



Annual Report 2008-2009

**The Joint Institute for Food Safety and
Applied Nutrition (JIFSAN)**

**University of Maryland
College Park, Maryland 20742**

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Executive Summary

In 1996, the Joint Institute for Food Safety & Applied Nutrition (JIFSAN) at the University of Maryland, College Park was established by the University and the US Food & Drug Administration (FDA) to support cooperative research, education, and outreach programs that enhance the safety of our food supply, and to advance new concepts in public health, applied nutrition, and animal health. This report summarizes the activities and accomplishments of the second year of the third five-year Cooperative Agreement (September 30, 2007 through July 30, 2012). The funding for the twelfth year was \$1,389,140.

Over the past year, JIFSAN continue experiencing exciting developments as well as changes. The Advisory Council met on March 10-11, 2009. The meeting involved brief presentations with updates on selected research and education/outreach programs, from JIFSAN, CFSAN and CVM. Discussions were held concerning the future directions. A follow up meeting on the role and structure of the Council was planned for November 2009.

JIFSAN's research efforts are extensive and varied. JIFSAN is supporting several research projects including ecology and control of *Salmonella* Newport contamination and survival on tomatoes, predictors of returning to pre-recall levels of spinach consumption survey, and evaluation of the ALERT (food defense) campaign. JIFSAN plans to fund three additional research projects using carry-forward funds. Support of the Center for Risk Communication Research (CRCR), led by the UM Department of Communication, is continuing with operation funding furnished by JIFSAN for the fourth year.

The JIFSAN Student Internship Program continues to increase in importance and participation. UM undergraduate students are offered an opportunity to work with FDA scientists in their laboratories on specific projects identified by the FDA scientist involved. During 2008-2009, 34 UM students participated in research in FDA laboratories.

The Food Safety Risk Analysis Professional Development Program continued to develop and offer both face-to-face and distance learning online courses. The three-week Summer Integrated Program (SIP) was offered in June 2009 in Washington, D.C. SIP was well received, attracting 30 participants from two countries. It will be offered again in June 2010. Four online risk analysis courses were also offered to a total of 46 students from nine countries, including USA. Two new quantitative risk assessment courses (online and in-classroom) were designed and taught by Risk Sciences International Inc. in 2009. In addition, there were two extra risk analysis courses taught per request of the CFSAN/FDA Dauphin Island and the Norwegian Institute of Public Health.

FoodRisk.org continues to be updated on a regular basis to allow for more and better resources in our database. Improvements in the database infrastructure have been made to

better maintain the integrity of previously entered data. FoodRisk.org will be hosting a tool designed to simplify the process of comparing different types of risks in foods, and evaluate the impact of the various elements that affect these risks, named iRisk. Additionally, a three year grant from USDA CSREES was awarded and will allow the improvement of FoodRisk overall organization and infrastructure, the development of new tools and online tutorials in the area of risk analysis. During 2009, there were several opportunities to promote outreach and increasing its viability such as talks at national and international meetings and poster presentation.

JIFSAN has strong international training programs supported by cooperative partnerships, including the Good Agricultural Practices (GAPs), the Good Aquacultural Practices (GAQPs), Commercially Sterile Packaged Foods (CSPF) programs. JIFSAN offered five GAPs and one GAQPs training and are planning for a GAQPs training in Indonesia in November 2008 and a CSPF training in Morocco in January 2009.

JIFSAN sponsored or co-sponsored two workshops/symposia this past year: the 9th Joint CSL/JIFSAN Symposium on Developing Responses to Emerging Food Safety Issues, June 18-20, 2008 (York, UK) and Research Needs Prioritization for Conducting a Quantitative Risk Assessment of E. coli O157:H7 in Leafy Greens, July 8-9, 2008 (College Park, MD). JIFSAN has committed to support the 5th Asian Conference on Food and Nutrition Safety that will be held on November 3-7, 2008, in Cebu, Philippines and Tools for Prioritizing Food Safety Risk, November 18-19, 2008, Greenbelt, MD. JIFSAN, the Interagency Risk Assessment Consortium (IRAC), FDA's Center for Biologics Evaluation Research, and the Society for Risk Analysis, cosponsored a symposium on "New Tools, Methods and Approaches for Risk Assessment", held in Baltimore, MD on December 10-11, 2009.

Organization

Mission and Vision

Founded in 1996 by the University of Maryland and the US Food & Drug Administration, the Joint Institute for Food Safety & Applied Nutrition (JIFSAN) is a multidisciplinary research, education and outreach program. JIFSAN's mission is **to advance sound strategies that improve public health, food safety, applied nutrition and animal health using risk analysis principles through cooperative research, education and outreach programs.** JIFSAN has developed a vision towards achieving its goal as **an internationally recognized source of scientific information and trainings on food safety, applied nutrition and animal health 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.** Achievement of the mission and vision necessitate the active development of program-focused partnerships, with government agencies, industry, academia and public interest groups, including the acquisition of external funding.

Staff

Director	Dr. Jianghong Meng
Associate Director	Dr. Paul Mazzocchi
Assistant to the Director	Ms. Vernora (Nora) Petty
Financial Officer	Ms. Mary Grimley
Risk Analysis Program Manager	Dr. Juliana M. Ruzante
Programs & Communications Coordinator	Ms. Judy Quigley
IT Programmer Analyst	Mr. Kyle McKillop
IT Assistant	Mr. Timothy Shaffer
Accounting Associate	Ms. Beth McAllister
Internship Program Director	Dr. Kaci Thompson

Senior Fellows

Food Safety	Dr. David Lineback
Nutrition & Food Safety	Dr. Sanford Miller
Program Development	Dr. John Jones
Corporate Relations	Mr. George M. Evancho

New Appointments

Dr. Juliana M. Ruzante was appointed as Risk Analysis Program Manager with JIFSAN on October 2008. She is in charge of the risk analysis training program and FoodRisk.org. Prior to coming to JIFSAN, Dr. Ruzante was with the University of Guelph and Public Health Agency of Canada developing and operating a multi-factorial framework to rank foodborne risks using multi-criteria decision analysis. She also worked at the Western Institute for Food Safety and Security (WIFSS), the University of California, Davis, where she did her graduate studies. Dr. Ruzante received her Doctor of Veterinary Medicine from University of Sao Paulo, Brazil and Master in Preventive Veterinary

Medicine (MPVM) and PhD in Comparative Pathology from UC Davis. Dr. Ruzante participated as an expert at FAO/WHO meeting and is a member of the Committee on Review of Use of Process Indicators in FSIS Public Health Risk-based Inspection System organized by The National Academies.

Mr. George M. Evancho joined JIFSAN as Senior Fellow for Corporate Relations. He is currently working with the members of the JIFSAN Advisory Council on the role and structure of the Council. Mr. Evancho's career in the food industry spans nearly 42 years, 39.5 of which were spent with Campbell Soup Co. Over the years, he held various positions in R&D, analytical services, mushroom research, microbiology, food safety, and quality, retiring as Group Director - Food Safety in July 2008. Mr. Evancho is a member of the Institute of Food Technologists and has been active in various organizations over the years. He served on several committees and sub-committees of the National Food Processors Association (now Grocery Manufacturers Association), served as member and Chair of the Technical Committee on Food Microbiology of the International Life Sciences Institute, member and Chair of the Executive Advisory Board of the National Center for Food Safety and Technology in Chicago, member and Chair of the Board of Advisors of the Center for Food Safety, University of Georgia, and has been a member of the JIFSAN Advisory Council for almost 10 years.

The JIFSAN Advisory Council

Central to the operation of JIFSAN is the Advisory Council composed of 22 members from private sector business, government agencies, academia, and representatives of consumers' interests. This group provides guidance to JIFSAN in developing research, education, and outreach programs to address problems in food safety, nutrition, animal health sciences, and risk analysis.

The Advisory Council meets two times a year, a spring annual meeting and a fall business meeting. The Council met on November 20, 2008 at the Sheraton Washington North Hotel, Beltsville, Maryland. After receiving updates on JIFSAN's activities, members discussed the role and structure of the Advisory Council and agreed on changes that could strengthen the Council's effectiveness. A chair (Dr. Richard Lane of Unilever) and a vice-chair (Dr. Julie Jones of the College of St. Catherine) were elected. Three standing subcommittees (program and direction, emerging issues, and membership) were created and staffed. These changes are viewed as a more effective mechanism for the Council to provide continuing advice and direction to JIFSAN outside of Council meetings, which were increased to two per year.

The 2009 annual meeting was held at the Greenbelt Marriott Hotel, Greenbelt, Maryland, on March 11-12, 2009. It began with a half-day symposium entitled: "New Dimensions and Strategies for Promoting Food Safety Globally," giving a brief synopsis of programs being sponsored, co-sponsored or under development by the Institute.

The second day of the Council meeting was a closed full-day business meeting, moderated by the newly appointed chair, Dr. Richard Lane. The session began with annual updates from JIFSAN's Interim Director, Dr. Jianghong Meng, Dr. Stephen Sundlof, Director, FDA, Center for Food Safety and Applied Nutrition and Dr. David White, Director Office of Research, FDA, Center for Veterinary Medicine. The meeting concluded with reports from the Council's standing and Ad Hoc committees. These committees have been actively involved in advising JIFSAN of its programs and future directions. The next meeting of the Advisory Council will convene in November 2009.

Program Areas

Research

JIFSAN's research efforts are extensive and varied; investigating issues related to food safety, applied nutrition and other public health issues at the local-regional level as well as the international level. The JIFSAN research program was established to assist in the generation of new knowledge to support research efforts in furthering the scientific basis for public health policy formulation, evaluation, modeling and risk assessment. The applied research includes 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.

Extramural Research Awards

USDA CSREES Grant Award: JIFSAN was granted funding for the development of An Online Integrated Food Safety Risk Analysis Resource for National and International Information Exchange. Dr. Juliana Ruzante will take the lead in this project to improve global food safety by facilitating the exchange of information and user-friendly tools. This will be accomplished through an integrated online resource that supports the use of the risk analysis paradigm; thus aiding in decision making to help solve food safety problems across the farm to fork continuum.

In partnership with the national Institute for Public health and Environment (RIVM) in the Netherlands and the National Food Institute in Denmark, JIFSAN will develop an online integrated catalogue on risk assessment by applying the methods used to build the *Campylobacter* spp. risk assessment framework (CRAF). The project will also redesign FoodRisk.org infrastructure to improve the online catalogue and develop additional risk ranking tools.

French Science Funds: JIFSAN collaborates with the French National Institute for Agricultural Research (INRA); University of California, San Diego, and the US FDA's Center for Food Safety and Nutrition on a joint research project to analyze the way that food safety risk assessments treat various forms of uncertainty. The project has been funded by French _____ and involves testing a computer based tool developed by INRA

and UC San Diego using a variety of food safety risk assessments to determine how each addresses the different forms of uncertainty (such as data uncertainty and model uncertainty) in the risk models, how these uncertainties are presented in the descriptive technical reports and executive summaries, and whether there are consistent differences between different types of risk assessments (for example, risk ranking assessments and product pathway assessments). This project will further develop a tool that will systematically evaluate risk assessments and other food safety documents.

Internal Research Program

With the renewal of the third-five year cooperative agreement several new research initiatives that address public health needs were identified and funded. UM and FDA researchers are developing molecular techniques for serotyping bacterial pathogens such as Salmonella and Shiga toxin-producing E. coli.

The study will determine the growth and survival characteristics of Salmonella on tomatoes and in the tomato growing environment including pH tolerance, desiccation and other stress responses, osmotic tolerances, and the potential for internalization and subsequent survival of Salmonella inside tomato fruits. Preliminary work has identified antagonistic strains that will be examined in greater detail to ascertain MIC values for each antagonist and various other studies to rate the potency and potential mechanisms for these microbes. Optimal antagonists will then be entered into field trials and once a successful candidate is selected, growers can be provided with the strain as part of ongoing trials into the effectiveness of such a strain as a kill-step in the persistence of *Salmonella* on Eastern shore tomatoes.

JIFSAN has used carryover funds to support several research projects, including continued support of three projects funded in 2008 and three new projects that will be funded in September 2010.

2008-2010:

- 1) Evaluating Public Health Impacts and Cost-Effectiveness of Implementing GAPs in the Tomato Farm Environment
PI: Amy Sapkota, Univ. of Maryland; FDA Collaborators: Andrew Estrin, and Cristina F. McLaughlin
- 2) Developing Phyllosphere Metrics in GAPs to Reduce the Risks of Salmonellosis in Fresh-Market Tomatoes and Other Vegetable Crops
PI: Chris Walsh, Univ. of Maryland; FDA Collaborator: Eric Brown
- 3) Plant Responses to the Colonization by *Escherichia coli* O157:H7 and *Salmonella*
PI: Jean-Michel Ane, Univ. of Wisconsin; FDA Collaborator: Eric Brown

2009-2010:

- 1) Development and Validation of Nanosensors for Detecting and Subtyping Foodborne Pathogens
PI: Drs Romel D. Gomez and Wenzia Song (UM) and Drs. Eric Brown and Thomas Hammack (FDA/CFSAN)
- 2) Development of a Risk Assessment Framework for Folate Metabolism and the Identification of Applicable Risk Assessment Models
PI: Dr. Nadine Saynoe (UM) and Dr. Wen Yen Juan (FDA/CFSAN)
- 3) Development and Validation of In Vitro Hepatotoxicity Assay(s) for Dietary Supplemental Materials
PI: Dr. Lucy Yu (UM) and Dr. Thomas J. Flynn (FDA/CVM).

Another goal of JIFSAN is to explore ways to expand its research program by developing partnerships with other organizations and the industry. JIFSAN is supporting a graduate student using carryover funds to conduct an observational study of food handling practices in retail deli departments. This study will provide a set of data regarding practices in deli departments for use within an interagency (FDA/FSIS) retail *Listeria monocytogenes* quantitative risk assessment currently in progress. Food employees (n=45) in deli departments at nine retail facilities were observed using a notational analysis method as they prepared food for sale. The notational analysis method allowed for the recording of the frequency and sequence of (1) contact between objects and the deli products before sale; (2) hand washing and glove changing during preparation; and (3) equipment, utensil and surface cleaning and sanitizing. The preliminary results will be presented at the Society for Risk Analysis Annual Meeting in Baltimore, MD at the end of this year.

JIFSAN Postdoctoral Research Associate Program

This program strengthens the science base for public health policy by providing short-term research opportunities for scientist within a regulatory environment. Between 2002 and 2008, 10 postdoctoral research associates were recruited; working in both FDA and UM laboratories, in areas where significant knowledge gaps or the lack of appropriate scientific data, methods, or models existed.

This program has generated significant amounts of new knowledge, to promote the safety of the U.S. food supply. FDA has the important opportunity of evaluating the potential of these individuals to become productive staff members when vacancies exist. Two postdoctoral research associates were funded during the 2007-2008 program year:

- *In Vitro* Skin Absorption of Nanoparticles: Robert Bronaugh (FDA); Srinivasa R. Raghavan (Chemical Engineering Department, UM); Oluwatosin Ogunsola (JIFSAN Research Associate)

- Ecology and Control of Salmonella Contamination and Survival in Tomatoes: Jianghong Meng (UM JIFSAN); Eric Brown (FDA CFSAN); Jie Zhang (JIFSAN Research Associate)

Support of Center for Risk Communication Research

JIFSAN continues providing funding in support of the Center for Risk Communication Research (CR²) led by the UM Department of Communication. The Center's mission is to advance understanding about how communication helps control risk; the public perceives risk communication; and the political, economic and social contexts for risk communication. The Center's goals include helping to establish public and scholarly agendas for risk communication research, collaborating with other institutions and individuals to secure funding for research projects, and providing support for research and fellowships.

The UM CR² is conducting three risk communication research projects regarding the effectiveness of the ALERT campaign; retail response to food recalls; and consumer behaviors concerning the 2006 spinach recall. Additionally, two GAPs research projects in an effort to determine the effectiveness of GAPs guidelines.

JIFSAN Student Internship Program

The JIFSAN Student Internship program is a unique undergraduate research program designed to provide UM undergraduate students with an opportunity to collaborate with FDA scientists on specific research projects related to the JIFSAN mission. In 2008-2009, 34 individual students participated in the program. Efforts continue to be made to extend these research opportunities for internships beyond laboratory experiences. UM Students are encouraged to co-author posters for presentation at FDA Science Forum and UM Bioscience Day. Several students have contributed to articles and research presentations with their FDA mentors.

The JIFSAN Internship Program is managed by Dr. Kaci Thompson, Director of Undergraduate Research and Internship Programs for the College of Chemical and Life Sciences. Student, faculty, and staff awareness of the Program is achieved through web postings, brochures, seminar series, campus list serves and the annual Internship Day. Dr. Thompson also gives presentations on the JIFSAN internship to freshmen in UNIV100, an introduction course on University life.

Research Publications

Vardeman, J. E., & Aldoory, L. (2008). How women make meaning of their shared involvement with spokespersons in news about bioterrorism. *Media Report to Women*, 36(2).

Xi, M., J. Zheng, S. Zhao, E. W. Brown, and J. Meng. (2008). “An enhanced discriminatory PFGE scheme for subtyping *Salmonella* serotypes Heidelberg, Kentucky, SaintPaul, and Hadar.” *J. Food Prot.* 71:2067:2072.

Zheng, J., S. Cui, L. Teel, S. Zhao, R. Singh, A. O’Brien and J. Meng. (2008). “Identification and characterization of Shiga toxin 2 variants in *Escherichia coli* isolated from animals, food and humans.” *Appl. Environ. Microbil.* 74: 5645–5652.

Zheng, J., J. Meng, S. Zhao, R. Sighn, and W. Song. (2008). “Campylobacter-induced polarized secretion of IL-8 in human intestinal epithelial cells requires Campylobacter-secreted CDT and TLR-induced activation of NF-kB.” *Infect. Immun.* 76:4498-4508.

Ruzante, J.M., Davidson, V.J., Caswell, J., Fazil, A., Cranfield, J.A.L., Henson, S.J., Anders, S.M., Schmidt, C., and Farber, J.M. (2009). “A Multifactorial Risk Prioritization Framework for Foodborne Pathogens.” *Risk Analysis*. Early view at <http://www3.interscience.wiley.com/cgi-bin/fulltext/122542673/PDFSTART>.

Yang, B., J. Zheng, E. Brown, S. Zhao, and J. Meng. (2009). “Characterization of antimicrobial resistance associated integrons and mismatch-repair mutation in *Salmonella* serovars.” *Intl J. Antimicrob. Agents*, 33:120 – 124

Zheng, J., S. Cui, S. Zhao, J. Meng. (2009). “Effect of transcriptional activators RamA and SoxS on expression of multidrug efflux pumps AcrAB and AcrF in fluoroquinolone-resistant *Salmonella* Typhimurium.” *J Antimicrob Chemother.* 63: 95-102

Education/Training

Working with partner organizations, education/outreach efforts include international food safety training programs to address the contamination problem at the source; a comprehensive online food safety risk analysis database (FoodRisk.org) and sponsorship of workshops and symposia.

Food Safety Risk Analysis Training Program:

This program provides trainings in the key components of risk analysis. Courses in the program are available in face-to-face as a summer integrated program [SIP], online and as individual customized programs tailored for specific audiences..

The Food Safety Risk Analysis webpage within JIFSAN website was updated. In addition to the new design, its content was revised and the course descriptions were edited to better reflect the learning objectives. We added more information on the requirements for the online courses, instructors and course options (core versus quantitative track).

In 2009, the JIFSAN Food Safety Risk Analysis courses were recognized by the Society of Risk Analysis and from now on they have on their website links to our course schedule and risk analysis training website.

New instructors have been identified and our current marketing emails have been redesigned to match the design of JIFSAN's website and to allow for easier management of our mailing lists.

Summer Integrated Program (SIP):

Four Core courses including Overview of Risk Analysis; Food Safety Risk Management; Food Safety Risk Assessment; and Food Safety Risk Communication and two Intermediate courses in Quantitative Risk Assessment Methods: part 1 and part 2 were taught in the Summer Integrated Program. The two quantitative risk assessment courses were developed and taught by Greg Paoli from Risk Sciences International Inc. and replaced the "Quantitative Risk Assessment Methods Model Building and Probabilistic Methods taught previously by Dr. Charlie Yoe". The courses were very well received and are based on practical examples and case studies. The 2009 SIP program was held in June 2009. Thirty individuals enrolled and attended the courses, for a total of 72 class seats including 6 international seats. The international participants were from Brazil and Italy. We believe that the slight lower overall enrollment and decrease in international participation in 2009 was due to the current economic crisis.

In addition, to SIP, JIFSAN organized a one week training course for the CFSAN/FDA Dauphin Island (AL) group. Dr. Yoe was the instructor of a week course that covered Risk Management and Risk Assessment. There were 20 professionals that attended the course offered in-house in July 2009.

Online Food Safety Risk Analysis Program:

Four JIFSAN Food Safety Risk Analysis courses are offered in distance learning mode: Overview of Risk Analysis; Food Safety Risk Management; Food Safety Risk Assessment; and Qualitative and Quantitative Risk assessment (new course developed and taught by Greg Paoli- RSI). Risk Communication online needed to be cancelled in 2009 due to lack of registration. For 2010, JIFSAN is working on the marketing strategy and in better course descriptions to enhance the interest and hopefully increase registrations especially in the risk communication class.

In 2009, there were 53 class registrations for the online program, of which 20 (38%) were international. A total of 46 individuals from eight countries participated in the program.

In addition to the regular online course a special Qualitative and quantitative risk assessment methods was taught to 11 professionals from the Norwegian Institute of Public Health in February/March 2009.

Train-the-Trainer International Training Programs:

The focus of this co-sponsored train-the-trainer program is to provide the international community with an adaptable framework of practices necessary for the production of safe, wholesome food products. The first international training program, GAPs, developed by JIFSAN serves as a model for the development and implementation of subsequent programs. The success of these programs has allowed JIFSAN to leverage these resources by developing collaborations with other agencies to identify and fund additional programs and offerings. As awareness for global education and outreach increases JIFSAN continues to build partnerships to address current issues.

Good Agricultural Practices (GAPs) Training Programs:

The program focuses on fresh fruits and vegetables. In 2009, GAPs trainings were Honduras, Dominican Republic, Guatemala, and Mexico. The GAPs training manual has been completely revised. The new manual will be utilized as a resource for participants in their future training efforts.

The Good Aquacultural Practices (GAQPs) International Training Program:

GAQPs training provides on-farm education for the safety and quality of raw aquacultural commodities. Since a successful pilot program in Vietnam in November 2006, the program has now been revised based on findings from its initial offering and a formal training manual has been developed. The training was offered in Thailand on May 5-9, 2008, in Indonesia on Nov. 3-7, 2008, and in Bangladesh on Nov. 1-5, 2009.

The Commercially Sterilized Package Foods (CSPF) International Training Program:

JIFSAN and industry experts have been working to develop a training program in commercially sterile packaged foods. The first (pilot) CSPF training program was offered in Casablanca Morocco in January 2009 and was supported by JIFSAN, USDA-FAS and a growing US industry consortium that presently includes Campbell Soup Co., General Mills Inc., and Kraft Foods Global, Inc.. The training team was led by Martin Lo (University of Maryland, JIFSAN), George Evancho (JIFSAN), Raymond Carroll (Campbells Soup Co.) and Daniel Geffen (FDA). The results of the pilot program were evaluated, and a training program is being revised and put in final form. Plans are to offer training internationally in 2010.

APEC Partnership Training Institute Network (PTIN):

JIFSAN participated in the Asia-Pacific Economic Cooperation (APEC) Food Safety Cooperation Forum (FSCF) meeting hosted by co-chairs Australia and China, in Singapore on July 30, 2009, and the first APEC Partnership Training Institute Network (PTIN) Workshop Examination of Hot Issues in Risk Analysis, August 1-2, 2009.

The APEC PTIN was established in 2008 to leverage expertise and resources from the private sector and academia to fulfill food safety capacity building priorities. PTIN Steering Group was also formed to provide guidance to PTIN operations, which includes diverse, knowledgeable and energetic experts.

As the US academia representative, Dr. Jianghong Meng serves on the Steering Group and attended its first face-to-face meeting in Singapore on July 29, 2009. At the Workshop *Examination of Hot Issues in Risk Analysis*, Dr. Juliana Ruzante gave an overview on food safety risk analysis, and she and Dr. Jianghong Meng also introduced the participants to JIFSAN's Food Risk Analysis program.

China Training Programs in Food Safety:

JIFSAN continues to work with USDA's Foreign Agriculture Service (FAS) in providing focused food safety training programs to Chinese food safety professionals. On October 25 through November 3, 2008, a Chinese delegation came to the U.S. for an intensive program on the U.S. pesticide programs and practices and on plans for further cooperation. Environmental Protection Agency (EPA) officials made presentations and engaged in the discussions on comparative practices. On November 15 to 22, 2008, USDA-FAS, in cooperation with the USDA Food Safety and Inspection Service (FSIS) and FDA, offered a special introductory program to Chinese Inspection and Quarantine officials on the U.S. port inspection and quarantine operations and practices. It included briefings by U.S. food safety officials, site visits to U.S. ports, discussion on comparative practices, and plans for a U.S. delegation to visit Chinese operations in 2009.

Outreach

FoodRisk.org On-line Database:

FoodRisk.org is the only online resource specialized in food safety risk analysis, including risk assessment, risk management, and risk communication. FoodRisk.org provides exclusive access to a number of unique data sets, tools, and resources, and is used by food safety experts to support risk assessment model building and data analysis.

FoodRisk.org continues to be updated in regular basis to allow for more and better resources in our database. In 2009, an information management student assistant has hired to work under the supervision of the Risk Analysis Program Manager, the student assistant was able to keep the database up to date and help with the reorganization of the website. In addition, improvements in the database infrastructure have been made to better maintain the integrity of previously entered data, a link checker has been developed to help monitor url that change over time.

The tool designed to simplify the process of comparing different types of risks in foods (iRISK) has not yet been finalized, but FoodRisk.org will be hosting it. A federal grant from USDA CSREES among other things will provide funds to build the infrastructure to support iRISK with the database. It is also part of this three year grant the development of online tutorials for iRISK and an online risk assessment catalogue to be developed in partnership with Food DTU in Denmark and RIVM in the Netherlands (ICRA). The funded project will develop a searchable risk assessment inventory in food safety and will improve the overall organization and infrastructure of FoodRisk.org making it more user-friendly.

During 2009, there were several opportunities nationally and internationally to increase FoodRisk.org's viability as highlighted below.

- FAO, Rome/Italy, February 16, 2009
- MedVetNet Workpackage 24 meeting, Berlin/Germany, February 19-20, 2009
- IRAC meeting, College Park, MD, April, 2009
- Advisory Council meeting, Greenbelt, MD
- USDA/FSIS Lunch Seminar, Washington, DC, October 7th, 2009
- PAHO Risk assessment training for National Health Surveillance Agency (ANVISA), Brasilia/Brazil, October 19, 2009
- Society for Risk Analysis, Baltimore, MD, December 8, 2009
- Joint IRAC-SRA-CBER-JIFSAN Symposium on New Tools, Methods and Approaches for Risk Assessment, Baltimore, MD, December 11, 2009

In 2009, the steering committee for FoodRisk.org was reassembled and has met twice in 2009 to discuss the future directions and how to leverage funds for the database. Dr. Sherri Dennis (CFSAN), Elizabeth Calvey (CFSAN), Janell Kause (FSIS), Juliana M. Ruzante (JIFSAN) and Dr. Jianghong Mend (JIFSAN) are the current members of FoodRisk.org steering committee.

FoodRisk.org was also received some financial support from the Risk Assessment Division within the Office of Public Health Science (OPHS) in the Food Safety and Inspection Service (FSIS), U.S. Department of Agriculture. With this support we were able to support the information management assistant and also develop a special FSIS page that contains all the FSIS risk assessment models (http://foodrisk.org/resource_types/tools/FSIS_RA_Models). We hope that the initiatives such as this will motivate other governmental agencies and institutions worldwide to share their risk assessment models more freely. For 2010, we have already plans to make available the risk assessment models developed by CFSAN.

Several records and data were entered in FoodRisk.org in 2009, some are highlighted below and were all based on strong collaboration with professionals from several institutions worldwide.

- Australian *Listeria monocytogenes* in Ready-to-Eat Meats Model: collaboration with Dr. Tom Ross from the Tasmanian Institute of Agricultural Research (http://foodrisk.org/exclusives/models/AU_listeria.cfm)
- Food Handling Practices Model v1.5: collaboration the FDA's Center for Food Safety and Applied Nutrition (CFSAN) (http://foodrisk.org/exclusives/FHPM/version1_5/)
- U.S. EPA, Office of Water Microbial Risk Assessment Thesaurus: collaboration U.S. EPA, Office of Water (http://foodrisk.org/resource_types/tools/microbial_risk_thesaurus.cfm).

- Center for Food Safety and Security Systems (CFS³) literature database: collaboration with Dr. Robert Buchanan (<http://foodrisk.org/exclusives/cfs3/>)

Acrylamide Infonet: At the request of the United Nations' World Health Organization and Food and Agricultural Organization, JIFSAN is operating the Acrylamide Infonet (www.acrylamide-food.org), the WHO/FAO Acrylamide in Food Network, through FoodRisk.org. This Network was established as a result of the June 2002 FAO/WHO Consultation on the Health Implications of Acrylamide in Food. The focal point for the network contains a database of researchers/data providers; references for research published elsewhere; studies in development database; listing of acrylamide websites; acrylamide documentation (general information); events and activities; Infonet updates; and call for data. In 2009, Acrylamide infonet was merged to FoodRisk.org to facilitate the management of this website, the old url is being redirected to the new one (<http://www.foodrisk.org/acrylamide>). For 2010, JIFSAN will be reevaluating structure and format of Acrylamide infonet together with WHO and FDA.

Workshops and Symposia:

JIFSAN Advisory Council Spring Symposium: New Dimensions and Strategies for Promoting Food Safety Globally, March 11, 2009 (Greenbelt, MD). The symposium focused on three areas: (a) Research Efforts; (b) Risk Analysis; and (c) International Training. A discussion at the end of the session focused on identifying emerging risks and potential areas for developing future partnerships. Symposium topics included:

- Impact of Consumer Perceptions of Food Recalls and Current Consumption
- Evaluating Public Health Impacts and Cost-Effectiveness of Implementing Good Agriculture Practices (GAPs)
- Pilot Observational Study of Food Safety Practices in Retail Deli Departments
- An International Collaboration: Understanding Uncertainty in Food Safety Risk Analysis Documents
- FoodRisk.org: An On-line Resources for Food Safety Risk Analysis
- Potential Impact of Good Aquacultural Practices Training in Indonesia
- Piloting a New Program to Promote Food Safety in the Food Processing Sector
- Developing a New Paradigm for Sustainable International Food Safety Training

JIFSAN/AMIF Overview of Successful Implementation of *Listeria monocytogenes* Intervention and Control, March 5, 2009 (College Park, MD). American Meat Institute Foundation and JIFSAN joined forces to present a workshop to provide an overview of a successful model for the *Listeria monocytogenes* Intervention and Control.

Dietary Exposure Assessment Tools for Prioritizing Food Safety Concerns Workshop was held on November 18-19, 2008 (Beltsville, MD). This workshop was a follow-up of the "Tools for Prioritizing Food Safety Concerns" workshop held in June 2007. The 2007 Workshop focused on criteria and tools for making rapid, cost-effective decisions about

unwanted chemical and microbial agents found in food in order to allocate scarce resources such that the greatest public health benefits is achieved. One of the areas recommended for more in-depth consideration by the 2007 Workshop participants was exposure assessment and this Workshop was convened to address that area.

Annual Fera/JIFSAN Joint Symposium: Methods and Systems for Tracking, Tracing, and Verifying Foods, Greenbelt Marriott Hotel, Greenbelt, Maryland USA (May 13-15, 2009). This is the tenth in a series of annual symposia on food safety and applied nutrition. The symposia are jointly organized by the Food and Environment Research Agency, UK and JIFSAN and co-sponsored by the EU TRACE project.

The focus of the 2009 Symposium will be on methods and systems for tracking, tracing and verifying foods throughout the food supply chain. Invited speakers will be drawn from regulatory agencies, public interest groups, universities and research institutions in Europe and North America. Additionally, speakers involved with the EU Trace Project (<http://www.trace.eu.org/>) will participate. Sessions will include discussions on advances in analytical technologies to characterize the origin of food products; application of technologies for tracking food through the supply chain; IT tools for electronic exchange of information; and barriers to adopting these technologies.

JIFSAN Co-sponsored International Conference on Predictive Modeling in Foods: The 6th International Conference on Predictive Modeling in Foods was held on September 8-12 in Washington DC . The conference discussed not only aspects relevant to predictive microbiology models but, neural networks, non-thermal and thermal inactivation, cross-contamination, quantitative risk assessment, microbial competition modeling and integrated modeling approaches that combined models originating from food engineering and predictive microbiology.

Fresh Produce Safety in Schools: JIFSAN, along with the US Department of Agriculture's Food and Nutrition Service (USDA, FNS), hosted the 'Produce Safety in Schools' Workshop on October 28, 2009. This one-day workshop brought together distinguished members of the scientific and educational communities in an open forum to discuss proper management of food in schools, specifically fresh fruit and vegetables. Discussions consisted of current practices related to fresh fruits and vegetables in child nutrition programs, and food safety issues that should be addressed in school food service, as well as educational materials and strategies to tackle the issues that were identified. A written report and action plan will be developed to summarize the proceedings of the workshop, which will be accessible at jifsan.umd.edu, as soon as it is available.

The Joint IRAC-SRA-CBER-JIFSAN Symposium: New Tools, Methods and Approaches for Risk Assessment on December 10-11, 2009 at the Renaissance Harbor Hotel, Baltimore, MD. A variety of approaches and methods are used in risk assessment. The goal of this symposium was to bring together a forum of risk assessment and other experts from a broad range of fields to discuss and share their insights in risk assessment and discuss common issues and novel approaches. The proposed topics to be discussed

include: i) current state of dose-response modeling approaches for use of animal model data and extrapolation to predict human dose-response for microbial pathogens; ii) application of proteomics and genomics to environmental, chemical/toxicological, food safety, drug and medical product risk assessments; iii) applying risk assessment methods to predicting the effects of immunotoxicants on immune function and susceptibility to infectious disease; iv) metrics and tools used in risk and benefit analysis; v) use of different databases in risk assessment; e.g., data from microarray studies, single nucleotide polymorphism and whole genome analyses to identify biomarkers for diseases and adverse effects; medical informatics; and free web-based databases accessible at www.foodrisk.org.

Future Plans (2009-20010)

The twelfth year cooperative agreement was awarded to JIFSAN in September, 2008 for \$ 1,389,140 from FDA. The continued financial support will assist JIFSAN to strengthen existing programs and allow expansion of JIFSAN's education, outreach and applied research programs, and external partnerships. JIFSAN will continue to work on new initiatives reported in 2008, including Asia-Pacific Economic Cooperation (APEC) Partnership Training Institute (PTI) for Food Safety; Regional Training Centers; Developing Research Partnership; and International Food Safety Laboratory Training Institute. Efforts will continue to be made for JIFSAN to obtain external funding for program support from other governmental agencies, and the industry.

Administrative

- JIFSAN has recruited a professional to manage its international training program. Dr. James Rushing will start the job on March 8, 2010.
- Two meetings of the JIFSAN Advisory Council will be held on March 24-25, 2010, and November 2010. These meetings will concentrate on the role and structure of the Advisory Council and strategic planning. Annual meeting in will include a symposium on Risk Communication – Communicating Science to the Public.

Research Initiatives

- JIFSAN will continue its efforts in seeking extramural funding to support its research program. We plan to submit additional three research proposals to various funding agencies in collaborating with researchers on campus, at FDA and other institutions.
- JIFSAN will work with experts to identify research need in food safety and applied nutrition and bring together researchers at UM, FDA and other institutions to undertake research questions. In addition, JIFSAN plans to fund several

research projects using carry-over funds in addition to the two GAPs projects and Plant Responses to *Salmonella* and *E. coli* project. Three new research projects have also been funded recently.

- Funding will continue for postdoctoral research associates and graduate research assistants in support of several research initiatives.
- Operation of the JIFSAN Internship Program will continue. Dr. Kaci Thomson will continue working closely with undergraduate coordinators of different colleges, particularly AGNR and CLFS, in recruiting most talented students to the program.

Education and Outreach Efforts

- JIFSAN will continue to explore opportunities for partnerships with federal agencies, the industry and international organizations to develop a sustainable international training program by establishing partnerships with foreign governments, academia, and industry provides an effect tool to prevent food safety problems from occurring. The programs would create a regional network of institutions that could provide extension-like training to improve food safety globally. New initiatives include APEC Training Institute Network, Regional Training Centers in Central & South America, Laboratory Training Institute, and Third Party Certifiers & Auditors Training. Additionally, JIFSAN will continue offering trainings in GAPs, GAQPs, CSPF, Food Safety Risk Analysis and WTO/SPS.
- The Risk Analysis Program at JIFSAN- is positioning itself to move to the next level of international recognition exploring partnerships with national and international organizations. JIFSAN will be revising the Overview of Risk Analysis online and will continue to improve the risk analysis courses as well as develop new courses that complement the area. In 2010, the RA program will offer a fellowship to one professional in the area of food safety and risk analysis to attend the SIP program – this is a pilot program that hopes to increase visibility to our courses. We will also survey past participants to identify their long term satisfaction with the JIFSAN courses so we can better target improvements to the RA courses. IN 2010, JIFSAN RA program will focus on improving its marketing approach to increase both domestic and international enrollment. In 2010, JIFSAN will hosp SIP in this own grounds in College Park, MD making use of its well equipped training room.

JIFSAN RA Program activities that provide opportunities in education, outreach, and research for food safety professionals, students, and faculty with a wide range of interests. JIFSAN continues its partnership with NRA on the development of a risk analysis tool/database that will improve understanding of how risk assessors (US/EU) address uncertainty throughout the food risk analysis process (risk assessment, risk management and risk communication). Findings will help

improve all aspects of the risk analysis process. Additionally, JIFSAN is working with the Risk Analysis Coordination Team (RACT) on a *Listeria monocytogenes* Retail Pilot study to help improve the development of a RI cross-contamination model being developed by FDA and FSIS.

- JIFSAN will continue its efforts to improve and update FoodRisk.org and leverage funds to support its activities. JIFSAN will continue co-sponsorship of symposia, workshops, conferences and other types of meetings.