We need to put our resources, both intellectual and monetary, to work solving problems, not just continually detecting that we still have them. And that is what *Advancing Food Safety Worldwide* is all about.

As always, please feel welcome to comment on any of my columns. I always enjoy hearing from you (gacuff@tamu.edu).

"COMMENTARY" FROM THE EXECUTIVE DIRECTOR



By DAVID W. THARP, CAE
EXECUTIVE DIRECTOR

"What can you expect from IAFP 2008?"

IAFP 2008 is just a few short weeks away now! Have you registered and made your hotel reservations? We have had great interest in the program this year along with excellent support from our exhibitors and sponsors. Many people come together to make the IAFP Annual Meetings a great success and this year is no exception. Planning begins many years in advance, with the majority of the work taking place in the period six to ten months prior.

Our presenters, both oral and poster presenters, have prepared to deliver the latest scientific research results for your benefit in learning from their experience. Exhibitors have invested heavily, both in time and financially to position their company and products to attract your attention. The Ohio Association of Food and Environmental Sanitarians has done a wonderful job of preparing for your arrival in Columbus; so all systems are in place and ready to go!

Many people have asked, "Why Columbus?" We say, "We have an active Ohio Affiliate who wanted us to come to their state!" When looking at three cities in Ohio, we selected Columbus because it fit the needs of our Annual Meeting better than the others. You are going to be surprised by Columbus – there are many restaurants, shops and night-time entertainment areas, all within easy walking distance of the convention site. Besides, Columbus is centrally located in the USA and easy to reach for those driving to the meeting. Columbus also has great airline traffic and connections from all the international hub airports.

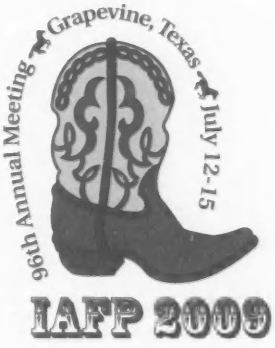
What can you expect from IAFP 2008? You can expect to interact with the leading food safety professionals from North America and the world! You can expect to learn the most recent procedures and methods in food science. You can expect to discover the latest technological developments in equipment and products in the IAFP Exhibit Hall. And, you can also expect to enjoy the company of food safety professionals who are interested in the same thing you are – keeping the food supply safe from contamination, thereby protecting the public's health.

The IAFP Annual Meeting has grown steadily in size and stature. It is now recognized as the leading food safety conference because of the extremely focused topic where we concentrate our efforts. We are interested in all factors leading to a safe food supply, from a science and food safety perspective. We are interested in a safe system of delivering food for public consumption, whether at home, in a restaurant or a café, where the public can eat this food without fear of illness. This system covers the entire spectrum from raw material, to processing (if any) to distribution, storage, cooking, cooling and health issues related to food handling and consumption. Each of these areas are scientifically evaluated and discussed through more than 500 presentations over the three-day conference.

Our preview coverage of IAFP 2008 begins on page 499. The preliminary program can be found on page 504 showing session titles, presentation titles and speaker names. In this month's issue of *Food Protection Trends*, we also included a list of exhibitors (page 540) and our sponsors (page 544). We encourage you to thank sponsors and exhibitors, even if you are unable to attend IAFP 2008. The sponsors and exhibitors truly make a huge difference for everyone who attends our meetings! Without their support, many things would be much different at our Annual Meetings.

Sponsors support refreshment breaks, lunches and after-session receptions each day in the Exhibit Hall. This in addition to our conference bags, name badges, and receptions including the Welcome Reception, Opening Night Reception and the President's Reception. Sponsors help us in countless ways and make it easy for attendees to have time and the right setting for networking with colleagues.

We hope you already have your hotel reservation, your airline ticket and have registered for IAFP 2008. If not, there is still time to act! We look forward to seeing you in Columbus next month.



CALL FOR SYMPOSIA
IAFP 2009

July 12–15, 2009
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The Program Committee invites International Association for Food Protection Members and other interested individuals to submit a symposium proposal for presentation during IAFP 2009, July 12–15, 2009 in Grapevine, Texas.

Symposia proposals may be submitted to the Association office no later than July 25, 2008 or be submitted to the IAFP registration desk at IAFP 2008 by Tuesday, August 5, 2008 at 10:00 a.m. If preferred, ideas may be presented in person to the Program Committee on Wednesday, August 6, 2008 at 7:00 a.m. (proposals must first be submitted in writing by Tuesday, August 5, 2008 at 10:00 a.m.).

For additional information, contact: Tamara Ford, Phone: 800.369.6337; 515.276.3344; E-mail: tford@foodprotection.org, or go to www.foodprotection.org.

ARTICLES

Food Protection Trends, Vol. 28, No. 7, Pages 468–472

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

International Association for Food Protection

An Integrated Assay for Rapid Detection of *Escherichia coli* O157:H7 on Beef Samples

JOHN WILLFORD[1] and LAWRENCE D. GOODRIDGE[2]*

[1]Dept. of Animal Science, University of Wyoming, Laramie, WY 82071, USA; [2]Dept. of Animal Sciences, Colorado State University, 350 West Pitkin St., Fort Collins, CO 80523-1171, USA

SUMMARY

The Phast Swab is a vertically integrated assay for rapid detection of *Escherichia coli* O157:H7. A sampling device, an *E. coli* O157:H7 reporter bacteriophage carrying the *lacZ* gene, bacterial growth medium, *E. coli* O157:H7-specific immunomagnetic beads and a β-galactosidase substrate (colorimetric or luminescent) are contained within a Snap Valve™ device. To conduct the assay, a sample to be tested is swabbed, and the swab is returned to the Snap Valve™ device; an eight-hour enrichment follows. Any *E. coli* O157:H7 cells are isolated and concentrated by immunomagnetic separation, and the reporter bacteriophage is added to the test compartment, where it infects any viable *E. coli* O157:H7 present in the sample, forcing the bacteria to make large amounts of β-galactosidase. Following the infection process (approximately 1 h), the cap of the Phast Swab is broken, releasing the substrate, which reacts with the β-galactosidase to produce a colorimetric signal (read visually) or a luminescent signal (read with a hand-held luminometer). The Phast Swab was evaluated for its ability to detect *E. coli* O157:H7 on 100 cm^2 portions of beef. The assay was capable of detecting 10^3 CFU/100 cm^2 of *E. coli* O157:H7 within 12 hours when a colorimetric substrate was used, and 10^1 CFU/100 cm^2 within 10 hours with the use of a luminescent substrate. The nature of this detection method is such that it effectively detects *E. coli* O157:H7 in a simple and rapid manner, with minimal need for instrumentation to interpret the test result.

INTRODUCTION

Escherichia coli O157:H7 continues to be an important agent of foodborne illness, causing an estimated 70,000 illnesses, 2,000 hospitalizations, and 60 deaths annually in the United States *(9)*. Fecally contaminated food and water are the sources of *E. coli* O157:H7 infections in humans *(4)*. Cattle and other ruminants have been established as natural reservoirs for *E. coli* O157:H7, and these food production animals continue to play a role in the epidemiology of human infections *(7)*.

During 2007, there was a spike in *E. coli* O157:H7-related beef recalls. For example, approximately 30.1 million pounds of ground beef were recalled, and the implicated ground beef collectively resulted in at least 55 cases of *E. coli* O157:H7 illness *(3)*. It is clear that there remains an acute need for the development of easy-to-use, robust, and sensitive detection methods for this pathogen. Also, although many methods have been developed to detect *E. coli* O157:H7 in food and water, most of the tests are not designed to be conducted in a field setting. The plethora of diagnostic methods that have been developed for detection of this organism

A peer-reviewed article

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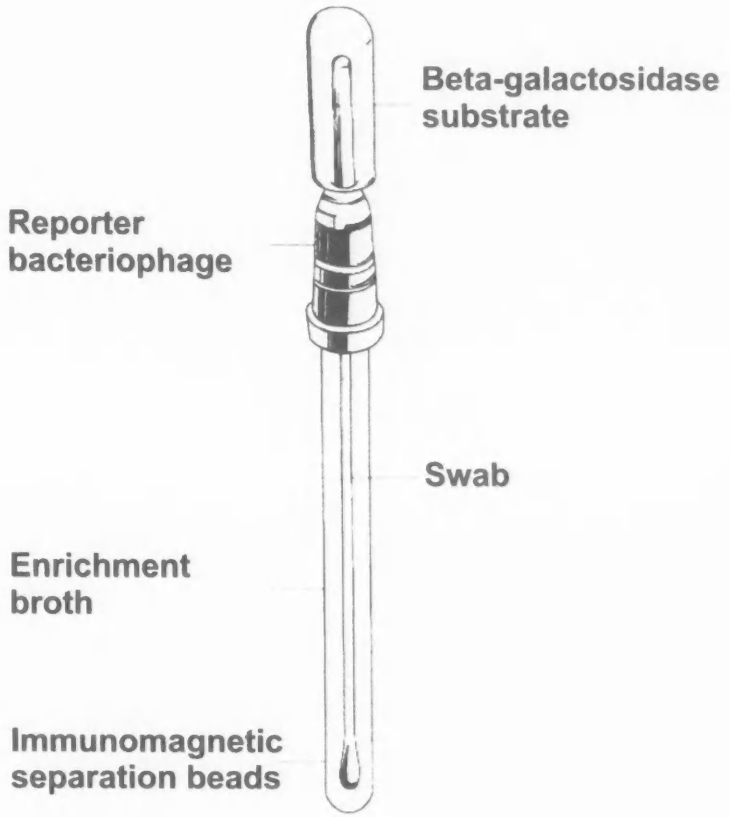
FIGURE 1. The Phast Swab. The bottom of the device contains growth media (Tryptic Soy Broth (TSB) supplemented with 0.2 M glucose) and *E. coli* O157 specific immunomagnetic (IMS) beads (Invitrogen, Carlsbad, CA). The top contains the reporter bacteriophage and the β-galactosidase substrate. A sampling tool (swab) is also contained in the device.



include culture on solid media, immunoassays, and molecular-based (polymerase chain reaction) methods *(10)*. Cultural methods are slow, requiring 24–48 hours for results, while immunoassays and molecular techniques are labor intensive, or time consuming, or they require extensive training of laboratory personnel. In addition, most immunoassays and molecular detection methods cannot distinguish between viable and non-viable cells. Newer detection assays ideally should be designed to detect *E. coli* O157:H7 on carcasses or beef trim, in the slaughterhouse setting.

Reporter bacteriophages (phages) represent a novel alternative for the detection of bacteria within food *(5)*. In this method, DNA carrying a reporter gene is introduced into a target bacterium via a phage. Once the reporter gene has been introduced into the bacterium, it is expressed, thereby allowing bacterial cells to be rapidly identified. Because phages need host cells to replicate, the reporter gene will not be expressed until the phage DNA has been injected into the host. Therefore, expression of the reporter gene is indicative of the presence of the infected organism. A major advantage of using reporter phages to detect bacteria is the ability of the phages to amplify themselves, and in the process, amplify the reporter signal. Also, reporter phages can detect only viable bacteria, which is an advantage over immunological and most genetic detection methods.

A vertically integrated assay based on the concept of the reporter phage has been developed that is capable of rapid detection of *E. coli* O157:H7 *(6)*. The assay combines a sampling device (a swab), an *E. coli* O157:H7 reporter bacteriophage carrying the *lacZ* gene, bacterial growth medium, *E. coli* O157:H7 specific immunomagnetic beads and a β-galactosidase substrate (colorimetric or luminescent) within a Snap Valve™ device (Fig. 1). Each component is contained in a separate reservoir and is therefore separated from the other components. Releasing individual components from each reservoir in a stepwise fashion allows for each component to be added to the bottom of the test device in succession, making the entire assay self contained. If a colorimetric substrate is used, the assay can be interpreted visually. Conversely, the use of a luminescent substrate allows for greater sensitivity. In this scenario, the entire test device is placed within a handheld luminometer, which enumerates the photons produced in the luminescent reaction. This novel method has been termed the "Phast Swab" to denote the combination of reporter phage, swabs and speed into an easy-to-use test. In the present study, the Phast Swab was investigated for its ability to detect *E. coli* O157:H7 on beef samples.

MATERIAL AND METHODS

Development of the Phast Swab

The Phast Swab was developed based on the use of Snap Valve™ devices (Hygiena, Camarillo, CA) (Fig. 2). Briefly, Snap Valve™ devices (Hygiena Corporation, Camarillo, CA) were modified to carry a colorimetric β-galactosidase substrate (chlorophenol red β-D-galactopyranoside (CPRG) Roche, Indianapolis, IN) or a luminescent β-galactosidase substrate (Beta-glo, Promega, Madison, WI) in the cap of the device. The bottom of the device contained growth medium (Tryptic Soy Broth [TSB], Difco, BD, Franklin Lakes, NJ, supplemented with 0.2 M glucose) and *E. coli* O157-specific immunomagnetic separation (IMS) beads (Invitrogen, Carlsbad, CA (Fig. 2A). A sampling device (a swab) was also included. To perform the Phast Swab method, the swab was removed, the surface of the meat was swabbed and the swab was returned to the Snap Valve™ device; an eight-hour enrichment followed. The IMS beads (with any *E. coli* O157:H7 cells attached) were then concentrated, and the growth medium was removed from the device with a disposable

FIGURE 2. Completion of the Phast Swab assay. The swab is removed, the surface to be tested is swabbed, and the swab is returned to the device; eight-hour enrichment follows (Fig. 2A). After enrichment, the IMS beads (with *E. coli* O157:H7 cells attached) are concentrated, and the growth media is removed (Fig. 2B). Following a wash step, the reporter phage is added (10^7 PFU/ml) and the Phast Swab is incubated at 37°C for 1.5 hours (Fig. 2C). Finally, the cap of the Phast Swab is broken, releasing the β-galactosidase (CPRG) substrate into the bottom of the device (Fig. 2D), where it will react with any β-galactosidase present. A positive test is indicated by the development of a red color; in a negative test, the color remains yellow (Fig. 2E).

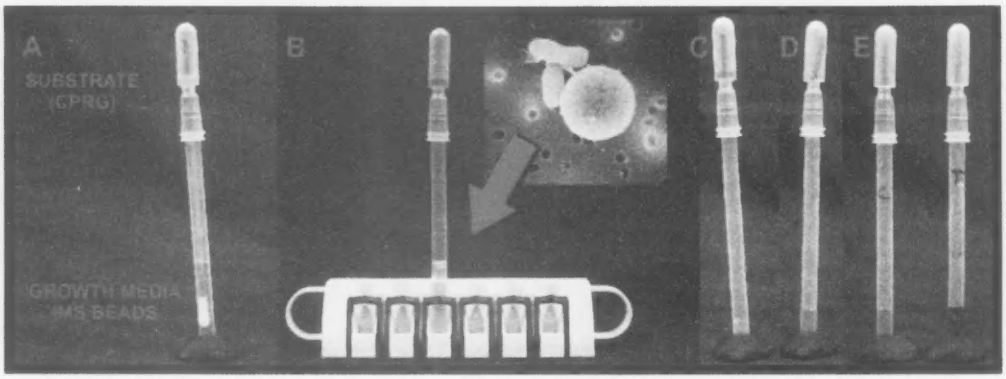
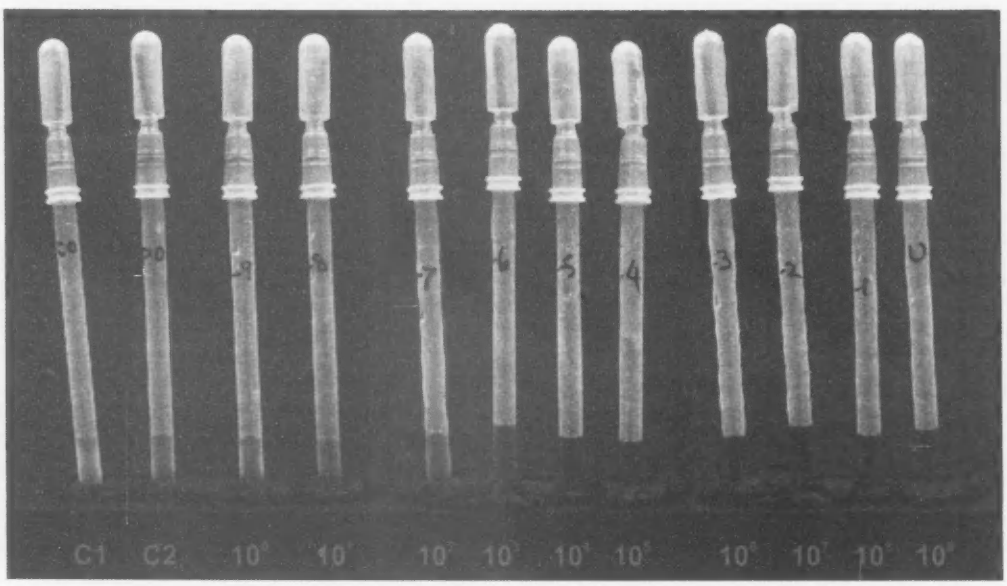
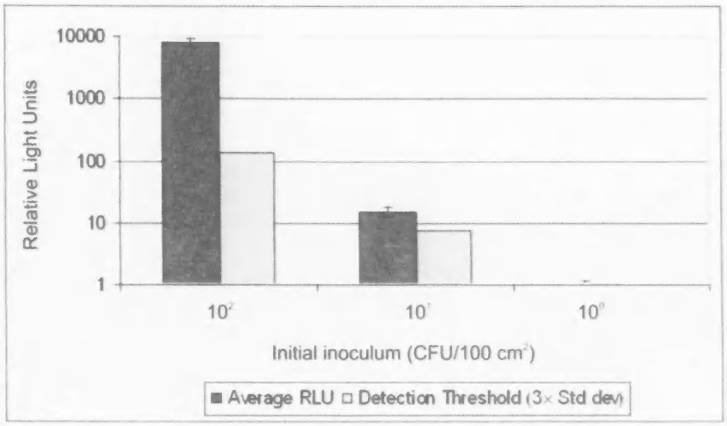


FIGURE 3. Results of the colorimetric swab assay. The detection limit was an initial inoculum of 10^3 CFU/100 cm^2. Key: C1, cell-only negative control; C2, phage-only negative control. The initial inoculum (in CFU/100 cm^2) is indicated beneath each Phast Swab. A positive test result is indicated by the development of a red (or orange) color; in a negative test, the color remains yellow.



transfer pipette (Fig. 2B). Following a wash step (in PBS-Tween), the reporter phage was added at a concentration of 10^7 PFU/ml, and the Phast Swab was incubated at 37°C for 1.5 hours (Fig. 2C). Finally, the cap of the Phast Swab was broken, releasing the β-galactosidase substrate into the bottom of the device (Fig. 2D), followed by a 2-hour incubation at 37°C for the colorimetric substrate or a 30-minute incubation at 37°C for the luminescent substrate. For colorimetric detection, a positive test was determined visually, and indicated by the development of a red color, while in a negative test, the color remained yellow (Fig. 2E). For luminescent detection, the incubation

FIGURE 4. Detection limit of the luminescent Phast Swab assay. An initial inoculum of 10^1 CFU/100 cm^2 gave detectable results.



steps were conducted at 31°C, and following the assay, the Phast Swab was read by use of a SystemSure II handheld luminometer (Hygiena, Camarillo, CA).

Evaluation of the Phast Swab

E. coli O157:H7 strain 27 (a bovine isolate from our strain collection housed in the Dept. of Animal Sciences at CSU) was used to evaluate the use of the Phast Swab on meat samples (simulated carcass tissue). Stock bacterial cultures were maintained in 30% glycerol and were frozen at -70°C. An overnight culture of *E. coli* O157:H7 strain 27 was diluted by preparing a series of 10^{-1} dilutions in lambda buffer until the final dilution was 10^{-9}. To simulate carcass tissue, ten centimeter by ten centimeter portions of beef (top round, sirloin tip) were inoculated with the serial dilutions of *E. coli* O157:H7 by pipetting 1 ml of each dilution on an individual 10 × 10 cm (100 cm^2) piece of meat and by spreading the dilution over the entire surface of the meat with a glass hockey stick. The concentration of each dilution was determined by plate count. The meat was allowed to dry for one hour, and then the entire surface of each meat sample was swabbed with an individual Phast Swab. The rest of the assay was performed as already described. Two negative controls were included in the assay. The controls consisted of a cell-only control (C1, Fig. 3), which entailed swabbing a meat sample inoculated with *E. coli* O157:H7 (10^9 CFU/ml) and completing the assay as already described, except that no reporter phage was added, and a phage-only control (C2, Fig. 3), which entailed swabbing an un-inoculated piece of meat (i.e., meat not previously inoculated with *E. coli* O157:H7) and completing the assay as already described.

Luminescent detection

For luminescent detection, the Phast Swab was conducted as described, except that a cell-only control was included for each dilution tested. A phage-only control was also included. Each Phast Swab was read three times, and the readings were subtracted from the mean reading of the cell-only or phage-only control (whichever had the higher RLU reading). Group means for the luminescent readings from each dilution were calculated. For each sample tested, a Student's t-test was performed, using a Φ value of 0.05. A test result was considered positive if it was 3 standard deviations greater than the corresponding group mean.

RESULTS AND DISCUSSION

The results of the colorimetric Phast Swab assay are shown in Fig. 3. The visual detection limit was obtained by comparing the test samples to the control samples (C1 and C2). Any sample in which a color change was observed (compared to the controls) was considered a positive test result. With an eight-hour enrichment, the detection limit was an original inoculum of 10^1 CFU/100 cm^2. The results of the colorimetric assay show that the Phast Swab is sensitive, easy to use, and fairly rapid. Further investigation has shown that placing the Phast Swabs in the refrigerator overnight increases the intensity of the color reaction, which helps in situations in which the color reaction is weak.

To increase the sensitivity of the assay, we investigated the use of β-galactosidase luminescent substrates. The luminescent substrates display the highest sensitivity and largest dynamic range of any class of β-galactosidase substrate, and these substrates allow the luminescent assay of β-galactosidase to become as sensitive as the assay of bioluminescent luciferase *(12)*. The luminescent assay was based on the use of a coupled luminescent reaction. Coupled assays have been designed using modified forms of luciferin that require the action of a second enzyme to yield luminescence. In this study, a luciferin-galactoside substrate (6-O-β-galactopyranosylluciferin) (Promega, Madison, WI) produced a detectable signal via a coupled enzyme reaction in which the substrate was first cleaved by β-galactosidase to form luciferin and galactose. The luciferin was then utilized in a firefly luciferase reaction to generate light, which was read by use of a handheld luminometer.

When the luminescent substrate was used, the initial 10^2 CFU/100 cm^2 inoculum was easily detectable ($T(2) = 297.29$, $\Phi < 0.005$), as was the initial 10^1 CFU/100 cm^2 inoculum ($T(2) = 5.586$, $\Phi = 0.031$) (Fig. 4). The increased sensitivity of the luminescent substrates indicated that the use of a luminescent substrate should increase the speed of the Phast Swab assay, since a shorter enrichment time would be needed for a positive result. In this study, the use of the luminescent substrate led to detection of *E. coli* O157:H7 on the beef samples within 10 hours, as opposed to 12 hours with use of the colorimetric substrate, and the limit of detection was 100 fold higher.

In previous experiments, the Phast Swab has been tested against other members of the *Enterobacteriaceae*, including various isolates and strains of non O157:H7 *E. coli*, *Salmonella* spp.,

and *Shigella dysenteriae (6)*. With the exception of *S. dysenteriae*, all bacteria produced negative test results. The inclusion of the phage-only control (the control in which an un-inoculated piece of meat was tested) allowed evaluation of the ability of the test to work in a meat sample in the presence of natural background flora. Specifically, we were interested in assessing the possibility of false positive results due to the presence of native bacteria on the meat. The results indicated that in both the colorimetric and the luminescent tests, the phage-only control remained negative (Fig. 3, C2; in the luminescent test, the background RLU were subtracted from each test). Therefore, the presence of background flora on the meat surface is unlikely to interfere with the ability of the Phast Swab to detect the presence of *E. coli* O157:H7.

In its current stage of development, the Phast Swab is estimated to cost approximately $4.74 per test for the colorimetric version and $5.34 per test for the luminescent version. These costs compare extremely favorably to other commercially available *E. coli* O157:H7 rapid tests, although only reagent costs were taken into consideration in determining the cost per test of the Phast Swab, and other manufacturing costs, such as labor, would increase the cost of production.

Reporter bacteriophages have been used to detect several foodborne pathogens, including *Salmonella* spp. *(2)*, and *Listeria monocytogenes (8)*. Recently Oda et al. *(11)* have used a GFP labeled bacteriophage to detect *E. coli* O157:H7. The method is simple and rapid, but requires the use of a fluorescent microscope to view the test result. In this study, we show that a β-galactosidase reporter phage can be combined into an integrated assay to detect viable *E. coli* O157:H7 efficiently and rapidly on beef samples. The Phast Swab is a novel, simple assay that can be utilized to detect the presence of low levels of *E. coli* O157:H7 within 10 to 12 hours. The colorimetric Phast Swab assay is easy to perform, results are available within 12 hours, and the use of a colorimetric substrate in the assay also eliminates the need for instrumentation to read the test result. The luminescent Phast Swab delivers test results in 10 hours and is easily read in a handheld luminometer. These portable luminometers are already widely used in the food industry to monitor hygiene by the ATP assay, which increases the likelihood that the luminescent Phast Swab could become widely accepted. It is conceivable that the Phast Swab assay could be used to test beef carcasses, beef trim, and contact surfaces for the presence of *E. coli* O157:H7, as part of a carcass monitoring program for this pathogen.

ACKNOWLEDGMENTS

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Listeria Prevention Practices for Small Cheese Operations

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SUMMARY

The production of specialty cheeses at small dairy operations poses unique challenges due to the characteristics of the cheeses produced, the artisan aspects of production, and the on-farm location of many of these plants. It is essential to ensure that the cheeses are free of *Listeria monocytogenes* and other pathogens. Although pasteurization destroys *Listeria* in the raw milk source, it will not prevent post-pasteurization contamination. This paper focuses on raw milk treatment and prevention of post-pasteurization contamination. Artisan cheese makers must obtain milk from dairy farms that have implemented sanitation practices that lower the risk of contamination. Artisan cheese plants should be constructed with emphasis on easy-to-clean design and appropriate materials and should utilize a plant layout that controls product and personnel flows. Production must adhere to a HACCP plan with appropriate prerequisite programs. Environmental testing must be utilized to verify the effectiveness of all programs. Weaknesses in any of these components could lead to system breakdown and ultimately to production of cheeses that are unsafe. In contrast, commitment to all components of a *Listeria* prevention strategy should assure the production of cheeses that are free of *Listeria*.

INTRODUCTION

In 2003, the FDA published a risk assessment to examine the relative risks of serious illness and death associated with consumption of ready-to-eat foods that may be contaminated with *Listeria monocytogenes (LM)*. Four dairy product categories were among the top ten risk groups *(13)*. The assessment was based largely on past history of *LM* outbreaks and recalls. Cheeses have been involved in *LM*-associated recalls, some of which are summarized in Table 1. Thus cheese processors must continue to focus on strategies for preventing *LM* contamination. Traditional commercial cheese plants, producing commodity style cheeses such as cheddar and mozzarella, successfully utilize practices that prevent *LM* contamination. However, in the past few years there has been a large increase in the production of specialty cheeses such as Camembert, blue, feta, ricotta, and others. These cheeses are commonly made at small cheesemaking operations that face a number of unique challenges not encountered by large-scale processors. For example, specialty cheeses are frequently made from raw milk. Furthermore, some specialty cheeses lack the built-in safety hurdles found in hard or semi-hard ripened cheeses *(17)*. A good example is the Mexican cheese queso fresco, which is high moisture, has a pH close to neutral, and frequently does not contain lactic acid starter culture *(34)*. Mexican-style cheeses have been involved in a number of cheese-borne outbreaks *(4, 31, 34, 43)*. In addition, small cheese processing operations are sometimes lo-

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TABLE 1. Some recent recalls of cheeses potentially contaminated with *Listeria monocytogenes*

Date of recall	Cheese Types
May 2006	Vintage Irish cheese with Porter
August 2005	Queso Seco
March 2005	Blue cheese
February 2004	Queso Fresco
January 2004	Brie cheese
September 2003	Blue cheese
June 2003	Washed curd cheese
March 2003	Queso Fresco
November 2002	Ricotta cheese
August 2002	Queso Fresco
March 2002	Goat Feta spread, cream cheese
December 2000	String cheese
November 2000	Jack, Queso Fresco, Colby Jack, Cheddar cheeses
September 1999	Queso Fresco
June 1999	Cheddar cheese

Source: FDA Recalls. www.fda.gov

cated on dairy farms, which contributes a unique set of difficulties. In spite of these challenges facing specialty cheese makers, there is little information available that addresses prevention of *LM* contamination in a small cheese processing operation.

The objective of this paper is to outline strategies for preventing *LM* contamination of milk and cheese, starting with the raw milk source, design and construction of the plant, cleaning and sanitation, and the cheese-making process. Examples are included that describe current prevention strategies at a queso fresco farmstead operation. The plant has been operating for many years, following principles discussed in this paper. No *LM* has ever been detected in the plant environment or in finished products. Even though this paper focuses on *LM* prevention, most of the discussion is applicable to prevention of other potential milkborne pathogens as well.

LISTERIA MONOCYTOGENES PREVENTION STRATEGIES

Strategies to ensure *LM* free cheeses focus on three general principles:

- destruction of *LM* by treatment of the raw milk
- prevention of post-pasteurization contamination
- introduction of safety hurdles into the process and cheese composition

Treatment of raw milk

Raw milk is a source of *LM*, a pathogen that has been detected in 4.6–6.5% of bulk tank milk on dairy farms *(24, 50)*. Pasteurization destroys *LM (11, 15)*. Non-ripened, or fresh cheeses such as queso fresco, must be made from pasteurized milk because they are consumed without lengthy ripening. However, for some specialty cheeses the pasteurization process is compensated for by requiring a minimum of 60 days ripening of the raw milk cheese at a temperature greater than 35°F (CFR 133.113) *(9)*. The justification for replacing pasteurization with 60 days ripening is that cheese does not support the outgrowth of milkborne pathogens, so that possible pathogen count will decrease during ripening and storage *(6)*. Some fairly recent research has questioned this rationale *(7, 8, 36, 41)*, and it appears that *LM* growth or survival in cheese depends on cheese type, especially with respect to the parameters of pH, starter culture, and water activity *(17, 35, 38)*. Furthermore, artisan cheeses may experience some day-to-day variability in composition and starter culture activity, which could influence the susceptibility to *LM* growth.

Heat-shocked or thermized cheese milk is milk that has been heat treated at less than the required time and temperature pasteurization combinations, which for batch pasteurization is 145°F for 30 min and for continuous pasteurization is 161°F for 15 s. The advantage of this treatment is that fewer of the endogenous milk enzymes, such as lipase, are destroyed, while pathogens are partially or completely destroyed *(25, 27)*. Thus this treatment is a compromise that may permit better cheese quality while lowering the initial level of potential pathogens prior to 60 days ripening.

Some cheese types, such as Emmental and Comté, are produced with a cook step in which the temperature may reach 131°F for 30 min. The objectives of this cook step to control water and calcium content of the curd particles and to promote the selective survival of certain ripening bacteria. In addition, the cook step acts as a heat shock treatment that helps insure the safety of these cheeses. Because of this added safety hurdle *(30)*, these cheeses are generally not implicated in cheeseborne recalls/outbreaks. In contrast, high moisture soft cheeses do not receive a cook step/heat treatment in the cheese vat. However, because soft cheeses are normally consumed within less than 60 days of production, it is not legal to sell

FIGURE 1. *Listeria* Diagram. *Listeria* control is achievable when all factors are controlled.

such cheeses in the United States if they are made from raw milk.

Even though *LM* is destroyed by pasteurization, it is important to keep *LM* levels in raw milk as low as possible, because this practice lowers the risk of environmental contamination. *LM* is a psychrotrophic type of bacterial pathogen that will grow at refrigeration temperatures (below 40°F). Because other flora are suppressed by refrigeration, the environment becomes less competitive and *Listeria* can be more viable; thus the time duration between milking and pasteurization/cheese making should be kept to a minimum.

In the case of raw milk cheeses, it is advisable to utilize only raw milk free of *LM*. While this is difficult to ensure from a practical point of view, it is at least possible to lower the risk of *LM* by frequent testing of raw milk sources, with subsequent exclusion of *LM* positive suppliers. Certain dairy management deficiencies can be directly linked to high *LM* levels in raw milk. These production practices include: inadequate frequency of cleaning the exercise area; poor cow cleanliness; insufficient lighting of milking barns and parlors; active milking machines lying on the parlor floor sucking up manure-contaminated water, and either non-use of single service paper towels or incorrect disinfection of towels between individual cows *(20, 42)*. Farmstead dairy plants have direct control over their raw milk quality; in contrast, when milk is purchased from outside sources, there is often little or no control over *LM* content.

LM counts do not generally correlate with total plate count; therefore it is difficult to assess the potential level of *LM* contamination of the raw milk. However, when assessing the contamination of raw milk with pathogens, it seems more appropriate to view the situation from a "qualitative" perspective than a "quantitative" one. In other words, the important point is if the pathogen is present or not — the specific level of contamination is less important. This is especially true for *LM*, because the Food and Drug Administration (FDA) follows a "zero-tolerance" policy for this pathogen and considers all ready-to-eat foods with any detectable *LM* as adulterated.

Prevention of post-processing contamination

Pasteurization controls *LM* only in the raw milk supply. Cheeses made from pasteurized milk can become contaminated with *LM* from numerous other sources *(26, 32)* following pasteurization. In fact, retail level testing has shown that *LM* contamination levels in pasteurized milk cheeses can be similar to levels encountered in raw milk cheeses *(40)*. This paper describes factors that must be controlled to prevent post-pasteurization contamination, especially:

- plant layout,
- plant construction, equipment construction and design,
- effective cleaning & sanitation,
- personal hygiene,
- Hazard Analysis Critical Control Point (HACCP),
- environmental and product testing

All of these are required components of a successful *LM* prevention strategy, and deficiencies in just one can significantly increase the risk of *LM* contamination (Fig. 1). Most of these parameters are part of the Current Good Manufacturing Practices (cGMPs), which are regulations published by the FDA that outline minimum requirements for maintaining a safe and wholesome processing environment (21CFR110) *(9)*.

Plant layout. *LM* prevention must be considered prior to construction of the cheese plant, because the plant layout determines the flow of people as well as products. The concept of hygienic zones focuses on restricting the access of people to sensitive areas of the plant. People will have access only to pre-determined hygienic zones at the plant, and only the cheese maker and assistants would be allowed in the production area. On a farmstead dairy, it would be essential to prevent those who have been in the dairy barn/milking parlor from entering the processing plant unless they have showered and changed clothes and foot-wear. Besides restricting the movement of people, the product flow must be controlled. It is common practice in all food processing that, to prevent cross contamination, a product can move only forward in the manufacturing chain. Larger food plants separate the raw and the processed sides of the manufacturing chain. This is rarely possible in smaller cheese plants, where the vat pasteurizer is often located in the cheese-making room, and in some situations the vat pasteurizer doubles as the cheese vat. Extreme care must be taken to prevent any possible recontamination of product in process by material from the raw milk side. For example, it is unacceptable to have spills/drips of raw milk onto plant floors.

Plant construction. Construction of the cheese plant must involve close consulting with state regulatory agencies.

The US Public Health Service—FDA Grade A Pasteurized Milk Ordinance (PMO) *(12)* contains general regulations regarding most aspects of the building. For example, the PMO states: "The floors… shall be constructed of concrete or other equally impervious and easily cleanable material; and shall be smooth, properly sloped, provided with trapped drains and kept in good repair…". Although plain concrete is allowed, eventually it will be eroded by whey and cleaning solutions. The resulting cracks and loosened tiles are impossible to clean and can serve as harborage and incubators for *LM*. A better solution is to use concrete covered with an epoxy coating. The floor should slope sufficiently to allow for quick draining and prevention of puddle formation on the floor surface. Appropriate wall materials include fiberglass reinforced plastic (FRP), which is easy to clean and resistant to moisture, heat and chemicals. In general, piping and equipment should be mounted approximately 2 ft from the wall to allow for cleaning.

The most common areas of dairy plants found positive for *LM* contamination are the floor drains *(10, 26, 28)*. Up to 80% of environmental *Listeria* sites have been attributed to floor drains *(16)* where *LM* can attach to cast iron *(46)*. Refrigerated areas are another common environmental incubator for *LM (45)*.

It is important to construct facilities and equipment so that they are easy to clean and sanitize. Special attention should focus on preventing condensate from dripping onto products, product contact surfaces, shelving and/or floors. In addition, ventilation systems can disperse *LM*-contaminated condensate inside the cooler. Draining of drip pans and formed condensate via sanitary pipes to a drain lowers this contamination risk.

Some cheeses are ripened for an extensive time on shelves that can be a source of *LM* contamination *(23)*. Formerly, wooden shelves were used for supporting the cheese for ripening and aging. Because raw or bare wood is difficult to clean and sanitize, only finished and poly-urethane-coated wood should be used. Currently, stainless steel (SS) shelves are preferable because of the ease of cleaning and sanitizing and of their overall durability. All items must be stored at least 18 inches above the floor, to prevent water splash from the floor. Water in contact with the floor is at high risk for *LM* contamination. It is recognized that water from high-pressure nozzles is a serious source of post-pasteurization contamination. Aerosols produced by high pressure water striking the floor can reach and contaminate most food contact surfaces within the plant.

Equipment construction and design. It can be difficult to find equipment for smaller-sized dairy processing operations. Equipment suppliers have become accustomed to building machinery of ever-increasing sizes and capacities. Hence, small-scale equipment has become a high-priced specialty product. This has driven processors to purchase and install used and/or retrofitted equipment. Used equipment can contain damaged stainless steel (SS) surfaces, as well as worn or stressed seams and/or welded joints that are very difficult to clean and sanitize. Both new and used equipment must follow design specifications that meet 3-A sanitary standards *(1)*. A number of different unit operations within dairy plants, such as tanks, tables, product fillers, and conveyers, have been observed to test positive for *LM*, although the contamination rate is lower than for environmental samples *(28, 39)*. *LM* attaches very tenaciously to SS even after short contact times *(33, 51)*, and SS cleanability is dependent on the SS surface finish *(37, 47)*.

Prior to purchase of equipment, it is important to consider both the construction and design features for relative ease of cleaning. Selection of equipment that is difficult to clean can prevent a proposed plant from becoming licensed by food industry regulators. A suggested strategy is to make payment(s) to equipment suppliers contingent on approval by regulatory agency representatives; this approach has been successfully used by some specialty cheese processors.

Effective cleaning and sanitation. It is important that a comprehensive cleaning and sanitation program be implemented and strictly followed. This program is normally developed in collaboration with suppliers of detergents and sanitizers. Two fundamentals apply when cleaning and sanitizing dairy plants: (1) cleaning alone does not destroy bacteria, and (2) it is impossible to sanitize a dirty surface. Thus a plant must first be thoroughly cleaned and then sanitized. There are two methods utilized in cleaning equipment and piping; Clean In Place (CIP) and Clean Out of Place (COP). In CIP, cleaning and sanitizing solutions are pumped through the equipment. Detergent concentration, solution temperature, and flow rate are set to ensure that all internal equipment surfaces are cleaned without disassembly. In some circumstances, CIP is not feasible, so that the equipment is disassembled and cleaned by hand or in a parts washer instead. As mentioned earlier, drains are particularly vulnerable to bacteria biofilms. Cleaning of a drain is basically the same as hand cleaning. Chemical supply companies recommend the use of hot, soapy water and a brush that makes contact with as much of the drain surface as possible. Following cleaning, the drain should be rinsed with potable water and sanitized, using sanitizer at higher concentrations than are used on food contact surfaces. While cleaning drains and floors, there is a risk of contaminating food contact surfaces from exposure to aerosols and condensate. Therefore, it is recommended that floors and drains be cleaned before equipment. Tompkin et al. *(49)* outlines an easy-to-follow cleaning procedure for equipment: dry clean, pre-rinse equipment, visually inspect equipment, foam and scrub equipment, rinse equipment, visually inspect equipment, clean floors, sanitize equipment and floors, and dry floors. Thus, cleaning from top down minimizes the risk of re-contaminating equipment during the cleaning and sanitation process. All brushes used during cleaning should be color coded, with black being used for floors and drains.

At least once a week, the plant walls and floors should be foamed with quats at concentrations from 400 to 800 ppm. This is especially important if condensate regularly collects on the wall, window, ceiling and equipment surfaces.

To prevent corrosion of SS it is important to follow the following recommendations: (1) use only soft fiber brushes, pads, and/or sponges for manual cleaning and for removal of milk residues; (2) apply chemical cleaners only as directed by the manufacturer/supplier; (3) thoroughly rinse all alkaline and acid cleaners from equipment surfaces with tap water; and (4) limit exposure time of SS to sanitizers. For example, chlorinated compounds should contact SS equipment surfaces for no longer than 20 min *(18)*.

The cheese plant's water supply needs to be of high quality in terms of both chemical content and microbiological profiles. Although no published studies report cheese contamination from *LM* in

the water supply, the quality of the water supply contributes to the overall cleanliness of the plant. The PMO states that dairy plant water supplies must be of a "… safe, sanitary quality" and should be tested by a certified laboratory at least every 6 months. In-plant testing of water quality is advisable for immediate detection of potential problems. An example of an in-plant testing protocol to monthly tests of water from several sources, such as sinks and hose stations. Collected in-plant water samples are then plated on aerobic count plates *(2)*. Potential coliforms in the water supply are best tested by a presence/absence method such as Colilert, which, like use of petrifilm, is relatively cost effective and requires little operator training *(5)*. A number of cheese types, such as Gouda and Morbier, include a curd washing step in which water is added directly to the curd/whey mixture. To avoid the risk of contamination from the water source, some cheese makers have chosen to add only filtered or UV-treated water. Water sources for humidity control in ripening rooms must also be controlled. All water sources must be equipped with backflow prevention devices.

Microbial air quality within the plant should be monitored. A simple technique for monitoring air quality is the 3M air sampling technique, using 3M plates *(3)*. For farmstead operations or plants located in urban areas, it is advisable to filter plant-intake air. All incoming air should be filtered through a sterilizing filter and the plant should be under positive air pressure to prevent the entrance of bacteria through cracks or open doors. As a general rule, plant air should be filtered 16 times per hour, and care should be taken that filters are dry because wet filters lead to mold and bacteria growth. Filter efficiency can be improved by bringing the filtered air past a metal-based filter or a UV light source. A UV activated titanium dioxide catalyst removes odors and unwanted bacteria.

Personal hygiene. Plant employees can spread pathogens around the plant and thus potentially can contaminate in-process or finished food products. *Listeria* has been isolated from the hands and clothing of food workers *(29)*. A rigorous and thorough hand washing protocol is one of the most effective strategies for *LM* control. For plant GMPs and pathogens control, each strategically placed hand washing station must: (1) be kept clean; (2) be continuously supplied with a biocidal-detergent; (3) contain hand rinsing capability; and (4) be supplied with paper towels for hands drying *(44)*. Mandated hand washing prompt signs and documented personal hygiene procedures need to be appropriately posted at each hand wash station and in rest room(s). A designated changing area also serves as a storage area for personal clothing and footwear. Upon entering production areas, all workers (as well as visitors) should step through either a sanitizer foot bath or a sanitizer foam sprayer (activated by either a timer or a motion detector). Footwear sanitation devices are quite effective in eliminating and/or controling *LM* contamination on personnel footwear *(49)* as long as the sanitizer is regularly changed (often 2–3 times/8 h) and the sanitizer concentration is maintained. Quats (~ 800 ppm) are commonly used in foot baths because of their residual effect, as compared to chlorine-based solutions. However, because of their residual effect, quats may interfere with the fermentation. Other options are iodophors (iodine complex in phosphoric acid) or peroxy acetic acid. Many dairy plants utilize a foot bath containing 25–35 ppm iodophor, since with loss of solution strength it loses its readily recognized amber color intensity. Hair and beard nets must always be worn and should always be available at the entrance to production area(s). It is most important that personnel recognize and appreciate that *LM* can presumably be found in all areas of the plant environment (i.e., in soils, water, air, aerosols, floors and floor drains, on insects and animals, in raw milk, and on footwear, clothing, and skin).

Hazard Analysis Critical Control Points (HACCP). Before starting up cheese production, it is important to consider risks involved in each step of the process and to develop strategies for controlling these risks, i.e., to develop a HACCP plan. This involves preparing a detailed process flow chart that diagrams each step or unit operation and that lists the inputs (raw materials and ingredients) and outputs (finished product[s] and whey), and the potential sites for contamination occurrence (human or product contact surfaces) as well as potential microbial kill (i.e., pasteurization) assessment *(45)*. This science-based undertaking of a formalized risk analysis (which is globally recognized and accepted) then reveals which steps of the process should be constantly monitored and controlled, thus providing for a determination of when "process is out of control" and corrective action protocols are mandated. A HACCP plan, in concert with its Prerequisite Programs, functions to provide the ultimate in food safety for food processing plants. A list of (not all inclusive) some examples (but not all inclusive) of HACCP Prerequisite Programs are: Sanitation, Facilities & Equipment Preventive Maintenance, GMP's, Pest Control, Personal Hygiene, Training, Internal Audits, Specifications and/or COA's (Certificates of Analysis for raw materials, ingredients and packaging materials), Allergenic/Sensitizing Agents Control, Emergency Response/recall Plan, and Food Plant Site Security.

Developing and implementing a formal HACCP Program may seem overwhelming for an artisan cheese processor. However, assistance is available either through the internet *(52)* or in reference books *(21)*. HACCP plans are both plant- and product-specific, but pre-developed plans can provide the framework on which to build a HACCP plan specifically adapted to the production of cheeses at an individual facility.

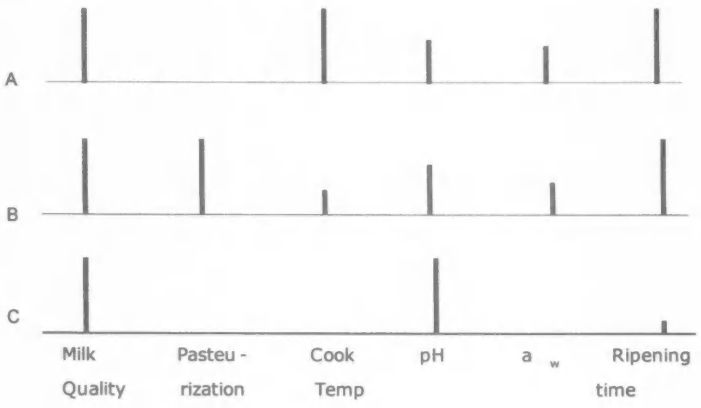
When developing a HACCP plan for raw milk cheese production, there is no apparent kill step to control *LM*. Instead, alternative options can be utilized, most notably the testing of incoming raw milk and control of the rates and extent of the fermentation process *(14)*.

Many foodborne outbreaks are linked to products that were produced in manufacturing situations that deviated from normal procedures. For example, the electric service was lost, the boiler failed, starter cultures lost their activity, etc. Therefore, it is essential to observe and fully document the process of every single lot of finished product in terms of: (1) a record of any unusual occurrences; (2) code numbers of each lot(s) of raw materials; (3) ingredients; and (4) direct-contact packaging materials. Time, temperatures, pH values and other essential process parameters must be recorded, and the records must be retained for at least 2 years (a general food industry rule of thumb is "the shelf-life period, plus one year"). Hence, the manufacturing records for a given lot of 4-year-old "aged cheddar" would need to be retained for a period of at least 5–6 years (4 yrs aging + 9 months sell-by-date on the package + the one-year-expectation).

TABLE 2. Environmental testing program for farmstead queso fresco plant. Each environmental test is done using 3M swabs and Petrifilm

Risk Assessment	Type of risk areas	# of risk areas	Frequency of testing	Bacteria tests
High risk	Drain, refrigeration condensate	2	Weekly	*Listeria*, Coliforms, *Enterobacteriaceae*, Total Aerobic Count
Low risk	Door handles, walls, equipment surfaces	60	Tested in a 4 weeks rotation with 15 swabs per week	*Listeria*, Coliforms *Enterobacteriaceae*, Total Aerobic Count

FIGURE 2. Safety hurdles for three cheeses based on processing and compositional hurdles. A: Raw milk Comté, B: Cheddar, C: French raw milk Camembert. The larger the vertical lines, the more effective the safety hurdle. The hurdles are raw milk quality (absence of pathogens), pasteurization vs. no pasteurization, cooking time and temperature of the curd whey mixture, rate and extent of pH development, water activity (a_w) in the final cheese, and duration of ripening.



Verification procedures. Unfortunately, the only system that assures that a cheese is not contaminated with *LM* is to sample and test every single cheese. This is obviously not possible, feasible and/or cost effective, and it is most infrequent that dairy products are tested for *LM*. Instead, from a practical standpoint, product manufacturing environment (i.e., environmental) sampling and testing is utilized, because it is generally accepted that a relationship may be found between environmental *LM* contamination and *LM* in the final products *(48)*. Thus determination of *LM* in the cheese making environment increases the likelihood for producing a *LM*-positive cheese. However, it is important to note that a *LM* positive plant doesn't necessarily produce *LM*-positive cheeses *(26)*. Testing is frequently done on a weekly basis *(49)*, although this can be adjusted based on results.

In the past, plant environmental pathogen testing was always performed by outside (i.e., off-site) laboratories. Recently, the 3M Co. has developed a relatively simplified test method for *Listeria* that does not require positive controls *(19)*. This apparently provides a reasonably safe test protocol for the conduct of in-plant testing. Product contact surfaces as well as non-contact areas such as drains and floors should be tested. An example of a product contact and environmental testing program at a farmstead queso fresco plant is outlined in Table 2.

BUILDING SAFETY HURDLES INTO THE PROCESS AND CHEESE COMPOSITION

When produced correctly, cheese is a safe food product. There is not one particular factor that renders cheese safe, but rather a combination of product and process parameters that all contribute to overall product safety. This principle of food safety is described as the hurdle approach *(30)*. Properties such as water activity, salt in moisture, pH, and lactic acid bacteria are hurdles built into the composition of the cheese. Raw milk quality, pasteurization, cook step, rate of fermentation, refrigeration, ripening and packaging are hurdles built into the process of producing the cheese. Different cheeses experience varied levels of these hurdles. Figure 2 outlines some of these hurdles in raw milk Comte, cheddar, and raw milk Camembert. It is clear that Comte and cheddar are cheese types that naturally provide protection against pathogens. In contrast, raw milk Camembert, as produced in France, is more susceptible to contamination. Thus, when considering starting up production of artisan cheese, the choice of cheese type is crucial.

CONCLUSION

The consumption of specialty cheeses is currently increasing rapidly in the United States *(22)*. It is important that consumers have faith in the safety of these products, but a cheese-borne outbreak

could shatter this trust. A serious cheese-borne outbreak would likely damage not only the specialty cheese sector but conceivably the entire dairy industry. Thus everybody associated with the United States cheese industry has an interest in promoting safety. As this paper demonstrates, many parameters must be controlled to ensure *LM* free cheese. Cheese producers who follow rigorous procedures to prevent milk and product contamination and who control raw milk quality will be able to produce specialty cheeses safely, whether these products are made from pasteurized or raw milk.

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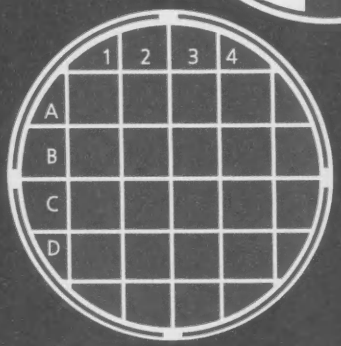

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Emirates Palace, Abu Dhabi
Abu Dhabi

Basheer Hassan Yousif
Dubai Municipality
Dubai

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Basingstoke, Hampshire

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Auburn University
Auburn

Amrita Pathania
Auburn University
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University of California–Davis
Davis

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Leprino Foods
Denver

Carol McInnes
Boulder County Public Health
Boulder

Hua Yang
Colorado State University
Fort Collins

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CDC
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Hua Wang
Grocery Manufacturers Association
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Lubbock

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Pullman

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De Sucre, Cumana Sucre

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Lithia Springs, GA

Dubai Municipality
Khalid Mohammed Sharif
Dubai, United Arab Emirates

NEW SUSTAINING MEMBERS

R&F Laboratories
Anthony L. Restaino
Downers Grove, Illinois

Rochester Midland Corporation
Jim Fifield
Rochester, New York

NEWS

County of Sacramento Selected 2008 Crumbine Award Winner

The County of Sacramento Environmental Management Department has been selected as the recipient of the 2008 Samuel J. Crumbine Consumer Protection Award for Excellence in Food Protection.

For 53 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.

2008 Crumbine Award Jury Chair Gary Erbeck of the County of San Diego Department of Environmental Health (the 2005 Crumbine Award winner) said, "The County of Sacramento has demonstrated leadership, innovation and a commitment to food safety that transcends the boundaries of their county. It is a guiding light for local food safety programs throughout the nation."

The County of Sacramento Environmental Management Department Director Val Siebal said collaboration with industry stakeholders and having a multi-pronged approach were key factors in developing their Retail Food Program. "We are extremely proud to receive this award as it demonstrates our ongoing commitment to consumer information and protection in Sacramento County."

Sacramento will receive the Crumbine Award at the Annual Educational Conference of the National Environmental Health Association, June 22–25 in Tucson, AZ. Award presentations will also be made at the annual meetings of the International Association for Food Protection, August 3–6 in Columbus, OH and the National Association of County and City Health Officials, September 9–12 in Sacramento, CA.

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, International Association for Food Protection, National Association of County and City Health Officials, National Environmental Health Association, National Restaurant Association Solutions, National Sanitation Foundation International and Underwriters Laboratories Inc.

3M Microbiology Wins Prestigious IAFP Black Pearl Award

The International Association for Food Protection (IAFP) recently selected 3M Microbiology as the 2008 recipient of the prestigious Black Pearl Award. The Black Pearl Award is given annually to one company for its outstanding achievement of corporate excellence in advancing food safety and quality.

When evaluating candidates for the Black Pearl Award, IAFP seeks companies that exemplify excellence in advancing food safety and quality through numerous channels, including customer programs, employee relations, educational activities, adherence to standards and support of the goals and objectives of IAFP.

According to David Tharp, executive director of IAFP, 3M Microbiology has long been an active and dedicated member of IAFP. "3M Microbiology's integrated approach to providing food safety solutions to the food industry is second to none. They have a history of partnering with customers and industry organizations to address issues or problems. Through active involvement in IAFP scientific journals and industry events, 3M Microbiology regularly provides ideas and solutions to the food industry."

"For 24 years, 3M Microbiology has partnered with the food industry to maximize food safety and quality worldwide," said Karen Mullery, global business manager, 3M Microbiology. "We are honored to receive such a prestigious award, and appreciate our efforts being endorsed in this way. As the food industry faces dynamic challenges, we at 3M are committed to responding with truly innovative solutions."

"In my opinion, 3M Microbiology epitomizes the commitment to protecting the food supply that we all strive to attain. Not only have they developed revolutionary technologies, they have also contributed to the profession by allowing their people the freedom to work with their customers in long-term thinking about methods to improve the quality of the food supply," said Larry Cohen, North American senior food safety program leader for Kraft Foods, who submitted a

nomination letter in support of 3M Microbiology. "We have worked with 3M Microbiology for almost 20 years, and in this time, we've come to view our relationship as a partnership."

3M Microbiology has been an IAFP Sustaining Member for 22 years and its employees are actively involved in IAFP committees, events and volunteer work.

NSF International Announces Recipients of the 2008 Food Safety Leadership Awards

NSF International announced the 2008 recipients of its Fifth Annual Food Safety Leadership Awards. NSF's Food Safety Leadership Awards Program recognizes key individuals and organizations who have demonstrated outstanding leadership in the foodservice industry.

The 2008 award recipients were announced at the Food Safety & Security Summit, March 19, 2008, Washington, D.C.

After reviewing all nominations, an independent panel of food safety experts recognized the following recipients for their groundbreaking achievements:

- Paul A. Lachance, Ph.D., F.A.C.N., C.N.S., Lifetime Achievement in Education & Technology;
- Daniel L. Engeljohn, Ph.D., Lifetime Achievement in Public Service;
- National Environmental Health Association, Education and Training;
- Elizabeth A. Bugden, MS, Education and Training;
- Jeanne Gleason, Ph.D., Education and Training;
- Christine Moe, Ph.D., Research Advancement;
- Sterilox Food Safety Systems, Equipment Design; and
- Norm Faiola, Ph.D., Product Development.

"NSF International is honored to present the 2008 food safety leadership awards. I was proud to congratulate this year's winners on their outstanding food safety efforts in March," said William Fisher, NSF International vice president.

This panel included industry notables:

Mary Adolf, Stan Bailey, John Farquharson, Ernest Julian, Ellen Laymon, Jim Mann, Donald Schaffner, David M. Theno and Ewen C.D. Todd.

International Commission on Microbiological Specifications for Foods Receives 2008 GMA Food Safety Award

Robert Brackett, chief science officer of the Grocery Manufacturers Association (GMA) has announced that the International Commission on Microbiological Specifications for Foods (ICMSF) is the 2008 recipient of the GMA Food Safety Award.

"On behalf of GMA and its members, I wish to congratulate the Commission on Microbiological Specifications for Foods for being named the recipient of the 2008 GMA Food Safety Award," said Dr. Brackett.

The books prepared by ICMSF are indispensable references for food safety professionals around the world. ICMSF has also made outstanding contributions to microbiological risk assessment and food safety policy, including the development of risk management concepts such as Food Safety Objectives that have become recognized internationally through Codex Alimentarius. ICMSF was described as "a guiding light for the microbiological food safety community."

The GMA Food Safety Award honors those individuals or organizations who have demonstrated a longstanding 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.

FDA Posts Revised Questions and Answers on Acrylamide

The US Food and Drug Administration's (FDA) Center for Food Safety and Applied Nutrition (CFSAN) has updated the Qs & As on acrylamide with new information related to acrylamide in foods, including adding consumer information on optional ways to reduce acrylamide levels in certain foods.

Acrylamide is a substance that forms in certain foods during some high-temperature cooking practices, such as frying and baking. Acrylamide causes cancer in laboratory animals at high doses, and is therefore a potential human carcinogen. Since the discovery of acrylamide in food in 2002, FDA has initiated a broad range of surveillance and research activities related to acrylamide.

In 2003, FDA posted Qs & As on acrylamide on its Web site, including the dietary message "to eat a

balanced diet, choosing a variety of foods that are low in trans fat and saturated fat, and rich in high-fiber grains, fruits, and vegetables." In 2004, in the Action Plan for Acrylamide in Food, FDA announced its intention to "develop and revise consumer messages about dietary choices and cooking methods, as additional knowledge is gained about acrylamide in food." Given advances in knowledge about ways to mitigate acrylamide in food and FDA's stated intention to revise consumer messages as more knowledge becomes available, FDA has updated its Qs & As on acrylamide to include limited consumer information on acrylamide reduction. This information covers storage of potatoes before cooking, cooking practices for potato products and toasted bread, and dietary intake.

FDA is providing this information for consumers who are looking for optional ways to reduce acrylamide. FDA's best advice for acrylamide and eating is that consumers adopt a healthy eating plan, consistent with the Dietary Guidelines for Americans, that emphasizes fruits, vegetables, whole grains, and fat-free or low-fat milk and milk products; includes lean meats, poultry, fish, beans, eggs, and nuts; and is low in saturated fats, trans fats, cholesterol, salt (sodium) and added sugars. FDA is waiting for completion of new toxicology research that is underway before considering whether new consumer advice on acrylamide is needed.

Retailers Joining Group Effort to Educate Millions of Consumers about Food Safety

Food retailers from around the country are joining a cooperative government, industry and consumer group effort to reach millions of consumers with important food safety information.

Be Food Safe, originally launched by the United States Department of Agriculture (USDA) and the US Partnership for Food Safety Education, encourages retailers to display food safety messages and visual reminders in front of customers through in-store promotions, brochures, flyers, packaging, circular ads and other forms of customer outreach. Nearly 40 retailers, representing approximately 6,000 supermarkets and an estimated 81 million consumers, have volunteered to implement Be Food Safe through their in-store and external customer communications programs. The campaign encourages the use of colorful, modular icons and photography to illustrate the basic safe food handling practices of clean, separate, cook and chill.

According to research conducted by the Partnership, 64 percent of consumers say it is "very important" to follow safe food handling at home, yet many consumers are not consistent in doing so. The same study found that consumers believed it was "very important" to educate the public on safe food handling, with most believing that food companies and the government should provide this information.

"The Partnership's work with food retailers will help us keep food safety top-of-mind with people who shop for and prepare food at home," said Shelley Feist, executive director of the Partnership for Food Safety Education. "It is important that consumers receive frequent reminders of the importance of safe food handling to reduce the risk of illness.

While the overall rate of foodborne illness has been declining, the Centers for Disease Control and Prevention indicate that an estimated one in four Americans suffers from foodborne illness each year.

"Ten years of consumer education through the Partnership has led to improved levels of awareness about basic safe food handling practices," said Bryan Silbermann, chairman of the Partnership's Board of Directors and the president of the Produce Marketing Association. "By adding the reach of retailers and suppliers using the consistent Be Food Safe messaging, we will be able to get important reminders in front of consumers where they shop."

The Food Marketing Institute (FMI) US Grocery Shopper Trends 2007 found that only 66 percent of shoppers are confident that the food they buy at the supermarket is safe, which is a 16 percent decrease from 2006 when 82 percent of consumers reported they were confident the food they purchase at the grocery store was safe.

"Food retailers across the country are eager to help communicate critical food safety messages to their customers," said Tim Hammonds, president and CEO of FMI. "Be Food Safe is an important, consumer-tested tool that grocers can use with confidence."

What Does the Label on Your Chicken Really Mean?

According to the US Department of Agriculture (USDA) —"100 percent natural" means the poultry doesn't contain artificial ingredients like preservatives. But experts warn – there are no guarantees. "100 percent natural – remember – no inspections are done. So we don't know if those claims are really true," says Shannon Wallace, R.D., registered dietitian with Baylor University Medical Center at Dallas.

Chicken labeled as "organic" must meet much stricter standards. Inspections are conducted and organic chicken cannot contain artificial ingredients, hormones or antibiotics. But are those really harmful to consumers?

"The USDA does not make any claims that organically produced food is any safer or more nutritious than conventionally produced food," adds Wallace.

Another popular chicken label—"grain fed." This is supposed to mean the chicken was not fed animal by-products, but just like "100 percent natural" and "free range," there is no outside monitoring for this claim.

And probably the most confusing label of them all—"free range." Chicken labeled as "free range" is supposed to be leaner, but again, experts warn the claim can be deceiving. "Free range does not always mean that the animal has been in an open area its whole life. It may only mean they were in a restricted area and let out into that open area one time during their life," says Wallace.

So what should you shop for in chicken?

"If you would like to have a healthy diet—trimming the fat or buying leaner cuts of meat is always important. And the research is still out regarding these other issues of hormones and antibiotics," says Wallace.

Start at the Store: Seven Ways to Prevent Foodborne Illness

Safeguarding your home against foodborne illnesses begins not at home, but at the supermarket, grocery store, or any other place where you buy food that you plan to store and serve.

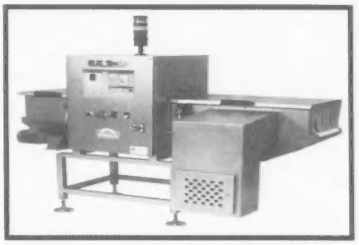
Combating foodborne illnesses is a top priority at the Food and Drug Administration (FDA). That's because, according to the Centers for Disease Control and Prevention (CDC), foodborne ailments cause about 325,000 hospitalizations and 5,200 deaths nationwide each year.

You as a consumer can play a key role in preventing these illnesses. While shopping for food, you should:

1. Check for cleanliness. Buying from a retailer who follows proper food handling practices helps assure that the food is safe. Ask yourself: What is the general impression of this facility? Does it look and smell clean?
2. Keep certain foods separated. Separate raw meat, poultry, and seafood from other foods in your grocery shopping cart. Place these foods in plastic bags to prevent their juices from dripping on other foods. It is also best to separate these foods from other foods at checkout and in your grocery bags.
3. Inspect cans and jars. Don't buy food in cans that are bulging or dented. Also, don't buy food in jars that are cracked or have loose or bulging lids. Since foods sold in cans or jars are processed to be sterile, they can "keep" for a long time if the can or jar is intact. A bulging can or jar lid may mean the food was under-processed and is contaminated. A dent in a can, especially if the dent affects a seam, may cause an opening in the seam which may allow contamination, as would a crack in a jar. A loose lid on a jar means the vacuum has been lost and the product may be contaminated. Don't buy a food product whose seal seems tampered with or damaged.
4. Inspect frozen food packaging. Don't buy frozen food if the package is damaged. Packages should not be open, torn or crushed on the edges. Also, avoid packages that are above the frost line in the store's freezer. If the package cover is transparent, look for signs of frost or ice crystals. This could mean that the food in the package has either been stored for a long time or thawed and refrozen. In such cases, choose another package.
5. Select frozen foods and perishables last. Meat, poultry, fish and eggs should be the last items placed in your shopping cart. Always put these products in separate plastic bags so that drippings don't contaminate other foods.
6. Choose fresh eggs carefully. Before putting eggs in your cart, open the carton and make sure that the eggs are clean and none are cracked. Buy only refrigerated eggs and follow the "Safe Handling Instructions" on the carton.
7. Be mindful of time and temperature. It's important to refrigerate perishable products as soon as possible after grocery shopping. Food safety experts stress the "2-hour rule"—because harmful bacteria can multiply in the "danger zone" (between 40° and 140°F), perishable foods should not be left at room temperature longer than 2 hours. Modify that rule to 1 hour when temperatures are above 90°F, as they often are in cars that have been parked in the sun.

If it will take more than an hour to get your groceries home, use an ice chest to keep frozen and perishable foods cold. Also, when the weather is warm and you are using your car's air conditioner, keep your groceries in the passenger compartment, not the trunk.

INDUSTRY PRODUCTS



Eriez

Eriez® XR-41 X-Ray Inspection System is Ideal to Meet Large Package Production Requirements

Eriez's advanced Model XR-41 is part of the company's new line of E-Z Tec® X-Ray Inspection Systems designed specifically for larger packaged products.

The XR-41 offers enhanced capabilities where multiple products and belt speeds are required. This system is ideal for foreign body detection of metal, glass, calcified bone, PVC and to inspect packages for mass and missing or defective objects.

The sophisticated XR-41 features a 15-inch color touch screen, stainless steel construction and auto set-up. The XR-41's external connectors can be networked as an SQL Client with full remote support facilities. For simplified operation, the XR-41 does not require frequent calibration.

Six E-Z Tec XR models are available to fit practically any inspection need. All Eriez Inspection Systems use advanced linear array technology that is recognized in the industry for its sensitivity, speed and sophistication.

Eriez
814.835.6000
Erie, PA
www.eriez.com

AOAC Approves bioMérieux VITEK® Two Identification Cards for Biological Threat Organisms, *E. coli* O157, *Listeria* and Staph

bioMérieux has received Performance-Tested Methods℠ (PTM) approval from the AOAC Research Institute for two critical identification cards for the food industry. The VITEK® 2 Gram-Positive (GP) card is certified for the identification of *Listeria* and *Staphylococcus* species and the VITEK 2 Gram-Negative (GN) card is certified to identify Gram-negative organisms such as *Salmonella* and *E. coli* O157.

"Our validation programs use rigorous testing methods to measure a product's performance in several key performance parameters including accuracy, precision, sensitivity, specificity, and ruggedness," said Scott G. Coates, managing director, AOAC Research Institute. "In addition, the test cards were validated by an AOAC RI recommended independent laboratory."

Recent reports from the US Centers for Disease Control and Prevention reveal that 76 million Americans get sick, more than 300,000 are hospitalized, and 5,000 people die from foodborne illnesses each year. The most commonly recognized foodborne infections are caused by bacteria such as *Listeria*, *Salmonella*, and *E. coli* O157:H7.

"Rapid and accurate identification of foodborne pathogens and biological threat organisms is crucial for ensuring food safety and protecting consumer health," stated Alexandre Mérieux, bioMérieux corporate vice president, industrial microbiology.

The VITEK 2 GP and GN cards were developed to address growing demand for quality control measures within the food industry and provide identification of organisms in just hours, while traditional methods take days to deliver results. The GN card offers automated identification of the most significant fermenting and non-fermenting Gram-negative bacilli, including several *Salmonella* species and *E. coli* O157, in addition to the select agent organisms *Brucella melitensis*, *Francisella tularensis*, *Burkholderia mallei*, *Burkholderia pseudomallei* and *Yersinia pestis*. The VITEK 2 GP card provides rapid identification of common Gram-positive organisms, including *Listeria* and *Staphylococcus* species.

bioMérieux
800.638.4835
Hazelwood, MO
www.biomerieux-usa.com

JohnsonDiversey Introduces TASKI JFit for Onboard Dilution Control

Professional cleaners can reduce costs and increase cleaning performance with TASKI JFit, the new onboard dilution control system for TASKI Swingo scrubber driers from JohnsonDiversey. The TASKI JFit unit is connected with the proven Cleaning Solution Dosing system and helps save up to 40 percent in cleaning solution compared to conventional scrubber driers.

The unit measures flow from the water tank to the brushes and automatically adds the right amount of chemicals. A microprocessor

delivers the accurate ratio of dilution, by continuously calculating demand for chemicals and controlling a peristaltic pump.

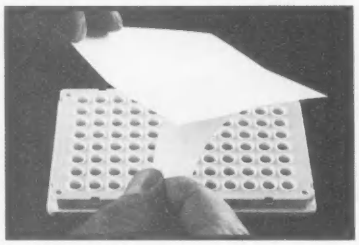
Chemicals for the JFit come in 1.5 litre super-concentrated closed pouches, which prevent operators coming in contact with the chemicals. Pouches are easily locked into the JFit unit. At the lowest dosage of 0.2 percent, one pouch cleans up to 25,000 square meters between changes.

JFit enhances safety by reducing the risk of product contact, spilling or accidental product mixing by eliminating the need for manual handling of open chemicals. Because the JFit system is simple and easy to use, operator training is kept to a minimum.

JFit helps control cleaning costs by eliminating costly overdosing, which can happen frequently in day-to-day cleaning operations. Additionally, JFit reduces chemical residue on the floor caused by overdosing. TASKI cleaning products used in the JFit system include Jontec 300 neutral floor cleaner, Jontec Forward heavy duty floor degreaser, and Jontec Tensol floor cleaner and maintainer.

Using super concentrates in 1.5 liters pouches, operators also eliminate handling, storing and transportation of heavy canisters. Smaller packaging has a positive impact on the environment and customer business by saving energy use and reducing emissions. Two 1.5-liter pouches have the equivalent cleaning power of three 5-liter canisters of conventional product, reducing amounts of chemicals and packaging material.

JohnsonDiversey
262.634.5977
Racine, WI
www.johnsondiversey.com



Excel Scientific, Inc.

New White Films Serve Luminescence and Microscopy Applications from Excel Scientific

Excel Scientific has introduced BrightMax™ Adhesive White Vinyl Films.

Used with white clear-bottom microplates, BrightMax films help to maximize signals in luminescence assays.

A split backing facilitates application of the film to either top or bottom of the plate. Applied to the bottom of a 96-well filter plate, the white film provides a convenient medium for holding dried filters removed from the plate for microscopic examination and storage, for example in ELISPOT techniques.

Excel Scientific, Inc.
760.246.4545
Victorville, CA
www.excelscientific.com

Olymel Plant Adopts SISTEM™ Learning Solution for Employee Training Program

The Olymel production facility in Brampton, ON, has signed an agreement with Silliker, Inc. to train its workforce with SISTEM™, an interactive, group-based training platform created by Alchemy Systems, Silliker's partner company.

SISTEM™ allows companies to deliver competency-based, streamlined, and consistent training via the Internet or company intranet. The customizable platform incorporates simple remote control devices with color-coded buttons for students, and features an integrated training management system that tracks participant interactions and automatically updates training records.

In an industry that is undergoing profound changes to meet new safety challenges, SISTEM™ was the obvious solution for the Brampton plant to promote and improve their safety practices. By implementing SISTEM™, the Ontario operation recognized the importance and urgency of harnessing a progressive training technology to meet the needs of its entire workforce that includes over 500 employees from diverse educational and cultural backgrounds.

SISTEM™ allows for the training of up to 32 workers at a time, with or without a facilitator, and maintains individual training records in a secure, auditable web database. Currently, the product is used to train nearly 85,000 food processing and food service workers. In 2006, Silliker and Alchemy entered into a strategic partnership to create custom food training programs to be used in addition to Alchemy's existing library of content. Food allergens, good manufacturing practices, plant sanitation, and HACCP are among the training topics featured in the Silliker-Alchemy alliance.

Silliker, Inc.
708.957.7878
Homewood, IL
www.sistemtraining.com/foodsafety

DuPont Launches Renewably Sourced Solutions for Packaging Market

DuPont has announced the expansion of its renewably sourced portfolio of offerings for the packaging market with the launch of new DuPont™ Biomax® TPS thermoplastic starch and DuPont™ Biomax® PTT (polytrimethylterephtalate) injection moldable resin. The launch took place at the global Interpack packaging trade fair.

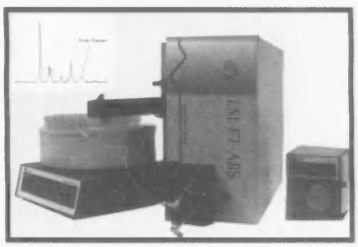
"Expanding our portfolio of solutions in renewably sourced packaging is a key strategy for DuPont's Performance Materials segment," said Diane Gulyas, group vice president, DuPont Performance materials. "These new offerings demonstrate the power of marrying DuPont's core competency in materials and polymer science with our leadership in bio-based technologies and renewable feedstocks to deliver offerings that provide comparable or better performance than the petrochemical-based materials they replace. They support our commitment to helping customers improve the sustainability of their value chains."

Biomax® TPS is a renewably sourced thermoplastic starch for packaging applications. The offering consists of sheet stock that contains 85–90 percent renewably sourced content for thermoformed trays and articles, and resins for injection-molded parts and containers. Biomax® PTT contains up to 35 percent renewably sourced content for packaging applications. It is especially suitable for use in injection-molded containers, cosmetic packaging and other parts where polyesters are used.

The new DuPont™ Hytrel® RS thermoplastic elastomers, DuPont™ Sorona® EP thermoplastic resins, DuPont™ Selar® VP breathable films and renewably sourced grades of DuPont™ Zytel® long chain polyamides.

Renewably Sourced Materials from DuPont offer several benefits over petroleum-based products. These products reduce dependence on petroleum and, in many instances, reduce the net production of greenhouse gases and energy consumption when compared to incumbent products. With today's innovative technologies, all this can be achieved without compromising performance. Applications for renewably sourced products cross numerous industries and markets. They are used in a wide variety of products including carpeting, fabrics for apparel and interiors, personal care products, automotive components, liquid detergents, food packaging and antifreeze.

DuPont Qualicon
800.441.7515
Wilmington, DE
www.dupont.com



Lambda Solutions, Inc.

New Ultra High Performance Flow-through Raman System!

The Lambda Solutions Dimension FT-ABS represents the first true high sensitivity on-line Raman System for critical fluid-phase monitoring.

The XL-FT features provide exceptional sensitivity and stability. The quartz-teflon cell design offers solvent/acid/base resistance and LSI RealTime monitoring software and optional integrated UV-Vis absorption extend analytical capability.

Wide ranging applications make the XL-FT ideal for semiconductor wet chemistry, petrochemical production and formulation, fermentation and chemical reaction monitoring.

This Flow Through System offers high performance and robustness with proven 24/7 operation, coverage from 50 cm-1 to 3000 cm-1 and resolution to 1.5 pixels/cm-1.

Lambda Solutions, Inc.
781.478.0170
Waltham, MA
www.LambdaSolutions.com

Food Safety Assured with SISTEM™ Training – Food Industry Leaders are Turning to SISTEM for Food Safety Training Compliance

Alchemy Systems has been selected by a number of major food manufacturers to help combat food safety challenges and regulatory compliance issues through employee training. Recent product recalls and improper animal-handling incidents have spurred a need for updated food safety initiatives that will restore confidence in consumers. By implementing Alchemy's unique group-based training platform, SISTEM, companies such as the American Foods Group (AFG), Buckhead Beef, Kerry Inc., Olymel and Tyson Foods Corporation have targeted workforce education to

promote the prevention of similar food safety incidents.

"Our customers are role models to the entire food industry for food safety training and compliance," said Steve Merrill, vice president of Alchemy Systems. "In addition to training their employees with our OSHA, HACCP and SQF compliance courses, they have used the customizing features of SISTEM to add courses unique to their equipment and food safety initiatives."

SISTEM is a ground-breaking training management solution used by more than 400 food-processing plants across the US and Canada to effectively train in-plant personnel and provide audit-ready reports. The SISTEM platform is applicable to, and used in a wide range of plants that process all types of food products including meat and poultry, dairy, produce, confections and pet food. SISTEM is designed to make training simple and successful right out-of-the-box approach.

The adoption of SISTEM training brings a positive outlook to an industry battling troublesome food safety issues. Incorporating consistent and effective training is a fundamental way companies like AFG, Tyson, and Buckhead Beef are reinforcing current food safety techniques and regulatory compliance with their employees.

Alchemy Systems
888.988.8832
Austin, TX
www.alchemysystems.com

Met One Instruments BAM-1020 Continuous Particulate Monitor Awarded USEPA Class III Designation

Met One Instruments has become the first instrument manufacturer ever to successfully be awarded USEPA Class III equivalency designation for a continuous PM-2.5 particulate monitor. The BAM-1020 beta attenuation mass monitor has been assigned USEPA designation EQPM-0308-170, notice of which was published in the US Federal Register on March 12, 2008.

The implication of this achievement is very significant as it will allow state, local and tribal air monitoring agencies currently performing PM-2.5 surveillance using conventional samplers for regulatory enforcement purposes to replace these samplers with the BAM-1020. Manual samplers for PM-2.5, which typically are operated on one-in-three or one-in-six day sampling schedules in which results were often not known for weeks or months after the event, may now be replaced with the BAM-1020 monitor.

The BAM-1020 monitor produces reliable, accurate, continuous, hourly results in real time. Elevated PM-2.5 events can be determined as they occur (instead of weeks after the fact), which will allow government officials to take timely mitigating action. Daily (vs. one-in-six day) PM-2.5 averages will be available and network operational costs may be substantially reduced.

Met One Instruments, Inc.
541.471.7111
Grants Pass, OR
www.metone.com

New Variable Speed DC Vacuum Pumps from Welch Pumps

The new Welch® VARIFLOW™ DC-Drive Vacuum Pumps are ideal for OEM and Laboratory applications.

These totally dry DC-drive variable speed vacuum pumps can be used for full chemical-duty and standard-duty operation.

The VARIFLOW Pumps offer high performance two-stage diaphragm mechanism with 45 LPM flow rate and ultimate vacuum to 1.5 torr (< 2 mbar).

The Chemical Duty Model 8115D-20 uses PTFE heads and diaphragms and FKM valves. The Standard Duty Model 8115D-25 uses aluminum heads, EPDM diaphragms and valves.

Flexible OEM designs are available with or without power supply and controller in an enclosure or as a bare pump. All models use 24V brushless DC motors with a maximum power consumption of 85 watts and can restart under vacuum.

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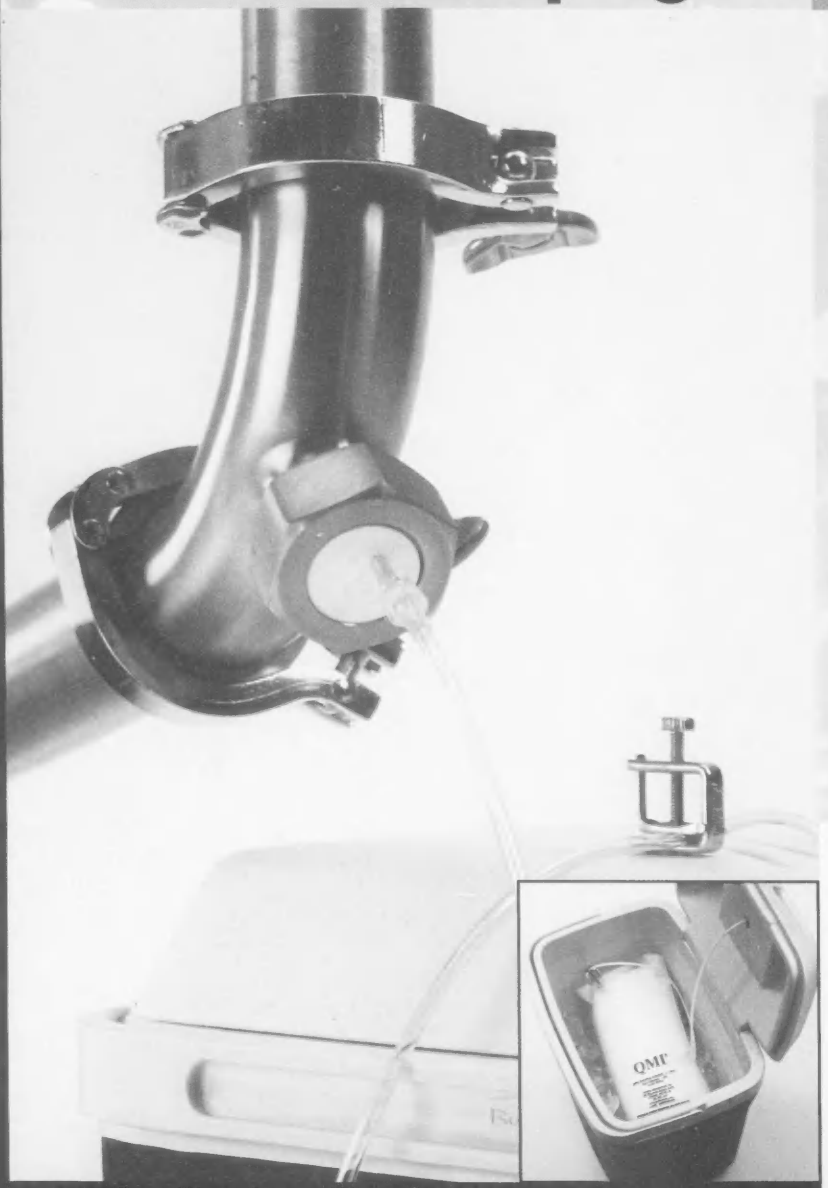

You work hard to run a clean and healthy dairy operation. Get maximum profits for all that effort by using the QMI Line and Tank Sampling System. The benefits are:

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

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Escherichia coli

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

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Presented January 2008

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FOOD SAFETY INNOVATION

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GMA FOOD SAFETY

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International Commission on Microbiological Specifications for Foods

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.

County of Sacramento
Environmental Management Department

AFFILIATE AWARDS

C.B. SHOGREN MEMORIAL
British Columbia Food Protection Association

BEST AFFILIATE OVERALL MEETING AWARD
Turkish Food Safety Association

BEST AFFILIATE EDUCATIONAL AWARD
Texas Association for Food Protection

BEST AFFILIATE COMMUNICATION MATERIALS AWARD
Ontario Food Protection Association

AFFILIATE MEMBERSHIP ACHIEVEMENT
Florida Association for Food Protection

COMMITTEE MEETINGS

TIMES	COMMITTEE MEETING	ROOM
Saturday, August 2		
3:00 p.m. – 4:00 p.m.	Past Presidents'	Fayette
3:00 p.m. – 4:30 p.m.	Membership	Marion
Sunday, August 3		
7:00 a.m. – 10:00 a.m.	Affiliate Council	Franklin CD
8:00 a.m. – 5:00 p.m.	Committee on Control of Foodborne Illness	Garfield
9:00 a.m. – 11:00 a.m.	Applied Laboratory Methods	Union B
9:00 a.m. – 11:00 a.m.	Food Chemical Hazards and Food Allergy	Delaware B
9:00 a.m. – 11:00 a.m.	Food Safety Education	Marion
9:00 a.m. – 11:00 a.m.	Viral and Parasitic Foodborne Disease	Delaware A
9:00 a.m. – 11:00 a.m.	Water Safety and Quality	Delaware C
10:00 a.m. – 12:00 p.m.	3-A Committee on Sanitary Procedures	Madison
10:00 a.m. – 12:00 p.m.	*JFP* Management	Union A
10:00 a.m. – 12:00 p.m.	Microbial Risk Analysis	Fairfield
10:00 a.m. – 12:00 p.m.	Retail Food Safety and Quality	Morrow
11:00 a.m. – 12:00 p.m.	Awards	Delaware A
11:00 a.m. – 12:00 p.m.	Constitution and Bylaws	Delaware B
12:00 p.m. – 1:30 p.m.	Student	Franklin CD
1:00 p.m. – 3:00 p.m.	Audiovisual Library	Madison
1:00 p.m. – 3:00 p.m.	Food Hygiene and Sanitation	Marion
1:00 p.m. – 3:00 p.m.	Predictive Modeling in Food*	Delaware D
1:00 p.m. – 3:00 p.m.	Fruit and Vegetable Safety and Quality	Union B
1:00 p.m. – 3:00 p.m.	Seafood Safety and Quality	Delaware A
2:00 p.m. – 4:00 p.m.	Beverage	Delaware B
2:00 p.m. – 4:00 p.m.	Dairy Quality and Safety	Fairfield
2:00 p.m. – 4:00 p.m.	*FPT* Management	Union A
2:00 p.m. – 4:00 p.m.	Meat and Poultry Safety and Quality	Morrow
2:00 p.m. – 4:00 p.m.	Food Law	Delaware C
3:00 p.m. – 4:30 p.m.	Foundation	Marion
3:00 p.m. – 4:30 p.m.	International Food Protection Issues*	Delaware A
3:30 p.m. – 4:30 p.m.	Nominating	Madison
4:30 p.m. – 5:30 p.m.	Editorial Board Reception	Franklin CD
Wednesday, August 6		
7:00 a.m. – 8:30 a.m.	Program	Marion

*Organizational Meetings

IAFP Members are welcome to attend Committee Meetings.
Both Members and Nonmembers are welcome to attend and participate in PDG meetings.

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Ivan Parkin Lecture

Sunday, August 3

6:00 p.m.

Utility of Microbiological Testing for Food Safety Assurance: The Good, the Bad, and the Ugly

Dr. Russell S. Flowers
Silliker Group Corporation
Homewood, Illinois

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

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

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

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

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JOHN H. SILLIKER LECTURE

WEDNESDAY, AUGUST 6

4:00 P.M.

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

DR. MICHAEL P. DOYLE
University of Georgia
Griffin, Georgia

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

Dr. Doyle is a graduate of the University of Wisconsin-Madison, where he earned his BS in Bacteriology, and MS and Ph.D. in Food Microbiology. The author of more than 400 scientific publications, Dr. Doyle has given more than 600 invited presentations at national and international scientific meetings, and has received several research awards from academic and national scientific organizations. He is a Fellow of IAFP, the American Academy of Microbiology, and the Institute of Food Technologists (IFT), and is a member of the National Academy of Sciences-Institute of Medicine.

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

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IAFP 2008 PRELIMINARY PROGRAM

DSC – Developing Scientist Competitor

SUNDAY, AUGUST 3
6:00 p.m. – 7:00 p.m.

OPENING SESSION – *Regency Ballroom*

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

Cheese and Wine Reception to follow in the Exhibit Hall.

MONDAY MORNING AUGUST 4

SYMPOSIA • 8:30 a.m. – 12:00 p.m.

S1 **2008 Foodborne Disease Update: *Salmonella* in Processed Foods**
Delaware A-D
Sponsored by the IAFP Foundation
Organizer: Jack Guzewich
Convenor: Jack Guzewich

8:30 *Salmonella* Serotype Mbandaka in Peanut Butter, Australia, 1996 — AGNES TAN, The University of Melbourne, Parkville, Australia

9:00 Outbreak Investigation: *Salmonella* Tennessee in Peanut Butter in the United States, 2007 — IAN WILLIAMS, CDC-NCZVED, Atlanta, GA, USA

9:30 Environmental Investigation and Regulatory Response: *Salmonella* Tennessee in Peanut Butter in the United States, 2007 — DON ZINK, FDA-CFSAN, College Park, MD, USA

10:00 Break

10:30 Outbreak Investigation: *Salmonella* 4,5,12:i:-Associated with Pot Pies in the United States, 2007 — IAN WILLIAMS, CDC-NCZVED, Atlanta, GA, USA

11:00 Environmental Investigation and Regulatory Response: *Salmonella* 4,5,12:i:- Associated with Pot Pies in the United States, 2007 — PATRICIA WHITE, USDA-FSIS, Omaha, NE, USA

11:30 Industry Perspective on the Peanut Butter and Pot Pie Outbreaks — JOSEPH D. MEYER, ConAgra, Omaha, NE, USA

S2 **Coming Out of the *Campylobacter* Closet: International Strategies for Reducing Human Campylobacteriosis**
Franklin A-C
Sponsored by the IAFP Foundation
Organizer: Roger Cook
Convenor: John Marcy

8:30 CODEX Initiatives for Control of *Campylobacter* in Poultry — JUDI LEE, New Zealand Food Safety Authority, Wellington, New Zealand

9:00 Scandanavian Regulatory Programs for Control of *Campylobacter* —Trials, Tribulations, Failures and Successes — HANS LINDMARK, National Food Administration, Uppsala, Sweden

9:30 Report Card — Two Years into the New Zealand Strategy for Controlling *Campylobacter* in Poultry — ROY BIGGS, Tegel Foods Ltd., New Market, Auckland, New Zealand

9:45 Report Card — Two Years into the New Zealand Strategy for Controlling *Campylobacter* in Poultry — JUDI LEE, New Zealand Food Safety Authority, Wellington, New Zealand

10:00 Break

10:30 Iceland, the Test-Bed of Regulatory *Campylobacter* Control and On-Farm Interventions: and Canada: A Study in Contrasts — RUFF LOWMAN, Canadian Food Inspection Agency, Ottawa, Ontario, Canada

11:00 An Industry Perspective of Regulatory *Campylobacter* Control Programs in the United Kingdom and United States — MIKE ROBACH, Cargill, Inc., Minneapolis, MN, USA

11:30 Panel Discussion

S3 **Globalization of Acceptance Criteria for Microbiological Methods: Separating the Science from the Politics**
Union D-E
Organizers: Michael Brodsky and Ruth Eden
Convenors: Michael Brodsky and Ruth Eden

8:30 Viewpoint: It's Hard to Play Ball When the Playing Field Isn't Level. An Industry Perspective on the Need to Level the Playing Field to Achieve a More Science-Based, Seamless Global Acceptance Process for Proprietary Methods — RONALD JOHNSON, bioMérieux, Inc., Hazelwood, MO, USA

Program subject to change

9:00 Viewpoint: Represents the AOAC Point-of-View. How AOAC is Working with Other Certification Bodies to Achieve Worldwide Harmonization of Methods Acceptance Criteria. Interaction with USDA, FDA and WHO/FAO under Codex — SCOTT COATES, AOAC RI, Gaithersburg, MD, USA

9:30 Viewpoint: Worked on ISO Regulations for Method Approvals. Represents the European Point-of-View. To Discuss Changes in Regulations in Europe and the Role of WHO/FAO under CODEX — ROY P. BETTS, Campden & Chorleywood Food Research Association, Chipping Campden, Gloucestershire, UK

10:00 Break

10:30 Viewpoint: A Canadian Regulatory Perspective on Adopting Analytical Methods and Prospects for Global Harmonization of Method Validation Protocols in Food Microbiology — JEFFREY M. FARBER, Food Directorate, Health Canada, Ottawa, ON, Canada

11:00 Viewpoint: Pharmaceutical Perspective and Experience on Harmonization of Methods Validation — SCOTT SUTTON, The Microbiology Network, N. Chili, NY, USA

ROUNDTABLE • 8:30 a.m. – 10:00 a.m.

RT1 Eating Seafood—Is It Worth the Risk?
Union A-C
Organizer: Kathleen T. Rajkowski
Convenors: Marlene E. Janes and Kathleen T. Rajkowski

8:30 Cooking Requirement for Different Types of Seafood — JOSEPH M. MADDEN, Neogen Corporation, Lansing, MI, USA

8:50 Pathogenic Bacteria and Viral and Parasite Concerns in Seafood Purchased by Consumers — MICHAEL JAHNCKE, Virginia Tech, Hampton, VA, USA

9:00 To be determined — LEE-ANN JAYKUS, North Carolina State University, Dept. of Food Science, Raleigh, NC, USA

9:10 Consumer Education on Safe Cooking and Handling of Seafood — ANTHONY O. FLOOD, International Food Safety Information Council, Washington, D.C., USA

9:15 Consumer Education on Safe Cooking and Handling of Seafood — CHRISTINE M. BRUHN, University of California–Davis, Davis, CA, USA

9:20 To be determined — JOE HUNSAKER, Hissho Sushi, Charlotte, NC, USA

9:30 Roundtable Discussion

TECHNICALS • 8:30 a.m. – 12:00 p.m.

T1 Pathogens, Beverages and Water Technical Session
Franklin D
Convenors: To be determined

T1-01 8:30 DSC Expression of the Urease Operon in *Escherichia coli* O157:H7 Treated with 0.5% Sodium Benzoate — FAITH J. CRITZER, Doris H. D'Souza and David A. Golden, University of Tennessee, Knoxville, TN, USA

T1-02 8:45 Polylysine-Induced Sensitization of *Enterobacteriaceae* to Medium-Chain Fatty Acid Derivatives — ROEL OTTO and Purac Biochem B.V., Gorinchem, The Netherlands

T1-03 9:00 Gene Expression Profiling of *Listeria monocytogenes* Strain F2365 in UHT Pasteurized Skim Milk — YANHONG LIU, USDA-ARS-ERRC, Wyndmoor, PA, USA

T1-04 9:15 DSC Interactions between σ^B and σ^L Appear to Contribute to *L. monocytogenes* Antimicrobial Resistance — M. ELIZABETH PALMER, Martin Wiedmann and Kathryn J. Boor, Cornell University, Ithaca, NY, USA

T1-05 9:30 Influence of Oxygen on Survival and Quantification of *Escherichia coli* O157:H7 and *Salmonella* serovar Typhimurium in Manure and Slurry — ALEXANDER V. SEMENOV, Eelco Franz, Leo van Ovebeek and Ariena van Bruggen, Wageningen University and Research Centre, Wageningen, The Netherlands

T1-06 9:45 DSC Survival of Norovirus in Biosolids — JIE WEI, Kalmia E. Kniel, Yan Jin and Tom Sims, University of Delaware, Newark, DE, USA

10:00 Break

T1-07 10:30 DSC Effect of Zero-Valent Iron on Removal of *Escherichia coli* O157:H7 from Agricultural Waters — ALEXANDRA M. DEREVIANKO, J. Handlin, A. Yoskowitz, Y. Jin, P. Chiu, M. Sharma and K. E. Kniel, University of Delaware, Newark, DE, USA

T1-08 10:45 DSC Transcriptome Analysis of *Escherichia coli* O157:H7 under Acidic Conditions — KRISTINA K. CARTER, Doris H. D'Souza, Arnold M. Saxton and David A. Golden, University of Tennessee, Knoxville, TN, USA

T1-09 11:00 DSC Transcriptional Regulators SigB and PrfA, and Flagella, Interact in a Temperature-Dependent Manner to Facilitate *L. monocytogenes* Invasion — REID A. IVY and M. Wiedmann, Cornell University, Ithaca, NY, USA

T1-10 11:15 Virulence Attenuated *Listeria monocytogenes* Strains Commonly Isolated from Food Show Potential to Confer Protective Immunity — KENDRA K. NIGHTINGALE, Alphina J. Ho, Esther D. Fortes, Bradley L. Njaa and Martin Wiedmann, Colorado State University, Fort Collins, CO, USA

T1-11 11:30 DSC — Characterization of the Ability of Bovine *Escherichia coli* O157 to Adhere to Human Intestinal Epithelium Cells — BRANDON A. CARLSON, John N. Sofos, Gary C. Smith, Keith E. Belk and Kendra K. Nightingale, Colorado State University, Fort Collins, CO, USA

T1-12 11:45 DSC — Molecular Epidemiology and Characterization of Virulence Gene in *Yersinia enterocolitica* Isolated from Swine — DANIEL A. TADESSE, Peter B. Bahnson, Julie A. Funk, W.E. Morgan Morrow and Wondwossen A. Gebreyes, The Ohio State University, Columbus, OH, USA

T2 — Antimicrobials and General Microbiology Technical Session
Fairfield
Convenors: To be determined

T2-01 8:30 DSC — Mechanisms of Allyl Isothiocyanate Antimicrobial Activity against *Escherichia coli* O157:H7 — FERNANDO B. LUCIANO and R. A. Holley, University of Manitoba, Winnipeg, MB, Canada

T2-02 8:45 DSC — Antimicrobial Effects of Persimmon Puree Concentrate in Brain Heart Infusion on *Listeria monocytogenes* and *Escherichia coli* O157 — C. G. WEBER, D. Y. C. Fung and B. A. Crozier-Dodson, Kansas State University, Manhattan, KS, USA

T2-03 9:00 DSC — Feedlot Production Practices and Their Impact on Pre- and Post-Harvest Antimicrobial Susceptibility Patterns of *Enterococcus* spp. — TAMMY M. PLATT, G. H. Loneragan, L. A. Branham, M. J. Engler, D. U. Thomson, R. S. Singer and M. M. Brashears, West Texas A&M University, Canyon, TX, USA

T2-04 9:15 — Effective Reduction of *Escherichia coli* O157:H7 in Feedlot Cattle by Use of Bacteriophages — Adam Moss, Bharat Bongale, Umesh Kumar, Shalini Katary, Deepti Bijlani, Chantale Johnson, Koji Hiratsuka, Calvin Booker and KISHORE MURTHY, GangaGen Life Sciences Inc, Ottawa, ON, Canada

T2-05 9:30 — Efficacy of Four Antimicrobial Ingredients to Inhibit the Growth of *Listeria monocytogenes* in Roast Beef — DEANNA HOFING, Robert Brooks, Richard Hull and Rory McClintock, WTI, Inc., Jefferson, GA, USA

T2-06 9:45 — *Listeria* Control in Ready-to-Eat Meat by Use of Clean Label Ingredients — Diana Visser, ROBIN PETERSON and Rene Hilhorst, PURAC America, Lincolnshire, IL, USA

10:00 — Break

T2-07 10:30 — Bacteriophage Treatment Reduces *Campylobacter jejuni* in Clinically Infected Chicken — KOJI HIRATSUKA, Phillippa Connerton, Ian Connerton, Adam Moss, Battouli Said-Salim, Bharat Bongale, Umesh Kumar, Shalini Katary, Pamela Auchterlonie and Kishore Murthy, GangaGen Life Sciences Inc., Ottawa, ON, Canada

T2-08 10:45 — Antimicrobial Resistance in *Campylobacter* Isolates Recovered from Chicken Carcass Rinsates in 2007 — PAULA J. FEDORKA-CRAY, Jodie R. Plumblee and Neena Anandaraman, USDA-ARS, Athens, GA, USA

T2-09 11:00 — Modeling of Activity of Triple Combinations of Antimicrobials, Using Lauric Arginate, Cinnamic Acid, and Sodium Benzoate or Potassium Sorbate as a Case Study — YUMEI DAI, Micha Peleg and Jochen Weiss, University of Massachusetts, Amherst, MA, USA

T2-10 11:15 DSC — Inactivation of *Salmonella* spp. and *Escherichia coli* O157:H7 on Tomatoes by Allyl Isothiocyanate, Carvacrol and Cinnamaldehyde in Vapor-State — MOHAMMAD M. OBAIDAT and Joseph F. Frank, University of Georgia, Athens, GA, USA

T2-11 11:30 — Survival of *Yersinia* in Whole Liquid Egg as Influenced by the Presence of Nisin — JOSHUA B. GURTLER, Howard Q. Zhang and Chris H. Sommers, USDA-ARS-ERRC, Wyndmoor, PA, USA

T2-12 11:45 DSC — Effects of Protein and Fat on Viral Inactivation through High Pressure Processing in Seafood Salad — KIRSTEN A. HIRNEISEN, Dallas G. Hoover, Doris Hicks, Lori Pivarnick and Kalmia E. Kniel, University of Delaware, Newark, DE, USA

POSTERS • 9:30 a.m. – 1:30 p.m.

P1 — Produce, Toxicology and Sanitation Poster Session
Exhibit Hall
9:30 a.m.–1:30 p.m.
Authors present 10:00 a.m.–12:00 p.m.
Convenors: To be determined

P1-01 — Potential Internalization of *Escherichia coli* O157:H7 in Lettuce (*Lactuca sativa L.*) by Soil Inoculation — G. ZHANG, L. Ma, L. R. Beuchat, M. C. Erickson, V. H. Phelan and M. P. Doyle, University of Georgia, Griffin, GA, USA

P1-02 — Comparison of Thermal Tolerance between Outbreak-Associated and Clinical Isolates of *Salmonella* Tennessee in Peanut Butter — L. Ma, G. ZHANG, P. Gerner-Smidt and M. P. Doyle, University of Georgia, Griffin, GA, USA

P1-03 — Evaluation of Surface-Sterilization Methods for *Escherichia coli* O157:H7 on Lettuce — G. ZHANG, L. Ma, L. R. Beuchat, M. C. Erickson, V. H. Phelan and M. P. Doyle, University of Georgia, Griffin, GA, USA

P1-04 — Potential Internalization of *Escherichia coli* O157:H7 in Pre-harvest Iceberg Lettuce (*Lactuca sativa L.*) — G. ZHANG, L. Ma, L. R. Beuchat, M. C. Erickson, V. H. Phelan and M. P. Doyle, University of Georgia, Griffin, GA, USA

P1-05 — Pre-Harvest Internalization of Zoonotic Pathogens by Lettuce as Influenced by Environmental Growth Conditions — Marilyn Erickson, Jean Liao, Alison Payton, CATHY WEBB, Li Ma, Guodong Zhang, Michael Doyle and Larry Beuchat, University of Georgia, Griffin, GA, USA

P1-06 Persistence of Enterohemorrhagic and Non-Pathogenic *Escherichia coli* on Spinach Leaves and in Rhizosphere — JITENDRA PATEL, Patricia Millner, Xiangwu Nou and Manan Sharma, USDA-ARS, Beltsville, MD, USA

P1-07 Attachment of *Escherichia coli* O157:H7 to Intact and Cut Lettuce Surfaces — JITENDRA PATEL and Gabriel Sanglay, USDA-ARS, Beltsville, MD, USA

P1-08 DSC Impact of Pre-Inoculation Growth Conditions on the Behavior of *E. coli* O157:H7 Inoculated onto Romaine Lettuce Plants and Cut Leaf Surfaces — CHRISTOPHER THEOFEL and Linda Harris, University of California–Davis, Davis, CA, USA

P1-09 The Attachment of Shiga Toxigenic *Escherichia coli* to Iceberg Lettuce as Affected by Hydrophobicity and Bacterial Growth Medium — Daniel Mitchell, Narelle Fegan, Mark Fegan and GARY DYKES, (will be presented by Patricia Desmarchelier), Food Science Australia, Tingalpa DC, Australia

P1-10 Use of Florescent Dyes for Visualization of Bacterial Attachment to Lettuce Leaves — LINDSEY A. KESKINEN, Peter H. Cooke and Bassam A. Annous, USDA-ARS-NAA-ERRC, Wyndmoor, PA, USA

P1-11 Efficacy of Chlorine Concentration and Acidic Electrolyzed Water in Decontaminating Lettuce Leaves Artificially Inoculated with *Escherichia coli* O157:H7 — LINDSEY A. KESKINEN, Angela Burke and Bassam A. Annous, USDA-ARS-NAA-ERRC, Wyndmoor, PA, USA

P1-12 Influence of Biofilm-Forming Bacteria on Association of Hepatitis A Virus with Lettuce — ADRIENNE E.H. SHEARER, Jie Wei and Kalmia E. Kniel, University of Delaware, Newark, DE, USA

P1-13 Development of a Simple Model System to Internalize *Escherichia coli* O157:H7 in Lettuce Leaves and to Evaluate Release into Wash Waters from Cut Surfaces — Z. HOU, N. Maks, T.J. Fu, M.L.Tortorello and P. J. Slade, National Center for Food Safety and Technology, Summit-Argo, IL, USA

P1-14 Survival and Growth of *Escherichia albertii* on Fresh-Cut Lettuce Stored at Various Temperatures — MANAN SHARMA, T. Matthew Taylor and Peter J. Taormina, USDA-ARS, Beltsville, MD, USA

P1-15 Visualization of Attachment and Internalization of a Bioluminescent Derivative of *Escherichia coli* O157:H7 ATCC 43895 on Lettuce Leaves — PATTI E. TANNER, Ronald Turco, Bradley Reuhs, Bruce Applegate and Maribeth Cousin, Purdue University, West Lafayette, IN, USA

P1-16 Efficacy of Antimicrobial Agents to Reduce Transfer of *Escherichia coli* O157:H7 on Lettuce Pieces — SALLY C. FOONG-CUNNINGHAM, Amanda L. Wessinger, Jesse D. Hines, Meghan M. Gadbois, Joy G. Herdt and Katherine M.J. Swanson, Ecolab Inc., Eagan, MN, USA

P1-17 Survival of *Salmonella* and *Escherichia coli* O157:H7 in Peanut Butter under Different Storage Temperatures — AGNES KILONZO-NTHENGE, Emily Rotich and Sandria Godwin, Tennessee State University, Nashville, TN, USA

P1-18 Environmental Investigation of a Restaurant's *Escherichia coli* O157:H7 Outbreak Linked to Iceberg Lettuce — MAHA HAJMEER, Christopher Yee, Carol Myers, Benson Yee, Davina Martinez, Patrick Kennelly, Jeff Farrar and Barbara Cassens, California Dept. of Public Health, Sacramento, CA, USA

P1-19 Survival of Attenuated *Escherichia coli* O157:H7 ATCC 700728 in Field-Innoculated Lettuce — ANNE-LAURE MOYNE, Mysore R. Sudarshana and Linda J. Harris, University of California–Davis, Davis, CA, USA

P1-20 DSC Evaluation of Chemical Disinfection Treatments to Inactivate *Escherichia coli* O157:H7 and *Listeria monocytogenes* on Mexican Spinach — JULIAN J. ESQUIVEL, Beatriz L. Alvarez-Mayorga, Leopoldo Orozco R. and Montserrat H. Iturriaga, Universidad Autonoma de Queretaro, Queretaro, Mexico

P1-21 Effects of Temperature Abuse and Subsequent Cold Storage on Natural Microflora and *Escherichia coli* O157:H7 on Spinach — TAM L. MAI, Ervin L. Faulmann and Mansour Samadpour, Institute for Environmental Health, Lake Forest Park, WA, USA

P1-22 DSC Characterization of Seasonal Diversity of the Spinach (*Spinacea oleracea*) Phyllosphere Microbial Community, Using Culture and Non-Culture Dependent Techniques — GABRIELA LOPEZ-VELASCO and Monica Ponder, Virginia Tech, Blacksburg, VA, USA

P1-23 Epiphytic Bacteria and Survival of *Escherichia coli* O157:H7 on Spinach — SANJA ILIC and Jeffrey T. LeJeune, The Ohio State University, Wooster, OH, USA

P1-24 DSC Reduction of *Escherichia coli* O157:H7 in Fresh Commercial Spinach by Lactic Acid Bacteria — WILLIAM E. CHANEY, Enusha Karunasena, Sara E. Gragg and Mindy M. Brashears, Texas Tech University, Lubbock, TX, USA

P1-25 The Effect of Different Refrigerator Storage Sites on the Proliferation of Spoilage and Indicator Bacteria on Bagged Spinach — DANIEL ARUSCAVAGE, Raymond Bowdish, Robert Seeley and Joelyn VanEss, SUNY-Potsdam, Potsdam, NY, USA

P1-26 DSC Effect of Lactic Acid-Producing Bacteria on the Sensory Characteristics of Fresh Spinach — SARA E. GRAGG, Chance Brooks, Angela Laury and Mindy Brashears, Texas Tech University, Lubbock, TX, USA

P1-27 Environmental Contamination of Spinach Placed in Close Proximity to Cattle Feedyard Operations — SARA E. GRAGG, Angela Laury, Markus Miller and Mindy Brashears, Texas Tech University, Lubbock, TX, USA

P1-28 Evaluation of Growth Kinetics of *Escherichia coli* O157:H7 on Bagged Spinach in Relation to Consumption Decisions Based on Visual Quality and Off-Odors — TREVOR SUSLOW, Elena de Castro, Victoria Zabala and Magdalena Sosa, University of California–Davis, Davis, CA, USA

P1-29 Characterization of Microbial Content of Organic and Conventional Produce in Maryland Relative to Production Practices and Inputs — PATRICIA MILLNER, David Ingram, Sara Reynolds, Daniel Shelton and Jitendra Patel, USDA-ARS, Beltsville, MD, USA

P1-30 Comparison of Moist Heat Inactivation Rates of *Salmonella* Enteritidis and *Pediococcus* spp. NRRL B-2354 on Whole Almonds under Commercial Plant Conditions — ERDOGAN CEYLAN, Guangwei Huang and Mark Carter, Silliker Inc., South Holland, IL, USA

P1-31 Inactivation of *Salmonella* Enteritidis PT30 by Low-Energy X-ray Irradiation on Almonds at Different Water Activities — SANGHYUP JEONG, Bradley P. Marks and Elliot T. Ryser, Michigan State University, East Lansing, MI, USA

P1-32 DSC The Survival of *Salmonella* Enteritidis on Walnuts during and after Walnut Hulling — TYANN BLESSINGTON, Elizabeth J. Mitcham and Linda J. Harris, University of California–Davis, Davis, CA, USA

P1-33 DSC Use of the Weibull Model to Evaluate the Impact of Storage Time and Temperature on Thermal Inactivation of *Salmonella* Enteritidis PT 30 on Oil Roasted Almonds — SHIRIN J. ABD, Kathryn L. McCarthy and Linda J. Harris, University of California–Davis, Davis, CA, USA

P1-34 Microbiological Evaluation of Step-by-Step Process in Seed Sprouting — SO YUN JUN and Y.K. Lee, Kyungpook National University, Buk-gu, Daegu, South Korea

P1-35 Detection and Recovery of *Escherichia coli* O157:H7 in Artificially Contaminated Alfalfa Sprouts by PATHATRIX Immunomagnetic Separation, Real-Time PCR and Cultural Methods — Stephen D. Weagant, Ken J. Yoshitomi, Karen C. Jinneman, Ruben Zapata, Chitra Wendakoon, Paul Browning and WILLIS M. FEDIO, New Mexico State University, Las Cruces, NM, USA

P1-36 DSC Reduction of Salmonellae Inoculated onto Alfalfa Sprouts' Surfaces by Gaseous Chlorine Dioxide — ARPAN R. BHAGAT, Jeongmok Kim and Richard H. Linton, Purdue University, West Lafayette, IN, USA

P1-37 Efficacy of Chlorine Dioxide Gas and Various Freezing Rates on the Microbiological Quality of Frozen Blueberries — LEI ZHANG, Zhinong Yan, Eric J. Hansen and Elliot T. Ryser, Michigan State University, East Lansing, MI, USA

P1-38 Impact of Harvesting and Handling on Bell Pepper Contamination with Viral Pathogens — CRISTOBAL CHAIDEZ, Josefina Leon, Rosa Martinez, Felipe Peraza, Marcela Soto, Andres Medrano and Celida Martinez, Centro de Investigación en Alimentación y Desarrollo, Culiacan, Sinaloa, Mexico

P1-39 Assessing Microbiological Quality of Produce from a Gleaning Project in Nashville, Tennessee — FUR-CHI CHEN, Sandria L. Godwin, Sean C. Siple and Bhargavi Sheshachala, Tennessee State University, Nashville, TN, USA

P1-40 DSC Washing Effect of Sodium Hypochlorite with 5% Acetic Acid and Acidified Sodium Chlorite on Reduction in Population of Foodborne Pathogens on Fresh Produce — KYUNG YOON KWON, Kyung A. Kang and Ki. S. Yoon, Kyung Hee University, Dongdaemun-Ku, Seoul, Korea

P1-41 Evaluation of Commercial Test Kits and Tangential Flow Filtration for Detection of *Salmonella* in Spent Mung Bean Irrigation Water — TONG-JEN FU and Nicole Maks, USDA, Summit-Argo, IL, USA

P1-42 Dump Tank Water Sanitation Technologies — LINDSAY ARTHUR, Kelley Knight and Robin McKellar, Ontario Ministry of Agriculture, Food and Rural Affairs, Guelph, ON, Canada

P1-43 Transfer Prevalence of *Escherichia coli* O157:H7 from Soil, Water, and Manure Contaminated with Low Numbers of the Pathogen to Lettuce Plants of Varying Age — Gabriel Mootian, Wen-Hsuan Wu, Hoan-jen Pang and KARL R. MATTHEWS, Rutgers University, The State University of New Jersey, New Brunswick, NJ, USA

P1-44 Effects of Time and Sanitizer Concentration in Produce Wash Water on Cross Contamination of *Salmonella* and *Escherichia coli* O157:H7 — Jacob A. Polsky and MARK A. HARRISON, University of Georgia, Athens, GA, USA

P1-45 DSC Microbiological Quality of Surface Water Used for Irrigation of Fresh Vegetable in Mpumalanga, South Africa — OLUWATOSIN IJABADENIYI, Amanda Minnaar and Elna Buys, University of Pretoria, Pretoria, Gauteng, South Africa

P1-46 Effect of Coffee Cherries Storage after Harvest before the Beginning of Drying on Contamination by Fungi and the Relationship to Ochratoxin A Production — IRENE AHOU KOUADIO, Univerisity of Cocody-Abidjan, Abidjan, Ivory Coast

P1-47 DSC Determination of Aflatoxin Levels in Herbal Medicines by ELISA-HPLC-LC/MS/MS — KYEONGYEOL KIM, Hyuna Park, Won-Bo Shim and Duck-Hwa Chung, Gyeongsang National University, Jinju, Gyeongnam, South Korea

P1-48 Monitoring of Ochratoxin A in Alcoholic Beverages — HEEYUN KIM, Joongoo Lee, Jihye Jeong, Mijung Noh, Seok Heo and Jong Seok, Gyeongin Regional Korea Food & Drug Administration, Nam-Gu, Incheon, Korea

P1-49 Determination of Patulin Level in Fruit Juices and Juice Concentrates in Korea — Joon Ho Eom, YOU-GYOUNG PARK, Jung A Byun, Dong Mi Seo, Eun Mi Lee, Mi Ra Kim, Nam Kyu Sun, Woo Young Jung and Jin Ha Lee, Korea Food and Drug Administration, Seo-gu, Daejeon, Korea

P1-50 The Exploratory Data on Furan Content in Processed Foods in the Korean Local Market — Gi-Myoung Kim, Kwang-Geun Lee and YOUNG SIG PARK, Korea University, Seongbuk-Gu, Seoul, Korea

P1-51 Comparison of Different SPE (Solid-Phase Extraction) Methods for the Analysis of Heterocyclic Amines from Fried Pork Patties — Jae-Hwan Lee, Yu-Mi Back, Kwang-Geun Lee and HAN-SEUNG SHIN, Dongguk University, Seoul, Korea

P1-52 Monitoring and Risk Assessment of Furan in Processed Foods by Solid Phase Microextraction Gas Chromatography Mass Spectrometry (SPME-GC/MS) — Tae-Kyu Kim, Mi-Kyoung An, Hyu-Shin Lim and KWANG-GEUN LEE, Dongguk University, Choong-Gu, Seoul, Korea

P1-53 Analysis of Heterocyclic Amines in Cooked Meats by High Performance Liquid Chromatography — Mass Spectrometry — Yu-Mi Back, Sim-Hea Kim, Jae-Hwan Lee, Han-Seung Shin and KWANG-GEUN LEE, Dongguk University, Choong-Gu, Seoul, Korea

P1-54 Acute Toxicity and Mutagenic Effect of Methanol Extracts of *Cirsium japonicum* — SOON-MI SHIM, Eunkyung Bae and Gun-Hee Kim, Duksung Women's University, Plant Resources Research Institute, Dobong-Gu, Seoul, Korea

P1-55 Effect of Acids on Optimum pH of Benzene Formation — YU TING DAI, Song He Sun, Xue Shu Xu, Jing Li Xie, Shi Can Lu and Ming Fang, East China University of Science and Technology, Shanghai, China

P1-56 Dietary Exposure to Chloropropanols of Secondary School Students in Hong Kong — JOAN C. W. YAU, Y. Xiao, Stephen W. C. Chung, and K.P. Kwong, Center for Food Safety, Hong Kong, China

P1-57 Mercury Levels in Female Students of the University of Japan – Relationship with Contents of Meals — MAMI ANDO, Hisako Aki and Wakaba Ishimoto, Osaka Shoin Women's University, Osaka, Japan

P1-58 Fish Consumption by Mothers of Infants and by Women of Childbearing Age — Conrad J. Choiniere, BABGALEH TIMBO, Debra Street, Paula Trumbo and Sara Fein, Center for Food Safety and Applied Nutrition, FDA, College Park, MD, USA

P1-59 Responses of *Listeria monocytogenes* to Disinfection Stress Monitored by Measurements of Intracellular pH and Viable Counts — VICKY G. KASTBJERG, Dennis S. Nielsen, Nils Arneborg and Lone Gram, National Institute of Aquatic Resources, Technical University of Denmark, Kgs. Lyngby, Denmark

P1-60 Characterization of Yeast Heterogeneity and Succession during the Spontaneous Fermentation of Natural Black Olives — Aspasia A. Nisiotou, Maria Souri, GEORGE-JOHN E. NYCHAS and Efstathios Z. Panagou, Agricultural University of Athens, Athens, Attica, Greece

P1-61 Impact of Teichoic Acids D-Alanylation in *Lactococcus lactis* on Its Surface Physico-chemical Properties, Adhesion Behavior and Nisin and Lysozyme Sensitivity — Efstathios Giaouris, Romain Briandet, Mickael Meyrand, Pascal Courtin, GEORGE-JOHN E. NYCHAS and Marie-Pierre Chapot-Chartier, Agricultural University of Athens, Athens, Attica, Greece

P1-62 Assessment of Microbiological Quality and Food Safety Management Performance for School Food Service in South Korea — JUNG HWA CHOI, Na Young Yi, Hye-Ja Chang and Tong-Kyung K. Yum, Yonsei University, Seoul, South Korea

P1-63 Efficacy of Electrolyzed Oxidizing Water against *Listeria monocytogenes* and *Morganella morganii* Biofilms — USAN MCCARTHY, Aladar Bencsath and Deborah Johnson, FDA-Gulf Coast Seafood Laboratory, Dauphin Island, AL, USA

P1-64 Assessment of Microbial Contamination Levels of Street-Vended Foods in Incheon and Daegu, Korea — Soon-Han Kim, Seung-Hwan Kim, EUN-JUNG CHANG, Jee-Youn Shim, Soo-Yeul Cho, Joon-Il Cho, Chi-Yeun Cheung, Sun-mi Lee, In-Sun Hwang, Kyu-Heon Kim, Jong-Mi Lim and Ok-Hee Kim, Korean Food and Drug Administration (KFDA), Dalseogu, Deagu, Korea

P1-65 DSC Evaluation of the Effectiveness of Prerequisite Programs and HACCP in Small Size Food Service Establishments in Birmingham, United Kingdom — Madeleine Smith and NANCY ACOSTA, University of Birmingham, School of Chemical Engineering, Birmingham, UK

P1-66 DSC Monitoring of Hand Sanitation of Employees in Public Restaurants, and Evaluation of Hand Washing Methods to Reduce Bacterial Populations on Their Hands — HYO-WON LEE, Kyeoungyeol Kim, Yohan Yoon and Duck-Hwa Chung, Gyeongsang National University, Jinju, Gyeongnam, South Korea

P1-67 Analysis of School Foodservice Dietitians' Perception of Barriers to HACCP Implementation and Food Sanitation/Safety Management Performance in South Korea — Na Young Yi, Jung Hwa Choi, HYE-JA CHANG and Tong-Kyung K. Yum, Dankook University, Jukjeon-dong, Suji-gu, Yongin-si, Gyeonggi-do, 448–701, South Korea

P1-68 Evaluation of Sanitation Practices in South Korean School Food Service Facilities — YOHAN YOON, Hyo-Won Lee, Eunkyoung Seo and Duck-Hwa Chung, Gyeongsang National University, Jinju, Gyeongnam, South Korea

P1-69 A Novel Kitchen Disinfectant Effective against Norovirus — FUMIHITO INAGETA, Kumiko Ikarashi, Shiori Sugawara, Erika Sobe, Nao Morii, Yukifumi Konagaya, Hiroshi Kibuse and Hiroshi Urakami, JohnsonDiversey Japan, Yokohama, Kanagawa, Japan

P1-70 Efficacy of Aerosolized Sanitizers on the Inhibition of Bacterial Biofilms — Seung-Youb Baek, Se-Wook Oh, Young-Ho Kim and SUN-YOUNG LEE, Chung-Ang University, Anseong-si, Gyeonggi-do, Korea

MONDAY AFTERNOON AUGUST 4

SYMPOSIA • 1:30 p.m. – 5:00 p.m.

S4 **Bacterial Physiology — A Forgotten Theme That is Critical for the Food Microbiologist**
Delaware A-D
Sponsored by ILSI North America Technical Committee on Food Microbiology
Organizer: ILSI North America
Convenors: Laurie S. Post and Martin Wiedmann

1:30 Genomics Meets Physiology: What Have Genomics Taught Us about the Effects of Growth Phase and Stress Exposure on Bacterial Physiology? — CHARLES W. KASPAR, University of Wisconsin-Madison, Madison, WI, USA

2:00 Effects of Growth Phases, Temperature and Stress Exposure on Foodborne Pathogen Virulence: The *L. monocytogenes* Example — KATHRYN J. BOOR, Cornell University, Dept. of Food Science, Ithaca, NY, USA

2:30 Effects of Growth Phases, Temperature and Stress Exposure on Foodborne Pathogen Survival and Stress Resistance: The *Salmonella* Example — ROY P. BETTS, Campden & Chorleywood Food Research Association, Chipping Campden, Gloucestershire, UK

3:00 Break

3:30 Effects of Stress Exposure on Foodborne Pathogen Physiology: The *E. coli* Example — TERESA M. BERGHOLZ, Cornell University, Dept. of Food Science, Ithaca, NY, USA

4:00 How the Physiological State of the Challenge Inoculum Affects Validation Study Outcomes — LARRY R. BEUCHAT, University of Georgia, Center for Food Safety, Griffin, GA, USA

4:30 Development and Validation of Detection Methods — How Does the Physiology of the Target Cell Affect Assay Sensitivity? — MARTIN WIEDMANN, Cornell University, Dept. of Food Science, Ithaca, NY, USA

S5 **Sampling and Sample Prep: Unglamorous but Very Necessary**
Franklin A-C
Sponsored by the IAFP Foundation
Organizers: Phil Coombs and Mary Lou Tortorello
Convenors: Byron Brehm-Stecher and Mary Lou Tortorello

1:30 The Need for Improved Sample Prep Methods — MARY LOU TORTORELLO, FDA-CFSAN, National Center for Food Safety & Technology, Summit-Argo, IL, USA

1:45 The Need for Improved Sample Prep Methods — BYRON BREHM-STECHER, Iowa State University, Dept. of Food Science and Human Nutrition, Ames, IA, USA

2:00 Risk-Based Sampling — J. EMILIO ESTEBAN, USDA-FSIS-OPHS, Alameda, CA, USA

2:30 Historical and Novel Approaches to Sample Prep — TONY SHARPE, Filtaflex Ltd., Almonte, ON, Canada

3:00 Break

3:30 Sampling Composting — MARK CARTER, Silliker Inc., South Holland, IL, USA

4:00 Representative Surface Sampling — DAVID GOLDEN, University of Tennessee, Dept. of Food Science and Technology, Knoxville, TN, USA

4:30 Sample Prep Technologies: New and Future Persepectives — LEE-ANN JAYKUS, North Carolina State University, Dept. of Food Science, Raleigh, NC, USA

S6 **New and Innovative Ways to Derive Risk-Based Management Options**
Union D-E
Organizers: Fumiko Kasuga and Ewen Todd
Convenors: Leon Gorris and Fumiko Kasuga

1:30 Regulatory Perspectives to Derive Risk Management Options — RICHARD WHITING, FDA-CFSAN, College Park, MD, USA

1:50 Setting Industrial Process Parameters on the Basis of Risk-Based Metrics — JEANNE-MARIE MEMBRE, Unilever–Safety and Environmental Assurance Centre, Sharnbrook, Bedford, UK

2:10 Green Field Risk-Based Approach to Managing *Clostridium botulinum* — MARTIN COLE, National Center for Food Safety and Technology, Illinois Institute of Technology, Summit-Argo, IL, USA

2:30 Scenario Analyses in Supporting Management of *Listeria* in Ready-to-Eat Meat — TOM ROSS, University of Tasmania, School of Agricultural Science, Hobart, Tasmania, Australia

S7 **Food Safety Issues in Food Transportation — Keeping It Cold and Keeping It Clean**
Franklin D
Sponsored by the IAFP Foundation
Organizers: Veny Gapud, Ronald H. Schmidt, Amy Simonne and Philip Wolff
Convenors: Veny Gapud and Ronald H. Schmidt

1:30 What Do We Expect from Our Distributors? — VENY GAPUD, Popeyes Chicken and Biscuits, Atlanta, GA, USA

2:00 RFID: New Applications in the Food Industry — JEAN-PIERRE EMOND, University of Florida, Gainesville, FL, USA

2:30 Food Safety Challenges in the Distribution — JORGE A. HERNANDEZ, US Foodservice, Rosemont, IL, USA

3:00 Break

3:30 Sanitary Design: Cross-Contamination Issues in Liquid Food Transportation — MICHAEL E. KASHTOCK, FDA, Rockville, MD, USA

4:00 Validation of Cleaning and Sanitizing in Milk, Juice, and Liquid Food Product Transport Tankers — PAUL WINNICZUK, University of Florida, Citrus Research & Education Center, Lake Alfred, FL, USA

4:30 Kentucky Prototype Bulk Milk Transportation Security System — CHRIS THOMPSON, University of Kentucky, College of Agriculture, Division of Regulatory Services, Lexington, KY, USA

ROUNDTABLE • 1:30 p.m. – 3:00 p.m.

RT2 Occurrence and Control of Norovirus: Is Public Vomiting Public Enemy #1?
Union A-C
Organizers: Doris D'Souza, Charles Gerba, Kali Kniel, Melvin Kramer and Suresh Pillai
Convenors: Doris D'Souza, Kali Kniel and Charles Gerba

1:30 Recommendations and Questions of Clean-up and Liability of Noroviruses — MELVIN KRAMER, EHA Consulting Group, Inc., Baltimore, MD, USA

1:45 Influence on Genotypes on Emerging and Increasing Norovirus Virulence and Infectivity — JAN VINJE, CDC, Atlanta, GA, USA

2:00 Update on Norovirus Outbreaks in Europe and Calicinet — DAVID BROWN, Health Protection Agency Colindale, London, UK

2:15 Perspectives on Battling and Combating Norovirus Infections — HAL KING, Chick-fil-A Restaurants, Atlanta, GA, USA

2:30 Roundtable Discussion on Survival and Control of Noroviruses on Fomites — CHARLES GERBA, Tucson, AZ, USA

2:45 Roundtable Discussion

ROUNDTABLE • 3:30 p.m. – 5:00 p.m.

RT3 Does Internalization of Pathogens Occur in Fresh Produce during Commercial Production and Processing?
Union A-C
Sponsored by the IAFP Foundation
Organizers: Pascal Delaquis and Linda Harris
Convenors: Pascal Delaquis and Linda Harris

3:30 To be determined — KARL MATTHEWS, Rutgers University, New Brunswick, NJ, USA

3:45 To be determined — KEITH WARRINER, University of Guelph, Guelph, ON, Canada

4:00 To be determined — JOSEPH FRANK, University of Georgia, Athens, GA, USA

4:15 To be determined — LARRY BEUCHAT, University of Georgia, Griffin, GA, USA

4:30 Roundtable Discussion

TECHNICALS • 1:30 p.m. – 5:00 p.m.

T3 Toxicology, Seafood and Meat and Poultry Technical Session
Fairfield
Convenors: To be determined

T3-01 1:30 DSC Development of Best Management Practices to Reduce the Likelihood of Soybeans Accumulating High Levels of Cadmium — LINDSAY ARTHUR, Beverley Hale, Debbie Chan and Edward Berkelaar, Ontario Ministry of Agriculture, Guelph, ON, Canada

T3-02 1:45 DSC Analysis of the Mycotoxin Zearalone and Masked Mycotoxins α- and β-Zearalenol Glucoside in Wheat Samples, Using a New LC-UV/MS Method — JAMES. J. SASANYA, C. Hall and C. W. Hall, Great Plains Institute of Food Safety, North Dakota State University, Fargo, ND, USA

T3-03 2:00 Decrease in the Mercury Concentration in Bluefin Tuna by Breeding Fishes with Low Mercury Levels — MASASHI ANDO, Masashi Nakao, Manabu Seoka, Masahiro Nakatani, Tokihiko Okada, Yasuyuki Tsukamasa and Ken-ichi Kawasaki, Kinki University, Nara, Japan

T3-04 2:15 DSC A Comparative Study for the Detection of Histamine-Producing Bacteria in Fish by Culture, Potentiometric and Molecular-Based Methods — KRISTÍN BJÖRNSDÓTTIR, Greg Bolton and David P. Green, North Carolina State University, Morehead City, NC, USA

T3-05 2:30 Effect of Cooling and Temperatures on Quality and Safety of Quahog Clams (*Mercenaria mercenaria*) — GEORGE FLICK, Robert Croonenberghs, Michael Peirson, Dianne Wall-Bourne and Linda Ankenman Granata, Virginia Tech, Blacksburg, VA, USA

T3-06 2:45 DSC Changes in the Levels of *V. parahaemolyticus* and *V. vulnificus* during Commercial Harvesting of Gulf Coast Oysters — STEPHENIE DRAKE, Brooke Whitney, Miguel Gutierrez, Amrish Chawla, Richelle Beverly, Marlene Janes, Jon Bell, John Supan, Jay Levine and Lee-Ann Jaykus, North Carolina State University, Raleigh, NC, USA

3:00 Break

T3-07 3:30 DSC Molecular Characterization of Antibiotic-Resistant *Salmonella* Typhimurium and *Salmonella* Kentucky Recovered from Pre- and Post-Chill Whole Broiler Carcasses — TAGELSIR MOHAMED, Salina Parveen, David White, Shaohua Zhao, Sharon Freidman and Karen Blickenstaff, University of Maryland Eastern Shore, Princess Anne, MD, USA

T3-08 3:45 Validation of Intervention Strategies to Control *Escherichia coli* O157:H7 and *Salmonella* Typhimurium DT 104 in Moisture-Enhanced Beef — ALEJANDRO ECHEVERRY, J. Chance Brooks and Mindy M. Brashears, Texas Tech University, Lubbock, TX, USA

T3-09 4:00 DSC Validation of Commercial Thermal Process for Control of *Escherichia coli* O157:H7 and *Salmonella* spp. in Chopped and Formed Beef Jerky — NIGEL HARPER, Kelly J. K. Getty and Elizabeth A. E. Boyle, Kansas State University, Manhattan, KS, USA

T3-10 4:15 FSIS Microbiological Testing Program for *Listeria monocytogenes* in Ready-to-Eat Meat and Poultry Products, 1994–2006 — KRISTINA BARLOW, Stephanie Buchanan, Evelyne Mbandi and Priscilla Levine, USDA, Washington, D.C., USA

T3-11 4:30 On-Line Brush and Spray Washers to Lower Numbers of *Campylobacter* and *Escherichia coli* and Presence of *Salmonella* on Broiler Carcasses during Processing — MARK E. BERRANG and J. Stan Bailey, USDA-ARS, Athens, GA, USA

T3-12 4:45 Multiplication of *Salmonella* Enteritidis on Egg Yolk Membranes and Penetration into Yolk Contents — RICHARD K. GAST, Rupa Guraya, Jean Guard-Bouldin and Peter S. Holt, USDA-ARS, Athens, GA, USA

POSTERS • 2:00 p.m.– 6:00 p.m.

P2 Meat and Poultry, Microbial Food Spoilage, Beverage and Dairy 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 Genetic Diversity of *Alicyclobacillus acidoterrestris* and the Correlation with Their Spoilage Ability — KOHEI MATSUMOTO, Yuko Tanaka and Keiichi Goto, Food Research Laboratories, Mitsui Norin Co., Ltd., Fujieda, Shizuoka, Japan

P2-02 Survey of Yeast and Mold Found in Food Bought at Retail — FRANK R. BURNS, Lois Fleck, and Kimberley Austin, DuPont Qualicon, Philadelphia, PA, USA

P2-03 DSC Production of Shelf-Stable Ranch Dressing with Elevated pH Using Ultra-High Pressure — JOSEPH M. JONES, Joy G. Waite, Evan J. Turek, C. Patrick Dunne and Ahmed E. Yousef, The Ohio State University, Columbus, OH, USA

P2-04 Investigation for Possible Sources of Contamination of Spoilage Microflora Associated with "Blown-Pack" Spoilage of Ground Beef Chubs — BALASUBRAHMANYAM KOTTAPALLI, Jarret D. Stopforth, Rico Suhalim and Mansour Samadpour, Institute for Environmental Health, Lake Forest Park, WA, USA

P2-05 Microbial Quality of Beverages Sold by Fast Food Restaurants and Convenience Stores in Griffin, Georgia and Surrounding Areas — YOEN JU PARK and Jinru Chen, University of Georgia, Griffin, GA, USA

P2-06 Withdrawn

P2-07 The Effect of Juice Temperature on *Clostridium botulinum* Type A Toxin Activity during the Hot-Filling of Juice Bottles — FRAN DOERR, G.E. Skinner, K. Reineke, G. Fleischman and J.W. Larkin, National Center for Food Safety and Technology/Illinois Institute of Technology, Summit-Argo, IL, USA

P2-08 DSC Inactivation of *Listeria innocua* in Apple and Carrot Juices by High Pressure Homogenization and Nisin — PANCHALEE PATHANIBUL, T. Matthew Taylor, P. Michael Davidson and Federico Harte, University of Tennessee, Knoxville, TN, USA

P2-09 DSC Inactivation of *Escherichia coli* K-12 in Apple Juice and Apple Cider Using High Pressure Homogenization and Chitosan — SAURABH KUMAR, Federico Harte, P. Michael Davidson, Svetlana Zivanovic, Jeyamkondan Subbiah and Harshvardhan Thippareddi, University of Nebraska-Lincoln, Lincoln, NE, USA

P2-10 Development of a Rep-PCR DNA Strain-Typing Method for Members of the Genus *Alicyclobacillus* — K. Reece, E. Atkins, T. Ross, S. Abedi, C. Smith, W. Dutch, MARK WISE, J. Embry, S. Frye, M. Healy and P. Rule, Bacterial Barcodes, Inc., Athens, GA, USA

P2-11 Rep-PCR Based Fingerprinting of *Saccharomyces* spp. Used in the Production of Fermented Beverages — E. Atkins, K. Reece, T. Ross, S. Abedi, C. Smith, W. Dutch, M. Wise, J. Embry, S. Frye and M. HEALY, Bacterial Barcodes, Inc., Athens, GA, USA

P2-12 Subclinical Mastitis in Dairy Ewes as a Source of Contamination for Bulk Milk and Cheese — VANESSA M. RALHA, Carlos C. Belo, Manuela E. Pintado and F. Xavier Malcata, Escola Superior de Biotecnologia – Universidade Católica Portuguesa, Porto, Portugal

P2-13 Culture-Dependent and Independent Methods to Monitor the Evolution of Lactic Acid Bacterial Microflora in a Greek PDO Soft Cheese — Dafni-Maria Kagkli, Vassilios Iliopoulos and GEORGE-JOHN E. NYCHAS, Agricultural University of Athens, Athens, Attica, Greece

P2-14 Bacterial Dynamics in Model (Sterile) Portuguese Traditional Cheeses: A Case Study of Food Safety — CLÁUDIA I. PEREIRA, Ana M. P. Gomes and F. Xavier Malcata, Escola Superior de Biotecnologia – Universidade Católica Portuguesa, Porto, Portugal

P2-15 Isolation, Identification, Virulence Tests and Determination of Pathotypes of *Escherichia coli* Isolated from Ricotta Cheese Commercialized in Campinas, São Paulo — Rosimary Turri, Maria-Magali Soares, SILVANA SREBERNICH, Patricia Jacob and Cristiane Soares, Pontificia Universidade Catolica de Campinas, Campinas, São Paulo, Brazil

P2-16 The Prevalence of *Listeria monocytogenes* in Queso Fresco in Sinaloa, Mexico — Cristobal Chaidez, Celida Martinez, Marcela Soto, Natalia Duarte, Jeffrey Call, Anna Porto-Fett, CHRISTOPHER O'CONNOR and John Luchansky, USDA-ARS, Wyndmoor, PA, USA

P2-17 The Behavior of *Listeria monocytogenes* in Butter — B. Lavender, Philip A. VOYSEY, K.J. Bridgwater, L. Watson and P. Anslow, Campden and Chorleywood Food Research Association, Chipping Campden, Gloucestershire, UK

P2-18 DSC Stability of Antibiotic Resistant *Enterococcus* sp. in the Dairy Fermentation Environment — XINHUI LI, Yingli Li, Valente Alvarez, William J. Harper and Hua H. Wang, The Ohio State University, Columbus, OH, USA

P2-19 Microbiological Safety of Iru, Ogi and Kunu-zaki; Three Small-Scale Fermented Foods Sold in Akure Metropolis, Nigeria — OLUWATOSIN IJABADENIYI, Emmanuel Awesu and Oluwatobi Esho, Federal University of Technology, Akure, Nigeria

P2-20 Sensory Evaluation of Probiotic Yogurts and Fermented Milks with an Incomplete Balanced Paired Comparison Design — Emma Mani-López, Enrique Palou and AURELIO LÓPEZ-MALO, Universidad de las Américas, Cholula, Puebla, Mexico

P2-21 Prevalence of *Salmonella* and *Listeria monocytogenes* in Raw, Bulk Tank Milk from United States Dairy Farms — JO ANN S. VAN KESSEL, Jeffrey S. Karns and Jason E. Lombard, USDA-ARS, Beltsville, MD, USA

P2-22 Prevalence of *Escherichia coli* Virulence Factors in Raw Bulk Tank Milk from United States Dairy Farms — JEFFREY S. KARNS, Jo Ann S. Van Kessel and Jason E. Lombard, USDA-ARS, Beltsville, MD, USA

P2-23 Extending Shelf Life by High Pressure Processing — ROSALIND ROBERTSON, Tim Carroll and Lindsay Pearce, Fonterra Research Centre, Palmerston North, New Zealand

P2-24 Effect of Mild Heat Treatment following High Pressure Processing on the Recovery of Pressure-Injured *Listeria monocytogenes* in Milk — SHIGENOBU KOSEKI, Yasuko Mizuno and Kazutaka Yamamoto, National Food Research Institute, Tsukuba, Ibaraki, Japan

P2-25 DSC Phenotypic and Genotypic Analysis of *Staphylococcus* spp. from Raw Bovine Milk in Northeastern Brazil — NARRY TIAO, Lauro Filho, Celso Bruno and Wondwossen A. Gebreyes, The Ohio State University, Columbus, OH, USA

P2-26 Alkaline Phosphatase Detection via Chemiluminescence in 45 Seconds with a One-Step Assay — ROBERT S. SALTER, Charm Sciences Inc., Lawrence, MA, USA

P2-27 Screening for Shigatoxin- and Intimin-Encoding Genes of Enterohemorrhagic *Escherichia coli* and for *Salmonella* on Cattle Carcasses and Beef Products — WALTER HILL, Chad Smith, Hans Richter and Mansour Samadpour, Institute for Environmental Health, Lake Forest Park, WA, USA

P2-28 Influence of Lot Size and Sampling Procedures on the Incidence of *Escherichia coli* O157:H7 Detection in Meat Trim — JOHN A. SCANGA and Mansour Samadpour, Institute for Environmental Health, Lake Forest Park, WA, USA

P2-29 Recovery Efficiency of Total Viable Counts from Beef Carcasses with the Surface Sponge Sampling Method — Mark L. Tamplin, Trenton Seager, Jacinta Simmons, IAN JENSON and John Sumner, Meat and Livestock Australia, North Sydney, New South Wales, Australia

P2-30 Prevalence and Distribution of *Escherichia coli* O157 on Beef Carcasses at Three Slaughter Plants — CORRI L. REKOW, M. F. Miller, J. C. Brooks, G. H. Loneragan and M. M. Brashears, Texas Tech University, Lubbock, TX, USA

P2-31 DSC Survival of *Escherichia coli* O157:H7 in Ground Beef Following Sublethal Heat-Shock and Subsequent Isothermal Cooking — KIMBERLY M. WIEGAND, Steven C. Ingham and Barbara H. Ingham, University of Wisconsin-Madison, Madison, WI, USA

P2-32 Survival of Non-O157:H7 STEC on Beef Tissue Surface Following Spray Treatment with Different Antimicrobials — Stefanie E. Gilbreth, TERESA C. PODTBURG and Peter W. Bodnaruk, Ecolab Inc., Eagan, MN, USA

P2-33 Impact of Slicer Design and Blade Type on Quantitative Transfer of *Listeria monocytogenes* during Slicing of Ham — ZHINONG YAN, Brankica Markovic, Ewen C.D. Todd and Elliot T. Ryser, Michigan State University, East Lansing, MI, USA

P2-34 *Listeria monocytogenes* Growth in Delicatessen Meats Based on Product Formulation, Age and Temperature — LEI ZHANG, Ewen C.D. Todd and Elliot T. Ryser, Michigan State University, East Lansing, MI, USA

P2-35 Control of *Clostridium perfringens* Germination and Outgrowth in "Natural" Turkey Roast by Lemon Juice Concentrate and Vinegar Mixtures — CAROL MARTINEZ, Vijay Juneja, Aida Peña-Ramos, Harshavardhan Thippareddi and Dennis Burson, University of Nebraska, Lincoln, NE, USA

P2-36 Reduction of *Salmonella* in Ground Turkey and Turkey Breasts with a *Lactobacillus*-Based Intervention — ANDREA DOW, Christine Alvarado and Mindy M. Brashears, Texas Tech University, Lubbock, TX, USA

P2-37 Prevalence and Levels Distribution of *Salmonella* spp. from Retail Pork Cuts from Four United States Cities — WILLIAM CENTRELLA, Brian Eblen, Wendy Maduff, Art Miller, Steve Larsen and Wendy Warren-Serna, Food Safety Net Services, San Antonio, TX, USA

P2-38 Minimum Nitrite Levels Required to Inhibit *Listeria monocytogenes* on Ready-to-Eat Turkey Prepared with Lactate and Diacetate — KATHLEEN A. GLASS and Lindsey M. McDonnell, University of Wisconsin-Madison, Madison, WI, USA

P2-39 DSC Efficacy of Chlorine Dioxide against *Listeria monocytogenes* in Brine Solutions — WLADIR B. VALDERRAMA, Edward W. Mills and Catherine N. Cutter, Pennsylvania State University, University Park, PA, USA

P2-40 Evaluation of Spraying a Lactic Acid-Based Antimicrobial Product on the Reduction of *Salmonella* on Broiler Chickens — MANUEL V. ALVARADO, A. Laury, C. Z. Alvarado and M. M. Brashears, Texas Tech University, Lubbock, TX, USA

P2-41 DSC Evaluation of the Reduction of *Escherichia coli* O157:H7 and *Salmonella* spp. by Spraying a Lactic Acid-Based Antimicrobial Product on USDA Select Beef Tips — ANGELA LAURY, Manuel Alvarado, Gary Nace, Chance Brooks and Mindy Brashears, Texas Tech University, Lubbock, TX, USA

P2-42 HACCP Validation for Use of Lactic Acid on Bologna, Ham, and Red Hot Ready-to-Eat Meat and Poultry Products — OMAIMA AHMED, Tom White and F. Ann Draughon, Food Science and Technology, The University of Tennessee, Knoxville, TN, USA

P2-43 Survival of *Campylobacter jejuni* on Sterile and Naturally Contaminated Vacuum-Packed Beef and Pork at Refrigerated Temperatures — BALA SAMPATHKUMAR and Frances M. Nattress, Agriculture and Agri-Food Canada, Lacombe, AB, Canada

P2-44 DSC Effectiveness of Non-Thermal Atmospheric Plasma on Reducing Foodborne Pathogens on Raw Poultry — BRIAN P. DIRKS, Danil Dobrynin, Alexander Gutsol, Yurii Mukhin, Alexander Fridman and Jennifer J. Quinlan, Drexel University, Philadelphia, PA, USA

P2-45 DSC Validation of Ground-and-Formed Beef Jerky Processing Lethality with Commercial Lactic Acid Bacteria Starter Cultures — ALENA G. BOROWSKI, Steven C. Ingham and Barbara H. Ingham, University of Wisconsin-Madison, Madison, WI, USA

P2-46 Validation of Intervention Strategies to Control *Escherichia coli* O157:H7 and *Salmonella* Typhimurium DT 104 in Injected Beef at the Retail Level — ALEJANDRO ECHEVERRY, J. Chance Brooks and Mindy M. Brashears, Texas Tech University, Lubbock, TX, USA

P2-47 DSC Effect of Substrate on Attachment and Subsequent Fate of *Escherichia coli* O157:H7 on Meat-Contact Surfaces — CATHERINE A. SIMPSON, Dimitra Dourou, Yohan Yoon, Keith E. Belk, John A. Scanga, Gary C. Smith and John N. Sofos, Colorado State University, Fort Collins, CO, USA

P2-48 Effect of Temperature, Shear and Substrate on Attachment and Biofilm Formation by *Escherichia coli* O157:H7 on Various Food-Contact Surfaces Encountered in Beef Processing — DIMITRA DOUROU, Catherine A. Simpson, Yohan Yoon, Keith E. Belk, John A. Scanga, Gary C. Smith, Konstantinos Koutsoumanis, George-John E. Nychas and John N. Sofos, Colorado State University, Fort Collins, CO, USA

P2-49 Inactivation of *Escherichia coli* O157:H7 on Raw and Frozen Ground Beef by High Pressure Processing — Elaine P. Black, KIRSTEN A. HIRNEISEN, Dallas G. Hoover and Kalmia E. Kniel, University of Delaware, 044 Townsend Hall, Newark, DE 19711, USA

P2-50 DSC Antilisterial Activities of Salad Dressings without or with Prior Microwave Oven Heating on Frankfurters during Simulated Home Storage — CANGLIANG SHEN, Ifigenia Geornaras, Patricia A. Kendall and John N. Sofos, Colorado State University, Fort Collins, CO, USA

P2-51 Viability of *Listeria monocytogenes* in Artificially Inoculated Turkey Breast Roll Treated with Lauric Arginate and High Hydrostatic Pressure and Stored at 4°C — DEVIN K. DUTILLY, David Manu, Stephanie Jung, Byron Brehm-Stecher and Aubrey Mendonca, Iowa State University, Ames, IA, USA

P2-52 Controlling *Listeria monocytogenes* in Ready-to-Eat Cooked Meats with Lactate or High Pressure Processing — J. DAVID LEGAN, Abdullatif Tay, Dennis L. Seman, Adam C. Borger and Evan J. Turek, Kraft Foods, Glenview, IL, USA

P2-53 DSC Detection and Identification of *Listeria* spp. at Different Processing Stages of Ready-to-Eat Meat Products Sold in Trinidad — STACEY-MARIE SYNE, Adesh Ramsubhag and Abiodun Adesiyun, The University of the West Indies, La Romain, Trinidad

P2-54 Growth and Survival of *Listeria monocytogenes* in German Sausage — MICHLINE BRICE and Clytrice Austin-Watson, Delaware State University, Dover, DE USA

P2-55 Effects of Sodium Lactate, Sodium Citrate, and Sodium Diacetate on Microbiological Quality and Inhibition of *Listeria monocytogenes* in Ready-to-Eat Hams — Karaline A. Poovey, DENNIS E. BURSON, Harshavardhan Thippareddi and Roger W. Mandigo, University of Nebraska, Lincoln, NE, USA

P2-56 DSC Effect of Fat Content on Survival of *Listeria monocytogenes* during Simulated Digestion of Inoculated Beef Frankfurters Stored at 7°C — IOANNA M. BARMPALIA-DAVIS, Ifigenia Geornaras, Patricia A. Kendall and John N. Sofos, Colorado State University, Fort Collins, CO, USA

P2-57 Effectiveness of Bacteriophage to Control the Outgrowth of *Listeria monocytogenes* on the Surface of Frankfurterers — Jeffrey E. Call, Anna Porto-Fett and JOHN B. LUCHANSKY, USDA-ERRC, Wyndmoor, PA, USA

P2-58 Cytotoxicity and Genotypic Characterization of *Campylobacter jejuni* Isolated from Poultry Products — VANIJA KALLUR and LEONARD L.WILLAMS, Alabama A&M University, Normal, AL, USA

P2-59 Effects of Heat Treatment and Freezing Stress on Survival of *Arcobacter butzleri* Isolated from Chicken — Min Hwa Lee, Kang-Bum Lee and CHANGSUN CHOI, Chung-Ang University, Ansung, Kyounggi, South Korea

P2-60 Growth of *Escherichia coli* O157:H7 and *Salmonella* Typhimurium during the Fermentation of Korean Kim-chi Supplemented with Pork Meat — Min Hwa Lee, Kang-Bum Lee and CHANGSUN CHOI, Chung-Ang University, Ansung, Kyounggi, South Korea

P2-61 DSC Processing Conditions Associated with *Salmonella* Contamination of Pork Carcasses in Very Small Wisconsin Slaughter Plants — RYAN J. ALGINO, Gene A. Badtram, Barbara H. Ingham and Steven C. Ingham, University of Wisconsin-Madison, Madison, WI, USA

P2-62 Serotypes, Intimin Variants and Other Virulence Factors of *eae*-positive *Escherichia coli* Isolated from Pigs and Sheep at Slaughter — CLAUDIO ZWEIFEL, Erik Fröhlicher, Gladys Krause, Lothar Beutin and Roger Stephan, Institute for Food Safety and Hygiene, Vetsuisse Faculty University of Zurich, Zurich, Switzerland

P2-63 *Campylobacter* Transmission Routes in Broiler Flocks on Selected Poultry Farms in Switzerland — CLAUDIO ZWEIFEL, Kathrin D. Scheu, Michaela Keel and Roger Stephan, Institute for Food Safety and Hygiene, Vetsuisse Faculty University of Zurich, Zurich, Switzerland

P2-64 Predictive Model For Growth of *Clostridium perfringens* during Cooling of Cooked Ground Chicken — VIJAY JUNEJA, Harry Marks and Harshavardhan Thippareddi, USDA-ARS-ERRC, Wyndmoor, PA, USA

P2-65 DSC The Survival of *Salmonella* during Frozen Storage and Microwave Cooking of Chicken Products — SILVIA A. DOMINGUEZ and Donald W. Schaffner, Rutgers University, The State University of New Jersey, New Brunswick, NJ, USA

P2-66 DSC Validation of a 2% Lactic Acid Antimicrobial Rinse as an Alternative to Chlorine for Mobile Poultry Slaughter Operations — ADITI KANNAN, Andy Bary, Craig Cogger and Karen Killinger, Washington State University, Pullman, WA, USA

P2-67 DSC Effect of Kosher Salt Application on Microbial-Profiles of Poultry Carcasses —GRIHALAKSHMI KAKANI, Veronica Molina, Marcos X. Sanchez-Plata and Joe M. Regenstein, Texas A&M University, College Station, TX, USA

P2-68 Prevalence and Antimicrobial Resistance of *Salmonella* Isolated from Retail Meat: National Antimicrobial Resistance Monitoring System (NARMS): 2002–2006 — SHAOHUA ZHAO, Althea Glenn, Sharon L. Friedman, Jason W. Abbott, Sherry Ayers, Elvira Hall-Robinson and P. F. McDermott, FDA, Laurel, MD, USA

P2-69 DSC Thermal Inactivation of *Salmonella* Enteritidis in Egg Constituents by Traditional Processing and in In-Shell Eggs by Microwave Processing — M. K. BADVELA, C. Rodriguez, A. Rehkopf, E. Patazca, G. Fleischman and C. Stewart, National Center for Food Safety and Technology, Summit, IL, USA

P2-70 DSC Effect of Ozone Concentration on Inactivation of *Salmonella enterica* Serovar Enteritidis in Shell Eggs by Sequential Application of Heat and Ozone — JENNIFER PERRY, Luis Rodriguez-Romo and Ahmed Yousef, The Ohio State University, Columbus, OH, USA

P2-71 Evaluation of Glass Capillary Tube and TDT Disk Methods for Determining Thermal Inactivation Kinetics of *Salmonella* in Liquid Whole Egg — JOSHUA B. GURTLER, Howard Q. Zhang, Lei Zhang, Elliot T. Ryser and Jayne Stratton, USDA-ARS-ERRC, Wyndmoor, PA, USA

P2-72 Occurrence of *Campylobacter* in Commercially Shelled Liquid Egg in Japan — MIKI SATO and Nobuhiro Sashihara, R&D Div. of Q. P. Corporation, Tokyo, Japan

TUESDAY MORNING AUGUST 5

SYMPOSIA • 8:30 a.m. – 12:00 p.m.

S8 Validating Processes for Reducing *Salmonella* in Low Water Activity Foods
Delaware A-D
Organizers: Linda J. Harris and Paul A. Hall
Convenors: Linda J. Harris and Paul A. Hall

8:30 *Salmonella* — Factors Affecting Resistance to Heat — LINDA J. HARRIS, University of California–Davis, Dept. of Food Science and Technology, Davis, CA, USA

9:00 Factors to Consider in Modeling Thermal Inactivation — BRADLEY P. MARKS, Michigan, State University, Biosystems Engineering, Davis, CA, USA

9:30 Surrogate Selection Strategy — GUANGWEI HUANG, Almond Board of California, Modesto, CA, USA

10:00 Break

10:30 Translating Laboratory Data to Equipment Validation — ERDAL TUNCAN, ConAgra Foods, Inc., Omaha, NE, USA

11:00 *Salmonella* – Factors Affecting Resistance to Non-Thermal Processes — JOHN W. LARKIN, Food and Drug Administration, Summit-Argo, IL, USA

11:30 Panel Discussion

S9 Advancements in Retail Food Safety
Franklin A-C
Sponsored by the IAFP Foundation
Organizers: Donna Garren, Alejandro Mazzotta and Frank Yiannas
Convenor: Frank Yiannas

8:30 Supply Chain Collaboration: Efforts to Harmonize Supplier Standards and Audits — DONNA GARREN, National Restaurant Association, Washington, D.C., USA

9:00 Norovirus Control at Retail — KATIE SWANSON, Ecolab Inc., St. Paul, MN, USA

9:30 Getting the Most Out of Retail Inspections — ALEJANDRO MAZZOTTA, McDonald's Corporation, Oak Brook, IL, USA

10:00 Break

10:30 Consumer Attitudes to Food Safety Events – The Retailers Role in Rebuilding Consumer Confidence — JOHN HANLIN, SUPERVALU, To be determined

11:00 Developments in Food Allergy Consumer Perspectives — ANNE MUNOZ-FURLONG, FAAN Founder, Fairfax, VA, USA

11:30 Panel Discussion

S10 From Fish to Table
Union D-E
Organizer: Kathleen Rajkowski
Convenors: Beilei Ge and Kathleen Rajkowski

8:30 Seafood: Balancing the Risks with the Benefits — CHARLES R. SANTERRE, Purdue University, Dept. of Foods and Nutrition, West Lafayette, IN, USA

9:00 To Cook or Not to Cook — DORIS T. HICKS, University of Delaware, College of Marine Studies, Lewes, DE, USA

9:30 Harvesting — Safety in the Filleting Industry — GEORGE J. FLICK, JR., Virginia Tech, Blacksburg, VA, USA

10:00 Break

10:30 Shipping — Temperature Abuse, Packaging, Etc. — PETER HIBBARD, Darden Restaurants Inc., Oviedo, FL, USA

11:00 Point of Sale (Retail) — GALE PRINCE, Retired-Director, Corporate Regulatory Affairs, Cincinnati, OH, USA

11:30 Safety in the Home — ANTHONY O. FLOOD, International Food Information Council, Washington, D.C., USA

S11 Best Practices in Global Food Export and Import
Franklin D
Organizers: Ewen Todd, Hudaa S. Neetoo and Ivan J. Nastasijevic
Convenors: Agnes G. Tan, Catherine A. Simpson and Hudaa S. Neetoo

8:30 Equivalence and International Comparison of Food Safety Systems — WHO Perspective — ROBERT L. BUCHANAN, DHHS/FDA/CFSAN, College Park, MD, USA

9:00 EU Food Import Management — WOLF MAIER, European Commission Delegation, Washington, D.C., USA

9:30 Multinational Companies and Import of Food-stuffs — Traceability and Sourcing — LEON G.M. GORRIS, Unilever, Sharnbrook, England

10:00 Break

10:30 International Food Export: Experience from Brazil — SUELY M.K. NAKASHIMA, Sadia Foods GmbH, Frankfurt, Hessen, Germany

11:00 Consumer Perception on Imported Foods — CAROLINE SMITH-DEWAAL, Center for Science in the Public Interest, Washington, D.C., USA

11:30 Global Food Trade Issues: Smuggling and Counterfeit — JOHN SPINK, Michigan State University, Okemos, MI, USA

ROUNDTABLE • 8:30 a.m. – 10:00 a.m.

RT4 Global Perspectives and Novel Approaches for Effective Food Safety Communication within Culturally Diverse Audiences
Union A-C
Sponsored by the IAFP Foundation
Organizers: Renee Boyer, Christine M. Bruhn, Benjamin Chapman and Tony Flood
Convenors: Renee Boyer and Benjamin Chapman

8:30 Challenges Associated with Delivering Effective Food Safety Education within Culturally Diverse Groups — VINCENT FASONE, Columbus Public Health, Columbus, OH, USA

8:45 Using Children to Collect Information and Convey Messages — DAVID MCCLEERY, Food Safety Promotion Board, Eastgate, Cork, Ireland

9:00 Using Cultural Perspectives to Enhance Food Safety Practices — PHILPPA ROSS-JAMES, New Zealand Food Safety Authority, Wellington, New Zealand

9:15 Reaching Consumers in an Asian Environment — HELEN YU, Asian Food Information Centre, Bangkok, Thailand

9:30 Roundtable Discussion

INTERACTIVE SESSION 8:30 a.m. – 5:00 p.m.

The Sequel to the Mystery Outbreak – What to Do When It Happens to You!
Morrow
Organizers: Sherry McGarry, Michael Roberson, Thilde Peterson and Greg Bear
Convenors: Sherry McGarry, Thilde Peterson, Ewen Todd, Christopher Griffith and Agnes G. Tan

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

TECHNICALS • 8:30 a.m. – 12:00 p.m.

T4 Risk Assessment and Produce Technical Session
Fairfield
Convenors: To be determined

T4-01 8:30 A Chain Modeling Approach to Estimate the Impact of Soil Cadmium Pollution on Human Dietary Exposure — EELCO FRANZ, Paul Römkens and Ine van der Fels-Klerx, RIKILT – Institute of Food Safety, Wageningen University and Research Centre, Wageningen, The Netherlands

T4-02 8:45 Risk-Based Sampling for Foodborne Pathogens — A Probabilistic Algorithm for *Escherichia coli* O157:H7 Sampling of the Federally Inspected Ground Beef Supply — Wayne Schlosser and JAMES WITHEE, USDA, Alameda, CA, USA

T4-03 9:00 Risk Assessment for Thermal Inactivation of *Salmonella* spp. in Fresh Pork — Nga Tran, Leila Barraj, ARTHUR MILLER, Brian Eblen and Steve Larsen, Exponent, Inc., Bowie, MD, USA

T4-04 9:15 Evaluating the Safety of Eggs — Duncan Craig, Ben Daughtry and DEON MAHONEY, Food Standards Australia New Zealand, Canberra, Australia

T4-05 9:30 DSC Predictive Modeling of *Listeria moncytogenes* Reduction on Fully-Cooked Chicken Drums during Post-Process Hot Water Pasteurization — MIN LI, L. Cooney, A. Pradhan and Y. Li, University of Arkansas, Fayetteville, AR, USA

T4-06 9:45 Development of a Predictive Model for the Growth of *Listeria monocytogenes* in Pasteurized Vanilla Cream and Validation under Dynamic Temperature Storage Conditions — Efstathios Z. Panagou, Niki Fasoulaki and GEORGE-JOHN E. NYCHAS, Agricultural University of Athens, Athens, Attica, Greece

10:00 Break

T4-07 10:30 Combined Effects of Sucrose Laurate Ester and Pressure-Assisted Thermal Processing to Inactivate *Bacillus amyloliquefaciens* Spores Suspended in Mashed Carrots — SILVIA De Lamo-Castellvi, W. Ratphtagsanti, V.M. Balasubramaniam and A.E. Yousef, The Ohio State University, Columbus, OH, USA

T4-08 10:45 The Role of Nutrients and Biodiversity in Controlling *Escherichia coli* O157:H7 in the Primary Production Chain of Lettuce — EELCO FRANZ, Alexander V. Semenov and Ariena H.C. van Bruggen, RIKILT – Institute of Food Safety, Wageningen University and Research Centre, Wageningen, The Netherlands

T4-09 11:00 Survival and Dispersal of Surrogate *Escherichia coli* under Lettuce Field Conditions: Effect of Irrigation — Michael Cahn, Elena de Castro, Carol D'lima, Steven Koike, Adrian Sbodio and TREVOR SUSLOW, University of California–Davis, Davis, CA, USA

T4-10 11:15 Growth of *Escherichia coli* O157:H7 on Commercially Packaged Fresh-Cut Salads — YAGUANG LUO, James McEvoy, Qiang He, Lin Shen, Ivana Vico and William Conway, USDA-ARS, Beltsville, MD, USA

T4-11 11:30 DSC Glo Germ as a Cross-Contamination Indicator during Processing of Leafy Greens — ANNEMARIE L. BUCHHOLZ, Zhinong Yan and Elliot T. Ryser, Michigan State University, East Lansing, MI, USA

T4-12 11:45 Evaluation of the Sensitivity and Specificity of Rapid Test Kits for Detection of Pathogenic *Escherichia coli* O157:H7 from Lettuce and Leafy Greens — CAROL D'LIMA, Elena de Castro and Trevor Suslow, University of California–Davis, Davis, CA, USA

POSTERS • 9:30 a.m. – 1:30 p.m.

P3 Applied Laboratory Methods, Education and Epidemiology Poster Session
Exhibit Hall
9:30 a.m.–1:30 p.m.
Authors present 10:00 a.m.–12:00 p.m
Convenors: To be determined

P3-01 Innovative Strategies to Enhance Food Safety in the Hospitality Industry in Dubai — BOBBY KRISHNA MUKUNDAN, Basheer Yousif and Yousef Al-Rashid, Dubai Municipality, Dubai, UAE

P3-02 Comparison of Sample Processing Methods for Detection of Staphylococcal Enterotoxin B by an Electrochemiluminescence (ECL) Immuno-Based Assay — CAROLYN F. MARINO, Brandon C. Speight, Stephanie Heersink, Randall K. Phebus and Richard D. Oberst, Kansas State University, Manhattan, KS, USA

P3-03 Validation of Sample Compositing for Detection of *Escherichia coli* O157:H7 from Spinach in Conjunction with Traditional and Rapid Methods — LESLIE K. THOMPSON, Brian Kupski, Jeanette Franklin, Stephanie Sowell, Rebecca Adams and Mark Carter, Silliker, Inc., South Holland, IL, USA

P3-04 Evaluation of BD Bacto™ Tryptic Soy Broth and Difco™ EC Medium, Modified for the Qualitative Detection of *Escherichia coli* O157:H7 in Beef Trims When Tested with Commercial Test Kits — LESLIE K. THOMPSON, Brian J. Kupski and Mark W. Carter, Silliker, Inc., South Holland, IL, USA

P3-05 Evaluation of a Molecular Beacon Based Real-Time PCR Test for Detection of *Salmonella* spp. in Selected Foods from a Single Primary Enrichment — LESLIE K. THOMPSON, Brian Kupski and Jeanette Franklin, Silliker, Inc., South Holland, IL, USA

P3-06 Comparison of a Novel Sample Collection Device and Buffer with a Cellulose Sponge for the Collection and Detection of *Listeria*, Using the USDA-FSIS Culture Method — STEPHEN VARKEY, Daniel R. DeMarco and Daniel Delduco, DuPont Qualicon, Wilmington, DE, USA

P3-07 Effect of Time, Temperature, and Neutralizing Media on the Recovery of Aerobic and Coliform Bacteria from Environmental Sponges — Benjamin R. Warren, CHRISTIE M. HANCOCK and Erdal U. Tuncan, ConAgra Foods, Inc., Omaha, NE, USA

P3-08 Novel System for the Detection of Indicator Organisms in Swabs and UHT Products — RUTH F. EDEN, BioLumix, Inc., Ann Arbor, MI, USA

P3-09 Comparison of Swiffer® Wipes and Conventional Drag Swab Methods in the Recovery of *Salmonella* from Swine Production Environment — BAYLEYEGN MOLLA ZEWDE, Melanie J. Abley, Brandon House, W.E. Morgan Morrow, Rebecca Robbins and Wondwossen A. Gebreyes, The Ohio State University, Columbus, OH, USA

P3-10 Manual Excision vs. Surface Sampling Device – A Comparison of Methods for the Microbiological Sampling of Raw Ground Beef Components — JARRET D. STOPFORTH, John A. Scanga, Balasubrahmanyam Kottapalli and Mansour Samadpour, Institute for Environmental Health, Lake Forest Park, WA, USA

P3-11 Validation to EN ISO 16140 of a New Rapid Culture-Based *Salmonella* Detection Method — ALASTAIR THOMAS, James Stringer, Danièle Sohier and Maryse Rannou, Thermo Fisher Scientific, Basingstoke, Hampshire, UK

P3-12 Comparison of Enrichment Media for Recovery of *Escherichia coli* O157:H7 from Meat and Environmental Samples — SARAH JOHNSON and John Luchansky, USDA-ARS, Athens, GA, USA

P3-13 Increased Levels of Lithium Chloride in Growth Media Eliminates the Growth of *Enterococcus* spp. during Recovery of *Listeria* spp. from Environmental Samples — Travis Steiner and LAWRENCE GOODRIDGE, Colorado State University, Fort Collins, CO, USA

P3-14 Comparison of Supplements to Enhance the Recovery of Thermally-Injured *Salmonella* from Liquid Egg White — JOSHUA B. GURTLER and Jeffrey L. Kornacki, USDA-ARS-ERRC, Wyndmoor, PA, USA

P3-15 DSC Comparison of Selective Media for Detection of *Escherichia coli* O157:H7 in Ground Beef and Radish Sprout — JAE-HOON LEE, Ji-Yeon Hyeon, Kwang-Young Song, In-Gyun Hwang, Hyo-Sun Kwak and Kun-Ho Seo, Konkuk University, Gwangjin-gu, Seoul, Korea

P3-16 Efficacy of a Chromogenic Plating Medium for Detecting *Listeria* Species from Environmental Samples — RICHARD SWIECH, Lawrence Restaino, Elon W. Frampton, William C. Lionberg and Anthony L. Restaino, R & F Laboratories, Downers Grove, IL, USA

P3-17 Recovery of *Listeria monocytogenes* from Pasteurized Liquid Egg Products — MARK PRATT, Lorenza Rozier, Jr., Mary Niemann, John Jarosh, Pam Rappolee, Warren Wong, Neelam Narang, Cathy Pentz, Victor Cook and Evelyne Mbandi, USDA-FSIS-OPHS-Midwestern Laboratory, St. Louis, MO, USA

P3-18 Comparison of Four Compact Dry Plate Methods against Standard (ISO) Methods for the Enumeration of *Enterobacteriaceae*, Coliforms and *Escherichia coli* in Foods during a MicroVal EN ISO 16140 Validation — CHRISTOPHER L. BAYLIS, Rebecca A. Green, Keith Jewell, Farinaz Monadjemi and Roy P. Betts, Campden and Chorleywood Food Research Association, Chipping Campden, Gloucestershire, UK

P3-19 Evaluation of ChromID *sakazakii* Medium (ESPM) for the Recovery of *Enterobacter sakazakii* from Several Food and Environmental Samples — JM. ROCHE, I. Desforges, L. Restaino and F. Villeval, bioMérieux, Inc., Salins, France

P3-20 Suitability of Modified Eosin Methylene Blue Agar for Recovering Heat-Injured *Escherichia coli* O157:H7 and *Salmonella* Serovars from Cooked Meat Products — Kimberly G. Wiegand, ALENA G. BOROWSKI, Steven C. Ingham and Barbara H. Ingham, University of Wisconsin-Madison, Madison, WI, USA

P3-21 Comparison of Eosin Methylene Blue Agar with Other Selective Media for the Isolation and Presumptive Identification of *Escherichia coli* — JI HYUN JUNG, Kyung Hee You, Hye Won Shin and Kang Pyo Lee, CJ Cheiljedang Corp., Seoul, Korea

P3-22 The Application of Immunomagnetic Separation in Combination with ALOA *Listeria* Chromogenic Agar for the Isolation and Identification of *Listeria monocytogenes* in a Variety of Foods — CARLOS G. LEON-VELARDE, Nathan Larson and Joseph A. Odumeru, Laboratory Services Division, Guelph, ON, Canada

P3-23 DSC Addressing Potential Contaminants in Soil for the Study of Pathogenic *Escherichia coli* O157 and O8 Strains — ANDREA LAYCOCK, Manan Sharma and Kali Kniel, University of Delaware, Newark, DE, USA

P3-24 Comparison of Colony Lysis Procedures for *Listeria monocytogenes* PCR — JACQUELINE P. UPHAM, Allana N. Loder and Carmel R. Young, Canadian Food Inspection Agency, Dartmouth, NS, Canada

P3-25 A Highly Sensitive Real-Time PCR Assay for the Detection and Identification of *Campylobacter jejuni* from Retail Broiler Samples — LIN LIU and Omar A. Oyarzabal, Auburn University, Auburn, AL, USA

P3-26 Validation of a PCR-Based Protocol for the Rapid Detection of *Salmonella* from Environmental Surfaces — VIVIANA FINO, Jack Janes, Andrew D. Farnum, Shawn Gartisde and Morgan Wallace, DuPont Qualicon, Wilmington, DE, USA

P3-27 Multiplex Ready-to-Use PCR Assays for the Detection of STEC and the Identification of EHEC — Sylvie Hallier-Soulier, Patrick Fach and Lothar Beutin, GeneSystems, Centre d'affaires CICEA, Bruz, France

P3-28 PATHATRIX Recirculating Immunomagnetic Separation – A Unique and Versatile System for the Rapid Detection of Foodborne Pathogens in Leafy Produce, Herbs and Spices — John Murray, Nicole Prentice, Paul Benton, Katarzyna Brzegowa, Brooke Houston, Marcie van Wart, Michael F. Scott and ADRIAN PARTON, Matrix MicroScience Ltd., Newmarket, Cambs, UK

P3-29 DSC MPN Determination of *Salmonella* Levels in Naturally-Contaminated Raw Almond Kernels with Two Sample Preparation Methods and Comparison of the Isolates Using Pulsed Field Gel Electrophoresis — ANIKA SINGLA and Linda J. Harris, University of California–Davis, Davis, CA, USA

P3-30 Detection of the *Escherichia coli* FLICh7 Gene with Real-Time PCR — NEELAM NARANG, Pina M. Fratamico, Glenn Tillman, Kitty Pupedis and William C. Cray, Jr., USDA-FSIS-OSEL, Athens, GA, USA

P3-31 Effective Procedures Independent of Serotype to Detect Shiga Toxin-Producing *Escherichia coli* and Surveillance on Beef — YUKIKO HARA-KUDO, Jun Niizuma, Ikuo Goto, Shinji Iizuka, Yoshifumi Kaji, Kazumasa Kamakura and Sosuke Suzuki, National Institute of Health Sciences, Tokyo, Japan

P3-32 DSC Sensitive and Direct Detection of *Salmonella enterica* in Chicken Rinse by Combined Immunomagnetic Separation (IMS) and Quantitative Real-Time PCR (qPCR) with an Internal Amplification Control (IAC) — HARI PRAKASH DWIVEDI, R. Derike Smiley, Helen Rawsthorne and Lee-Ann Jaykus, North Carolina State University, Raleigh, NC, USA

P3-33 Modeling the Responses of *Lactobacillus paracasei* and *Enterobacter aerogenes* in a Gel Cassette System — Chrysoula C. Tassou, Eleni Langou, Eleftherios Saravanos, GEORGE-JOHN E. NYCHAS and Efstathios Z. Panagou, Agricultural University of Athens, Athens, Attica, Greece

P3-34 Highly Specific and Sensitive Detection of *Escherichia coli* O157:H7 with Real-Time PCR — LILY WONG, Paolo Vatta, Priya Balachandran, Robert Tebbs, Pius Brzoska, Craig Cummings, Manohar Furtado and Olga Petrauskene, Applied Biosystems, Foster City, CA, USA

P3-35 Development of a Rapid Detection Method for *Listeria* with Idaho Technology's R.A.P.I.D.® LT System in Soft Cheese and Deli Meat, and on Environmental Surfaces — ELIJAH POWELL, Traci Hayes, Derek Edvalson, Haleigh Millward, Vivian Ngan-Winward, Mike Powers and Stephanie Thatcher, Idaho Technology, Inc., Salt Lake City, UT, USA

P3-36 Evaluation of Idaho Technology's R.A.P.I.D.® LT *Salmonella* Food Security System in Select Foods — Stephanie Thatcher, ELIJAH POWELL, Daymon Swenson, Haleigh Millward, Vivian Ngan-Winward and Mike Powers, Idaho Technology, Inc., Salt Lake City, UT, USA

P3-37 Withdrawn

P3-38 Comparison of Detection Methods and Their Sensitivity in Identifying and Quantifying *Escherichia coli* O157 Isolated from Beef Carcasses and Hides — CORRI L. REKOW, M. F. Miller, J. C. Brooks, G. H. Loneragan and M. M. Brashears, Texas Tech University, Lubbock, TX, USA

P3-39 DSC Comparative Evalution of Three Selective Media and Automated ELISA Method for Detection of *Campylobacter jejuni* in Ground Beef — JEONG-HWAN CHEON, Ji-Yeon Hyeon, Kwang-Young Song, Jong-Seok Park, Seok Heo and Kun-Ho Seo, Konkuk University, Seoul, Korea

P3-40 The Use of Feline Calicivirus as an Internal Control for the Detection of Hepatitis A Virus with the Pathatrix System VANESSA MORTON, Michelle Driscoll, Kirsten Mattison, Sabah Bidawid and Jeff Farber, Health Canada, Ottawa, ON, Canada

P3-41 Inclusivity of Three Immunomagnetic Beads for Forty Strains of *E. coli* O157 — K. J. Yoshitomi, S. D. Weagant, C. N Wendakoon, C. Carrillo, K. C. Jinneman, R. Zapata, P. Browning and WILLIS M. FEDIO, New Mexico State University, Las Cruces, NM, USA

P3-42 Development of Immunochromatography Test Strip Containing Monoclonal Antibody for Rapid Detection of Ochratoxin A in White Rice — Ju-Mi Choe, WON-BO SHIM, Yohan Yoon and Duck-Haw Chung, Gyeongsang National University, Division of Applied Life Science, Jinju, Gyeongnam 660-701, South Korea

P3-43 An Independent Comparative Evaluation of the TEMPO® EB for the Enumeration of *Enterobacteriaceae* In Foods — ERIN CROWLEY, Patrick Bird, Meghan McDonough, James Agin and David Goins, Q Laboratories, Inc., Cincinnati, OH, USA

P3-44 A Comparison of the bioMérieux TEMPO® EC Method to the Petrifilm™ *Escherichia coli*-Coliform Count Plate Method (MFHPB-34) for the Enumeration of *Escherichia coli* from Food Products — José Riva, Josée Houle, Karine Seyer, STÉPHANIE BONNEAU and Bérengère Genest, bioMérieux Canada Inc., St-Laurent, QC, Canada

P3-45 Performances of the TEMPO® STA Method in Comparison with Conventional Plate Count Method for Enumeration of *Staphylococcus aureus* in Food Samples — AURELIEN COSTA, Frederic Derepas, Christophe Meunier, Sophie Cagnes, Christine Vivier, Sonia Chattellier and Raffaella Giardino, bioMérieux, Inc., La Balme les Grottes, France

P3-46 Evaluation of a New Automated Lactic Acid Bacteria Method for Enumeration in Food Products Using the TEMPO® System — GREGORY DEVULDER, Cidem Ilter and Audrey Maingue, bioMérieux SA, Marcy-l'Etoile, France

P3-47 Evaluation of a New Method for the Enumeration of *Enterobacteriaceae* in Foods — JUDITH COLÓN-REVELES, John Mills, Darla Pyse, Linette Beiner, Mary Beth Anheuser, Ronald Johnson and Gregory Devulder, bioMérieux, Inc., Hazelwood, MO, USA

P3-48 Evaluation of a New Method for the Enumeration of Coliforms in Foods JOHN MILLS, Judith Colón-Reveles, Darla Pyse, Linette Beiner, Ronald Johnson and Gregory Devulder, bioMérieux, Inc., Hazelwood, MO, USA

P3-49 DSC Binding Characterization of *Listeria* Adhesion Protein from Different *Listeria* Species to Its Eukaryotic Receptor Hsp60 with a Surface Plasmon Resonance Biosensor — BALAMURUGAN JAGADEESAN and Arun K. Bhunia, Purdue University, West Lafayette, IN, USA

P3-50 DSC Chromatographic Method for Monitoring of Patulin in Fruit Juices Produced in South Korea — EUNKYOUNG SEO, Kyeongyeol Kim, Hyo-Won Lee and Duck-Hwa Chung, Gyeongsang National University, Jinju, Gyeongnam, South Korea

P3-51 Advantages of Bacteriophage in Conventional Selective Agars for the Isolation of *Salmonella* — VERAPAZ GONZALEZ, Meredith Sutzko, Mark Muldoon and Michael Brown, Strategic Diagnostics Inc., Newark, DE, USA

P3-52 DSC Impact of Growth Phase, Chemicals and Food Matrices on Bacterial Differentiation Using FTIR Spectroscopy — VERA PETROVA, Catherine Donnelly, Giuseppe Petrucci and Kenneth Puzey, University of Vermont, Burlington, VT, USA

P3-53 DSC Insight into Asian and Hispanic Restaurant Managers' Needs for Safe Food Handling — OMAR NIODE and Christine Bruhn, University of California–Davis, Davis, CA, USA

P3-54 Promoting Science-Based Home Food Preservation Learning for Adult Consumers through the Use of Online Educational Tools — ELIZABETH ANDRESS, Elaine D'Sa, James Hansen, Judy Harrison and Mark Harrison, The University of Georgia, Athens, GA, USA

P3-55 When Do Dieticians and Nurses Provide Food Safety Information to High Risk Populations? — JANET BUFFER, Lydia Medeiros, Wei Yuan, Pat Kendall and John Sofos, The Ohio State University, Columbus, OH, USA

P3-56 Food Safety Practices and Educational Needs of Dietary Managers in Nursing Care Facilities — PATRICIA KENDALL, Lydia Medeiros, Mary Schroeder, Wei Yuan and John Sofos, Colorado State University, Fort Collins, CO, USA

P3-57 Preparation and Storage of Reconstituted Powdered Milk Formula: Caregiver Perspectives — ELIZABETH C. REDMOND and Christopher Griffith, University of Wales Institute, Cardiff, Food Research and Consultancy Unit, Western Ave., Cardiff, South Glamorgan CF52YB, Wales, UK

P3-58 DSC Characterization of Food Safety Knowledge and Behaviors of Adolescents — ASHLEY PEDIGO, Jennifer Richards, Arnold Saxton and Ann Draughon, University of Tennessee, Knoxville, TN, USA

P3-59 Food Safety Labels and Education for Meals-on-Wheels Participants — JULIE A. ALBRECHT and Sarah E. Purcell, University of Nebraska-Lincoln, Lincoln, NE, USA

P3-60 Successful Listeriosis Prevention Continuing Education Seminars for Health Professionals Working with Pregnant Women — MARY SCHROEDER, Patricia Kendall and John Sofos, Colorado State University, Fort Collins, CO, USA

P3-61 An Evaluation of the Technical Development Programs and Training Needs of Food Manufacturers — DAVID LLOYD, Helen Taylor and John Sweeting, University of Wales Institute, Cardiff, Cardiff, Wales, UK

P3-62 A Pilot Study of the Conference for Food Protection's Proposed Model for Training and Standardizing Food Safety Inspection Officers in Retail Food Regulatory Agencies — DAVID MCSWANE and John Marcello, Indiana University, Indianapolis, IN, USA

P3-63 DSC Analyzing the Social Costs of Food Safety Failures — MEEBOK KIM and Neal Hooker, The Ohio State University, Columbus, OH, USA

P3-64 DSC A Socio-Psychological Model Applied to the Implementation of Food Safety Management Systems — BRITA BALL, Anne Wilcock and May Aung, University of Guelph, Guelph, ON, Canada

P3-65 Determining The Level of Compliance with Legal Traceabilty Requirements — GORDON HAYBURN and Andrew Clarke, The Tetley Group Limited, Greenford, Middlesex, UK

P3-66 DSC Risk Communication and the Lessons Learned from the 2007 Melamine Associated Outbreak: Potential Food Safety Benefits — STELLA OPENDI SASANYA, Margaret Khaitsa and Robert Littlfield, North Dakota State University, Fargo, ND, USA

P3-67 Good Agricultural Practices Online Produce Safety Course — ELIZABETH A. BIHN and Robert B. Gravani, Cornell University, Geneva, NY, USA

P3-68 An International Comparison of Food Safety Programs in the Fresh Produce Industry — ALBERT F. CHAMBERS and Sally Rutherford, Monachus Consulting, Ottawa, ON, Canada

P3-69 Evidence for Implicating Food Vehicles in Outbreaks, 1998–2006 — HEENA B. JOSHI, Tracy Ayers, Mike Lynch and Ian Williams, CDC, Atlanta, GA, USA

P3-70 Epidemiology of Seafood-Associated Outbreaks in the United States, 1973– 2006 — TRACY AYERS, Martha Iwamoto, David Swerdlow and Ian Williams, CDC, Atlanta, GA, USA

P3-71 Food Commodities Associated with *Salmonella* Outbreaks, 1998–2006 — TRACY AYERS, Mike Lynch and Ian Williams, CDC, Atlanta, GA, USA

P3-72 Enteric Disease Outbreaks Associated with Fairs and Festivals, 1998–2006 — STEPHANI GRAY, Tracy Ayers, Jonathan Yoder, Robert Tauxe and Michael Lynch, CDC, Atlanta, GA, USA

P3-73 Contributing Factors Identified in Outbreaks from CDC's National Electronic Foodborne Outbreak Reporting System, FoodNet Sites, 2006 — IDA ROSENBLUM, Alicia Cronquist, Quyen Phan, Kirsten Larson, David Nicholas, Patrick McCarthy, Mary Patrick and Timothy F. Jones, CDC, Atlanta, GA, USA

P3-74 Invasive *Salmonella* Infections in the United States, 1996–2006 — KELLY JACKSON, M. Iwamoto and D. Swerdlow, CDC, Atlanta, GA, USA

P3-75 Estimation of the Burden of Diarrheal Diseases in Miyagi Prefecture, Japan, 2005–2006 — KUNIHIRO KUBOTA, Emiko Iwasaki, Shunichi Inagaki, Tomomi Nokubo, Yoshiharu Sakurai, Mayumi Komatsu, Koshi Abe, Masanori Kumagai, Miyako Oguro, Hajime Toyofuku, Fumiko Kasuga, Frederick J. Angulo, Elaine Scallan and Kaoru Morikawa, National Institute of Health Sciences, Tokyo, Japan

P3-76 Assessing Food Safety Trends in Mexican Food — WENDY FRANCO, Kimberly M. Evans and Amarat Simonne, University of Florida, Gainesville, FL, USA

P3-77 Microbiological Quality of Eggs in Six States of Mexico — C. Aguilar, B. L. Álvarez-Mayorga, J. Castro-Rosas, T. S. Cid-Pérez, S. Garcia, N. Heredia, MONTSERRAT H. ITURRIAGA, M. E. Hernández, G.V. Nevarez-Moorillón, F. Tejeda-Trujillo and J. M. Ventura-Sobrevilla, Universidad Autonoma de Queretaro, Querétaro, Mexico

P3-78 Establishing a Rep-PCR DNA Fingerprinting Library for *Escherichia coli* — W. Dutch, K. Reece, T. Ross, E. Atkins, S. Abedi, C. Smith, J. Embry, S. Frye, MARK WISE and M. Healy, Bacterial Barcodes, Inc.,Athens, GA, USA

IAFP Business Meeting • 12:15 p.m. – 1:00 p.m.

Union A-C

- Welcome and Introduction
  Stan Bailey, President-Elect
- Moment of Silence
  Gary Acuff, President
- Call to Order
  Gary Acuff, President
- Minutes of the 2007 Business Meeting
  Gary Acuff, President
- President's Report
  Gary Acuff, President
- Report of Committees
  Tellers, *Mindy Brashears*
  JFP Management, *Mark Harrison*
  FPT Management, *Jinru Chen*
  Foundation, *Gale Prince*
- Report of the Affiliate Council
  Carl Custer, Affiliate Council Chairperson
- Report of the Executive Director
  David Tharp, Executive Director
- Unfinished Business
- New Business
- Adjournment
  Gary Acuff, President

SYMPOSIA • 1:30 p.m. – 5:00 p.m.

S12 Back to the Future: How Clinical Microbiology Findings Today Predict the Food Microbiology Headaches for Tomorrow

Delaware A-D

Sponsored by ILSI North America Technical Committee on Food Microbiology

Organizer: ILSI North America

Convenors: Marguerite A. Neill and Peter Gerner-Smidt

1:30 Introduction — MARGUERITE A. NEILL, Brown Medical School and Memorial Hospital of Rhode Island, Pawtucket, RI, USA

1:35 *E. coli* O157:H7 and Other STEC: How We Came to Test Foods (and What Does This Tell Us)? — STEFANO MORABITO, Istituto Superiore di Sanita, Roma, Italy

2:05 The Hepatitis – Food Connection: A and E — GREGORY L. ARMSTRONG, CDC, Atlanta, GA, USA

2:35 Noroviruses: From Unknown Etiology to Major Pathogen in Our Food: Role of Better Diagnostics — JAN VINJÉ, CDC, Atlanta, GA, USA

3:05 Break

3:30 Is Inflammatory Bowel Disease an Infectious Disorder? — JAN-MICHAEL A. KLAPPROTH, Emory University, Atlanta, GA, USA

4:00 *Clostridium difficile*: The Lastest Bad Bug and Coming on Strong but from Where? — J. GLENN SONGER, The University of Arizona, Tucson, AZ, USA

4:30 Roundtable Discussion

S13 Pathogen Data Sharing to Advance Food Safety

Franklin A-C

Organizer: Mickey Parish

Convenor: Mickey Parish

1:30 How More Data Sharing Would Improve Public Health Efforts to Control and Prevent Disease — ROBERT TAUXE, CDC, Atlanta, GA, USA

1:45 Government Interagency Interactions and Food Law — CARL S. CUSTER, Retired-USDA FSIS OPHS MD MIB, Bethesda, MD, USA

2:00 BIFSCO: Beef Industry Collecting and Comparing Pathogen Data — TIMOTHY P. BIELA, Texas American Foodservice, Fort Worth, TX, USA

2:15 International Perspective on Data Sharing for Risk Assessments — LEON GORRIS, Unilever, SEAC, Sharnbrook, Bedford, UK

2:30 Pathogen Data Sharing Can Increase Economic Incentives for Food Safety — S. ANDREW STARBIRD, Santa Clara University, Santa Clara, CA, USA

2:45 Consumer Perspective on Sharing Pathogen Data with the Public — BARBARA KOWALCYK, Center for Foodborne Illness Research & Prevention, Grove City, PA, USA

3:00 Break

3:30 Panel Discussion

S14 Food Safety and Regulatory Issues Associated with Non-Thermal Processing of Foods and Beverages

Union A-C

Sponsored by the IAFP Foundation

Organizers: Alejandro Castillo, Kathy Lawlor, Steve Murphy, Mangesh Palekar, Kathleen Rajkowski, Ron Schmidt and Jay Schuman

Convenors: Kathleen Rajkowski and Kathy Lawlor

1:30 Processing Using Food Irradiation — CHRISTOPHER SOMMERS, USDA-ARS-ERRC-FSITRU, Wyndmoor, PA, USA

2:00 Removal of Microorganisms — Microfiltration and Bactofugation — HEINRICH IVERSEN, Tetra Pak Inc., Vernon Hills, IL, USA

2:30 Pulsed Electric Field and Ohmic Processing — GUSTAVO BARBOSA-CANOVAS, Washington State University, Pullman, WA, USA

3:00 Break

3:30 High Pressure and High Pressure Carbon Dioxide Processing — MURAT O. BALABAN, University of Alaska Fairbanks, Fishery Industrial Technology Center, Kodiak, AK, USA

4:00 Consumer Acceptance of Alternative Technologies — CHRISTINE M. BRUHN, University of California-Davis, Davis, CA, USA

4:30 Regulatory Implications of Alternative Technologies (Panel Discussion) — JOHN W. LARKIN, National Center for Food Safety and Technology, FDA, Summit-Argo, IL, USA; VOLKER HEINZ, German Institute of Food Technologies (DIL e.V.), Quackenbruck, Germany; JEFFREY T. BARACH, GMA, Washington, D.C., USA; and DAVID R. JOY, Keller and Heckman, LLP, Washington, D.C., USA

S15 Harmonization of Irrigation Water Practices

Union D-E

Sponsored by the IAFP Foundation

Organizers: Dean C. Davidson and Peter Kennedy

Convenors: Dean C. Davidson and Peter Kennedy

1:30 Legislative Review of Recreational Water Standards for Irrigation Waters — MICHELLE A. SMITH, CFSAN, College Park, MD USA

2:00 Microbiological Quality of Irrigation Water: Separating Fantasies from Realities — SURESH D. PILLAI, Texas A&M University, College Station, TX, USA

2:30 Non-Microbial Threat Analysis of Irrigation Water — RITA SCHOENY, US Environmental Protection Agency, Washington, D.C., USA

3:00 Break

3:30 A National Review of Irrigation Water Practices — NORMAN FOGG, FDA, Division of Field Investigations, Rockville, MD, USA

4:00 Animal Agriculture: Potential Impacts on Irrigation Water Quality — JEANETTE THURSTON, USDA-ARS, Lincoln, NE, USA

4:30 Irrigation Water Case Studies: A Grower's Perspective — BARRY A. EISENBURG, River Ranch Fresh Foods, Salinas, CA, USA

S16 Spores in the Dairy Industry — A Growing Concern — What Can You Do?

Franklin D

Sponsored by the IAFP Foundation

Organizers: Dennis Bogart and David Blomquist

Convenor: John Bruhn

1:30 Impact of Spores and Current Issues in the Industry — RAY MCCOY, Dean Foods Corporation, Dallas, TX, USA

2:00 Current Research in North America — KATHRYN J. BOOR, Cornell University, Dept. of Food Science, Ithaca, NY, USA

2:30 Bacterial Spores in the Dairy Industry – What Can be Done to Solve the Problem? — PER EINAR GRANUM, Norwegian School of Veterinary Science, Oslo, Norway

3:00 Break

3:30 Spores and Special Considerations in Cultured Products — KATHLEEN A. GLASS, University of Wisconsin, Food Research Institute, Madison, WI, USA

4:00 Accumulative Case Study of Dairy Plants' Experiences with Heat Resistant Psychrotrophs — DARRELL BIGALKE, Quality Management Incorporated, Oakdale, MN, USA

4:30 What's a Farm to Do? Dairy Farm Procedures to Address Spores — MARK WUSTENBERG, Bay City, OR, USA

TECHNICALS • 1:30 p.m. – 5:00 p.m.

T5 Applied Laboratory Methods and Novel Laboratory Methods Technical Session

Fairfield

Convenors: To be determined

T5-01 1:30 DSC Comparative Evaluation of Stomacher®, Pulsifier®, Bagmixer®, and Smasher® for Sample Preparations of Foods for Viable Cell Count and Coliform Counts — CESAR CABALLERO, E. Wenke, J. Saini , B.A. Crozier-Dodson and D.Y.C Fung, Kansas State University, Manhattan, KS, USA

T5-02 1:45 Collaborative Study to Evaluate a Total Bacteria Count Assay Using Quantitative Real-Time PCR — THOMAS ROMICK and Rafael Marfil, Industrial Microbial Testing, Newport Coast, CA, USA

T5-03 2:00 Construction of an Internal Amplification Control by In Vitro Transcription for *Salmonella* Detection Using Real-Time RT-PCR — FAITH J. CRITZER and Doris H. D'Souza, University of Tennessee, Knoxville, TN, USA

T5-04 2:15 Eliminating Sample Preparation for Real-Time PCR Food Pathogen Detection — ROBERT TEBBS, Priya Balachandran, Ada Wong, Somaya Bit, Cristin O'Shea, Maura Barbisin, Jen-Kuei Liu, Olga Petrauskene and Manohar Furtado, Applied Biosystems, Foster City, CA, USA

T5-05 2:30 DSC Evaluation of Fecal DNA Purification Methods and Conventional Culture Methods for the Detection of *Escherichia coli* O157:H7 in Feces of Naturally Infected Feedlot Cattle — EBOT TABE, Dawn Doetkott, James Oloya and Margaret Khaitsa, North Dakota State University, Fargo, ND, USA

T5-06 2:45 DSC Evaluation of an Automated ELISA and Real Time PCR by Comparing with Conventional Culture Method for the Detection of *Escherichia coli* O157:H7 in Selected Foods — JUNG-YOUN PARK, Ji-Yeon Hyeon, Kwang-Young Song, Hyo-Sun Kwak, In-Gyun Hwang and Kun-Ho Seo, Konkuk University, College of Veterinary Medicine, Seoul, Korea

3:00 Break

T5-07 3:30 DSC Evaluation of the Validity of Rapid Methods for Detection of *Listeria monocytogenes* in Various Food Samples — SO-RI HAN, Ji-Yeon Hyeon, Kwang-Young Song, Jong-Seok Park, Seok Heo and Kun-Ho Seo, Konkuk University, Seoul, Korea

T5-08 3:45 Performance of Media for Recovery of *Salmonella* from Thermally-Treated Egg White — JOSHUA B. GURTLER, USDA-ARS-ERRC, Wyndmoor, PA, USA

T5-09 4:00 Establishment of ELISA-LC/MS/MS System to Detect Aflatoxin B1 in Agricultural Products — Hyuna Park, Kyeoungyeol Kim, Won-Bo Shim and DUCK-HWA CHUNG, Gyeongsang National University, Gyeongnam, South Korea

T5-10 4:15 Rapid Assay for Detecting *Cryptosporidium parvum* in Milk Using Piezoelectric-Excited Millimeter-Sized Cantilever (PEMC) Sensors — Sen Xu and RAJ MUTHARASAN, Drexel University, Philadelphia, PA, USA

T5-11 4:30 The Use of Propridium Monoazide (PMA) to Distinguish between Viable and Dead *C. sporogenes* (PA 3679) Spores after Thermal Processing — Christina N. Dock, RONALD DERIKE SMILEY and Lee-Ann Jaykus, North Carolina State University, Raleigh, NC, USA

T5-12 4:45 DSC Fourier Transform Infrared (FT-IR) Spectroscopic Methods for Analyzing Biofilms on Food Equipment Surfaces — MICHELE Y. MANUZON, Nurdan A. Kocaoglu-Vurma, Luis E. Rodriguez-Saona and W. James Harper, The Ohio State University, Columbus, OH, USA

POSTERS • 2:00 p.m. – 6:00 p.m.

P4 Pathogens and Novel Laboratory Methods 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 Withdrawn

P4-02 Withdrawn

P4-03 DSC Development of Aerobic Enrichment Broth for Isolation of *Campylobacter jejuni* and *Campylobacter coli* from Foods — LUISA SOLIS, Norma Heredia, Irene W. Wesley and Santos García, Universidad Autonoma de Nuevo Leon, San Nicolas, NL, Mexico

P4-04 Novel Method for Screening Raw Seafood for *Vibrio parahaemolyticus* — HIDEMASA KODAKA, Hajime Teramura, Shingo Mizuochi, Mikako Saito and Hideaki Matsuoka, Nissui Pharmaceutical Co. Ltd., Ibaraki, Japan

P4-05 Evaluation of a Rapid Agarose Gel Electrophoresis System for Detection of *Shigella* Species in Foods — JACQUELINE P. UPHAM and Cathy M. Fox, Canadian Food Inspection Agency, Dartmouth, NS, Canada

P4-06 A PCR-Based Method to Distinguish Viable from Non-Viable Spores of *Bacillus subtilis* — HELEN RAWSTHORNE, Christina Dock and Lee-Ann Jaykus, North Carolina State University, Raleigh, NC, USA

P4-07 Validation of a PCR-Based Protocol for the Rapid Detection of *Staphylococcus aureus* from Infant Formula, Soy Protein Isolate and Ground Beef — F. MORGAN WALLACE, George Tice, Jeffrey C. Rohrbeck, Timothy R. Dambaugh, Bridget W. Andaloro, Dawn M. Fallon, Eugene R. Davis and Siqun Wang, DuPont Qualicon, Wilmington, DE, USA

P4-08 An Independent Laboratory Evaluation of a Real-Time PCR Method Utilizing a Single Nonspecific Enrichment to the USDA/FSIS and FDA/BAM Reference Methods for the Detection of *Escherichia coli* O157:H7 in Selected Foods — AMY C. REMES and Robert P. Jechorek, rtech Laboratories, St. Paul, MN, USA

P4-09 Automatic Multiplex Real-Time PCR System for the Fast Detection of Twelve Foodborne Pathogens on One 96 Well Plate — YONG SUK NAM, Soo Bok Kim, Seon Mi Choi, Sung Won Hong, Myo Ah Baek, Jin Hyuck Kim and Kwang Won Hong, Kogenebiotech Co., Ltd., Seoul, Korea

P4-10 Evaluation of a Molecular Beacon Real-Time PCR Assay for Detection of *Listeria monocytogenes* in Selected Foods from a Single Primary Enrichment — WENDY F. LAUER, Jean-Philippe Tourniaire, Caroline D. Sidi, Pierre Sonigo and Asmita Patel, Bio-Rad Laboratories, Hercules, CA, USA

P4-11 DSC Enzymatic Release of DNA from Fusarium Spores or Use in Real-Time PCR — JANAKA S. MORANDAGE, Charles Woloshuk and Maribeth Cousin, Purdue University, West Lafayette, IN, USA

P4-12 Development of Conventional PCR Method to Detect the Presence of Ara h 1 Peanut (*Arachis hypogaea*) Allergen in Food — EVA RENCOVA and Zora Hubalkova, Veterinary Research Institute, Brnom, Czech Republic

P4-13 Internal and Independent Laboratory Validation of a Reverse-Transcriptase PCR Assay for Detection of Genus *Listeria* from Stainless Steel Surfaces — DANIEL R. DEMARCO, Stephen Varkey and Joanne Ruebl, DuPont Qualicon, Wilmington, DE, USA

P4-14 Methods for the Characterization of Bacterial Starters Used in Food Applications — Nicolas Desroche, Sylvaine Quatravaux, Jean Guzzo and PATRICE ARBAULT, Bioadvantage Consulting, Oorilenas, France

P4-15 DSC Identification of Primers to Detect *Lactobacillus acidophilus* NP51 in Cattle Feces — SUNEET RANDHAWA, M. M. Brashears, M. Fokar and E. Karunasena, Texas Tech University, Lubbock, TX, USA

P4-16 An Independent Evaluation of a New Method: An Automated System for Simultaneous Detection and Differentiation of *Listeria monocytogenes* and *Listeria* Species in Food — ERIN CROWLEY, Patrick Bird, Joseph Benzinger, Dianne Moss, Michelle Kelly, Emily Kellner, Daniel Barket, James Agin and David Goins, Q Laboratories, Inc., Cincinnati, OH, USA

P4-17 Novel Phage Ligand Enzyme-Linked Fluorescent Assay (ELFA) for Same Day Detection of *Escherichia coli* O157:H7 in Environmental and Feed Samples — DELPHINE THEVENOT, Marion Bouvier, Audrey Gleizal and Christine Vernozy-Rozand, Ecole Nationale Vétérinaire de Lyon, Marcy l'Etoile, France

P4-18 Novel Phage Ligand Enzyme-Linked Fluorescent Assay for Same Day Detection of *Escherichia coli* O157:H7 in Composite Samples of Raw Ground Beef and Trimmings — CHRISTINE VERNOZY-ROZAND, Marion Bouvier, Audrey Gleizal and Delphine Thevenot, Ecole Nationale Vétérinaire de Lyon, Marcy l'Etoile, France

P4-19 Surface Area and Volume Measurement of Salad and Roma Tomatoes for Microbial Enumeration — JOSEPH EIFERT, Hengjian Wang and David Kang, Virginia Tech, Blacksburg, VA, USA

P4-20 Determination of Fumonisins B1 and B2 in Agricultural Products by High Performance Liquid Chromatography — Eunkyoung Seo, YOHAN YOON, Hyuna Park and Duck-Hwa Chung, Gyeongsang National University, Gyeongnam, South Korea

P4-21 Rapid Detection of Meat Freshness with Fourier Transform Infrared Spectroscopy — Anthoula A. Argyri, Mohammed Salim Ammor, Efstathios Z. Panagou and GEORGE-JOHN E. NYCHAS, Agricultural University of Athens, Athens, Attica, Greece

P4-22 Rapid Discrimination of Non-O157 STEC Strains by Fourier Transform Infrared Spectroscopy — SALLY C. FOONG-CUNNINGHAM, Erin R. Brown and Peter W. Bodnaruk, Ecolab Inc., Eagan, MN, USA

P4-23 Nano-Immunomagnetic Separation of *Listeria monocytogenes* — YONGHUA XIONG, Chuanmin Ruan, Haibo Huang, Min Li and Yanbin Li, University of Arkansas, Fayetteville, AR, USA

P4-24 DSC Sensitive Detection of *Listeria monocytogenes* Using an Impedance Immunosensor Combined with Semiconductive Nanowire Bundle — DAMIRA KANAYEVA, Ronghui Wang, Wenjiun Dong, Ryan Tian and Yanbin Li, University of Arkansas, Fayetteville, AR, USA

P4-25 Impact of Variability in O157 Antigen Expression on Immuno-Capture of *Escherichia coli* O157:H7 in Beef Enrichments — FRANK R. BURNS and F. Morgan Wallace, DuPont Qualicon, Philadelphia, PA, USA

P4-26 Application of Novel Bacteriophage Derived Binding Proteins for Specific\Magnetic Separation of *Escherichia coli* O157 from Pure Culture and Food — JAN KRETZER, Renate Grassl, Manfred Biebl, Stefan Miller and Karolina Heed, Profos AG, Bavaria, Germany

P4-27 Isolation of *Vibrio vulnificus* from Oyster Homogenate by Immunomagnetic Separation Using Anti-H Monoclonal Antibodies — Ravirajsinh Jadeja, Marlene Janes and Janet Simonson, Louisiana State University, Baton Rouge, LA, USA

P4-28 DSC Development of a Real-Time, NASBA-Molecular Beacon System for Rapid and Specific Detection of Live Microbes in Juice Products — LINLIN XIAO, Wangyu Tong and Hua H. Wang, The Ohio State University, Columbus, OH, USA

P4-29 Practicality and Validity of Protein-Wiping Method of Sanitation Self-Inspection in Food-Processing Plants — SUSUMU KAWASAKI, Shunsuke Yamanaka and Shinichi Kawamoto, National Food Research Institute, Ibaraki, Japan

P4-30 Rapid Tools for Microbial Forensics in the Food Industry — Suzanne J. Jordan, Rob Limburn, Christopher L. Baylis and ROY P. BETTS, Campden and Chorleywood Food Research Association, Chipping Campden, Gloucestershire, UK

P4-31 Rapid Confirmation and Characterization of Food Related Salmonellae — Suzanne J. Jordan, Rob Limburn, Christopher L. Baylis and ROY P. BETTS, Campden and Chorleywood Food Research Association, Chipping Campden, Gloucestershire, UK

P4-32 Effect of Salt and Acid and the Sequence of Application on the Growth Boundaries of *Escherichia coli* — Gail Betts, Annette Sansom, Nikki Hoskins, Nia Hughes and ROY P. BETTS, Campden and Chorleywood Food Research Association, Chipping Campden, Gloucestershire, UK

P4-33 Reduction of *Escherichia coli* O157:H7 on Lettuce Using Electrolyzed Oxidizing Water under Simulated Food Service Operation Conditions — PHILIPUS PANGLOLI, Y. C. Hung, L. R. Beuchat and C. H. King, The University of Georgia, Griffin, GA, USA

P4-34 Antibiotic Testing of Enterohemorrhagic *Escherichia coli* Isolated from Ground Beef Samples by Use of a Spiral Gradient Endpoint Method — MAJORITE FULLERTON and Leonard L. Williams, Alabama A&M University, Normal, AL, USA

P4-35 DSC Attachment and Growth of *Escherichia coli* O157:H7 on Stainless Steel as Affected by Nutrient Level, Ground Beef Residues and Natural Flora — JEREMY M. ADLER, Yohan Yoon, Keith E. Belk, John A. Scanga, Gary C. Smith and John N. Sofos, Colorado State University, Fort Collins, CO, USA

P4-36 DSC Cross Protection of Acid-Adapted *Escherichia coli* O157:H7 against Activated Lactoperoxidase and Low pH — ANGELA PARRY-HANSON, Piet Jooste and Elna M. Buys, University of Pretoria, Pretoria, Gauteng, South Africa

P4-37 Survival and Growth of Acid Adapted *Escherichia coli* O157:H7 in Traditional Goat Milk Amasi — Bhekisisa C. Dlamini and ELNA M. BUYS, University of Pretoria, Pretoria, Gauteng, South Africa

P4-38 Increased Acid Resistance of Acid Adapted *Escherichia coli* O157:H7 Isolated from Different Sources in Acetic Acid Solution — T. W. KIM, J. H. Choi, T. Ding, Y. Pan, E. Berry, F. Briedt, Syed Mohammad Ehsanur Rahman and D.H. Oh, Kangwon National University, Kangwondo, South Korea

P4-39 DSC Role of Exopolysaccharides in Protecting the Cells of Shiga-Toxin Producing *Escherichia coli* against Chlorine Treatment — BYONG KWON YOO and Jinru Chen, The University of Georgia, Griffin, GA, USA

P4-40 Production of Cellulose by the Cells of Shiga-Toxin Producing *Escherichia coli* as Influenced by Different Environmental Conditions — BYONG KWON YOO and Jinru Chen, The University of Georgia, Griffin, GA, USA

P4-41 Prevalence of Shiga-Toxigenic *Escherichia coli* and *Salmonella* in Commercially Available Compost — DAVID INGRAM, Patricia Millner and Jitendra Patel, USDA-ARS, Beltsville, MD, USA

P4-42 Characterization and Potential Human Health Risks of Shiga Toxin-Producing *Escherichia coli* from Beef Cattle on the Range — L. M. BOLLINGER and H. S. Hussein, University of Nevada-Reno, Reno, NV, USA

P4-43 Determining the Impact of Environmental Factors on the Regrowth of *Escherichia coli* O157:H7 in Dairy Compost — JINKYUNG KIM and Xiuping Jiang, Clemson University, Clemson, SC, USA

P4-44 Characterization and Evaluation of Aptamers Isolated against *Listeria monocytogenes* — C. Yamamoto and T. SEN, Hitachi Chemical Research Center, Inc., Irvine, CA, USA

P4-45 DSC Evaluation of the Diversity and Distribution of *Listeria monocytogenes* in Retail Food Establishments, Using Pulsed-Field Gel Electrophoresis and Automated Ribotyping — MARIA D. SANCHEZ, Daniel Rice, Martin Wiedmann, Esther Fortes and Brian Sauders, New York State Department of Agriculture and Markets, Albany, NY, USA

P4-46 DSC Proteome-Based Studies for Inhibition of Biofilm Formation of *Listeria monocytogenes* by β-Casein Glycomacropeptide — HYUN SUN YUN, Younghoon Kim, Jin Lee, Sejong Oh and Sae Hun Kim, Korea University, Division of Food Bioscience & Technology, Anam-dong, Sungbuk-gu, Seoul, South Korea

P4-47 The Effect of Heat Treatment on the Antimicrobial Susceptibility Profiles of *Listeria monocytogenes* Scott A and *Listeria innocua* — NAGAPRASAD MUPPALA and Leonard L. Williams, Alabama A&M Univeristy, Normal, AL, USA

P4-48 Membrane Fatty Acid Changes of Cells from Ten *Listeria monocytogenes* Strains Exposed to Various Antimicrobials — GIANNA DURÁN, Ifigenia Geornaras, Terry E. Engle and John N. Sofos, Colorado State University, Fort Collins, CO, USA

P4-49 Phenotypic Characterization of gtcA Transposon Mutants of Serotype 4b *Listeria monocytogenes* — NANCY G. FAITH, Ying Cheng, Sophia Kathariou, Brian Neudeck, Lewis Shi and Charles Czuprynski, University of Wisconsin-Madison, Madison, WI, USA

P4-50 The Impact of Cold Shock Family Proteins on Growth of *Listeria monocytogenes* at Low Temperatures and in Presence of Organic Acids — T. TASARA, B. Schmid, J. Klumpp, M. Loessner and R. Stephan, Institute for Food Safety and Hygiene, Zurich, Switzerland

P4-51 DSC The Effect of Acid Stress and Heat Shock on the Minimum Ultraviolet Light Dose Required to Inactivate *Listeria monocytogenes* in Water and 9% NaCl — JULIE S. MCKINNEY, Robert C. Williams, Susan S. Sumner, Joseph D. Eifert and Greg D. Boardman, Virginia Tech, Blacksburg, VA, USA

P4-52 Invasiveness of Non-Starved and Up-to-24-Month Starvation-Stressed Cells of *Listeria monocytogenes* ScottA Serotype 4b in the Human Caco-2 Cell Model — RAMAKRISHNA NANNAPANENI, Robert Story, Keith C. Wiggins and Michael G. Johnson, Mississippi State University, MS, USA

P4-53 DSC Comparison of Antimicrobial Resistance Determinants among *Salmonella*, *Campylobacter*, *Escherichia coli*, and *Enterococcus* Isolated from Swine — PAMELA FRY, Melanie Abley, Susan Kaydos-Daniels, Paula Cray and Wondwossen Gebreyes, The Ohio State University, Columbus, OH, USA

P4-54 Phenotypic and Genotypic Characterization of Multi-Drug Resistant *Salmonella* Serotype Heidelberg Isolated from Humans and Animals — Wondwossen A. Gebreyes, Daniel A. Tadesse and PRAPAS PATCHANEE, The Ohio State University, Columbus, OH, USA

P4-55 Influence of Autoinducer-2 (AI-2) on the Growth and Virulence of *Salmonella enterica* Serovar Typhimurium and Modulation of These Effects from Poultry Meat-Derived Fatty Acids Having AI-2 Inhibitory Properties — Kenneth W. Widmer, Palmy Jesudhasan, Martha Cepeda and SURESH D. PILLAI, Texas A&M University, College Station, TX, USA

P4-56 DSC Induction of Cross Protected and Viable but Nonculturable *Salmonella enterica* serotype Typhimurium under Various Stress Conditions — HUA XU and Juhee Ahn, Kangwon National University, Division of Biomaterials Engineering, Chuncheon, Gangwon, South Korea

P4-57 Simple, Rapid and Reliable Detection of Enterophaemorrhagic *Escherichia coli* O26 Using Immunochromatography — TARO YONEKITA, Tatsuya Fujimura, Takashi Matsumoto and Fumiki Morimatsu, Nippon Meat Packers, Inc., Tsukuba, Ibaraki, Japan

P4-58 Evaluation of Eukaryotic Cell Invasion on a Library of Genetically Diverse *Campylobacter* spp. Isolates — E. DEANN AKINS, Kelli L. Hiett, Holly S. Sellers, Erich Linnemann, L. Jason Richardson, Nelson A. Cox and Mark A. Harrison, University of Georgia, Athens, GA, USA

P4-59 DSC Thermal Inactivation of *Campylobacter jejuni* in Broth — ALI AL-SAKKAF, Nigel French, Rob Lake, Brian Wilkinson and John Mawson, Massey University, Manawatu, New Zealand

P4-60 Antimicrobial Resistance, Virulence and Genotypic Profiling of *Campylobacter jejuni* and *Campylobacter coli* Isolated from Humans and Retail Meat — S. THAKUR, B. Kroft, D. White, S. Zhao, W. Gebreyes, J. Abbott, P. Cullen, L. English, P. Carter and H. Harbottle, North Carolina State University, Raleigh, NC, USA

P4-61 Isolation and Genotyping of *Enterobacter sakazakii* from Korean Traditional Powdered Foods (Sunsik) and Related Raw Materials — JUNG-BEOM KIM, Jeong-A Han, Ki-Sung Kwon, Yong-Bae Park, Myung-Jin Lee, Ki-Cheol Kim, Jeong-Weon Huh, Dae-Hwan Kim, Jung Bok Lee, Jong Chan Kim, Jae-Ho Choi, Tae-Woong Kim and Deog-Hwan Oh, Gyeonggido Institution of Health & Environment, Gyeonggi-do, Republic of Korea

P4-62 DSC Invasion of *Enterobacter sakazakii* Strains MNW2 and SK81 in Neonatal Mice — ARENA RICHARDSON, Sonya Massengill and Mary Alice Smith, University of Georgia, Athens, GA, USA

P4-63 Isolation and Characterization of Enterotoxigenic *Staphylococcus* Strains from Cheese in Bogota, Colombia — MARIA CONSUELO VANEGAS, Lina María González, Aida Juliana Martinez and Francisco Buitrago, Los Andes University Bogota-Colombia, Bogotá, Colombia

P4-64 Enterotoxigenicity and Other Metabolic Characteristics of *Staphylococcus* Species — Jennifer M. Hait and REGINALD W. BENNETT, FDA, College Park, MD, USA

P4-65 The Distribution of Newly Described Enterotoxin-Like Genes in *Staphylococcus aureus* from Ready-to-Eat Food in Korea — SU KYUNG OH, Nari Lee, Hun Jung Kim, Hyang Sook Chun, Se-Wook Oh and Minseon Koo, Korea Food Research Institute, Songnam, Kyunggi-do, Korea

P4-66 Morphological Analysis of Heat-Sensitive and Heat-Resistant Spores of *Clostridium sporogenes* via Transmission Electron Microscopy — JAE-HYUNG MAH, Dong-Hyun Kang and Juming Tang, Washington State University, Pullman, WA, USA

P4-67 Effect of the Combination of pH, Water Activity and Temperature on the Germination of *Bacillus anthracis* Spores — YUN YUN DIANA HAO and Richard C. Whiting, FDA-CFSAN, College Park, MD, USA

P4-68 Development of Intervention Strategies for Pathogens in Protected Environments on Food-Contact Surfaces — BONNIE M. CO, Benjamin D. Gross, Paul A. Klockow, Katy M. Baughman, Bassam A. Annous and David E. Nivens, Purdue University, West Lafayette, IN, USA

P4-69 Isolation of Bacteriophages Infecting Gram-Positive Foodborne Pathogens — Wan-Jing Lee, J. ANDREW HUDSON, Jack Heinemann, Craig Billington and Lynn McIntyre, ESR Ltd., Christchurch, New Zealand

P4-70 Potential Use of Bacteriophages to Control Pathogens in Foods Stored under Refrigeration — Craig Billington, Aruni Premaratne, Lynn McIntyre, Teresa Bigwood and J. ANDREW HUDSON, ESR Ltd., Christchurch, New Zealand

P4-71 DSC Attachment and Chemical Inactivation of Noroviruses to Fomites — MARYLINE GIRARD, Kirsten Mattison and Julie Jean, Université Laval, Quebec, QC, Canada

P4-72 Effect of Sodium Hypochlorite on Murine Norovirus, a Surrogate for the Human Norovirus — STEPHEN F. GROVE, Alvin Lee and Cynthia M. Stewart, NCFST, Summit-Argo, IL, USA

WEDNESDAY MORNING AUGUST 6

SYMPOSIA • 8:30 a.m. – 12:00 p.m.

S17 Dairy Pasteurization in Today's Risk-Based Food Safety Environment — International Perspectives on the Use of Risk Assessment Tools

Franklin A-C

Sponsored by the IAFP Foundation

Organizers: Lisa Oakley and Joanna Shepherd

Convenors: Roger Cook and Joanna Shepherd

8:30 History of Pasteurization — The Need to Control Pathogens in Raw Milk — ALLEN SAYLER, International Dairy Foods Association, Washington, D.C., USA

8:50 Risk Assessment — The Tools to Move on — LISA OAKLEY, New Zealand Food Safety Authority, Wellington, New Zealand

9:10 Just How Many Pathogens are There in Today's Raw Milk? — BRUCE HILL, Fonterra Co-operative Group Ltd., Palmerston North, New Zealand

9:30 What Does Pasteurization Actually Achieve for Contemporary Pathogens? — LINDSAY PEARCE, Fonterra Co-operative Group Ltd., Palmerston North, New Zealand

10:00 Break

10:30 Influences on Australasian Risk Management Decisions — DEON MAHONEY, Food Standards Australia New Zealand, Canberra, ACT, Australia

10:45 Influences on French Risk Management Decisions — MOEZ SANAA, National Veterinary School of Alfort, Maison, Alfort Cedex, France

11:00 Influences on Canadian Risk Management Decisions — HELENE COUTURE, Health Canada, Tunney's Pasture, Ottawa, ON Canada

11:15 Influences on United States Risk Management Decisions — STEVEN SIMS, FDA, College Park, MD, USA

11:30 Panel Discussion

S18 Innovative Applications of Bacteriophages in Rapid Enrichment, Detection and Identification of Foodborne Pathogens
Union D-E
Sponsored by the IAFP Foundation
Organizer: Jingkun Li
Convenors: George Paoli and Jingkun Li

8:30 Bacteriophages as Selective Agents for Rapid Enrichment and Detection of Foodborne Pathogens — MARK MULDOON, Strategic Diagnostics Inc., Newark, DE, USA

9:00 Bacteriophages — Mediated Adenylate Kinase Assay for High Throughput Pathogen Detection — PRADIP PATEL, Alaska Food Diagnostics, Ltd., Salisbury, Wiltshire, UK

9:30 Bacteriophage Proteins as Sample Preparation Tools to Improve the Detection of Foodborne Pathogens — JAN KRETZER, Profos AG, Regensburg, Bavaria, Germany

10:00 Break

10:30 Novel Phage Ligand-Based Detection of *Escherichia coli* O157:H7 and *Salmonella* in Food and Environmental Samples — VINCENT ATRACHE, bioMérieux Industry, Marcy l'Etoile, France

11:00 Antibody Phage Display for Foodborne Pathogen Detection — GEORGE C. PAOLI, USDA-ARS-ERRC, Wyndmoor, PA, USA

11:30 Using Bacteriophages for Rapid Identification of Bacteria Directly from Samples and Mixed Cultures — DREW SMITH, MicroPhage, Inc., Longmont, CO, USA

S19 Chemical Contaminants Testing in Foods
Franklin D
Organizers: Patrice Arbault, Tong-Jen Fu, Peter Olsen and Pamela Wilger
Convenors: Tong-Jen Fu and Pamela Wilger

8:30 Current Issues in Pesticide Testing in Produce — GRACE BANDONG, The National Food Laboratory, Inc., Dublin, CA, USA

9:00 Detecting Chemical Hazards in Seafood — GAYE SIMS, Silliker JR Laboratories, ULC, Upper Tantallon, NS, Canada

9:30 Veterinary Drug Residue Analysis in Support of Risk Assessment in Canada — ERIC BRAEKVELT, Health Canada, Ottawa, ON, Canada

10:00 Detecting Chemicals Formed during Thermal Processing of Foods — PETER VARELIS, National Center of Food Safety and Technology, Summit-Argo, IL, USA

ROUNDTABLE • 8:30 a.m. – 10:00 a.m.

RT5 Comparative International Approaches to Regulating Unsafe Food
Delaware A-D
Organizer: Caroline Smith-DeWaal and Deon Mahoney
Convenor: Leon Gorris

8:30 The United States Approach to Managing Unsafe Food, Including Elaborating on the Legal Concept of Adulteration and Its Applications in Risk Management — CAROLINE SMITH DEWAAL, Center for Science in the Public Interest, Washington, D.C., USA

8:45 The Australian Legal Approach to Managing Unsafe Food — DEON MAHONEY, Food Standards Australia New Zealand, Canberra, ACT, Australia

9:00 The Japanese Legal Approach to Managing Unsafe Food — PAUL YOUNG, Waters Corporation, Manchester, England, UK

9:15 The Irish/EU Legal Approach to Managing Unsafe Food — WAYNE ANDERSON, Food Safety Authority of Ireland, Dublin, Ireland

9:30 Roundtable Discussion

ROUNDTABLE • 10:30 a.m. – 12:00 p.m.

RT6 Water: Potability vs. Drinkability
Delaware A-D
Sponsored by the IAFP Foundation
Organizers: Dean C. Davidson and Peter Kennedy
Convenors: Dean C. Davidson and Peter Kennedy

10:30 Legal vs. Illegal Aspects of Potability — DAVID BENNITZ, Health Canada, Ottawa, ON, Canada

10:45 United States vs. International Water Potability Standards — JOSEPH A. COTRUVO, Water, Environment and Public Health, Washington, D.C., USA

11:00 USDA Viewpoint with Regard to the Use and Reuse of Water in the Food Plant — KATHLEEN T. RAJKOWSKI, USDA-ARS-ERRC, FSITRU, Wyndmoor, PA, USA

11:15 EPA Viewpoint Regarding Drinking Water (Potable) Regulations as It Relates to the Food Industry — JENNIFER BEST, EPA, Office of Ground Water and Drinking Water, Cincinnati, OH, USA

11:30 Water Testing and Types of Checks for Municipal Water Supplies — KEVIN M. MORLEY, American Water Works Association, Washington, D.C., USA

11:45 Roundtable Discussion

TECHNICALS • 8:30 a.m. – 12:00 p.m.

T6 **Education and Sanitation Technical Session**
Fairfield
Convenors: To be determined

T6-01 8:30 DSC Registered Dieticians and Registered Nurses Lack Awareness and Knowledge of *Listeria monocytogenes* Indicating Need for Continuing Education — WEI YUAN, Lydia Medeiros, Janet Buffer, Patricia Kendall and John Sofos, The Ohio State University, Columbus, OH, USA

T6-02 8:45 Best Practice – Occupational Exposure Control Plan for Restaurants and Food Establishments — GINA M. REO, QAS, LLC, Princeton Junction, NJ, USA

T6-03 9:00 DSC An Observational Study of Food Safety Practices at Food Service Conducted through Video Capture — BENJAMIN CHAPMAN, Tiffany Eversley, Katie Filion, Tanya MacLaurin and Douglas Powell, University of Guelph, Guelph, ON, Canada

T6-04 9:15 Transportation Risk Assessment for Food Safety and Security; An Examination of Risks and Solutions Associated with Food Transportation — MARIANNE COUREY, Michigan Dept. of Agriculture Food and Dairy Division, St. Clair Shores, MI, USA

T6-05 9:30 Consumer Attitudes to Food Safety in Mexico — EMA MALDONADO-SIMÁN, P. A. Martínez-Hernández and L. López-Durán, Universidad Autonoma Chapingo, Texcoco, Edo. De Mexico, Mexico

T6-06 9:45 Efficacy of Two Commercial Sanitizers and Two Conveyor Belting Systems against *Listeria monocytogenes* during Normal Operation — HINONG YAN, Matthew Steele, Lei Zhang, and Elliot T. Ryser, Michigan State University, East Lansing, MI, USA

10:00 Break

T6-07 10:30 DSC Beyond Intent — Direct Observation of Meal Preparation Procedures in a Home Kitchen Setting — SARAH DEDONDER, Douglas Powell, Casey Wilkinson, Brae Surgeoner, Ben Chapman and Randall Phebus, Kansas State University, Manhattan, KS, USA

T6-08 10:45 Consumers and Take-Out Food: Safe-Handling Practices, Desired Packaging Attributes, and Temperature Integrity of Packaging — MARGARET BINKLEY, Charlie Broz and Janice Boyce, Texas Tech University, Lubbock, TX, USA

T6-09 11:00 DSC Validation of a Four-Chain Quaternary Ammonium Compound (A) and Polymeric Biocide (B) for Inhibition of *Listeria monocytogenes* Attachment on Food Contact Surfaces — JASDEEP SAINI, C.A. Tanus, J.L. Marsden, D.Y.C. Fung and B.A. Crozier-Dodson, Kansas State University, Manhattan, KS, USA

T6-10 11:15 Presence of Aerobic Microorganisms, *Enterobacteriaceae* and *Salmonella* in the Shell Egg Processing Environment — MICHAEL T. MUSGROVE and Mark E. Berrang, Egg Safety and Quality Research Unit, Athens, GA, USA

T6-11 11:30 Evaluation of Household Products as Sanitizers against *Listeria monocytogenes*, *Escherichia coli* O157:H7 and *Salmonella* Typhimurium — HUA YANG, Patricia A. Kendall, Lydia Medeiros and John N. Sofos, Colorado State University, Fort Collins, CO, USA

T6-12 11:45 Food Safety Management in Fraser Health Authority, Vancouver, BC, Canada — DERJEET GILL, Fraser Health Authority, Health Protection, Surrey, BC, Canada and O. PETER SNYDER, JR., Hospitality Institute of Technology and Management, St. Paul, MN, USA

POSTERS • 9:30 a.m. – 1:30 p.m.

P5 **Risk Assessment, Antimicrobials, Seafood and General Microbiology Poster Session**
Exhibit Hall
9:30 a.m.–1:30 p.m.
Authors present 10:00 a.m.–12:00 p.m.
Convenors: To be determined

P5-01 DSC Prevalence of Antibiotic-Resistant Bacteria in Deli and Restaurant Foods — XIAOJING LI and Hua H. Wang, The Ohio State University, Dept. of Food Science and Technology, Columbus, OH, USA

P5-02 Trends from 2002 through 2006 in Total *Campylobacter* and Total Ciprofloxacin-Resistant *Campylobacter* Loads in Rinses from Retail Raw Broiler Chicken Carcasses — RAMAKRISHNA NANNAPANENI, Robert Story, Keith C. Wiggins and Michael G. Johnson, Mississippi State University, Mississippi State, MS, USA

P5-03 Modeling the Growth of *Listeria monocytogenes* in Delicatessen Turkey and Ham — DANILO T. CAMPOS, Bradley P. Marks, Lei Zhang, Elliot T. Ryser and Ewen C.D. Todd, Michigan State University, East Lansing, MI, USA

P5-04 Growth Model of a Plasmid-Bearing Virulent Strain of *Yersinia pseudotuberculosis* in Raw Ground Beef — SAUMYA BHADURI and John G. Phillips, USDA-ARS-ERRC-MFS, 600 E. Mermaid Lane, Wyndmoor, PA, USA

P5-05 A Risk Assessment Model of *Vibrio parahaemolyticus* for Consumption of Raw Oysters in Korea — JONG-KYUNG LEE, Se-Wook Oh, Yun-Ji Kim, Minseon Koo, Hyang-Sook Chun, Min-A Lee and Kisun Yoon, Korea Food Research Institute, Kyunggi-do, Korea

P5-06 DSC A Model of the Effect of Temperature on the Growth of Pathogenic and Nonpathogenic *Vibrio parahaemolyticus* Isolated from Oysters in Korea — KYUNG JIN MIN, K. S. Yoon, Y. J. Jung, K. Y. Kwon, J. K. Lee and S. W. Oh, Kyung Hee University, Seoul, Korea

P5-07 A Multi-Factorial Risk Prioritization Framework for Foodborne Pathogens — JULIANA M. RUZANTE, Aamir Fazil, Valerie Davidson, John Cranfield, Spenser Henson, Julie Caswell, Sven Anders, Claudia Schmidt and Jeff Farber, University of Guelph, Guelph, ON, Canada

P5-08 Development of a Logistic Regression Plot for Predicting the Probability of Achieving a 7-Log Reduction of *Escherichia coli* O157:H7 during Beef Slow-Cooking Processes — KIMBERLY M. WIEGAND, Steven C. Ingham, Greg M. Burnham and Barbara H. Ingham, University of Wisconsin-Madison, Madison, WI, USA

P5-09 Comparison of Three Mathematical Approaches to Predicting Pathogen Growth during Short-Term Temperature Abuse of Raw Meat and Poultry Products — DARAND BORNEMAN and Steven C. Ingham, University of Wisconsin-Madison, Madison, WI, USA

P5-10 Fuzzy Math Calculation for Quantitative Risk Assessment of Roasted Duck Cuisine — Yu-Jin Choi, Hyo-min Nang, Seung-won Jung, Seung-ju Lee and KWANG-GEUN LEE, Dongguk University, Seoul, Korea

P5-11 Development of a Predictive Model of *Staphylococcus aureus* as a Function of Storage Temperature, pH, and Concentration of NaCl — Seung-Won Jung, Yu-jin Choi, Hyo-min Nang, Seung-Ju Lee and KWANG-GEUN LEE, Dongguk University, Seoul, Korea

P5-12 Risk Assessment of Non-Heat Preparation of Japanese Foods, Using Quantitative Risk Assessment — Joo-Hyun Song, Yu-jin Choi, Seung-won Jung, Seung-ju Lee and KWANG-GEUN LEE, Dongguk University, Seoul, Korea

P5-13 DSC Survival of *Staphylococcus aureus* in Salsa Mexicana — WENDY FRANCO, Wei-Yea Hsu, and Amarat Simonne, University of Florida, Gainesville, FL, USA

P5-14 Comparison of Linear vs. Non-Linear Models to Describe the Thermal Inactivation Kinetics of Heat-Resistant *Bacillus* Spores — RICO SUHALIM, Balasubrahmanyam Kottapalli and Mansour Samadpour, Institute for Environmental Health, Lake Forest Park, WA, USA

P5-15 DSC Development of a Mathematical Model for Growth of *Salmonella* on Cut Tomatoes — WENJING PAN and Don Schaffner, Rutgers University, The State University of New Jersey, New Brunswick, NJ, USA

P5-16 Assessment of Microbiological Quality in Korean Traditionally Fermented Jeot-gal Products — KI-HYUN KIM, S. M. Lee, J. M. Lim, H. J. You, K. S. Park, D. H. Cho, D. B. Kim, S.Y. Cho, O.H. Kim and K.H. Lee, Busan Regional Korea Food & Drug Administration, Busan, Nam-Gu, Korea

P5-17 Microbiological Quality of Food in the State of Hidalgo, México — Cuauhtemoc Zamudio, Verónica Hernández, Alma D. Chapa, M. Lissete Leon, Aide Neria, M. Elizabeth Castelazo, MIROSLAVA SANCHEZ-MENDOZA and Jorge F. Islas, State Laboratory of Public Health in Hidalgo, Pachuca, Hidalgo, Mexico

P5-18 Groups Unaware of Food Recall: Policy Implication — JOCILYN E. DELLAVA, Cara L. Cuite, Benjamin Onyango and William K. Hallman, Rutgers, The State University of New Jersey, New Brunswick, NJ, USA

P5-19 Profile of the Temperature of Meals Consumed by Sugar Cane Cutters — SILVANAS REBERNICH, Lara Correa and Patricia Silva, Pontificia Universidade Catolica de Campinas, Campinas, São Paulo, Brazil

P5-20 Risk Assessment of Lettuce Contamination with *Escherichia coli* O157:H7 — EELCO FRANZ, Alexander V. Semenov and Ariena H.C. van Bruggen, RIKILT – Institute of Food Safety, Wageningen University and Research Centre, Wageningen

P5-21 Survival of *Escherichia coli* O157:H7, *Listeria monocytogenes* and *Salmonella* in Garlic Powder and Onion Powder — Benjamin R. Warren, CHRISTIE M. HANCOCK and Erdal U. Tuncan, ConAgra Foods, Inc., Omaha, NE, USA

P5-22 Edible Apple Film Wraps Containing Plant Antimicrobials Inactivate *Salmonella enterica* and *Escherichia coli* O157:H7 on Poultry — SADHANA RAVISHANKAR, Libin Zhu, Carl Olsen, Tara McHugh and Mendel Friedman, University of Arizona, Tucson, AZ, USA

P5-23 Antimicrobial Activities of Cinnamaldehyde and Carvacrol against Antibiotic-Resistant *Campylobacter jejuni* and *Salmonella enterica* Strains — SADHANA RAVISHANKAR, Libin Zhu and Mendel Friedman, University of Arizona, Tucson, AZ, USA

P5-24 The Use of Caseicin Antimicrobial Peptides for the Inhibition of *Escherichia coli* O157:H7 — LUCIA RIVAS, Mary J. McDonnell, Catherine M. Burgess, Seamus Fanning and Geraldine Duffy, Ashtown Food Research Centre, Teagasc, Ashtown Food Research Centre, Dublin, Ireland

P5-25 Biocontrol of *Escherichia coli* O157:H7 on Fresh-Cut Lettuce and Cantaloupe by Treatment with Bacteriophage — MANAN SHARMA, Jitendra Patel, William Conway, Sean Ferguson and Alexander Sulakvelidze, Food Safety Laboratory, USDA-ARS, Beltsville, MD, USA

P5-26 Mechanism of Inactivating *Escherichia coli* O157:H7 by Ultra-High Pressure in Combination with Tert-Butylhydroquinone — YOON-KYUNG CHUNG, Aaron S. Malone and Ahmed E. Yousef, The Ohio State University, Columbus, OH, USA

P5-27 The Probability of Growth of *Listeria monocytogenes* in Minced Salmon and Tryptic Soy Broth Containing Salt and Phenol Compounds during Storage at Various Temperatures — CHENG-AN HWANG, USDA-ARS-ERRC, Wyndmoor, PA, USA

P5-28 Predictive Modeling of *Listeria monocytogenes* on Cured and Uncured Turkey Breast for Safety-Based Shelf-Life Determination — IFIGENIA GEORNARAS, Yvan Le Marc, Gianna Durán, Alexandra Lianou, Ukrit Laosiripornwattana, Camelia C. Grosulescu, Yohan Yoon, József Baranyi and John N. Sofos, Colorado State University, Fort Collins, CO, USA

P5-29 Predicting the Effects of Storage Temperature on Growth of *Listeria monocytogenes* on Roast Beef Formulated with or without Antimicrobials — YVAN LE MARC, Ifigenia Geornaras, Brandon A. Carlson, Yohan Yoon, József Baranyi and John N. Sofos, Institute of Food Research, Norwich, Norfolk, UK

P5-30 Effect of Thirteen Antimicrobials on Morphology of *Listeria monocytogenes* Cells as Examined with Scanning and Transmission Electron Microscopy — GIANNA DURÁN, Ifigenia Geornaras and John N. Sofos, Colorado State University, Fort Collins, CO, USA

P5-31 Control of *Listeria monocytogenes* on Frankfurters by Dipping in Hops Beta Acids Solutions — CANGLIANG SHEN, Ifigenia Geornaras, Patricia A. Kendall and John N. Sofos, Colorado State University, Fort Collins, CO, USA

P5-32 Efficacy of Surface Spray Application of Lauric Arginate Derivative to Control *Listeria monocytogenes* on Roast Beef and Pastrami — L. M. SANTIAGO-CONNOLLY, G. W. Bartholomew, W. J. Dorsa, A. C. S. Porto-Fett, J. Smith, J. E. Call and J. B. Luchansky, Custom Food Products, LLC, Carson, CA, USA

P5-33 Survival and Growth of *Salmonella enterica* Serovar Weltevreden in Som-fak, a Thai Low-Salt Fermented Product — NETE BERNBOM, Yoke Yin Ng and Lone Gram, National Institute of Aquatic Resources, Technical University of Denmark, Kgs. Lyngby, Denmark

P5-34 UV Catalysis with Novel TiO2 Nanofiber Coating and Its Bactericidal Activity against *Escherichia coli* O157:H7 — LISA COONEY, Yanbin Li, Ryan Tian, Wenjun Dong, Michael Slavik and Hong Wang, University of Arkansas, Fayetteville, AR, USA

P5-35 Effect of Antimicrobials on the Growth Kinetics and Morphological Changes of Stressed *Salmonella* Typhimurium — YANG JIN JUNG and Ki S. Yoon, Kyunghee University, Seoul, Republic of Korea

P5-36 DSC Natural Products as Inhibitors of Growth of *Campylobacter* and *Salmonella* Strains — D. VALTIERRA, S. García and N. Heredia, Universidad Autonoma de Nuevo Leon, Apdo. Postal 124-F, San Nicolas, NL 66450, Mexico

P5-37 Antimicrobial Activity of Chitosans and Chitooligosaccharides in Milk and Apple Juice, on *Bacillus cereus* and Spores — JOÃO FERNANDES, Peter Eaton, Freni Tavaria, Manuela Pintado and Xavier Malcata, Escola Superior de Biotecnologia, Universidade Católica Portuguesa, Porto, Portugal

P5-38 DSC Chitosans and Chitooligosaccharides: Antimicrobial Activity on *Bacillus cereus* (and Its Spores) — JOÃO FERNANDES, Peter Eaton, Freni Tavaria, Manuela Pintado and Xavier Malcata, Escola Superior de Biotecnologia, Universidade Católica Portuguesa, Porto, Portugal

P5-39 Synergistic Effect of UV Irradiation on Chemical Disinfectant Treatments for Reduction of *Bacillus cereus* — JI-HYOUNG HA and Sang-Do Ha, Kyunggi-do, South Korea

P5-40 Withdrawn

P5-41 Antimicrobial Testing of *Staphylococcus aureus* Strains Isolated from Clinical, Milk and Meat Samples — OLASUNMBO AJAYI and Leonard L. Williams, Alabama A&M University, Normal, AL, USA

P5-42 Assessment of Membrane Integrity Damage of *Clostridium perfringens* and *Vibrio cholerae* by Plant Extracts — E. Sánchez, SANTOS GARCIA and N. Heredia, Universidad Autonoma de Nuevo Leon, San Nicolas, NL, Mexico

P5-43 *Aspergillus flavus* and *Aspergillus niger* Growth Response to Cinnamon Extracts — AURELIO LÓPEZ-MALO and Enrique Palou, Universidad de las Américas, Puebla, Puebla, Mexico

P5-44 Antimicrobial Efficacy of Vanillin and Cinnamic Aldehyde in Peach Puree — Daniela Cinta, Yani D. Ramírez-Torres, AURELIO LÓPEZ-MALO and Enrique Palou, Universidad de las Américas, Puebla, Puebla, Mexico

P5-45 Reduction of Foodborne Pathogens in a Korean Fermented Fish Product (Jeot-gal) Model System with Natural Antimicrobials — Yunsik Choi, Jong-Kyung Lee and JIYONG PARK, Yonsei University, Seoul, South Korea

P5-46 Dietary Exposure to Benzoic Acid from Prepackaged Non-Alcoholic Beverages of Secondary School Students in Hong Kong — K. M. Ma, C. M. Chan, S. W. C. Chung, Y. Y. Ho and Y. XIAO, Center for Food Safety, Hong Kong, China

P5-47 DSC Antimicrobial Activity of Edible Plants against Enteropathogenic Bacteria — ALEJANDRINA MONTES, Norma Heredia and Santos García, Universidad Autonoma de Nuevo Leon, San Nicolas, NL, Mexico

P5-48 Estimation of Shelf Life of Ethanol and Peroxide Compounds Sanitizers by Arrhenius Model — YONG-SU KIM, Ae-Yeong Kim, In-Sook Park, Sang-Do Ha and Yu-Mi Seo, Korea Health Industry Development Institute, Seoul, Korea

P5-49 Evaluation of Antimicrobial Properties of Lemongrass [*Cymbopogon citratus* (*C. nees*) Stapf (Poaceae)] — THABILE P. NKAMBULE, Wei-Yea Hsu and Amarat Simonne, University of Florida, Gainesville, FL, USA

P5-50 Antibacterial Activities of Metal Nanoparticle Catalysts — HEIDI WEINKAUF and Byron Brehm-Stecher, Iowa State University, Ames, IA, USA

P5-51 DSC Polyionic Compounds Enhance the Antimicrobial Activities of Plant Essential Oils — HEIDI WEINKAUF and Byron Brehm-Stecher, Iowa State University, 2312 Food Sciences Bldg., Ames, IA 50011, USA

P5-52 The In Vitro Activity of Antibacterial Foam Handwashes Can Vary Dramatically and is Not Strictly Dependent upon the Active Ingredient or Active Concentration — DAVID MACINGA, Cara Bondi and Daryl Paulson, GOJO Industries, Incorporated, Akron, OH, USA

P5-53 DSC Screening and Usage of Bacteriocin-Like Inhibitory Substance from Senegalese Traditional Foods Lactic Acid Bacteria as Fish Preservative — MICHEL BAKAR DIOP, Jacqueline Destain, Robin Dubois-Dauphin, Emmanuel Tine and Philippe Thonart, Agricultural University of Gembloux, Gembloux, Belgium

P5-54 DSC The Bacteriocin-Producing *Lactococcus lactis* CWBI-B1410 Supplemented with Glucose is a Protective Culture to Improve the Bacterial Spoilage Control of Traditional Fish Products Fermented in Senegal — MICHEL BAKAR DIOP, Jacqueline Destain, Robin Dubois-Dauphin, Emmanuel Tine and Philippe Thonart, Agricultural University of Gembloux, Gembloux, Belgium

P5-55 Assessing the Efficacy of Home-Style Cooking Methods on Reducing Tetracycline-Resistant Bacteria in Shrimp Samples — LU ZHANG and Hua Wang, The Ohio State University, Columbus, OH, USA

P5-56 Chemical Characterization and Histamine-Forming Bacteria in Salted Mullet Roe Products — YUNG-HSIANG TSAI, Hsien-Feng Kung and Ean-Tun Liaw, National Kaohsiung Marine University, Kaohsiung City, Taiwan

P5-57 DSC The Effect of Storage Temperature on the Growth and Survival of Total and Pathogenic *Vibrio parahaemolyticus* in Gulf Coast Shell Stock Oysters — MESHACK MUDOH, Salina Parveen, Jeffrey A. Krantz, John Bowers, Mark L. Tamplin, Ligia V. A. da Silva and Angelo DePaola, University of Maryland Eastern Shore, Princess Anne, MD, USA

P5-58 Predictive Model for the Growth and Survival of *Vibrio vulnificus* in Gulf Coast Shellstock Oysters — LIGIA DASILVA, Salina Parveen, Angelo DePaola, John Bowers, Meshack Mudoh, Sivaranjani Pagadala and Mark L. Tamplin, University of Maryland Eastern Shore, Princess Anne, MD, USA

P5-59 DSC Enumeration and Molecular Characterization of *Vibrio parahaemolyticus* in and Isolated from Louisiana Gulf Coast Oysters — BROOKE WHITNEY, Stephenie Drake and Lee-Ann Jaykus, North Carolina State University, Cary, NC, USA

P5-60 Reduction of *Vibrio parahaemolyticus* in Pacific Oysters during Long-Term Frozen Storage — Chengchu Liu, Jianzhang Lu and YI-CHENG SU, Oregon State University, Astoria, OR, USA

P5-61 Irradiation D-10 Values and UV Destruction of Finfish Isolates of *Listeria monocytogenes* — KATHLEEN T. RAJKOWSKI, USDA-ARS, ERRC, Wyndmoor, PA, USA

P5-62 DSC Potential Application of Antimicrobials to Control *Listeria monocytogenes* in Vacuum-Packaged Cold-Smoked Salmon (CSS) Pâté and Fillets — H. NEETOO, Mu Ye and Haiqiang Chen, University of Delaware, Newark, DE, USA

P5-63 DSC Isolation and Characterization of *Listeria monocytogenes* from Blue Crab Meat (*Callinectus sapidus*) and Blue Crab Processing Plants — SIVARANJANI PAGADALA, Salina Parveen, Thomas Rippen, Mark L. Tamplin, John Luchansky, Anna C. S. Porto-Fett and Martin Wiedmann, University of Maryland Eastern Shore, Princess Anne, MD, USA

P5-64 Efficacy of FD&C Red No. 3 and Ultra-High Pressure Combination Treatment against Foodborne Pathogens in Food Systems — JOY G. WAITE and Ahmed E. Yousef, The Ohio State University, Columbus, OH, USA

P5-65 DSC The Survival of *Escherichia coli* in Rainbow Trout Byproducts (*Oncorhynchus mykiss*) Processed Using Isoelectric Solubilization / Precipitation — LANCYA LANSDOWNE, Sarah Beamer, Jacek Jaczynski and Kristen Matak, West Virginia University, Morgantown, WV, USA

P5-66 Effect of Pressurization Rate and Food Matrix on Spore Inactivation by Pressure-Assisted Thermal Processing — WANNASAWAT RATPHITAGSANTI and V.M. Balasubramaniam, The Ohio State University, Columbus, OH, USA

P5-67 Influence of Minerals on Sporulation and Heat Resistance of *Clostridium sporogenes* — JAE-HYUNG MAH, Dong-Hyun Kang and Juming Tang, Washington State University, Pullman, WA, USA

P5-68 Efficacy of Disinfection Methods of Decontamination of Infant Bottles Used for Feeding Powdered Formula Milk — ELIZABETH C. REDMOND, Christopher J. Griffith and Steven Riley, University of Wales Institute, Cardiff, Cardiff, Wales, UK

P5-69 The Profiles of Tetracycline Resistance Bacteria in Human Microflora Associated with the Infant Digestive System — DANIEL F. KINKELAAR and Hua Wang, The Ohio State University, Columbus, OH, USA

P5-70 DSC Ability of Cleaners and Sanitizers to Degrade Curli Produced by Shiga Toxin-Producing *Escherichia coli* — YOEN JU PARK and Jinru Chen, The University of Georgia, Griffin, GA, USA

P5-71 Recovery of Viable Cells of Shiga Toxin-Producing *Escherichia coli* as Influenced by the Use of Different Neutralizing Solutions after Sanitizing Treatments — YOEN JU PARK and Jinru Chen, The University of Georgia, Griffin, GA, USA

P5-72 Prevalence, Persistence, and Spread of *Listeria* spp. in a Commercial Delicatessen — ZHINONG YAN, Annemarie L. Buchholz, Lei Zhang and Elliot T. Ryser, Michigan State University, East Lansing, MI, USA

P5-73 Inactivation of Pathogens in Compost Mixtures as Influenced by Type of Manure — MARILYN ERICKSON, Chris Smith, Xiuping Jiang and Michael Doyle, University of Georgia, Griffin, GA, USA

P5-74 Evaluation of Novel Antimicrobials to Inhibit the Growth of *Listeria monocytogenes* in Ready-to-Eat Boneless Ham and Uncured Turkey Breast — ROBERT BROOKS, Deanna Hofing, Richard Hull, Melissa Sauer and Rory McClintock, WTI, Inc., Jefferson, GA, USA

WEDNESDAY AFTERNOON AUGUST 6

SYMPOSIA • 1:30 p.m. – 3:30 p.m.

S20 Food Defense Educational Programs: Status, Focus and Future

Delaware A-D

Sponsored by the IAFP Foundation

Organizer: Randall K. Phebus

Convenor: Randall K. Phebus

1:30 The Need for National Educational Programs in Food Defense – SHAUN KENNEDY, National Center for Food Protection and Defense, University of Minnesota, St. Paul, MN, USA

1:50 Developing a Curriculum that Meets Students' Needs in Food Defense – DAVID MCSWANE, School of Public and Environmental Affairs, Indiana University, Bloomington, IN, USA

2:10 Food Defense Education: The University of Minnesota Summer Public Health Institute Approach – To be determined

2:30 Collaborative Food Defense Graduate Educational Initiatives: Examples and Challenges—ABBEY NUTSCH, National Agricultural Biosecurity Center/Food Science Institute, Kansas State University, Manhattan, KS, USA

2:50 Panel Discussion

S21 Is It Overdone? Examining the Meat and Cancer Hypothesis and Its Impact on Food Safety

Franklin A-C

Organizers: Randy Huffman and Lisa Mina

Convenors: Randy Huffman and Lisa Mina

1:30 Standards of Scientific Evidence: How Do They Impact Food Safety and Health Risk? — JAMES COUGHLIN, Coughlin and Associates, Laguna Niguel, CA, USA

2:00 Does the Science Really Connect Meat to Cancer? — DAVID M. KLURFELD, USDA, Beltsville, MD, USA

2:30 Heterocyclic Amines and Polyaromatic Hydrocarbons in Meat Products: What is the True Health Risk? — ARTHUR MILLER, Exponent, Bowie, MD, USA

3:00 Nitrites: Essential to Health? A New Story about an Old Antimicrobial — NATHAN BRYAN, University of Texas–Houston, Houston, TX, USA

S22 What is the "Real" Issue with MDR?

Union A-C

Sponsored by the IAFP Foundation

Organizer: Paula J. Fedorka-Cray

Convenors: J. Stan Bailey and Paula J. Fedorka-Cray

1:30 Resistance to Third Generation Cephalosporins in *Salmonella* Isolated from NARMS Retail Meats — SHAOHUA ZHAO, FDA, Center for Veterinary Medicine, Laurel, MD, USA

1:50 MDR in Food Animals — PAULA FEDORKA–CRAY, USDA-ARS, Athens, GA, USA

2:10 MDR in Humans — JEAN WHICHARD, CDC, Atlanta, GA, USA

2:30 MDR from across the Pond: The United Kingdom View — JOHN THRELFALL, Health Protection Agency, London, UK

3:00 Panel Discussion

S23 The Greening of Food Packaging — Safety of Biodegradeable, Reused and Recycled Food Packaging

Union D-E

Organizers: Ken Anderson and Allen R. Sayler

Convenors: Ken Anderson and Allen R. Sayler

1:30 Current Technologies for Recyclable, Reuseable, and Biodegradable Food Packaging – Susan Selke, School of Packaging, Michigan State University, East Lansing, MI, USA

1:50 Recycling and Reusing Plastic Milk Bottles – Edward Kosior, Nextek Limited, London, UK

2:10 Industry Experience with Recycling Composite Food Packaging Material – Representative from TetraPak Packaging Division

2:30 Industry Experience with Safety of Bio-degradable Food Packaging Material – Representative from NatureWorks LLC

3:10 Risk Analysis of Food Safety Issues Related to the Recycling, Reuse and Bio-degradability of Food Packaging Material – Representative from FDA

S24 Food Allergens: Scientific Advances and Control Measures

Franklin D

Sponsored by the IAFP Foundation

Organizers: Tong-Jen Fu and Linda Leake

Convenors: Tong-Jen Fu and Linda Leake

1:30 Food Allergy: Mechanisms and Current Advances in Disease Management — WESLEY BURKS, Duke University, Durham, NC, USA

2:00 Food Allergens: Current Understanding and Impact of Processing — TONG-JEN FU, FDA, National Center for Food Safety and Technology, Summit-Argo, IL, USA

2:30 Allergen Control Measures – Food Processors' Perspective — RENE CREVEL, Unilever Research Colworth, Sharnbrook, Bedford,UK

3:00 Allergen Control – United States and International Regulatory Perspective — STEVE RIZK, M&M Mars, Hackettstown, NJ, USA

TECHNICALS • 1:30 p.m. – 3:15 p.m.

T7 Spoilage and Epidemiology Technical Session
Fairfield
Convenors: To be determined

T7-01 1:30 Yeast and Mold Ecology in Food Factories — DEBRA SMITH, Phil Voysey and Suzanne Jordan, Campden and Chorleywood Food Research Association, Chipping Campden, Glouscestershire, England

T7-02 1:45 Microbial Contamination during Production of Edible Peeled Chestnuts — IRWIN R. DONIS GONZALEZ, Dennis W. Fulbright, Bruce Harte, Daniel Guyer and Elliot T. Ryser, Michigan State University, East Lansing, MI, USA

T7-03 2:00 Inactivation of Bacteria and Yeast on Peeled Chestnuts Using X-ray Radiation — IRWIN R. DONIS GONZALEZ, Dennis W. Fulbright, Sanghyup Jeong, Daniel Guyer and Elliot T. Ryser, Michigan State University, East Lansing, MI, USA

T7-04 2:15 Multistate Outbreak of *Salmonella* I 4,[5],12:i:- Infections Associated with Commercially Produced Frozen Pot Pies — United States, 2007 — RAJAL MODY, Stephanie Meyer, Olga Henao, Thai-An Nguyen, Anandi Sheth, Jana Austin, Patsy White and Ian Williams, CDC, Atlanta, GA, USA

T7-05 2:30 Increasing Incidence of Listeriosis in France and Its Relations with Host Factors and Food Control — ALEXANDRE LECLERCQ, Alban Le Monnier, Marc Lecuit and Véronique Goulet, National Reference Centre for Listeria and WHO Collaborating Centre for Foodborne Listeriosis, Institut Pasteur, Paris, France

T7-06 2:45 Prevalence of Exposures to Raw Meat and Poultry Products among Children Riding in Shopping Carts: Increased Risk of *Salmonella* and *Campylobacter* Infection? — MARY E. PATRICK, Shelly Zansky, Tim F. Jones, Stephanie Meyer, Sharon Hurd, Dawn Norton, Suzanne Segler and Elaine Scallan, CDC, Atlanta, GA, USA

T7-07 3:00 Genotypic Similarities and Antimicrobial Resistance Profiles of *Salmonella* Isolates in Humans and Animals in North Dakota — JAMES OLOYA, Dawn Doetkott and Margaret Khaitsa, North Dakota State University, Fargo, ND, USA

4:00 p.m. – 4:45 p.m.

John H. Silliker Lecture – *Franklin A-C*

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

95th Annual Meeting

IAFP 2008

Columbus, Ohio • August 3–6

IAFP 2008 NETWORKING OPPORTUNITIES

IAFP FUNCTIONS

WELCOME RECEPTION

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

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

COMMITTEE MEETINGS

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

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

STUDENT LUNCHEON

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

Sponsored by Texas A&M University, Center for Food Safety

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

EDITORIAL BOARD RECEPTION

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

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

OPENING SESSION AND IVAN PARKIN LECTURE

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

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

CHEESE AND WINE RECEPTION

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

Sponsored by Kraft Foods

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

IAFP JOB FAIR

Sunday, August 3 through Wednesday, August 6

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

COMMITTEE AND PDG CHAIRPERSON BREAKFAST

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

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

EXHIBIT HALL LUNCH

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

Sponsored by JohnsonDiversey

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

Sponsored by SGS North America

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

EXHIBIT HALL RECEPTIONS

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

Sponsored by DuPont Qualicon

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

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

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

PRESIDENT'S RECEPTION

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

Sponsored by Fisher Scientific

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

BUSINESS MEETING

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

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

JOHN H. SILLIKER LECTURE

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

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

AWARDS RECEPTION AND BANQUET

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

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

95th Annual Meeting

IAFP 2008

Columbus, Ohio • August 3–6

IAFP 2008 GENERAL INFORMATION

REGISTRATION INCLUDES

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

Full Registration includes:

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

PRESENTATION HOURS

Sunday, August 3	
Opening Session	6:00 p.m. - 7:00 p.m.
Monday, August 4	
Symposia & Technical Sessions	8:30 a.m. – 5:00 p.m.
Tuesday, August 5	
Symposia & Technical Sessions	8:30 a.m. – 5:00 p.m.
Wednesday, August 6	
Symposia & Technical Sessions	8:30 a.m. – 3:30 p.m.
Closing Session	4:00 p.m. – 5:00 p.m.

GOLF TOURNAMENT

Saturday, August 2

Golf Tournament at Golf Club of Dublin 6:00 a.m. – 2:00 p.m.

Join your friends and colleagues for an exciting round of golf before IAFP 2008. Golf the Golf Club of Dublin (Ohio) and you may envision yourself playing in Dublin, Ireland. The new Golf Club of Dublin was designed with the spirit of golf from the British Isles and will leave you thinking that you have just played Turnberry or Carnoustie. It is the first course in the region to be built with authentic links features such as stacked sod bunkers, rectangular teeing grounds, fescue covered dunes, stone walls and enormous greens. With 18-holes, a driving range, an Irish pub and a banquet hall on site–the Golf Club of Dublin offers a first-class resort style experience.

The Golf Club of Dublin was ranked one of the "Top 25 in America" by Golf Magazine and "Must Play Golf Courses" by ESPN just to name a few. For a true championship test and memorable experience you must play the Golf Club of Dublin. Price includes transportation, greens fees with a cart, range balls, breakfast, lunch and prizes.

REGISTER ONLINE

Register online at **www.foodprotection.org**

EXHIBIT HOURS

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

HOTEL INFORMATION

Hotel reservations can be made online at **www.foodprotection.org**.

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

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

CANCELLATION POLICY

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

Event and extra tickets purchased are nonrefundable.

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

95th Annual Meeting

IAFP 2008

Columbus, Ohio • August 3–6

IAFP 2008 REGISTRATION FORM

3 Ways to Register

ONLINE	FAX	MAIL
www.foodprotection.org	515.276.8655	6200 Aurora Ave., Suite 200W Des Moines, IA 50322-2864, USA

Member Number: _____

First name (as it will appear on your badge) _____ Last name _____

Employer _____ Title _____

Mailing Address (Please specify: ❒ Home ❒ Work) _____

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

Telephone _____ Fax _____ E-mail _____

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

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

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

REGISTRATION FEES	MEMBERS	NONMEMBERS	TOTAL
Registration	$ 415 ($ 465 late)	$ 630 ($ 680 late)	_____
Association Student Member	$ 80 ($ 90 late)	Not Available	_____
Retired Association Member	$ 80 ($ 90 late)	Not Available	_____
One Day Registration* ❒ Mon. ❒ Tues. ❒ Wed.	$ 225 ($ 250 late)	$ 350 ($ 375 late)	_____
Spouse/Companion* (Name): _____	$ 60 ($ 60 late)	$ 60 ($ 60 late)	_____
Children 15 & Over* (Names): _____	$ 25 ($ 25 late)	$ 25 ($ 25 late)	_____
Children 14 & Under* (Names): _____	FREE	FREE	_____
*Awards Banquet not included			
Additional Awards Banquet Ticket – Wednesday, 8/6	$ 50 ($ 60 late)	$ 50 ($ 60 late)	_____
Student Luncheon – Sunday, 8/3	$ 10 ($ 15 late)		_____
GOLF TOURNAMENT		**# OF TICKETS**	
Golf Club of Dublin, Saturday, 8/2	$ 140 ($ 150 late)	_____	_____
WORKSHOPS – PRE-MEETING			
Better Process Cheese Control School	$ 575 ($ 650 late)	$ 675 ($ 750 late)	_____
The Art of Fungal Characterization and Identification: A Hands-on Workshop	$ 620 ($ 695 late)	$ 720 ($ 795 late)	_____
Hands-on Workshop on Microbial Risk Assessment Modeling and Interpretation	$ 270 ($ 345 late)	$ 370 ($ 445 late)	_____
ABSTRACTS			
Annual Meeting Abstracts (citable publication to be mailed Oct. 1)	$ 25	$ 25	_____

Payment Options: ❒ **VISA** ❒ **Master Card** ❒ **American Express** ❒ **Discover**

❒ **Check Enclosed**

TOTAL AMOUNT ENCLOSED $ _____
US FUNDS on US BANK

Refunds subject to cancellation policy

CREDIT CARD # _____

CARD ID #* _____ EXP. DATE _____

SIGNATURE _____

*Visa, Mastercard and Discover: See 3-digit Card ID number on the back of the card after account number.
American Express: See 4-digit, non-embossed number printed above your account number on the face of your card.

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

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

EXHIBITORS DO NOT USE THIS FORM

International Association for Food Protection

95th Annual Meeting

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IAFP 2008 WORKSHOPS

WORKSHOP 1	WORKSHOP 2	WORKSHOP 3
Better Process Cheese Control School	The Art of Fungal Characterization and Identfication: A Hands-on Workshop	Hands-on Workshop on Microbial Risk Assessment Modeling and Interpretation
Friday and Saturday August 1–2 8:00 a.m. – 5:00 p.m.	**Friday and Saturday August 1–2 8:00 a.m. – 5:00 p.m.**	**Saturday August 2 8:00 a.m. – 5:00 p.m.**

REGISTRATION – (Payment must be received by July 18, 2008 to avoid late registration rates).

Cancellations received by July 18, 2008 will be refunded, less a $50.00 administrative fee. No refunds will be made after this date.

	Early Late	Late Rate
Member	$575.00	$650.00
Non-Member	$675.00	$750.00

	Early Rate	Late Rate
Member	$620.00	$695.00
Non-Member	$720.00	$795.00

	Early Rate	Late Rate
Member	$270.00	$345.00
Non-Member	$370.00	$445.00

Workshop 1 – Better Process Cheese Control School – Processing Controls for Shelf-Stable Pasteurized Process Cheese Product Manufacture – Friday and Saturday, August 1–2

Current regulations for Low Acid Canned Foods (LACF) require that "Operators of systems shall be under the operating supervision of a person who has attended a school approved by the Commissioner for giving instruction appropriate to the preservation technology involved and who has been identified by that school as having satisfactorily completed the prescribed course of instruction." The Better Process Control School (BPCS) training course currently available does not include process cheese formulation as a preservation technology.

This 2-day course is designed to cover LACF regulations as they pertain to shelf-stable process cheese manufacture, microbiology and control of *Clostridium botulinum*, thermal processing/pasteurization, formulation control, process instrumentation, HACCP, and production and packaging controls. Examinations will be given at the completion of each section. Satisfactory completion of this course will fulfill the regulatory certification requirements for operators of process cheese manufacturing systems.

Topics:

- Introduction to LACF Regulations for Shelf Stable Process Cheese
- Microbiology – Basic Microbiology, Factors Affecting Growth
- Thermal Processing – Microbial Death, D, Z, and F Values, Factors Affecting Thermal Resistance, Pasteurization, Commercial Sterilization, Sterilization
- Botulism and Control of *C. botulinum* – Disease, Risks, Methods to Control Toxin Production
- Formulation Control for Shelf Stable Process Cheeses – Ingredients That Affect Safety, FRI Studies, Additional Factors for Safety
- Process Controls for Process Cheese – Cheese Processing Overview, Preparations Prior to Cooking, Batch Cooking, Continuous Cooking, Testing
- Food Plant Sanitation and GMPs – Basic Principles of Sanitation, Good Manufacturing Practices
- HACCP and Production Controls – Principles of HACCP, Critical Control Points for Shelf Stable Process Cheese, Other Production Controls for Shelf Stable Process Cheese
- Packaging for Process Cheese – Package Development Process, Examples of Packaging, Development and Qualification Testing
- Records and Record-Keeping – Reasons for Record-Keeping, Proper Documentation on Records, Record Retention and Availability, Product Recalls, Processing Records

Instructors:

Kathy Glass, University of Wisconsin-Madison, Madison, WI, USA
Loralyn Ledenbach, Kraft Foods, Glenview, IL, USA
Virgil Metzger, Kraft Foods, Glenview, IL, USA
Don Zink, FDA-CFSAN, College Park, MD, USA

Organizer:

Loralyn Ledenbach, Kraft Foods, Glenview, IL, USA

INTENDED AUDIENCE

Operators, supervisors, and management in process cheese manufacturing facilities. Food safety professionals and regulatory officials involved in LACF filing for process cheese products

This workshop is dedicated to Dr. Nobi Tanaka, whose work at the Food Research Institute, University of Wisconsin-Madison has been instrumental in assuring the safety of shelf stable process cheese products.

Workshop 2 – The Art of Fungal Characterization and Identification: A Hands-on Workshop – Friday and Saturday, August 1–2

Mitigating the risks of yeasts and mold contamination remains a constant battle within certain segments of the food and beverage industry. Molds and yeasts cause significant pre- and post-harvest food spoilage losses and mycotoxigenic molds pose significant food safety/regulatory hazards. Fungal identification is a scientific challenge requiring both art and technical expertise. There are a limited number of scientists who understand and have developed the art of fungal identification to a sound science. This workshop provides a unique opportunity to interact with and learn first-hand from a group of experts the best practice for isolation and the basics of classical identification methods, along with current molecular methods being used. Fifty-percent of the workshop will involve live demonstration and a direct hands-on experience in a laboratory setting.

Topics:

- Classical and Molecular Methods of Identification of Yeast and Molds
- Basic Isolation and Analytical Methods of Fungal Contaminants
- Safe Handling of Fungal Cultures
- Environmental Sampling of Processing Plant

Instructors:

Anthony Armstrong, PepsiCo, Barrington, IL, USA
Frank Burns, DuPont Qualicon, Philadelphia, PA, USA
Maribeth Cousin, Purdue University, West Lafayette, IN, USA
Dave Pincus, bioMérieux, Inc., Hazelwood, MO, USA
Emilia Rico-Munoz, BCN Research Laboratories, Rockford, TN, USA

Organizers:

Frank Burns, DuPont Qualicon, Philadelphia, PA, USA
Dave Pincus, bioMérieux, Inc., Hazelwood, MO, USA
Patricia Rule, bioMérieux, Inc., Hazelwood, MO, USA

Laboratory Host – Ahmed Yousef, The Ohio State University, Columbus, OH, USA

INTENDED AUDIENCE

Microbiologists in quality assurance and quality control performing routine analysis as well as investigational work for the recovery and identification of yeast and mold from food or beverage

Workshop 3 – Hands-on Workshop on Microbial Risk Assessment Modeling and Interpretation – Saturday, August 2

Microbiological risk assessments (MRA) have received much interest in the last decade but require particular multi-disciplinary skills for successful development. This hands-on workshop should help create awareness of the principles of risk assessment/management, the skill requirements, and experience gained regarding the utility and validity of MRA studies. The lecturers will present several of the valuable resources available for risk assessors and managers and provide insights in the challenges to interpret and utilize risk assessment studies. Case studies will help participants to understand the principles of risk assessment and risk management and there will be an opportunity given to participants to propose cases relevant to them ahead of the workshop that may be dealt within plenary or one on one. The workshop will also cover a recent development, the establishment of a broad conceptual framework for risk governance by the International Risk Governance Council. This addresses the fact that the success with which risks are managed in society depends on a complex system of risk governance.

Topics:

- Different MRA Types and Scopes: From Risk Profiles to Probabilistic Approaches to Risk Assessment
- Interpreting Outputs from Different MRA Types for Risk Management Decision-Making
- Detailed Example MRA Case Studies
- Learnings for Industry and Governments from Existing Risk Assessments
- Guidance on Utility and Validity of Microbiological Risk Assessments
- The Risk Governance Framework Developed by the International Risk Governance Council (IRGC)
- Risk Assessment Software and Decision Support Systems for Risk Evaluation and Risk Ranking (from ComBase, over Risk Ranger to FAO/WHO Web-Based MRA Tools)

Instructors:

Leon Gorris, Unilever, SEAC, Sharnbrook, UK
Tom Ross, Centre for Food Safety, Tasmanian Institute of Agricultural Research, School of Agricultural Science, University of Tasmania, Hobart, Tasmania, Australia
Ewen C. D. Todd, Michigan State University, East Lansing, MI, USA
Richard C. Whiting, FDA-CFSA, College Park, MD, USA

Organizers:

Leon Gorris, Unilever, SEAC, Sharnbrook, UK
Ewen C. D. Todd, Michigan State University, East Lansing, MI, USA

INTENDED AUDIENCE

Risk assessment and management staff from government, industry and academia interested in microbiological food safety management

TO REGISTER, GO ONLINE TO WWW.FOODPROTECTION.ORG.

95th Annual Meeting

IAFP 2008

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IAFP 2008 Exhibitors

Companies Scheduled to Exhibit as of June 2, 2008

◆ Indicates IAFP Sustaining Member

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

◆ 3M Microbiology
800.328.1671 www.3m.com/microbiology

A&B Ingredients, Inc.
973.227.1390 www.abingredients.com

A2LA
301.644.3204 www.a2la.org

◆ Advanced Instruments, Inc.
800.225.4034 www.aicompanies.com

◆ Aemtek, Inc.
510.979.1979 www.aemtek.com

AES – Chemunex, Inc.
609.497.0166 www.aeschemunex.com

AID GmbH
49.7434.9364.0 www.aid-diagnostika.com

American Proficiency Institute
800.333.0958 www.api-pt.com

Applied Biosystems
650.638.5800 www.appliedbiosystems.com

◆ ASI Food Safety Consultants
800.477.0778 www.asifood.com

ASM Press
800.546.2416 http://estore.asm.org

ATCC
800.638.6597 www.atcc.org

Battelle
614.424.5295 www.battelle.org

◆ BD Diagnostics
410.316.4024 www.bd.com/ds

◆ BioControl
800.245.0113 www.biocontrolsys.com

BioLumix
734.973.5870 www.mybiolumix.com

◆ bioMérieux, Inc.
800.634.7656 www.biomerieux-usa.com

◆ Bio-Rad Laboratories
800.4BIORAD www.foodscience.bio-rad.com

British Food Journal
44.01274.785117 www.emeraldinsight.com/bfj.htm

◆ Charm Sciences, Inc.
800.343.2170 www.charm.com

◆ Chemstar Corporation
800.327.0777 www.chemstarcorp.com

◆ Chestnut Labs
417.829.3724 www.chestnutlabs.com

Cooper-Atkins Corporation
860.347.2256 www.cooper-atkins.com

Copan Diagnostics, Inc.
951.696.6957 www.copanusa.com

CRC Press – Taylor & Francis Group LLC
800.272.7737 www.crcpress.com

◆ Decagon Devices, Inc.
800.755.2751 www.decagon.com

◆ Deibel Laboratories
847.329.9900 www.deibellabs.com

◆ DonLevy Laboratories
219.226.0001 www.donlevylab.com

◆ DuPont Qualicon
800.863.6842 www.qualicon.com

◆ Ecolab Inc.
800.392.3392 www.ecolab.com

Environmental Health Testing
800.446.0257 www.nrfsp.com

Exponent
888.656.3976 www.exponent.com

◆ Fisher Scientific
800.494.6913 www.fishersci.com

Food Quality Magazine, A Wiley-Blackwell Publication
480.419.1851 www.foodquality.com

Food Safety Magazine
818.842.4777 www.foodsafetymagazine.com

◆ Food Safety Net Services
888.525.9788 www.food-safetynet.com

◆ FoodHandler, Inc.
800.338.4433 www.foodhandler.com

G&K Services, Inc.
952.912.5500 www.gkservices.com

◆ GOJO Industries
800.321.9647 www.gojo.com

Hanna Instruments, USA
401.765.7500 www.hannainst.com

◆ HiMedia Laboratories Pvt. Limited
91.22.40951919 www.himedialabs.com

Hygiena
805.388.8007 www.hygiena.net

◆ Idaho Technology, Inc.
801.736.6354 www.idahotech.com

◆ IEH Laboratories & Consulting Group
206.522.5180 www.iehinc.com

International Association for Food Protection
800.369.6337 www.foodprotection.org

International Association for Food Protection – Student PDG
800.369.6337 www.foodprotection.org

International Food Hygiene
44.13.7724.1724 www.positiveaction.co.uk

International Food Information Council Foundation
202.296.6540 www.ific.org

Intertek
630.623.8318 www.intertek.com

Invitrogen
800.955.6288 www.invitrogen.com

◆ JohnsonDiversey
513.554.4253 www.johnsondiversey.us

Kim Laboratories, Inc.
888.4.KIM.LAB www.kimlaboratories.com

LITMUS RAPID-B, LLC
610.696.4405 www.litmusrapid-b.com

◆ MATRIX MicroScience, Inc.
303.277.9613 www.matrixmsci.com

Meritech
303.790.4670 www.meritech.com

Meyer Industries, Inc.
210.736.1811 www.meyer-industries.com

◆ Michelson Laboratories, Inc.
562.928.0553 www.michelsonlab.com

◆ Michigan State University Online Master of Science in Food Safety
517.884.2078 www.online.foodsafety.msu.edu

◆ Microbial-Vac Systems, Inc.
801.523.3962 www.m-vac.com

◆ MicroBioLogics, Inc.
800.599.BUGS www.microbiologics.com

Microbiology International
800.396.4276 www.800ezmicro.com

◆ Mol Industries
616.453.2484 www.molindustries.com

◆ Nasco Whirl-Pak
920.563.2446 www.enasco.com

◆ The National Food Laboratory, Inc.
925.828.1440 www.thenfl.com

◆ Nelson-Jameson, Inc.
800.826.8302 www.nelsonjameson.com

◆ Neogen Corporation
800.234.5333 www.neogen.com

Neutec Group, Inc
800.280.0726 www.neutecgroup.com

Nice-Pak Commercial
800.444.6725 www.nicepak.com

◆ NSF International
800.NSF.MARK www.nsf.org

◆ Orkin Commercial Services
800.675.4666 www.orkincommercial.com

Partnership for Food Safety Education
202.220.0651 www.fightbac.org

◆ Q Laboratories, Inc.
513.471.1300 www.qlaboratories.com

QMI
651.501.2337 www.qmisystems.com

Quality Assurance & Food Safety Magazine
800.456.0707 www.qualityassurancemag.com

◆ R&F Laboratories
630.969.5300 www.rf-labs.com

◆ REMEL, Inc. (Part of Thermo Fisher Scientific)
800.255.6730 www.remel.com

◆ Rochester Midland Corporation, Food Safety Division
800.RMC.4448 www.rochestermidland.com

◆ rtech™ laboratories
800.328.9687 www.rtechlabs.com

SGS US Testing Co. Inc.
888.777.TEST www.us.sgs.com/cts

◆ Silliker, Inc.
888.957.LABS www.silliker.com

Society for Applied Microbiology
44.1234.76.0751 www.sfam.org.uk

Springer
800.SPRINGER www.springer.com

SQF Institute
202.220.0635 www.sqfi.com

Steton
888.343.5655 www.steton.com

◆ Strategic Diagnostics Inc.
800.544.8881 www.sdix.com

USDA
215.233.6620 www.arserrc.gov

USDA Food Safety and Inspection Service
202.690.6370 www.fsis.gov

USDA/NAL/Food Safety Research Information Office
301.504.7374 www.fsrio.nal.usda.gov

Webber/Smith Associates, Inc.
717.291.2266 www.webbersmith.com

◆ Weber Scientific
800.328.8378 www.weberscientific.com

Wiley-Blackwell
800.862.6657 www.blackwellfood.com

◆ World Technology Ingredients
706.387.5150 www.wtiinc.com

SPECIAL EXHIBIT HALL EVENTS

Sunday, August 3

7:00 p.m. – 9:00 p.m.
Cheese and Wine Reception
Sponsored by Kraft Foods

Monday, August 4

10:00 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. – 6:00 p.m.
Exhibit Hall Reception
Sponsored by DuPont Qualicon

Tuesday, August 5

10:00 a.m. Pastries and Coffee
Sponsored by Food Safety Net Services

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
Sponsored in part by Food Safety Net Services, Kroger, Q Laboratories, Springer, and Quality Assurance Magazine

EXHIBIT HOURS

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

WTI – A World Leader in Food Safety and Functional Food Ingredients

World Technology Ingredients Company, Inc. (WTI, Inc) is a specialty ingredients company founded in 1978 to provide ingredients and technology to the meat, poultry and seafood industries. Since 1988, World Technology Ingredients has been issued 12 patents in ingredient and food process technology.

WTI manufactures dry and liquid ingredients for use by food manufacturers to enhance finished product performance and inhibit a broad range of bacteria, yeast and molds. All ingredients manufactured and sold by World Technology Ingredients are approved for use in USDA and FDA regulated products. All WTI ingredients are Generally Recognized As Safe (GRAS), nonallergenic and safe for direct contact.

WTI opened its new state of the art production facility in Jefferson, Georgia in December 2005 with additional capacity to do Custom Blending and Contract Packaging. The facility, carefully designed to exceed all Good Manufacturing Practices (GMP's) requirements received a SUPERIOR rating by the AIB on its very first inspection.

WTI is committed to providing safe, new and innovative solutions for its customers. Through leading edge research and technical initiatives, WTI is able to meet the needs of its customers, both large and small. Our goal is simple – to continuously identify and develop new ingredients/technology which provides our customers the tools to profitably succeed.

WTI Products Portfolio

World Technology Ingredients manufactures five different brands of product, each designed to profitably enhance selected performance attributes of a wide variety of foods. The product lines are: *IONAL, Myosol, MOstatin, TenderIn, Marinal and FlavorIn.*

IONAL Products

The *IONAL* brands of antimicrobials consist of three basic product lines: *IONAL, IONAL Plus* and *IONAL LC* – all based upon blends of buffered citrates alone or in combination with diacetate or acetate. Since it's approval as an antimicrobial for meats and poultry in 1995 extensive research has been conducted into the use of buffered citrates to inhibit the growth of pathogenic and nonpathogenic bacteria in/on raw and ready to eat meats and poultry.

IONAL is straight buffered sodium or potassium citrate. As the name implies it increases ionic strength. In muscle protein systems this equates to increased marinade/brine retention and yield during processing with less moisture migration and purge in the finished package.

IONAL Plus products are buffered citrates with diacetate or acetate. It primarily is used to increase the shelf life of perishable foods, especially raw marinated meats, fish and poultry. Typically incorporation of *IONAL Plus* into a food system will double the products shelf life.

IONAL LC products are buffered citrates with diacetate or acetate which have been specifically formulated to inhibit the growth of pathogenic bacteria such as *Listeria monocytogenes* in/on foods, especially ready to eat meats. Studies have also shown it to be an effective means of inhibiting the outgrowth of *Clostridium perfringens*.

Myosol Products

Myosol branded liquid phosphates; Myosol and *Myosol Plus* are performance enhanced functional ingredients designed to improve product/process yield and meat tenderness. *Myosol* brand phosphates are supersaturated tetrapotassium pyrophosphate solutions which are pH optimized to meet your specific needs. They are readily soluble in cold water and instantaneously reactive in meat systems.

MOstatin Products

MOstatin brand products are all natural, consumer friendly, clean label ingredients designed to enhance the retention qualities of marinades in muscle foods and inhibit the growth of pathogens and spoilage microorganisms in a wide array of food systems. MO for microorganism; statin for stasis or no growth. There are four basic product lines of *MOstatins: MOstatin LV, MOstatin V, MOstatin VE, and MOstatin LVE. MOstatins* have been successfully used as a CCP for *Listeria* in ham. They have also performed successfully against this pathogen of public health significance in refrigerated salads and soups.

MOstatin LV

MOstatin LV is an all natural blend of lemon juice concentrate and vinegar designed to enhance the organoleptic properties of foods while inhibiting a broad spectrum of bacteria, yeast and molds. *MOstatin LV* increases the water holding capacity of muscle protein systems. At low concentrations *MOstatin LV* does not have any flavor impact on the finished product. At higher concentrations, its slight citric taste enhances the natural flavors of meats, fish, poultry and vegetables.

MOstatin V

MOstatin V is a buffered vinegar product designed to inhibit a broad spectrum of bacteria, yeast and molds in foods. At low concentrations *MOstatin V* does not have any flavor impact on the finished product. At higher concentrations it yields a slight vinegar taste and odor.

MOstatin VE

MOstatin VE is a buffered vinegar system with native tapioca or potato starch designed to enhance/increase marinade retention in ready to eat muscle foods while inhibiting a broad spectrum of bacteria, yeast and molds. At low concentrations *MOstatin VE* does not have any flavor impact on the finished product. At higher concentrations it yields a slight vinegar taste and odor.

MOstatin LVE

MOstatin LVE is on all natural blend of lemon juice concentrate, vinegar and native tapioca or potato starch. It is designed to increase cook yield of ready to eat muscle foods while inhibiting pathogen and nonpathogenic bacteria, yeast and molds.

Marinal Products

Marinal brand marinades are customized systems designed to deliver maximum performance at an affordable cost. They are specially formulated to maximize the interactions between substrate, process and packaging in order to achieve the customers' desired performance objectives.

TenderIns

TenderIns are all natural, consumer friendly, clean label alternatives to phosphates for use in muscle foods. *TenderIns* are derived from fruit juices and vegetable bi-products. They are species specific products – each formulated to accommodate the different functional characteristics encountered by different muscle foods: a.k.a. beef, chicken, pork, turkey or fish.

TenderIn L

TenderIn L is the liquid form of *TenderIns*, each custom blended to meet the specific performance requirements of a wide range of food systems.

TenderIn DL

TenderIn DL is processed lemon juice concentrate dried onto a rice flour carrier designed to increase the cook yield of ready to eat meats and overall viscosity of food systems. The rice flour is a specialty blend formulated to deliver the optimum amylose and amylopectin concentrations. Its unique properties in cooked systems make *TenderIns* a viable alternative to phosphates.

FlavorIns

FlavorIns are all natural flavor systems derived from fruit, vegetable and vinegar based ingredients designed to enhance to organoleptic attributes of food systems throughout the shelf life of a product. They are available in both a dry and liquid form depending upon the desired functionality in the finished product.

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IAFP 2008 Special Contributors

BD

JohnsonDiversey
Clean is just the beginning

BIOMÉRIEUX INDUSTRY

KRAFT

BIO-RAD

1883 Kroger 2008

Cargill

Nestlé
Good Food, Good Life

DEIBEL LABORATORIES

NSF

DUPONT

SGS

Fisher Scientific

SILLIKER
Food Safety & Quality Solutions

FSNS
Food Safety Net Services

SDI
Strategic Diagnostics Inc.

IAFP FOUNDATION

Texas A&M University
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IAFP FOUNDATION

COMING EVENTS

AUGUST

- **1–2, IAFP 2008 Workshops,**
  Workshop 1 – Better Process Cheese Control School
  Workshop 2 – The Art of Fungal Characterization and Identification: A Hands-on Workshop
  Workshop 3 – Hands-on Workshop on Microbial Risk Assessment Modeling and Interpretation
  For more information, contact Julie Cattanach at 800.369.6337; E-mail: jcattanach@foodprotection.org. See our workshop information on page 538.

- **3–6, IAFP Annual Meeting, Hyatt Regency Columbus,** Columbus, OH. contact Julie Cattanach at 800.369.6337; E-mail: jcattanach@foodprotection.org. See our registration form on page 537.

- **12–13, Food and Nutritional Labeling Workshop,** University of Arkansas, Fayetteville, AR. For more information, go to http://www.uark.edu/ua/foodpro/Workshops/.
- **12–13, NMC Regional Meeting,** Hotel Sierra, Green Bay, WI. For more information, call NMC at 608.848.4615 or go to www.nmconline.org.
- **12–14, Statistical Process Control for the Food Industry,** Athens, GA. For more information, contact University of Georgia Food Science Extension Outreach Program at 706.542.2574 or go to www.EFSonline.uga.edu.
- **18–20, Food and Nutraceutical Additives Workshop,** University of Arkansas, Fayetteville, AR. For more information,go to http://www.uark.edu/ua/foodpro/Workshops/.
- **24–27, ABIC 2008 Conference,** University College Cork, Cork, Ireland. For more information, go to www.abic.ca/abic2008.

SEPTEMBER

- **1–4, Food Micro 2008 – The 21st International ICFMH Symposium,** Aberdeen Exhibition and Conference Centre, Aberdeen, Scotland. For more information, go to www.foodmicro2008.org/.
- **4–5, ASI Food Safety Consultants Bioterrorism and Food Safety Seminar,** Las Vegas, NV. For more information, contact Vicki Bodrow at 800.477.0778; E-mail: vbodrow@asifood.com.
- **7–9, 5th International Whey Conference,** Paris, France. For more information, go to www.iwc-2008.org/home.asp.
- **9–12,ASTHO – NACCHO Joint 2008 Conference,** Sacramento Convention Center, Sacramento, CA. For more information call 703.964.1240 or go to www.naccho.org.
- **14–17, 2008 TAPPI PLACE Conference,** Renaissance Portsmouth Hotel, Portsmouth, VA. For more information, call 800.332.8686 or go to www.tappi.org/08place.
- **15, ASIS International – 54th Annual Seminar and Exhibits,** Atlanta, GA. For more information, call 800.465.3717 or go to www.qmi.com.
- **16, Managing Food Chain Security Effectively Workshop,** CCFRA Chipping Campden, Gloucestershire, United Kingdom. For more information, go to www.campden.co.uk/training/training.htm.
- **16–17, Upper Midwest Dairy Industry Association Annual Meeting,** Holiday Inn, St. Cloud, MN. For more information, E-mail Gene Watnass at saantaw@prtel.com.
- **16–18, Microbiological Laboratory Logistics and Fundamentals Workshop,** University of Arkansas, Fayetteville, AR. For more information, go to http://www.uark.edu/ua/foodpro/Workshops/.
- **16–18, New York State Association for Food Protection's 85th Annual Conference,** Doubletree Hotel, East Syracuse, NY. For more information, contact Janene Lucia at 607.255.2892; E-mail: jgg3@cornell.edu.
- **18, Nutritional Quality of Produce Conference,** CCFRA Chipping Campden, Gloucestershire, United Kingdom. For more information, go to www.campden.co.uk/training/agric10.htm.
- **21–24, AACC International Annual Meeting,** Hawaii Convention Center, Honolulu. For more information, call 651.454.7250 or go to http://meeting.aaccnet.org.
- **21–24, 122nd AOAC International Annual Meeting,** Dallas TX. For more information, go to www.aoac.org.
- **24–25, 2nd Annual China International Food Safety and Quality Conference and Expo,** The Landmark Hotel & Towers, Beijing, China. For more information, go to www.chinafoodsafety.com.
- **24–25, Molecular Biology and Biotechnology; Workshop for Beginners,** University of Arkansas, Fayetteville, AR. For more information, go to http://www.uark.edu/ua/foodpro/Workshops/.
- **24–25, Wisconsin Association for Food Protection Joint Educational Conference,** Holiday Inn, Manitowoc, WI. For more information, go to www.wafp-wi.org.
- **24–26, Washington Association for Food Protection Annual Conference,** Campbell's Resort, Chelan, WA. For more information, contact Stephanie Olmsted at 425.201.6471 or go to www.waffp.org.
- **29–1 Oct., Indiana Environmental Health Association Fall Educational Conference,** Belterra Hotel and Conference Center, Belterra, IN. For more information, contact Kelli Whiting at 317.221.2256; E-mail: kwhiting@hhcorp.org.

OCTOBER

- **1–2, Mexico Association for Food Protection with State University of Puebla International Congress of Food Safety,** Puebla, Mexico. For more information, contact Fausto Tejeda Trujillo at 52.222.455.9601; E-mail: ftejada@siu.buap.mx.

IAFP UPCOMING MEETINGS

AUGUST 3-6, 2008
Columbus, Ohio

JULY 12-15, 2009
Grapevine, Texas

AUGUST 1-4, 2010
Anaheim, California

COMING EVENTS

- **7–8, Advanced HACCP Training for Meat and Poultry Producers,** Athens, GA. For more information, contact University of Georgia Food Science Extension Outreach Program at 706.542.2574 or go to www.EFSonline.uga.edu.
- **9–11, Current Developments in Food and Environmental Virology Symposium,** Pisa, Italy. For more information, call 39.050.2213644 or go to www.cost929-environet.org.
- **12–16, 2nd ASM Conference on Beneficial Microbes: Beneficial Host-Microbial Interactions,** San Diego, CA. For more information, call ASM at 202.737.3600 or go to www.asm.org.
- **19–22, 8th Joint Meeting of the Seafood Science and Technology Society and the Atlantic Fisheries Technology Conference,** Wrightsville Beach, NC. For more information, call 252.222.6334 or go to www.seafoodlab.cmast.ncsu.edu/sst_aft2008/.
- **19–22, 28th Food Microbiology Symposium "Current Concepts in Foodborne Pathogens and Rapid and Automated Methods in Food Microbiology,"** University of Wisconsin-River Falls, River Falls, WI. For more information, call 715.425.3704 or go to www.uwrf.edu/food-science.
- **25–28, American Society for Microbiology's Annual Interscience Conference on Antimicrobial Agents and Chemotherapy,** Washington, D.C. For more information, go to www.icaac.org.
- **28–29, AIB International's Principles of Inspecting and Auditing Food Plants,** Atlanta, GA. For more information, call 785.537.4740 or go to www.aibonline.org.

NOVEMBER

- **3–6, Better Process Control School,** University of Arkansas, Fayetteville, AR. For more information, go to http://www.uark.edu/depts/ifse/bpcsrev1.html.
- **5–6, Alabama Association for Food Protection Annual Meeting,** Birmingham, AL. For more information, contact G. M. Gallaspy at 334.206.5375; E-mail: ggallaspy@adph.state.al.us.
- **18–21, New Zealand Association for Food Protection with New Zealand Microbiology Society Annual Meeting,** Christchurch, New Zealand. For more information, contact Lynn McIntyre at 64.3.351.0015.
- **19–21, IAFP's 4th European International Symposium on Food Safety,** Lisbon, Portugal. For more information, contact the Association at 800.369.6337 or go to www.foodprotection.org.
- **19–21, The ILSI Europe International Symposium on Food Packaging,** Prague, Czech Republic. For more information, call 32.2.771.00.14 or go to http://europe.ilsi.org/events/upcoming/4thfoodpckg.htm.
- **20, Ontario Association for Food Protection's 50th Annual Meeting,** Mississauga Convention Centre, Mississauga, Ontario, Canada. For more information, contact Gail Seed at 519.463.6320 or go to www.ofpa.on.ca.

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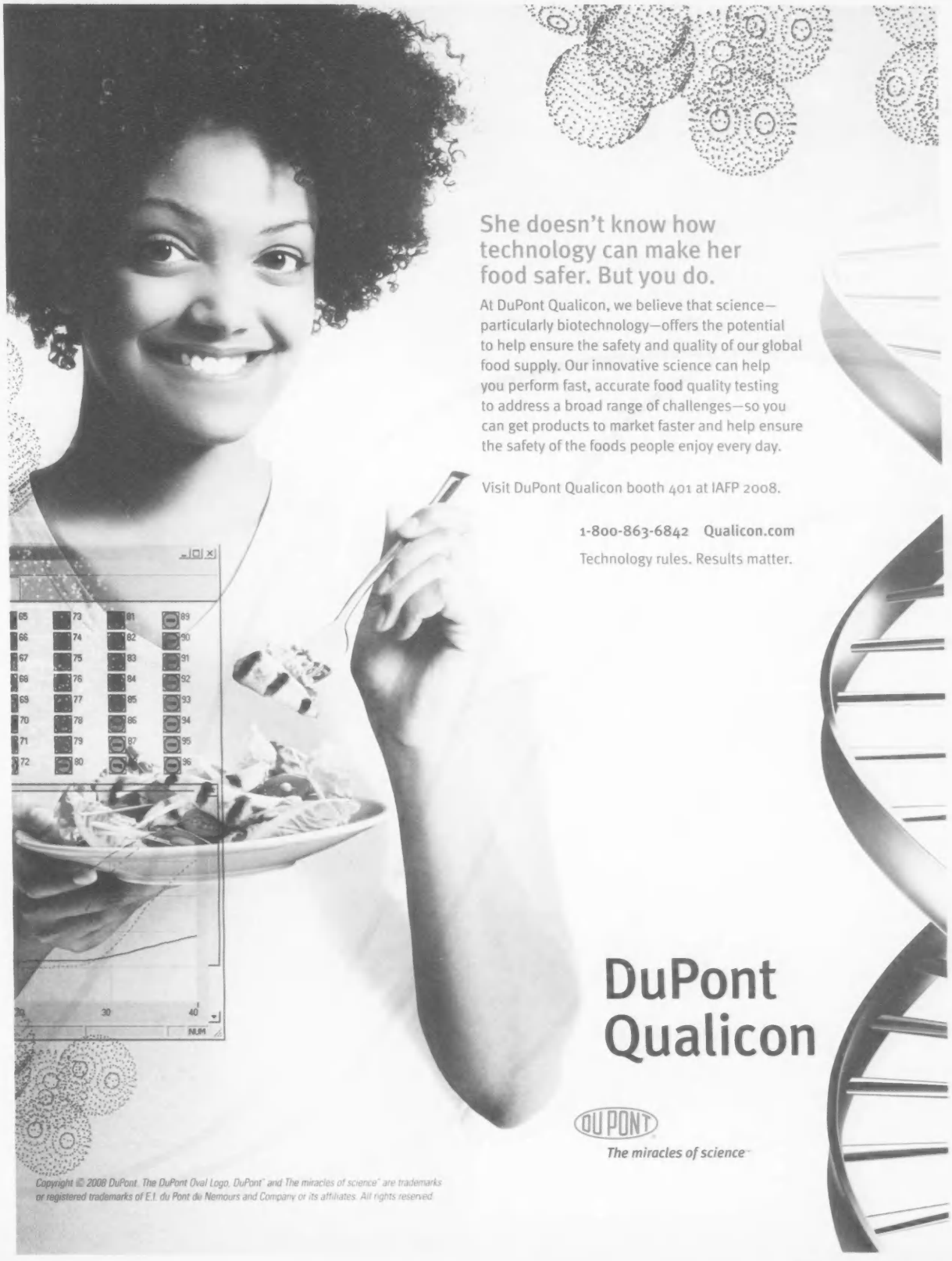

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