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INSIDE

ISU Professor Named Top Educator by Meat Processors Association 2

UA Press Releases Food Safety Consortium Book of Essays by Leading Researchers 3

UA Center for Food Safety News 4-5

Papers & Presentations 6

30th Annual Rapid Methods Conference Slated for June at Kansas State 6

Consumers' Trust Is Crucial to Companies, OFPA Speakers Tell Gathering . . . 7

Federal Funding Ensures K-State Continued Work in Homeland Security and Food Defense Education 8

Food Protection Workshop Slated for June at UA 9

ISU Researcher Receives NSF Food Safety Leadership Award 9

Irradiation Remains a Matter of Education 10

Food Safety Digest 11

The Food Safety Consortium Newsletter is a production of the three member schools of the consortium: University of Arkansas, Iowa State University and Kansas State University. Your comments are welcome.

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Trying to Stop the Pump: One Way to Prevent *Campylobacter's* Antibiotic Resistance

Agricultural producers raising swine and turkeys know they need to worry about two related pathogens in the animals — *Campylobacter jejuni* and *Campylobacter coli*. Things become more complicated when those pathogens find ways to resist antibiotics intended to maintain the animals' health.

Much of the blame for this situation, explained Qijing Zhang of Iowa State University, can be placed on a mechanism in the bacteria called the efflux pump. It pushes out toxic substances from bacterial cells, but it also pushes out antibiotics. When the antibiotics are extruded by the pumps, pathogens such as *Campylobacter* are able to resist those antibiotics and survive in the animal hosts.



Qijing Zhang

Zhang, a professor of veterinary microbiology and preventive medicine, is working on a project supported by the Food Safety Consortium aimed at stopping the efflux pumps' effectiveness. Of the various efflux pumps in the bacteria, the one at the top of his list is labeled CmeABC.

"The first one we need to knock out or inhibit is CmeABC," Zhang said. "That is the predominant one. If we can figure out some ways to block that pump and make it non-

functional, basically *Campylobacter* will not be able to extrude antibiotics efficiently."

Zhang's research team has found two other efflux pumps — named Cjl375 and Cjl678 — that also enable *Campylobacter* to resist antibiotics.

(Continued on page 2)

Spicing the Meat Also Cuts the Cancer Risk

Spices will do more than just enhance the taste of ground beef. They'll also cut down on the risk of compounds that can cause cancer.

J. Scott Smith, a Kansas State University food chemistry professor, has pursued different projects in recent years seeking ways to reduce heterocyclic amines (HCAs). HCAs are the carcinogenic compounds that are produced when muscle foods, such as ground beef patties, are barbecued, grilled, boiled or fried. Consuming HCAs through meat increases risk factors for colorectal, stomach, lung, pancreatic, mammary and prostate cancers.

Smith, in research supported by the Food Safety Consortium, found that certain spices con-

taining natural antioxidants would reduce HCA levels by 40 percent when applied to beef patties during cooking.

"Cooked beef tends to develop more HCAs than other kinds of cooked meats such as pork and chicken," Smith said.

"Cooked beef patties appear to be the cooked meat with the highest mutagenic activity and may be the most important source of HCAs in the human diet."

Previous studies have shown that meat products cooked below 352 degrees Fahrenheit for less than four minutes had low or undetectable levels of HCAs, with HCAs increasing with higher temperatures and added cooking time. It's not a good idea to lower cooking tem-

(Continued on page 2)

Certain spices containing natural antioxidants would reduce HCA levels by 40 percent when applied to beef patties during cooking.



James Dickson

ISU Professor Named Top Educator by Meat Processors Association

James Dickson of Iowa State University has received the outstanding educator award from the North American Meat Processors Association at its annual management conference in Chicago.

The Harry L. Rudnick Educator of the Year Award is given annually to a leader who has shown a long-standing commitment to, and who has upheld, the highest standards in meat and/or food science education. Dickson was honored by NAMP President Gary Malenke of Sioux-Preme Pork Products at an awards ceremony held March 20.

Dickson is a professor of animal science and a faculty member in ISU's interdepartmental microbiology program. He is professor-in-charge of Iowa State's part of the Food Safety Consortium, a three-state research effort that also includes the University of Arkansas and Kansas State University.

Dickson's research focuses on the control of bacteria of public health significance in foods of animal origin. He holds a bachelor of science in microbiology from Clemson University, a master of science in dairy science from the University of Georgia and a Ph.D. in food science and technology from the University of Nebraska. ■

Trying to Stop the Pump ... (Continued from page 1)

The pumps apparently work synergistically so that *Campylobacter* achieves a high level of resistance.

The strategy at this point is for the researchers to find an effective and stable inhibitor to block the pump's effectiveness, which would make *Campylobacter* more susceptible to antibiotics and also prevent *Campylobacter* from colonizing in animals' guts.

"So, one stone, two birds," Zhang said.

The search for such inhibitors remains a challenge, and Zhang isn't yet sure whether the inhibitors will turn out to be natural or synthetic products. The eventual goal is to develop a product for commercial use either at the farm or in the processing plant. Part of the complexity lies in the ability of efflux pumps to extrude multiple antibiotics at once.

"That means if we design inhibitors, then potentially we will be able to prevent the resistance to multiple antibiotics, not just to one antibiotic," Zhang said.

The effort is a long-term project. Over the next couple of years, Zhang's research team will seek to identify a potential chemical compound in a natural product that will show promise of inhibiting an efflux pump. Then it will be possible to predict how many years may be needed to commercialize it for practical use. ■

The strategy at this point is to find an effective and stable inhibitor to block the pump's effectiveness.

Spicing the Meat... (Continued from page 1)

peratures too much, so antioxidant spices with phenolic compounds can block HCAs before they form during heating and still allow high temperatures to be maintained.

Smith's research team investigated six spices — cumin, coriander seeds, galangal, fingerroot, rosemary and tumeric — and found that the latter three had the highest levels of antioxidant activity toward inhibiting the formation of HCAs, with rosemary as the most effective.

Consumers can take advantage of the spices by integrating them into their cooking regimen. Previous research in his laboratory has demonstrated that some commercial rosemary extracts, available for purchase on the Internet, can inhibit HCA formation by 61 to 79 percent. Smith's earlier work also showed that Thai spices can inhibit HCA formation by 40 to 43 percent.

Smith said future research in this area will investigate what some marinades or powders can do to inhibit HCAs when applied to cooked patties. His earlier project showed that marinating steaks with certain herbs, rosemary and other antioxidant spices also reduces HCAs. ■



J. Scott Smith

UA Press Releases Food Safety Consortium Book of Essays by Leading Researchers

Timely reports on several topics dealing with the food supply comprise the 362-page edition of *Perspectives on Food-Safety Issues of Animal-Derived Foods*, a volume of essays by the nation's leading food safety researchers. The University of Arkansas Press published the book in association with the Food Safety Consortium (FSC).

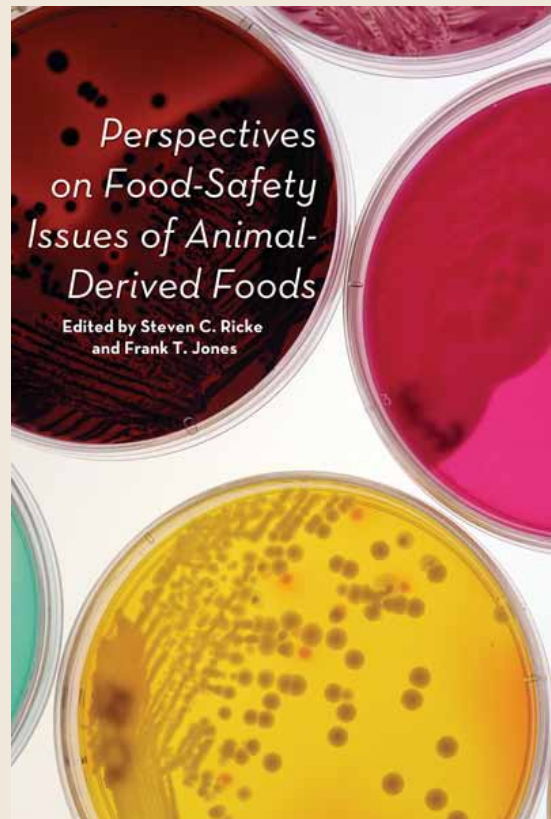
The FSC is an alliance of researchers at the University of Arkansas, Iowa State University and Kansas State University that was established by Congress in 1988. Its work is funded annually through the U.S. Department of Agriculture. The book includes a brief history of the FSC's founding and its research accomplishments.

"Although great strides have been made by the scientific community in understanding the biology and dissemination of foodborne pathogens, recent media headlines publicizing pathogenic bacterial contamination of foods such as spinach and peanut butter indicate that foodborne disease is still a high-profile issue for the consumer," said Steven C. Ricke, who holds the Donald W. "Buddy" Wray Chair in Food Safety at the University of Arkansas Division of Agriculture.

Ricke, the FSC's research director at the U of A, served as co-editor of the book with Frank T. Jones, who retired last year as associate director for extension at the UA Center of Excellence for Poultry Science.

The book consists of 24 essays written by researchers at universities, industries and government agencies across the United States. Their work is divided into five categories: preharvest foodborne pathogen ecology and intervention strategies, postharvest foodborne pathogen ecology, rapid methods and detection strategies for foodborne pathogens, antibiotics and antimicrobials in food safety, and emerging issues in food safety.

The book has its origins in an FSC symposium presented in 2006 at which several researchers from the organization's three universities and other institutions delivered oral reports on a variety of food safety issues. In the following years, many of the symposium's presenters worked with other researchers to expand their reports into peer-reviewed book chapters that were reviewed by scientific experts in their respective fields and comments were addressed during the revisions and editing of the book chapters.



Perspectives on Food-Safety Issues of Animal-Derived Foods, a volume of essays by the nation's leading food safety researchers, was published by the University of Arkansas Press in association with the Food Safety Consortium.

The book is available for sale at the University of Arkansas bookstore, or through the UA Press at <http://www.uapress.org/titles/fa09/ricke.html> or 800-626-0090. ■

■ UA Center for Food Safety ■

Former UA Researcher Returns to Bulgaria, Pursues Food Safety Efforts

From 2006 to 2009, Vesela Chalova-Zhekova was a post-doctoral associate at the University of Arkansas Division of Agriculture Center for Food Safety, where she worked under the supervision of Center director Steven C. Ricke. Chalova-Zhekova, a native of Bulgaria, earned an M.S. degree in biotechnology in 1994 from the University of Food Technologies in Bulgaria and a Ph.D. in 2005 from Texas A&M University. Ricke was her major advisor at Texas A&M, where she developed her expertise in bacterial physiology and molecular biology and applied it to the potential use of biosensors in poultry nutrition.

At Arkansas, she worked on new projects involving *Salmonella* spp. and *Lactobacilli*. In the process of developing these additional research areas, she expanded her microbiological skills and molecular techniques. Her research focused on the health aspect of the complex interaction between food derivatives (citrus oils, Maillard Reaction Products) and gastrointestinal microorganisms including *Salmonella*, *Lactobacilli* and *Bifidobacteria*.

Chalova-Zhekova returned to Bulgaria last year and joined the faculty at the University of Food Technologies in Plovdiv, a city in the southern part of the country, where she is an assistant professor of biochemistry. She recently answered questions about her work there.

Q: Do you teach classes? What topics do you teach? What level of students do you teach?

A: I teach Food Biochemistry for undergraduate students. In addition, starting from the new academic year, I will be teaching Genetically Modified Foods, which is designated for master level students.

Q: What research area did you pursue at the University of Arkansas as a postdoctoral associate?

A: My research area included food-borne pathogens with emphasis on *Escherichia coli* and *Salmonella*.

Q: What research do you pursue at the Bulgarian university?

A: Food safety and the interaction between food-related microorganisms and food matrix will continue to be a part of my research. A new direction is the research on functionality of proteins isolated from sunflower oil cake, which is a byproduct of sunflower oil production in Bulgaria.

Q: Will you be collaborating with the University of Arkansas on any of your future research projects?

A: Collaborating with University of Arkansas would be a pleasure and great

opportunity for diversifying research projects, exchanging ideas and experiencing the high-level expertise of the University of Arkansas scientists.

Q: Do you work on research projects with any other European universities?

A: Currently, University of Food Technologies has numerous contracts with universities from EU countries which allow collaboration and mobility of students and teachers. Partnerships with local industrial companies with EU participation also exist. Students graduating from University of Food Technologies obtain an educational degree, which is equivalent to the respective degree obtained in any university in the EU and therefore have the opportunity to be hired by EU food companies when their qualification is needed. ■



Steven Ricke and Vesela Chalova-Zhekova

■ UA Center for Food Safety ■

Milillo's NRI Fellowship at Center Supports *Salmonella* Work

By September, Sara Milillo will complete her two-year fellowship grant at the University of Arkansas Division of Agriculture Center for Food Safety. But after that there will still remain unexplored areas of the *Salmonella* research she is pursuing.

Milillo, a postdoctoral associate, is working under center director Steven Ricke's supervision on research looking at new ways to reduce *Salmonella* contamination of poultry. The research is examining how effective certain antimicrobial treatments are in mitigating *Salmonella* and a genetic analysis of the *Salmonella* that survive the treatments. The project is being supported by a National Research Initiative postdoctoral fellowship grant for \$113,383 from the U.S. Depart-



Sara Milillo

ment of Agriculture.

Milillo's two presentations at American Society for Microbiology conferences summarize her work. At the 2009 meeting in Philadelphia, she presented a report on "Efficacy of Organic Acid Salts at Reducing *Salmonella* Typhimurium Populations Grown in BHI or Model Chicken Media at Different

Temperatures." The report concluded that combining sodium lactate with thermal treatment achieves a synergistic antimicrobial effect on *Salmonella* Typhimurium grown in nutrient rich media.

At this summer's ASM meeting in San Diego, Milillo will present a paper on "Exposure to Acidified 55°C Solutions of Select Organic Acid Salts Leads to a Loss

of *Salmonella* Typhimurium Viability Due in Part to Disruption of the Cell Membrane and Corresponding Cell Damage." The report's data will suggest that a combined thermal acidified sodium propionate treatment may provide an effective antimicrobial treatment for *Salmonella*-contaminated poultry, leading to significant reductions in *Salmonella*-related foodborne illness cases.

Milillo said the results gained from her work with Ricke are providing "an important contribution to food safety research by serving as a foundation for future examination of *Salmonella* gene regulation in post-harvest environments." She added that her project, in combination with Ricke's previous work in *Salmonella* research, is providing "a unique opportunity for making connections between survival and persistence mechanisms used by *Salmonella* during pre- and post-harvest." ■

NCTR Scientists Explore Emerging *Salmonella*

Food safety scientists Rajesh Nayak and Steven Foley at the National Center for Toxicological Research (NCTR) in Jefferson, Ark., are focusing on emerging pathogens, such as *Salmonella* Javiana and *Salmonella* Heidelberg. They are collaborating with researchers at the University of Arkansas Division of Agriculture Center for Food Safety, the U.S. Department of Agriculture, other federal Food and Drug Administration centers and state public health laboratories in developing technologies that promote and protect public health.

"Foods in themselves are complex matrices," said Rajesh Nayak, a research scientist at NCTR, an FDA center. In a talk on March 31 to UA food science faculty and students, Nayak advised that university researchers can help by focusing on

technologies that can be useful in the detection, surveillance and control of foodborne pathogens.

NCTR's investigations into *Salmonella* Javiana and *Salmonella* Heidelberg are part of FDA's overall food protection plan, developed in 2007, to address both accidental and deliberate contamination of the nation's food supply. In particular, Nayak said, NCTR looks at the issues surrounding pathogens' resistance to antimicrobials and is developing technologies for rapidly detecting foodborne pathogens.

Salmonella Javiana was one of the most commonly reported serovar to the Centers for Disease Control's PulseNet



Rajesh Nayak

database. "We wanted to know more about the genetics of this pathogen, so we looked at the demographics, the genetic diversity, the antimicrobial resistance issues and the pathogenicity," Nayak said. They found that the infection rates of this pathogen occurred mostly in children under age 10, and only a few of these bacterial

isolates were resistant to multiple drugs. *Salmonella* Heidelberg is the fourth most common serovar to cause salmonellosis in humans and the most common serovar in retail meats. There is also some evidence to suggest that it can colonize in the reproductive tract of laying hens

[\(Continued on page 6\)](#)

Papers & Presentations

Irene Wesley, National Animal Disease Center delivered an invited presentation on “From Poult to Platter” to the annual meeting of the Midwest Poultry Federation in March in St. Paul, Minn.

Catherine Strohbahn, Iowa State, delivered presentations in February on “SafeFood© for Child Nutrition Programs” at the Northeast Iowa Food and Fitness Initiative in Fayette, Iowa, and “Best Practice On Farm Food Safety” at the Iowa Farmers Market Annual Meeting in Des Moines. She also made presentations in March on “The Lowdown on Local Foods” at the Nebraska Food Safety Task Force in Nebraska City, Neb., and “Training for Student Organization Members, Risk Management” at ISU.

NCTE Scientist Explore...

(Continued from page 5)

and subsequently contaminate eggs. “Our goal is to characterize the distribution of *Salmonella* Heidelberg populations in turkeys,” Nayak explained. “We have analyzed *S. Heidelberg* isolates collected from farm samples, veterinary diagnostics samples, processing plants and retail fresh meats.”

Looking at the bigger picture, Nayak said, “Food safety has many unknown variables and there are no simple solutions. There is a need to move from organoleptic to science-based testing methods. We have been doing that successfully with some risk-assessment work and HACCP protocols. We also need to improve our food safety education by partnering with the universities and state public health laboratories.”

Foley also spoke about projects that his research group is pursuing at NCTR. He described his work examining the genetics of antimicrobial resistance in *Salmonella* serovars that are commonly detected in food animal species and are sources of human infections. Foley also described the results of DNA sequencing studies of plasmids from multidrug-resistant *Salmonella* Heidelberg isolates. These plasmids were found to contain genes encoding resistance to multiple antibiotics and likely increased virulence in poultry. ■

30th Annual Rapid Methods Conference Slated for June at Kansas State

Kansas State University will host the 30th Annual International Workshop and Symposium on Rapid Methods and Automation in Microbiology. The conference, which was founded by and is still directed by Daniel Y.C. Fung, is set for June 11-18 at the Clarion Hotel in Manhattan, Kan., and also on the K-State campus.

The workshop will focus on the practical application of conventional and new commercial systems of rapid identification of microorganisms from medical specimens, foods, water and the environment. Workshop participants will receive eight days of intensive theoretical and hands-on training in microbiological automation.

The registration fee for the entire workshop is \$2,355. Workshop registration is for June 11-18 and includes the mini-symposium on June 11 and 12. This registration option includes eight days of program sessions and laboratories and handout materials. The registration fee for only the mini-symposium on June 11-12 is \$750 and includes sessions, handouts, refreshment breaks, one lunch, opening banquet and a reception.

Full registration details are available through the K-State Division of Continuing Education at <http://www.dce.k-state.edu/conf/rapidmethods/> or by calling 1-800-432-8222 or 785-532-5569.

Previous symposium participants, numbering about 4,000 scientists since the first workshop in 1981, have come from 46 states and 60 countries. Since 1990, 35 internationally known scientists have been designated as Distinguished Fellows. Since 1987, more than 50 outstanding graduate students and scholars have been named Fellows.

Fung is a professor of food science at K-State and a distinguished professor at the Autonomas University of Barcelona in Spain. He has presented lectures and symposia in 26 nations. He has more than 800 publications in journals, books and proceedings, and he is the recipient of the 2007 Outstanding Educator in Food Safety Awards, given by *Food Safety* magazine and Conagra Foods. He completed 104 graduate students (33 Ph.D. and 71 M.S.) as the major professor. He is a fellow of the Institute of Food Technologists and the International Academy of Food Science and Technology. He presented an invited lecture at Pasteur Institute in Paris during the 100-year commemoration of Pasteur’s death in 1995.

Consumers' Trust Is Crucial to Companies, OFPA Speakers Tell Gathering

Speakers at this year's Ozark Food Processors Association Convention and Exposition in Springdale, Ark., explained how developing and maintaining the trust of consumers is vital for food businesses, whether by maintaining food safety standards or monitoring social media.

Speaking April 7 at the OFPA's 104th annual gathering, Frank Yiannas, Wal-Mart Stores vice president for food safety, said a food company's priorities may change but food safety must be a "part of the unchanging values and beliefs of an organization." Food safety is still a priority at Wal-Mart, but most of all it's a value and a belief, he said.

Noting that food product recalls have hurt consumers' confidence in the industry overall, Yiannas said he sees "a lack of consumer trust, and you as a food safety professional don't want to be associated with a lack of trust."

The key is to begin with reducing risks to food safety in the early stages of the food production system. Yiannas said Wal-Mart requires all its food suppliers to meet standards of science-based risk reduction before they are certified to sell their products to Wal-Mart.

Wal-Mart is also seeking to reduce retail risk factors through its "Food Safety High Five," a set of standards for all employees to follow (be clean, be healthy; keep it cold, keep it hot; don't cross contaminate; wash, rinse and sanitize; cook it and chill it). The five standards are illustrated in a graphic with details by each standard and are posted at points in the stores where staffers will see them. Each store is audited monthly to confirm they are in compliance with the company's food safety standards.

Yiannas said that in the event of a food product recall, Wal-Mart can notify all its stores within minutes to pull the product from the shelves and to lock down registers so no more of the product in question can be purchased.

Food companies also need to be aware of what consumers are saying about them online, which requires frequent monitoring of social media, blogs and Web sites, especially if they contain postings with information damaging to a company's reputation. Myra Golden, the owner of Myra Golden Seminars in Tulsa, advised businesses to check frequently on consumer-oriented sites and those that pertain specifically to their industry so they can address problems that are publicized.

Golden explained that consumers who are dissatisfied with a product or who don't receive satisfactory service from a company can take their complaints online where they may appear on sites such as Consumerist, Twitter, Facebook, YouTube and various blogs. From there, stories of their problem can circulate to other sites and sometimes be picked up by traditional news media. A company's own entry on Wikipedia can be edited and changed by someone from the outside, so that must be monitored too, she said.

Golden advised that one way to keep up with what's being said is to use the Google Alert service (<http://www.google.com/alerts>) that will track designated search terms of an individual's choice and send an automated e-mail with lists of the latest mentions.

Also speaking, after an opening welcome from Tony Windham, University of Arkansas Division of Agriculture associate

vice president for extension, was Eric Le Blanc, Tyson Foods director of marketing-deli division, who discussed the behavior and attitudes of consumers in making decisions on purchasing deli products. Le Blanc said Tyson's surveys found that one in four shoppers visit the deli section of a grocery store, and that three-fourths of shoppers looking for prepared foods had already planned to do so. Many deli shoppers, Le Blanc said, notice an item and "buy it because they saw it."

The OFPA convention opened April 6 with its annual golf tournament held at Shadow Valley Country Club in Rogers. Eighty-six golfers played in the event with proceeds benefiting the OFPA scholarship fund. The day's activities included the fourth annual Food and Beverage Innovations Competition in which University of Arkansas students demonstrated research skills and interacted with industry. The students' products were on display at that evening's dinner where OFPA scholarship recipients, all UA food science students, were also recognized. Scholarships sponsored by OFPA and its members were awarded to 13 students.

The OFPA Exposition this year attracted 72 exhibitors with more than 430 people attending. ■

Yiannas sees "a lack of consumer trust, and you as a food safety professional don't want to be associated with a lack of trust."

Federal Funding Ensures K-State Continued Work in Homeland Security and Food Defense Education

A group of Kansas State University food scientists will continue their work in educating current and future leaders in homeland security and food defense, thanks to renewed funding from the Department of Homeland Security.

"This is very exciting for K-State," said Curtis Kastner, professor and director of K-State's Food Science Institute. "This means that we will continue to bear responsibility for helping fashion the educational activities of the National Center for Food Protection and Defense."

Kastner, along with Abbey Nutsch, K-State assistant professor of food science in the Department of Animal Sciences and Industry, are co-leaders for the educational portion of NCFPD, which is based at the University of Minnesota.

NCFPD was launched as a Homeland Security Center of Excellence in July 2004. A multidisciplinary and action-oriented research consortium, NCFPD addresses the vulnerability of the nation's food system to attack through intentional contamination with biological or chemical agents. NCFPD's general research and education program (including the education theme which K-State leads) is aimed at reducing the potential for contamination at any point along the food supply chain and mitigating potentially catastrophic public health and economic effects of such attacks. The program incorporates cutting-edge research across a range of disciplines, taking a comprehensive, farm-to-table view of the food system and encompassing all aspects from primary production through transportation and food processing to retail and food service.

The recent DHS funding for NCFPD is expected to total about \$20 million over the next six years; a portion of that funding will come to K-State as NCFPD's Education Theme Leader. The renewed funding ensures that K-State will play a major educational leadership role for NCFPD, Kastner said.

"K-State's leadership for NCFPD's education theme involves two noteworthy projects," he said. "One major NCFPD educational initiative, which K-State leads, involves the pioneering of a graduate education program, led by Nutsch. That program is focused on food defense, and will feature online courses offered by faculty members and institutions including K-State."

The second major NCFPD educational project led by K-State is the Frontier Interdisciplinary eXperiences (or FIX) program, Kastner said. In this program, undergraduate and graduate students from K-State and New Mexico State universities receive scholarship, fellowship, internship, field-trip and other opportunities to learn about issues related to cross-border cooperation, food safety and security, international trade, and homeland security generally and food defense particularly.

The Frontier program is a joint venture of K-State and New Mexico State University. K-State assistant professor in the Department of Diagnostic Medicine/Pathobiology, Justin Kastner, and NMSU's Jason Ackleson are co-directors of the Frontier program.

"The Frontier program is designed to help students blend academic perspectives regarding border security, food security and international trade policy," Justin Kastner said. "Students are encouraged to see the food system, international trade and homeland security as complex policy issues. For example, 13 Frontier students traveled to Washington, D.C., to learn about a wide range of homeland security, import security, public health and food safety and security issues."

As part of its role as the Education Theme leader for NCFPD, K-State receives funding for the FIX program to support scholarship and fellowship programs. In addition to this base funding from NCFPD, the FIX program has received other funds that go directly to student scholarships and fellowships. Last

September the FIX program received a \$390,000 award from the Department of Homeland Security Career Development Grants program, a program designed to provide curricular and experiential learning opportunities for NCFPD-affiliated students being tracked into homeland security employment.

"The food system is complex and international trade is complicated," Justin Kastner said. "The global food system involves a multiplicity of actors and institutions; therefore, cross-border cooperation is needed to ensure the continued flow of food across borders as well as the safety and security of exports and imports. That's why we take the students on field trips to learn about cross-border cooperation. For example, in May 2009, our students travelled to the U.S.-Mexico border to learn about cross-border cooperation at the Santa Teresa, N.M., port of entry, through which 1 million cattle are imported each year. And this month's trip to Washington, D.C., exposed students to policymaking issues."

Overall, NCFPD has impacted well over 200 students at more than 30 universities through NCFPD research and education projects over the last five years. More specifically, the FIX program currently has more than 15 students (primarily at K-State and NMSU but also at other NCFPD-affiliated universities).

"We have graduated students from the FIX program who have worked in the (U.S. Department of Agriculture's) Food Safety and Inspection Service, international organizations such as the World Trade Organization, food companies and, most recently, national laboratories devoted to homeland security," Justin Kastner said. "We are currently evaluating applications from a number of NCFPD-affiliated students to participate in the Frontier program's new \$390,000 career development grant program."

(Continued on page 9)

Food Protection Workshop Slated for June at UA

Entrepreneurs, small-business operators and younger management employees of larger companies will have the opportunity to learn more about food defense at a workshop set for June 9-10 presented by the University of Arkansas Institute of Food Science and Engineering. The workshop will be held at the Center for Continuing Education in Fayetteville. Topics to be covered include good management practices, quality systems, vulnerability assessments, reportable food registry, GPS traceback, agroterrorism, the Food Safety Modernization Act and the role of the FBI in food defense.

The conference registration fee is \$250 in advance and \$350 at the site. Registration will close when the course is filled. For additional details and to complete the online registration form, see the conference website at http://www.uark.edu/ua/foodpro/Workshops/Food_Safety_Defense_Workshop.html.

Federal Funding...

(Continued from page 8)

The FIX program is committed to helping cultivate critical thinking skills and the ability to think across academic disciplines, such as social sciences as well as biological sciences; political science as well as food science, he added.

"We believe these skills will help make our graduates the kind of homeland security professionals our society needs for the future," said Nutsch, who plays an active leadership role in the FIX program.

Other members of the K-State Educational Theme team include Deanna Retzlaff, Kelly Getty and Bettie Minshall, all of whom are active in promoting K-State's food science-related distance education programs.

More information about the National Center for Food Protection and Defense is available at www.ncfpd.umn.edu. More information about the Frontier Interdisciplinary eXperiences (FIX) program is available at <http://frontier.k-state.edu/>. ■

ISU Researcher Receives NSF Food Safety Leadership Award

Nearly half of the average American's food budget is spent eating away from home, according to the USDA. That's why Catherine Strohbahn educates food service companies on the power they have to impact people's health.

Her dedication to food safety has not gone unnoticed by peers and leaders in her field. Strohbahn, an Iowa State University Extension specialist in hotel, restaurant and institution management and a Food Safety Consortium researcher, was recently awarded the 2010 Food Safety Leadership Award for Education from the National Sanitation Foundation. She received the award at the Food Safety Summit in Washington on April 14.

The award recognizes Strohbahn for providing outstanding food safety educational outreach for students, farm workers, consumers and food service employees in schools, assisted living facilities, restaurants and universities. Her nomination letters also praise her ingenuity, vision and innovation in Extension outreach.

"Dr. Strohbahn is one of the first researchers to examine farm-to-school [lunchroom] issues ... (She) had the foresight in the late 1990s to begin examining these issues, including food safety — and now farm-to-school is receiving national attention as a priority with USDA," according to a nomination letter from Jeannie Sneed, food safety specialist in the USDA Food and Nutrition Service.

Strohbahn has developed approaches to teaching food safety that use multimedia, including video, interactive computer-based training, simulations and podcasts. Strohbahn directs a popular food safety web site (<http://www.iowafoodsafety.org>), which features interactive lessons, videos and downloadable handouts and receives more than 9 million visits per year.

"It's really important to provide science-based information, and our web presence allows us to do that," Strohbahn said. "We're trying to use the web as a vehicle to get food safety information to the general public."

Strohbahn, who has taught 10 different ISU courses to more than 2,000 students in the past 20 years, said food safety education appeals to her because of a growing disconnect with people regarding the source of their food and how it is produced. By reaching out through education and incorporating a web-based approach, Strohbahn has made lasting impact not only in Iowa, but across the nation, according to her nominator.

"I think it's very important to raise awareness among people that what they put in their bodies really affects their overall well-being," she said. "You can't fully tap into your human potential if one is not in good health." ■



Catherine Strohbahn

Irradiation Remains a Matter of Education

The absence of irradiated produce in most grocery stores is essentially a self-fulfilling prophecy. Producers don't think retailers will stock irradiated food. Retailers don't think consumers will buy irradiated food. So, consumers can't find irradiated produce at their market.

But Anuradha Prakash of Chapman University sees it differently. "In the end, people buy foods, not technologies," she said at last year's Institute of Food Technologists annual meeting in Anaheim, Calif. She delivered a presentation that she had prepared jointly with Christine Bruhn, director of the Center for Consumer Research at the University of California-Davis.

Prakash, a food science professor at Chapman University in Orange, Calif., noted that consumers buy irradiated meat, poultry and produce where it is available. Education and promotion will increase the number of people buying. Prakash believes that while education of consumers is important to improving acceptance of irradiated produce, it will also be important to gauge the perceptions of buyers and sellers in the produce distribution chain and provide irradiation education to them as well.

Buyers who are currently purchasing irradiated products, Prakash said, are likely to be people with college educations and incomes over \$30,000 as well as those who handle food in a risky manner.

Acceptance of irradiation increases when people hear about how irradiation enhances safety and when they actually see an irradiated product. Prakash said consumers also tend to support irradiation soon after the reporting of a threat to food safety that could have been reduced by the procedure.

Numbers in support of irradiation are gaining strength. A 2009 consumer survey by the International Food Information Council asked 1,064 people their opinion of irradiation. Thirty-four percent viewed irradiation with a "very favorable" attitude and 26 percent reported a "favorable" attitude. More than 50 percent said they would purchase irradiated food if it makes a product safer to eat.

Prakash said no data had been gathered yet on consumers' opinion of irradiating produce. "What would the perception of freshness be of irradiated lettuce?" she asked.

Sales of irradiated foods have done well where they have been offered, Prakash said, mentioning Publix Super Markets' sales of irradiated frozen chicken and Wegmans Food Markets' sales of irradiated ground beef as examples.

Consumer education messages should include irradiation in the context of a total food manufacturing system, Prakash said, and the food industry must work with health professionals to update consumer information at all levels.

"Most, but not all, will buy irradiated foods when given the opportunity," she said. ■

Food Safety Digest

by Dave Edmark

It's unlikely that many people in professions affiliated with food safety ever believed the old tale called the "five-second rule." The legend has been that if you drop a piece of food on the floor, it's still safe to eat as long as you retrieve it within five seconds. Now there's some actual research to knock down the idea.

The Clorox Co. funded a study by Scott Kelley, an associate professor of biology at San Diego State University. "We wanted to know if there was any truth to the theory that bacteria need time to attach to surfaces of fallen food or commonly dropped items like sippy cups," Kelley said. "Unfortunately, for those of us who lived by that rule, it looks like a total myth. Five seconds is all it takes."

In Kelley's study, three baby carrots were dropped on a sink, a tile floor, a carpet and a tabletop. One control carrot was not dropped on a surface. In each case, germs attached to the dropped carrots within five seconds. The same results were recorded when a sippy cup mouthpiece was left on the same type of surface in four homes in addition to a high chair tray's surface.

If scientific evidence is persuasive, the experiment comes none too soon. Clorox said a survey of 500 parents showed that 65 percent of them said they followed the five-second rule and that 75 percent allowed their children to eat food directly off their high chair tray.

Of all the surfaces tested when carrots were dropped, countertops were the source of the greatest number of germs, followed by the tile floor, carpeted floor and tabletop. When a sippy cup mouthpiece was dropped, the high chair tray was the source of the most germs, and the countertop was the source of the least amount.



A private organization's study in March reported that foodborne illness costs the United States \$152 billion a year in health care and other losses. The U.S. Department of Agriculture estimate of the costs has stood at \$35 billion a year since 1997, the Associated Press said.

The Produce Safety Project, an initiative of the Pew Charitable Trusts, sponsored the study, which was conducted by Robert Scharff, an Ohio State University assistant professor of consumer sciences who formerly served as a Food and Drug Administration economist.

Scharff said the recent study covered more pathogens than the 1997 USDA study and included a broader set of economic losses such as the costs of emergency and ongoing medical care, pain, suffering and death. He said the peer-reviewed study also assigned costs to foodborne illnesses whose source was not identified. The federal government estimates that accounts for more than three-fourths of all cases.



Last November, the Canadian Food Inspection Agency increased its frequency of inspection at meat processing plants after the U.S. Department of Agriculture audited Canadian plants that export their product to the United States. Word of the situation became known in March when records surfaced showing that the CFIA was trying to increase its presence to adhere to American food safety standards. *The Montreal Gazette* reported that Canadian Agriculture Minister Gerry Ritz told questioners from opposition parties in the House of Commons that the arrangement wasn't prioritizing American consumers. He said the CFIA inspectors conducted

their business in the plants once every 12 hours for food being marketed both domestically and internationally.



China announced in March that it would increase its food safety efforts and work to bring more farms under better supervision. The announcement by Wei Chao'an, the vice minister of agriculture, came in the wake of a dairy scandal that caused the deaths of at least six children and 300,000 illnesses from a tainted infant formula, the Associated Press reported.

The government said in a statement it would "implement quality and safety monitoring programs targeting raw and fresh milk and strengthen supervision of purchase stations for raw and fresh milk." Milk tainted with melamine has recently been found repackaged in different places around the country. ■