JIFSAN

ADVISORY COUNCIL ANNUAL SYMPOSIUM

April 27-28, 2011
Greenbelt Marriott Hotel
Greenbelt, Maryland
JIFSAN

Celebrating 15 Years
Spanning the Globe

In
Food Safety Training and Partnerships
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Welcome from the Chair and Vice-Chair
JIFSAN Advisory Council

We are delighted to welcome you to JIFSAN’s 2011 Advisory Council Annual Spring Symposium. This will celebrate JIFSAN’s 15th Anniversary of fostering the missions of the Food & Drug Administration and the University of Maryland to provide the scientific basis for advancing the food safety agenda through multidisciplinary research, outreach and educational programs.

JIFSAN also provides valuable opportunities for collaborative efforts with other federal and state agencies, industry, consumer and trade groups, and international organizations that promote food safety throughout the supply chain.

To commemorate this milestone event, we will review JIFSAN’s achievements over the past 15 years and feature a program that we hope is both engaging and informative. We also want to celebrate several pioneers who were involved in the inception and launching of this 15 year effort especially the first two directors of JIFSAN, Dr. David Lineback and Dr. Jianghong Meng and a pioneering founder, Dr. Paul Mazzocchi.

The theme of the symposium is: “Mitigating Consequences of an Outbreak /Adverse Event.” It will cover an overview of lessons learned from past events; the use of risk analysis tools to focus resources on preventing future occurrences; and understanding how the consumer interprets and reacts to information.

This symposium could not happen without the help of many dedicated people and generous donations from our sponsors. We want to acknowledge industry’s participation and financial support as a vital part of the continued success of JIFSAN. We would also like to express our sincere thanks to the Organizing Committee for defining the topics of this symposium, and our distinguished speakers for sharing their knowledge and insights. We especially like to thank you for participating, enriching the discussions and sharing in this occasion.

Please let us know if there is anything we can do to maximize your symposium experience. We wish you a pleasant and productive two days and hope that you will gain valuable insights from our expert speakers, establish new connections and enhance relationships.

Thank you for attending and making the 2011 Spring Symposium a success!

Sincerely,

Julie Jones
Chair

Patrizia Barone
Vice-chair
Advisory Council

(First row from left) DeAnn Benesh, Donna Rosenbaum, Julie Jones, Elizabeth Calvey (JIFSAN Associate Director, FDA)*

(Second row from left) Daniel March, Patrizia Barone, Henry Chin, Michael Doyle, James Willis, Courtney Brein, Paul Mazzocchi (Associate Director, JIFSAN)*

(Third row from left) Mark Empie, Craig Llewellyn, Bradd Eldridge, Kenneth Falci, Thomas Trautman, Gordon Smith, (VP and Senior Fellow, Research and Development, ConAgra Foods, Inc.),** Jianghong Meng, (JIFSAN Director),* David Lineback, Joseph Scimeca, John Vicini, James Rushing (JIFSAN, Manager International Programs),* Steven Robbs (Program Liaison, FDA),* George Evancho (JIFSAN, Senior Fellow)*

*JIFSAN/FDA Representatives
**Substitute for Steven Hermansky
Advisory Council Members not pictured:

Steven Hermansky
Sanford Miller
Gilbert Leveille
Deirdre Schlunegger
Alejandro Mazzota
From the Desk of the Director

As we celebrate the 15th Anniversary of JIFSAN, we are reminded that JIFSAN was established to advance sound strategies that improve public health, food safety, and applied nutrition using risk analysis principles through cooperative research, education and outreach programs. To date, JIFSAN has made great progress against these objectives.

JIFSAN has demonstrated a strong capability in building partnerships with the federal government, industry and the international community. Our applied research program continues to focus on risk analysis, and our professional development courses and training programs, delivered in a variety of modes, focus on improving the knowledge and expertise of food safety professionals in government, academia and industry in the use of risk analysis tools to improve the safety of the global food supply.

These are exciting times, which present both challenges and opportunities. JIFSAN is well positioned to assist in improving the safety of foods including addressing new requirements arising from the recent passage of the Food Safety Modernization Act. With internationally recognized strength and expertise in food safety training, JIFSAN will collaborate with its partners in developing food safety training centers in countries/regions to build capacity of both foreign regulators and manufacturers in the use of internationally recognized best practices in food safety management to better assure the safety of the global food supply.

Jianghong Meng

JIFSAN Directors

Dr. Paul Mazzocchi, 1996-1998 (Seated)
Dr. David Lineback, 1998-2005 (Standing – Left)
Dr. Jianghong Meng, 2006- Present (Standing – Right)
**JIFSAN - 15 Years Building Partnerships**

**1996-2011**

In the mid 1990s it was clear that concerns surrounding a safe food supply were becoming an emerging issue in the US and that more creative ways were needed to address these concerns. Recognizing the need to reach beyond the traditional roles of a government regulatory body and an academic institution, FDA and the University of Maryland, College Park, a leading land-grant institution, forged a partnership to leverage resources and provide additional mechanisms to address these increasing concerns with food safety. Thus, the Joint Institute for Food Safety and Applied Nutrition (JIFSAN), a cooperative venture of the University of Maryland and the US FDA, was established in 1996.

Since its inception JIFSAN has been a key partner in FDA’s food safety program and has developed additional partnership with other U.S. government agencies including USDA-FAS; USDA-FSIS and USAID; various commodity groups; foreign governments and the food industry. JIFSAN’s programs and activities have impacted the safety of the global food supply by actively contributing to the 1997 Food Safety Initiative; FDA’s 2007 Food Protection Plan; and FDA’s ability to implement the current Food Safety Modernization Act. As a part of the 1997 National Food Safety Initiative, JIFSAN was instrumental in developing the framework for the Food Safety Risk Assessment Clearinghouse that has evolved into the internationally recognized FoodRisk.org – the only on-line resource specializing in food safety risk analysis. JIFSAN’s globally recognized training programs including Food Safety Risk Analysis, Good Agricultural Practices (GAP) and Good Aquacultural Practices (GAqP), have contributed to increased understanding of those principles which underpin prevention of food-borne illness and contamination within the food supply chain. As the regulatory framework for global food safety is transformed, JIFSAN will continue to contribute by building on its past efforts.

From joint press release, April 15, 1996.
JIFSAN as part of a leading land-grant institution developed its programs around the three core concepts of the land-grant philosophy: teaching, research, and extension/outreach. JIFSAN has the flexibility to recruit and utilize the very best expertise from around the world to address important problems in food safety. Most of these efforts are partnerships with other units in this and other universities, foreign and US government agencies, NGOs and industry, an approach that leverages JIFSAN’s limited resources and magnifies its impact.

JIFSAN has many active programs in research, education and outreach. JIFSAN’s research efforts are extensive and varied, and include not only traditional laboratory and field research, but also educational, behavioral or social research, focused on defining the behavioral determinants that promote sound food safety practices. JIFSAN has also developed and implemented innovative education and training programs. It reaches a broad community by sponsoring/co-sponsoring and participating in workshops, conferences and seminars, promoting debate and dialogue on emerging issues in food safety and applied nutrition. JIFSAN’s goal is to become an internationally recognized source of scientific information and trainings on food safety, and applied nutrition and that will enable the development of sound public health policy, the improvement of human nutrition, and the reduction of the burden of food-borne illness.

“The FDA Food Safety Modernization Act only heightens the imperative that we in the United States work in partnership with the global food safety community to meet the public’s high expectations for the safety of food, no matter its origin.”

From: Remarks by M. Taylor; 17Feb11: Global Food Safety Conference
http://www.fda.gov/AboutFDA/CentersOffices/OC/OfficeofFoods/ucm243591.htm
Advisory Council
2011 Annual Symposium Program
**Symposium Objective**

Outbreaks and adverse events appear to occur with alarming frequency resulting in a lack of, or decline in, confidence in the safety of foods. Preventing such events and restoring consumer confidence is the goal of the entire food industry and the Joint Institute for Food Safety and Applied Nutrition Advisory Council 2011 Symposium is designed to help facilitate that goal.

There are lessons to be learned from past outbreaks and adverse events, but learning from the past will only get you so far. Circumstances change, microorganisms adapt, analytical methods get refined and can detect infinitely smaller quantities, and our exposure to changing environments expands in a continuously shrinking world.

Using risk analysis tools in addition to past lessons-learned could help identify and quantify where we are most vulnerable, and allow us to focus our limited and increasingly valuable resources on prevention.

When the unexpected does happen, knowing how and what to communicate to the consumer could reduce damage to a brand’s image and minimize loss of consumer confidence. And if lost, knowing how to regain consumer confidence can help rebuild your business.

The focus of the JIFSAN Advisory Council 2011 Symposium is mitigating consequences of an outbreak/adverse event. The symposium will provide an overview of lessons learning from past events; the use of risk analysis tools to focus resources on preventing future occurrences; and understanding how the consumer interprets and reacts to information.

Having the right tools and knowledge give you an advantage when facing the challenges of an outbreak/adverse event, and knowing how to communicate with consumers could help you remain competitive. Attend the JIFSAN AC 2011 Symposium on Mitigating Consequences of Outbreaks/Adverse Events and learn how to better understand and manage the issues.

**Organizing Committee**

(*Front from left*)
George Evancho, Chair
Patrizia Barone, Elizabeth Calvey
DeAnn Benesh

(*Back from left*)
Bradd Eldridge (back
Thomas Trautman
David Lineback
Joseph Scimeca
### 2011 Spring Symposium

**Mitigating Consequences of an Outbreak/Adverse Event**

**Greenbelt Marriott Hotel**

**Greenbelt, Maryland**

**April 27, 2011**

<table>
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<tr>
<th>Time</th>
<th>Event Description</th>
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<tbody>
<tr>
<td>7:30 AM</td>
<td>Registration &amp; Continental Breakfast&lt;br&gt;Poster Session (10:00 am to 5:00 pm – Chesapeake Room)</td>
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<tr>
<td>9:00 AM</td>
<td>Welcome&lt;br&gt;<em>Jianghong Meng, Director, JIFSAN</em>&lt;br&gt;<em>George Evancho, Symposium Chair</em></td>
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<tr>
<td>9:20 AM</td>
<td>Session 1: Making a Difference in the Future by Learning from the Past&lt;br&gt;<em>Session Chair &amp; Moderator: Dr. Patrizia Barone – Unilever</em></td>
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<tr>
<td>9:30</td>
<td>Lessons from the Hydrolyzed Vegetable Protein Incident&lt;br&gt;Speaker: <em>Jenny Scott, FDA, Center for Food Safety and Applied Nutrition, College Park, MD</em></td>
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<tr>
<td>10:00</td>
<td>A Retrospective on the Multiagency Response to Seafood Safety Following the 2010 Deepwater Horizon Oil Spill&lt;br&gt;Speaker: <em>Peter Koufopoulos, FDA, Center for Food Safety and Applied Nutrition, College Park, MD</em></td>
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<tr>
<td>10:30</td>
<td>Break</td>
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</table>
10:45  Case Study – Managing through a Crisis: An Industry Perspective  
Speaker: William Daniels, Earthbound Farms, San Juan Bautista, CA

11:15  Lessons Learned from Salmonella in Eggs Outbreak  
Speaker: Donald Zink, FDA, Center for Food Safety and Applied Nutrition, College Park, MD

11:45  Session Overview (15 Minutes)

12:00  Lunch (Annapolis Room)

1:30 PM  Session 2: Risk Analysis Relevance and Applications

Session Co-Chair & Moderator: Elizabeth Calvey – FDA

1:40  Risk Assessment Tools for Decision Making  
Speaker: Greg Paoli, Risk Sciences International, Ottawa/Canada

2:10  Rapid Risk Assessments to Make Informed Decisions on Emerging Issues  
Speaker: Sherri Dennis, FDA, Center for Food Safety and Applied Nutrition, College Park, MD

2:40  Break

3:00  Communicating Uncertainty between Risk Managers and Risk Assessors  
Speaker: Sandrine Blanchemanche, INRA Met@risk, Paris, France

3:30  Risk Analysis – Practical Examples of Where and When It Can be Applied: An Industry Perspective  
Speaker: Leon Gorris, Unilever, China

4:00  Session & Day Overview (30 Minutes)

Evening Event

6:00  JIFSAN 15th Anniversary Reception (Grand Ballroom)

7:00  Anniversary Dinner (Grand Ballroom)

Keynote Speaker: Dr. William E. Kirwan  
Chancellor, University System of Maryland
JIFSAN – Celebrating 15 Years of Success

Advisory Council 2011 Spring Symposium

Mitigating Consequences of an Outbreak/Adverse Event

Greenbelt Marriott Hotel

Greenbelt, Maryland

April 28, 2011

7:30 AM  Registration & Continental Breakfast
          Poster Session (9:00 am to 12:00 pm – Chesapeake Room)

9:00 AM  Welcome – Day Two
          Jianghong Meng, Director, JIFSAN
          George Evancho, Symposium Chair

9:20 AM  Session 3: Communicating with the Consumer

          Session Chair & Moderator: George Evancho – JIFSAN

9:30  Communicating to the Consumer: Managing Public Outrage
       Speaker: Stephen Sundlof, University of Maryland, College Park, MD

10:00  Using Social Media to Communicate in Times of Crisis
       Speaker: Kimberly Reed, IFIC Foundation, Washington, DC

10:30  Break

10:45  Consumers’ Perceptions of Recalls
       Speaker: Donna Rosenbaum, Food Safety Partners, Ltd.,
               Northbrook, IL

11:15  Motivating Consumers to Respond Appropriately to Food Recalls
       Speaker: William Hallman, Food Policy Institute, Rutgers University,
               Camden, NJ

11:45  Session Overview and Symposium Wrap-up
SPEAKERS

AND

ABSTRACTS
Jenny Scott is Senior Advisor to the Director of the Office of Food Safety at the Food and Drug Administration’s Center for Food Safety and Applied Nutrition. In that position she develops and implements policies, regulations and guidelines related to food safety and provides technical expertise in a variety of food safety areas. Prior to joining FDA in August 2009, Ms. Scott was Vice President of Science Policy, Food Protection, at the Grocery Manufacturers Association in Washington, DC, where she held various positions over a 29-year tenure. She received an A.B. degree in biology from Wellesley College, an M.S. in bacteriology from the University of Wisconsin, and an M.S. in food science from the University of Maryland. She has published widely in the areas of microbial food safety. She has been active in professional associations such as the American Society for Microbiology, the Institute of Food Technologists, and the International Association for Food Protection, of which she was President in 2000-2001. She is a fellow of both IAFP and IFT. Ms. Scott served 3 terms on the US National Advisory Committee on Microbiological Criteria for Foods and currently serves as the US delegate to the Codex Committee on Food Hygiene.
Lessons Learned from the Hydrolyzed Vegetable Protein Incident

Jenny Scott  
Senior Advisor  
Food and Drug Administration  
CFSAN Office of Foods  
College Park, MD

ABSTRACT

In early February, 2010, FDA received submissions from two companies to the Reportable Food Registry (RFR) related to the presence of Salmonella Tennessee in hydrolyzed vegetable protein (HVP). In February and March 2010 there were 177 products recalled from commerce as a result of this incident. However, the number of recalls could potentially have been much larger. HVP is a flavor enhancer used in a wide variety of processed food products, such as soups, sauces, chilies, stews, hot dogs, gravies, seasoned snack foods, dips, and dressings. It is often blended with other spices to make seasonings that are used in or on foods. The HVP recall by the supplier was responsible for 1001 RFR entries involving at least 11 different commodity categories. This incident emphasized the complexity of contamination events involving ingredients. It demonstrated the benefits to FDA of the RFR portal in making the agency aware of contamination events and documenting the distribution of contaminated ingredients. The event showed (1) the utility of finished product testing in uncovering contamination events; (2) the importance of root cause analysis in identifying the source; (3) the benefits of a good environmental testing program in identifying environmental contamination that could potentially lead to product contamination; (4) the importance of good supplier control programs; (5) the importance of firms knowing the impact of pathogen inactivation steps for their products (validation), including those to be delivered by the customer or consumer. The lessons learned from this incident have broad implications for the entire food industry, but food safety will be enhanced if appropriate actions are implemented as a result.
Peter Koufopoulos is a graduate of the University of South Carolina, obtaining his BS in Marine Biology in 1992. After graduating, he joined the SC Department of Health and Environmental Control working in the state’s Superfund assessment group. Here he completed impact assessments and evaluated hazardous waste transmission routes (air, surface water and groundwater) to sensitive environments. Peter worked as project manager on several hazardous waste clean-up projects overseeing remediation efforts, budget, personnel, worker safety and contracts.

In September 1997, Peter left Superfund work and joined the agency’s (molluscan) shellfish sanitation program. Over the next four years, he supervised the local shellfish program office in Charleston, SC. Peter was responsible for ensuring compliance with the standards found in the National Shellfish Sanitation Program (NSSP). The NSSP provides an outline of the minimum standards necessary to ensure wholesome shellfish; such as water quality thresholds, pollution source identification and abatement, processing plant standards, and laboratory and analysis guidelines.
A Retrospective on the Multiagency Response to Seafood Safety Following the 2010 Deepwater Horizon Oil Spill

Peter Koufopoulos,
Food and Drug Administration
Center for Food Safety and Applied Nutrition
College Park, MD

ABSTRACT

During the period of April 20 through July 15, 2010 approximately 210 million gallons of crude petroleum spilled into the Gulf of Mexico (GOM) following the explosion and sinking of the Deepwater Horizon (MC 252) drilling platform. The explosion resulted in the loss of human life and the release of crude petroleum impacting approximately 88,000 square miles of Federal and State territorial waters. Among the significant human and environmental impacts of the spill, fisheries resources and supporting marine and estuarine ecosystems were subjected to contamination by crude petroleum, which compromised the health of the GOM and the safety of seafood resources. The FDA operates a mandatory safety program for all fish and fishery products under the provisions of the Federal Food, Drug and Cosmetic Act, the Public Health Service Act, and related regulations. The FDA and other Federal and State Agencies responded to the MC 252 petroleum spill in a coordinated manner to institute a unified seafood safety protocol for the testing and re-opening of GOM fisheries. To date, the unified protocol has resulted in the reopening of fisheries in approximately 98% of the state and federal waters of the GOM.
William Daniels is the Senior Vice President of Operations and Organic Integrity and has been with Earthbound Farm since 1999. He has helped the company grow from a small, regional salad producer to the nation’s largest grower, packer and shipper of organic produce. As Earthbound Farm’s Senior Vice President of Operations and Organic Integrity, Daniels is responsible for operations (manufacturing, distribution, facilities), food safety, food quality and the company’s organic integrity program.

As the leader of Earthbound Farm’s industry-leading food safety program, Will is a sought-after speaker and has addressed key issues in food safety in the produce industry at meetings of the National Academy of Sciences, the National Restaurant Association, the Institute of Food Technologists, and the International Association for Food Protection. He has also been featured in a variety of national news stories on food safety with media such as The New York Times, and ABC News’s Good Morning America; and is the author of a chapter, “Effectively Managing through a Crisis,” in the book Microbial Safety of Fresh Produce, published by Wiley in 2009.

An active leader in the organic industry, Will serves on a variety of boards and technical committees. He currently serves on: The Board of Directors of the California Certified Organic Farmers, recently as President; the board of directors for the California Leafy Greens Marketing Agreement; the editorial advisory board for the Organic Processing magazine; numerous technical committees with California and Arizona Leafy Greens Marketing Agreement; the United Fresh Produce Association; the UC Davis Center for Produce Safety and the Organic Trade Association.

Prior to working with Earthbound Farm, Will had his own food service consulting company where he worked on projects in menu revision, nutrition and food safety. He graduated from California Polytechnic State University, San Luis Obispo with a bachelor of science in nutrition. In his free time, Daniels likes to cook — he makes a mean barbecue sauce — and enjoys spending time with his wife and daughters.
Managing through a Crisis: An Industry Perspective

William Daniels
Earthbound Farms
San Juan Bautista, CA

ABSTRACT

The summer of 2006 was an inflection point for the produce industry. The FDA had issued its second warning letter concerning outbreaks of foodborne illness caused by produce. FDA officials had arranged a special meeting with growers in the Salinas Valley to deliver the message that in the interest of public health; the next produce-linked outbreak would be dealt with swiftly and sternly. Unfortunately, for Natural Selection Foods, their spinach was linked to the subsequent produce-related outbreak.

In the following weeks and months, investigators for the company and the government combed diligently through paperwork, facilities, and fields. Despite the countless man-hours invested in an attempt to pinpoint the cause of the contamination that was responsible for 200 sicknesses and three deaths, none was ever identified. The closest they came was a sample taken about a mile from one spinach field that matched a case sample. For purposes of the investigation, it was solidified that EBF was involved.

In this presentation, Will Daniels takes you through his personal experience before, during and after the outbreak. What was the company doing before the outbreak? What happened during the outbreak that would help to shape the food safety program moving forward? What was developed as a result of the investigation? You will learn more about what it takes to be prepared for an incident, how to manage through the crisis and what Natural Selection Food is doing today, which is now regarded as one of the most aggressive multi-hurdle food safety programs in industry.
Dr. Donald L. Zink received a Bachelor of Science degree from Abilene Christian University. He earned an M.S. degree in Microbiology and a Ph.D. in Biochemistry and Biophysics from Texas A&M University. Between 1978 and 1983, he held faculty positions at Texas A&M University’s College of Veterinary Medicine and at the University of Arizona in the Department of Microbiology and the Department of Food Science. He joined Campbell Soup Company in 1983 as Manager of Process Microbiology where he worked in the area of refrigerated food safety and aseptic processing. In 1990, he joined Nestle, where he held various positions in Quality Assurance for the Carnation Company and later served as Director of Food Safety for Nestle USA. In 2000, he joined a new beef processing venture company, Future Beef Operations, as Vice President of Research and Development and Product Safety. In 2002, he joined the U.S. Food and Drug Administration’s Center for Food Safety and Applied Nutrition where he served as a Senior Food Scientist in the Office of Food Safety and is currently serving as Senior Science Advisor for CFSAN in the Office of the Center Director.

Dr. Zink has served as a member of several advisory committees including the Committee on Program and technical Review of the U.S. Army Natick RDEC for the National Research Council and the National Advisory Committee on Microbiological Criteria for Foods.
Lessons Learned from *Salmonella* in Eggs Outbreaks

*Donald Zink, Ph.D.*

Senior Science Advisor  
Food and Drug Administration  
Center for Food Safety and Applied Nutrition  
College Park, MD

ABSTRACT

Beginning in May 2010, CDC identified a nationwide outbreak of *Salmonella* Enteriditis (SE) through PulseNet. An epidemiologic investigation identified that eggs were the likely source of the infections. FDA, CDC, and state partners conducted traceback investigations and found that many cases were linked to eggs from a single firm, Wright County Egg, in Galt, Iowa. On August 13, 2010, this firm conducted a nationwide voluntary recall of shell eggs that it had shipped since May 19, 2010. The firm sold shell eggs to distributors and wholesalers in 22 states and Mexico, who then distributed the shell eggs further throughout the country. In all, more than 500 million eggs were recalled. According to CDC, approximately 1,939 reported illnesses are likely to be associated with this outbreak.

The FDA regulates the safety of shell eggs under the Federal Food Drug and Cosmetic Act and also has authority to take actions under the Public Health Service Act. When foods are a source of communicable diseases. The USDA regulates processed egg products under the Egg Products Inspection Act. The USDA Food Safety Inspection Service inspects egg product processors and the USDA Agricultural Marketing Service conducts surveillance to prevent the distribution of adulterated or misbranded egg products and provides grading and certification services on a voluntary basis. The USDA Animal and Plant Health Inspection Service is responsible for the health of layer flocks, including SE control programs.

This outbreak underscored the food safety implications for food producers that supply large segments of the US food supply. When there are numerous intermediate suppliers, traceback investigations can be time-consuming and complex. The eradication of SE from very large production operations is challenging and can impact the egg supply for many weeks or even months. The FDA Egg Safety Rule published in final form in July of 2009 and is expected to prevent approximately 79,000 cases of foodborne illness and 30 deaths each year caused by consumption of eggs contaminated with SE. The regulation requires preventive measures during the production of eggs in poultry houses and requires subsequent refrigeration during storage and transportation. Also, the rule requires that measures designed to prevent SE be adopted by virtually all egg producers with 3,000 or more laying hens whose shell eggs are not processed with a treatment, such as pasteurization, to ensure their safety.
Greg Paoli serves as Principal Risk Scientist at Risk Sciences International. He has experience in diverse risk domains including toxicological, microbiological, and nutritional hazards. This experience has included exposures through a variety of environmental media, including air, water, dermal, and agricultural uptake of chemicals. Additional experience includes risk assessment projects in the areas of climate change impacts, medical and engineering devices, and consumer products. He specializes in probabilistic risk assessment methods, the development of risk-based decision-support tools and comparative risk assessment.

Greg has served on a number of expert committees devoted to the risk sciences. He was a member of the U.S. National Research Council committee that issued the 2009 report, *Science and Decisions: Advancing Risk Assessment*. He serves on the Canadian Standards Association Technical Committee on Risk Management, advisory committees of the National Roundtable on the Environment and the Economy, a US NRC Standing Committee on the Use of Public Health Data at the U.S. Food Safety and Inspection Service, and has served on several expert committees convened by the World Health Organization.

Greg completed a term as Councilor of the Society for Risk Analysis (SRA) and is a member of the Editorial Board of *Risk Analysis*. He has provided training in risk assessment methods around the world, including the continuing education programs of the Harvard School of Public Health and the University of Maryland. Greg holds a Bachelors Degree in Electrical and Computer Engineering and a Master’s Degree in Systems Design Engineering from the University of Waterloo.
ABSTRACT

The provision of software-enabled risk assessment and decision support tools is increasingly recognized as a critical part of food safety infrastructure.

This presentation will focus on some potential roles for tools in the future of food safety, with examples of some tools in development and some imagined.
Sherri Dennis
Food and Drug Administration

Dr. Sherri Dennis serves as the Director for Center For Food Safety and Applied Nutrition's Risk Assessment Coordination Team (RACT), in the Office of Food Defense, Communication and Emergency Response, at FDA. RACT is responsible for strategic planning, management, and coordination of major risk assessments conducted within the Center. This team creatively facilitates improvements in risk assessment research, to support science-based risk management decisions. Dr. Dennis has been invited to serve on numerous agency, interagency, and international workgroups addressing a wide range of scientific and technical topics, including information quality, peer review, risk-informed decision making, Listeria, Vibrio, avian influenza, and thresholds for allergens and gluten in food. She earned her BS in Animal Bioscience from Pennsylvania State University and her MS and doctorate in Agronomy from Virginia Tech. Prior to joining FDA in 1999 she worked for an environmental consulting firm. Currently she co-chairs the Interagency Risk Assessment Consortium (IRAC) Policy Council.
Rapid Risk Assessment to Make Informed Decisions on Emerging Issues

Sherri Dennis
Food and Drug Administration
Center for Food Safety and Applied Nutrition
College Park, MD

ABSTRACT
The Food and Drug Administration is responding to the need for more rapid risk-assessment capability by developing new tools for the global food-risk analysis community. Typically, microbial risk assessments conducted by FDA are designed to provide scientific support for strategic regulatory and policy needs. The process of commissioning, conducting, reviewing, and validating these risk assessment models and reports typically is not particularly rapid and, from start to finish, can encompass several years. However, the timeframe needed for developing a risk assessment to support decision-making in an emergency or crisis is considerably shorter - hours or days. FDA has initiated several projects to develop tools for conducting risk assessments in a shorter timeframe. These tools include qualitative approaches (e.g., decision trees) and quantitative approaches (e.g., scenario analysis). The comparative risk assessment tool iRISK, into which users may enter their own data specific to their issues, will facilitate more rapid assessments. It allows assessors to share data and models and to conduct scenario analysis within a structured environment. This tool will be made widely available in the food-safety community via an on-line portal, to enable real-time collaborations. Templates, a library of information on food-supply chains, dose-response functions, and information from previously conducted risk assessments of specific food-hazard pairs are among iRISK’s features.
Sandrine Blanchemanche
INRA Met@risk

Dr. Sandrine Blanchemanche is Director of Met@risk Unit (Food Risk Analysis Methodologies), a multidisciplinary Unit (statistics, computer sciences, nutrition, toxicology, social sciences) of the French Institute of Agricultural Research (INRA) and a collaborating center of the World Health Organization (WHO). She is a social scientist and highly interested in scientific uncertainty, consumer behavior change and risk communication. These last years, she directed several projects on decision making under uncertainty and developed experimental methods (survey, field and lab experiments). She analyzed the governmental communication on risk and benefits of fish consumption and showed the strong limitations of such a campaign: the consumption advice based on a scientific risk assessment resulted in ambiguity and complexity for people who decided not to change their behavior and relied on their consumption habits (2006-2008). She also explored a more controversial and uncertain topic with the direction of the project “Risk, Uncertainty and Regulation: NanoFoods in France and Germany” (2008-2010). The project team investigated the impact of information related to different implications of nanosciences (environment, human health and society) on risk perception and acceptance of NanoFoods. More recently, she focused her work on the dissemination of health information within social networks. She studied, through an experimental survey of 6000 individuals, how a message used to prevent foodborne diseases spreads among people and what are the patterns of information transfer (2009-2010). Currently, she is the director of HolyRisk Project (2009-2013) together with Pr Akos Rona-Tas (UCSD) and with a strong collaboration of the Joint Institute for Food Safety and Applied Nutrition (Jifsan). This project is interdisciplinary, involving scientists from sociology, economics, risk assessment and computer science. It is a comparative study of the EU and the US that investigates the ways different forms of uncertainty are expresses throughout the food risk analysis process (assessment, management and communication). It will provide an international database and a case-based reasoning system for Risk Managers as a tool for decision-making.
Communicating Uncertainty between Risk Managers and Risk Assessors

Sandrine Blanchemanche
INRAMet@risk
Paris, France

ABSTRACT

Scientific knowledge became one of the most important prerequisites for making regulatory decisions. Food risk policies are based on the framework of risk analysis which has been an effort to apply universal and formal methods of science to risk assessment and to place societal response to hazards on a scientific footing. As scientific knowledge is never complete, risk assessors are expected to present policy makers with not just what is known but also what is uncertain about a particular risk. For policy decisions the nature and level of the incompleteness of the evidence is of great importance and policy action will always be influenced not just by what seems firmly established but also by what is considered uncertain. One of the FAO General Principles of food safety risk management is “Risk management decisions should take into account the uncertainty in the output of the risk assessment: The risk estimate should, wherever possible, include a numerical expression of uncertainty, and this must be conveyed to risk managers in a readily understandable form so that the full implications of the range of uncertainty can be included in decision-making. For example, if the risk estimate is highly uncertain the risk management decision might be more conservative.” Despite the shared willingness to express, take into account and better communicate uncertainty in the framework of risk analysis, it does not exist standardized way to do it and finally uncertainties are expressed more or less explicitly all along risk assessment reports. With the objective to better understand the types of uncertainty are expressed, we built a hierarchical ontology composed by 29 uncertainty variables and used it to code food risk assessments reports (for chemical and biological agents). We also analyze the specificity of the language used in those reports especially the different forms of judgment expressed by the expert panels. The judgments are described through 5 variables (Hedging, Precaution, Assumption, Confidence and Disagreement). Because the role scientific uncertainty plays in policy making is also strongly influenced by institutional and regulatory conditions that vary from country to country, we compare risk assessments from the US and Europe. For instance, this comparison shows clearly that the European reports are more willing to express precaution and confidence than the American reports while these latters express more disagreement.

The clear expression of uncertainties in a harmonized way is of crucial interest to improve communication between risk assessors and risk managers. It is a key point for a better risk communication to the public.
Dr. Leon Gorris is from The Netherlands. He graduated in Biology and holds a PhD degree in Microbiology from the University of Nijmegen. After a post-doc period there, he worked at the Agrotechnological Research Institute (part of the then Ministry of Agriculture, Nature Management and Fisheries of The Netherlands), where he established and headed the Department of "Food Safety & Applied Microbiology". Some of the main foods related research areas in this department were mild food preservation systems, hurdle technology applications and novel processing methods. Since 1998 he is with Unilever. He first headed the “Microbiology & Preservation” department at Unilever’s Food R&D facility in Vlaardingen, The Netherlands. He then moved to Unilever’s corporate safety centre in the UK to establish a new multi-disciplinary department with senior experts in toxicology, microbiology, occupational safety, and environmental care.

Leon has been engaged with international organisations, such as Codex Alimentarius, FAO and WHO, as a risk assessment specialist for about 12 years in many different roles (e.g. expert in consultations, organising meetings and workshops, capacity building projects). He is a member of the International Commission on Microbiological Specifications for Foods (ICMSF), past ICMSF secretary and current head of the ICMSF delegation to Codex. He is a member of the Industry Council for Development (ICD), which works with FAO and WHO on regional capacity building (focusing on Asia and Africa). He has been actively involved in the International Life Sciences Institute (ILSI), in Europe, North-America, India and South East Asia. He holds a part-time professorship position (the European Chair in Food Safety Microbiology) at the University of Wageningen, The Netherlands, with responsibility for the University’s curriculum, post graduate education, distance learning education, and MSc and PhD research.
Risk Analysis – Practical Examples of Where and When It Can be Applied
An Industry Perspective

Leon Gorris
Regulatory Affairs
Unilever, Shanghai, China.

ABSTRACT

Chemical contaminants such as pesticides and physical hazards such as glass much more often than not can be considered artificial and avoidable regarding food safety. However, the situation with respect to microbiological pathogens is more complex as generally they are naturally occurring on raw materials and in environments that foods pass through at different stages of the farm to fork continuum. Nevertheless, food safety relies on adequate control of all relevant hazards, chemical, physical or biological. Current best practice systems for food safety management (GAP-GMP-GHP, HACCP) can achieve a very high level of food safety assurance when they are deployed faithfully and consistently, and are based on a sound product concept. It is a misconception that testing alone or even HACCP alone can deliver safe food. Rather, the combination of a good product and process design, good deployment using best practice systems and selective use of testing (for validation and verification) is the overall “package” that is needed for reliable food safety assurance. Whilst this is not at all a radically new insight, current practices around the world do not always reflect this thinking and views of societies’ about what constitutes a safe food product is a dynamic aspect both in time and in place. Food safety standards and other “metrics” reflecting safe foods vary tremendously between countries and/or regions, and the rational for this is not always evident or scientifically supported. Notably, food safety management in the international context is constantly evolving since it started to become more and more harmonized globally over the last 100 years. Whilst originally “hazard-based decision-making” has been (and often still is) the norm, governments around the world (lead by Codex Alimentarius, FAO and WHO) are adopting Risk Analysis (RA) as the framework for risk-based decision-making. This framework provides a structured and systematic foundation for modern food safety management as it supports a responsible move away from mere hazard-based to more risk-based food safety control at the governmental level. As part of the framework, and in the area of food safety microbiology, several new risk metrics have been designed to link country public health policy with operational control of the food present on the market. Unilever has adopted this governmental model to risk-based decision-making and the science/technologies involved in it into our food safety assurance approach to innovating and marketing food products. This approach consists of establishing a safe design based on pertinent knowledge/data, informed selection of processes and control measures to prevent, eliminate or adequately control significant hazards, and validation and verification by useful testing during the product innovation and product manufacturing, respectively. Examples will be given in the presentation.
Dr. Stephen F. Sundlof, an executive with the U.S. Food and Drug Administration (FDA), is serving a two-year assignment with the Center for Public and Corporate Veterinary Medicine (CPCVM) to expand its programs related to food safety and security. Under an agreement between the FDA and the CPCVM, Sundlof will work to enhance the public and corporate veterinary medicine curriculum for veterinary students with a focus on food safety and security, and to develop career transition training for veterinarians interested in public service. He will develop a new training and development program in regulatory science designed for government employees, which will be done in partnership with the University of Minnesota and the Ohio State University. The expectation of this collaborative effort is to provide a continuum of training in public practice from the veterinary school level through the mid-career level.

Sundlof has served as director of the FDA’s Center for Food Safety and Applied Nutrition from 2008 to 2010, and spent the previous 14 years as director of the FDA’s Center for Veterinary Medicine. He began his career in 1980 on the faculty of the University of Florida’s College of Veterinary Medicine.

Sundlof has published numerous articles in scientific journals on drug residues and food safety. From 1994 to 2008, he served as chairman of the World Health Organization/Food and Agriculture Organization of the United Nations Codex Alimentarius Committee on Residues of Veterinary Drugs in Foods. He is a diplomate of the American Board of Veterinary Toxicology and a former president of the American Academy of Veterinary Pharmacology and Therapeutics.
Communicating to the Consumer: Managing Public Outrage

Stephen F. Sundlof
Visiting Professor
University of Maryland
College Park, MD

ABSTRACT

Communicating risk to consumers is challenging, but communicating negligible or absence of risk can be even more difficult, especially when the subject of the communication elicits strong emotional responses such as fear, anger, or moral outrage. Examples of such food-related issues include genetically modified plants and animals, cloning of livestock, and food irradiation. In an emotionally charged environment, messages intended to inform and calm consumers often have the opposite effect and cause damage to the credibility of the agency. In these situations, the focus of attention should be directed toward managing public outrage long before a regulatory decision is announced. Once the level of outrage has been reduced, the public is much more likely to be receptive to risk communication messages and ultimately make informed and rational decisions.
Kimberly A. Reed
International Food Information Council Foundation

Kimberly A. Reed is Executive Director of the International Food Information Council Foundation. She also serves as Senior Vice President for Membership, Communications, and Strategic Initiatives at the International Food Information Council (IFIC) and oversees IFIC’s Media Relations, International Relations, and Trends and Consumer Insights Programs. Ms. Reed has more than fifteen years of experience at senior levels in both the public and private sectors. Most recently, she was Vice President for Financial Markets Policy Relations at Lehman Brothers in New York, NY.

Originally from Buckhannon, West Virginia, Ms. Reed earned a law degree from West Virginia University College of Law and a dual undergraduate degree in biology and government and a minor in chemistry from West Virginia Wesleyan College. She currently serves on the National Board of Directors of the Alzheimer’s Association, Board of Trustees of West Virginia Wesleyan College, and Board of Governors of the Republican National Lawyers Association. She also teaches democracy-building courses to political parties in emerging nations in order to advance freedom and women’s rights around the world.

Ms. Reed was honored with the U.S. Department of the Treasury Meritorious Service Award and Secretary’s Honor Award, and the West Virginia Wesleyan College Young Alumni Achievement Award. She has been recognized as a “Young Professional Leader” by the American Swiss Foundation, American Council on Germany, and American Council of Young Political Leaders.
Using Social Media to Communicate in Times of Crisis

Kimberly Reed
Executive Director
International Food Information Council Foundation
Washington, DC

ABSTRACT

Social media is changing our world. No longer considered a “new” communication tool, social media is an initial and primary way that more and more consumers are obtaining their information, especially during a time of crisis. The world recently witnessed the power of social media during the earthquake and tsunami in Japan and the political protests that toppled governments in Tunisia and Egypt. The public used blogs, Facebook, Twitter, and YouTube to be news generators, instantly share information, including text, images, and videos, and attract large, global followings.

Today’s food safety and nutrition messages, when transmitted virally, can quickly and successfully reach, inform, engage, and influence target audiences. As such, the public has a growing expectation that those in positions of responsibility must connect with them using these tools. The IFIC Foundation 2010 Food and Health Survey noted that close to half of Americans (47%) rated themselves as confident in the safety of the U.S. food supply. When asked who they believe is responsible for food safety in the U.S., 74% believe that the government is responsible, followed by food manufacturers (70%), farmers/producers (56%), retailers/food services (49%), and consumers/individuals (41%). Social media can help those in positions of responsibility maintain/increase this level of trust in the food supply, build relationships, and leverage and empower others to share important, accurate information during a crisis.

In just one year after being launched, the IFIC Foundation’s social media tools, including those found on www.foodinsight.org, connected stakeholders to the Foundation’s messages one million times. This presentation will share insights on how authorities, experts, and other stakeholders can share knowledge and understanding about potential risk, outbreaks, and adverse events through social media to help the public make well-informed decisions and restore confidence. It will cover the main social networking tools, “rules of engagement,” best practices, and a food safety case study. The discussion also will highlight the importance of using social media tools to monitor on-line conversations and identify trends which can serve as a warning sign for when action is required to help the public react appropriately.
Donna Rosenbaum is the CEO and lead consultant for Food Safety Partners, Ltd. of Northbrook, Illinois. Food Safety Partners is a national food safety consulting firm that specializes in consumer-based projects. She earned her degree in Neurobiology from Northwestern University and was working in healthcare management when *E. coli* disease claimed the life of her daughter’s best friend as the first victim in the Jack in the Box outbreak in 1992. Donna then became a committed food safety advocate and now has over 18 years of expertise in working on consumer food safety issues. She has personally worked with thousands of foodborne illness victims and consumers concerned with the safety of our food supply. She is a long-time member of IAFP, has recently spoken at the APHL conference on “The Impact of Emerging Foodborne Pathogens”, at a joint meeting of the USDA, FDA, & CDC on “Measuring Progress on Food Safety”, and has been an invited participant to the WHO/FERG stakeholder event in Geneva, Switzerland. Endeavors include consultation on various foodborne illness cases, development of material for management of recalls and outbreaks for a food industry insurance group, and media and social media outreach platforms on food safety for interested corporations.
Consumers’ Perceptions of Recalls

Donna Rosenbaum
Food Safety Partners, Ltd., Northbrook, IL

ABSTRACT

Every American consumer’s perception of a particular food recall from the marketplace is drawn from their personal food safety belief system and is based on many subjective inputs over a period of time. Getting consumers to tune in to food recall information and take the recommended action(s) is a high priority for public health, yet the scientific study of human behavior regarding recalls and the best communication strategies is a relatively new area of inquiry and published data is scarce. In an attempt to understand how consumers react to recalls, where they go for information, and when and whether they return to purchasing and consuming the recalled product, this presentation will take two different approaches.

The first approach will be to review of a series of consumer perception studies on food safety and quality done in Canada in 2004, 2006 & 2010.* The most interesting Canadian data is quantitative information tracked on reactions to a recall and information sources used by consumers in food recall situations. The Canadian studies use a novel approach: results are defined for the following six consumer segments—Concerned Natural Food Buyers, Cautious Information Seekers, Prudent Family Shoppers, Unengaged Nutrition Focused Followers, Self-assured Habitualists, and Uninvolved Blind Trusters. Each of these consumer groups have unique characteristics and attitudes that shed light on how best to communicate specifically to them about recalls. Canadian consumers were found to be either active information gatherers or passive information absorbers. Those who actively seek information about food quality and safety were found to further influence other consumer segments. The concluding 2010 study has two additional compelling findings. More than one third of Canadians have avoided purchasing either a specific brand or type of food in the last year. For two thirds of all participants, their confidence in these products would be restored by a government investigation report clearing all of the problems. The questionnaire protocols for all three Canadian studies used many open-ended questions or when a list of answers was presented, it often included an “other” category for personally relevant responses.

The second approach will be more anecdotal in nature. The consultants at Food Safety Partners have spent a significant amount of time with thousands of consumers who have been adversely affected by failures in the U.S. food recall system. Included in this group are foodborne illness victims and their families, as well as consumers seeking important recall information who could not find what they needed in order to make informed decisions. The biggest obstacle to discuss is the nature of “voluntary” recall which has a variety of negative impacts on the entire recall system, including how quickly the recall is made public. In addition, company press releases are infrequently updated after the initial recall announcement, leading to outdated information on government websites that misleads consumers. Different government agencies relate and display recall information in different manners, often confusing consumers. Many of the common factors and concerns that have been raised by these consumers could help inform recall communication efforts in the future.

Note that the Canadian studies are being reviewed to inform the panel discussion on consumer confidence in the food supply and are not research projects of Food Safety Partners, Ltd.
Dr. William K. Hallman is a professor and Chair of the Department of Human Ecology and a member of the graduate faculties of Psychology, Nutritional Sciences, and Planning and Public Policy at Rutgers, the State University of New Jersey. Dr. Hallman also serves as the Director of the Food Policy Institute (FPI) at Rutgers. He earned a B.S. in Behavioral Analysis from Juniata College in 1983, and a PhD. in Experimental Psychology from the University of South Carolina in 1989. His research explores public perceptions of controversial issues concerning food, health, and the environment. Recent projects have examined consumer perceptions and behaviors concerning agricultural biotechnology, animal cloning, avian influenza, accidental and intentional food contamination incidents, and food recalls. His current research projects include studies of public perceptions and responses to food safety risks, the use of nanotechnology in food, public understanding of health claims made for food products, and food safety and security among older adults.

Dr. Hallman serves on the Executive Committee of Rutgers Against Hunger (RAH), and helped to found the New Brunswick Community Farmers Market, which offers food insecure residents access to fresh, locally grown, affordable, nutritious, and culturally appropriate produce and other food products.
Motivating Consumers to Respond Appropriately to Food Recalls

William K. Hallman
Food Policy Institute
Rutgers University
Camden, NJ

ABSTRACT

Research suggests that simply telling people about a food recall is often not enough to motivate them to look for and discard recalled products. Instead, getting people to take action requires that they are aware of the recall, believe it applies to them, believe that the consequences are serious enough to warrant action, can identify the affected products, and believe that discarding (or returning) the product is both necessary and sufficient to resolve the problem. Moreover, getting people motivated to take action is only the first responsibility of food recall communications. Once the problem that led to the recall has been properly solved, consumers must also receive the message that the products are safe again to eat. This paper presents ways to improve awareness, increase relevance, convey consequences, accentuate identifying information, compel appropriate actions, and to reestablish consumer confidence. By providing the guidance in this paper, we hope to help communicators maximize the number of people who get their messages about food recalls, and increase the likelihood that the public will take appropriate precautionary behaviors without losing confidence in the food supply.
POSTER SESSION TITLES

- Phylogenetic and Comparative Analysis of Salmonella Newport from Different Sources by Whole Genome Sequencing
- FSIS Actions During and After the 2010 Pepper Coated Salami Outbreak Investigation
- Development of a Key Events Dose-Response Framework for Folate
- Comparative Analysis and Expression Patterns of two Thermostable Nuclease Genes in Staphylococcus Aureus
- Prevalence and Characterization of Shiga Toxin-Producing Escherichia coli in Retail Meat
- Risk Information Integration: Facilitating Effective Mitigation Strategy Decision-Making
- Mitigating Food Safety Risks of Packaged Leafy Greens via Temperature Control in Supply Chain
- Rapid and Reliable Targeted ToF Screening for Pesticides in Food
- Strains of the Escherichia coli O157:H7 Stepwise Evolutionary Model Exhibit Different IS629 Transposition Frequencies
- Antimicrobial Resistance of Salmonella Isolates from Retail Meats
- Development of a Label Free Biosensor System for Detection of E. coli in Food Samples Based on Carbon Nanotube Field Effect Transistor Arrays
- An Interactive Online Database for Reported Cases of Botulism
- Bacterial Community Diversity and Variation in Spray Water Sources and the Tomato Fruit Surface
- Molecular Serogrouping for Shiga Toxin-Producing E. coli Using the Luminex ® Technology
- Highlighting Food Safety Risk Analysis Programs -- USDA National Institute of Food and Agriculture Institute of Food Safety and Nutrition
- Distribution of Internalized Salmonella Inside Tomatoes and the Effects of Post-Harvest Handling Salmonella Internalization
- Effects of Dietary Phenolics and Botanical Extracts on Hepatotoxicity-Related Endpoints in Human and Rat Hepatoma Cells and Statistical Models for Prediction of Hepatotoxicity
- FSIS Actions During and After the Pepper Coated Salami Outbreak Investigation
12th Annual Fera/JIFSAN Symposium
Dealing with Uncertainty in Risk-Based Decision Making and Response
June 15-17, 2011
Greenbelt Marriott Hotel
Greenbelt, MD

Keynote Speaker: Donald Zink “The Power of New Information in Risk-Based Decision Making”
Detailed Case Study I (Peanut Butter): Jenny Scott

Session 1: Sources of Uncertainty in Food Safety Risk Assessment - Current Practice
Session Chair: Andy Hart
- Analytical Perspective
- Toxicological Perspective
- Exposure Perspective
- Epidemiology Perspective

Session 2: Improving Data Collection to Quantify and/or Reduce Uncertainty
Session Chair: Juliana Ruzante
- Designing Studies to Better Understand Food Source Attribution
- Designing Rapid Risk Assessments
- Designing Studies to Define Baseline Prevalence and Identifying Out of Compliance/Violations

Session 3: Tools Used for Characterizing Uncertainty
Session Chair: Roy Macarthur
- Uncertainty Analysis - Characterizing the Total Uncertainty when Combining the Different Sources (Quantitative and Qualitative)
- Using Quantitative Risk Assessment and Accounting for Variability and Uncertainty
- Dealing with Uncertainty in Risk-Benefit Analyses: Balancing Health Benefits and Risks
- The Role of Expert Judgment in Characterizing Uncertainty

Session 4: Informed Decision Making
Session Chair: Greg Noonan/ Paul Brereton
- A Government Perspective: Role of Science, Uncertainty and Risk Perception in Making Informed Decisions
- An Industry Perspective: Role of Science, Uncertainty and Risk Perception in Making Informed Decisions
- Communicating the Risk/Benefit to Stakeholders

Register at jifsan.umd.edu
Questions? Contact Vernora (Nora) Petty: v.petty@umd.edu
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* Core Program includes: Overview of Risk Analysis, Food Safety Risk Management, Food Safety Risk Communication and Food Safety Risk Assessment

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If you have additional questions, contact: Judy Quigley, JIFSAN Training Programs Coordinator, jquigley@umd.edu, (301) 405-1696
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