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Beware of Washing Away the Pathogens and Sending Them to the Food

When it's time to wash down the facilities in food processing plants to clear out any pathogenic bacteria, industry needs to watch for one unintended consequence. Washing the floor drains could actually make it easier for any *Listeria monocytogenes* to travel from the drain to points on the processing line.

Food Safety Consortium researchers at Kansas State University already knew that the open floor drains in processing environments can harbor the bacteria, which is why those drains are the targets of high pressure washing and cleaning. They found out a new angle: that the aerosols



Jasdeep Saini

generated by the washing can transfer the bacterial cells away from the drain as intended but onto surfaces where food is being processed a few feet above the floor.

The situation can be remedied, but workers need to be trained how to do so, said Jasdeep Saini, a KSU doctoral student in food science who researched the issue with food science professors James Marsden and Daniel Fung. The workers would then modify their cleaning procedures.

"If the worker who is actually doing that knows that this is the point from where the translocation of bacteria is actually occurring and

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Looking for Creative Ways Online to Get Their Hands Washed

Generations of admonitions haven't always been able to get across the simple message: wash hands before dining. They're not giving up at Iowa State University where the food safety Web site includes a section devoted to the topic.

The page with the theme of "Did You Wash 'Em?" highlights one of many topics covered on the site at <http://www.iowafoodsafety.org> with the support of the Food Safety Consortium. As with all the information on the site, the hand-washing content is research based.

"This was targeted to multiple audiences, both consumers as well as retail food services," said Catherine Strohhenn, an ISU Extension specialist in hotel, restaurant and institutional management who supervises the site.

ISU researchers published their findings on hand-washing habits in the *Journal of Food Pro-*



Catherine Strohhenn

tection based on observed behaviors in different sectors of the retail food service industry: child care, assisted living, schools and restaurants.

"What we're hoping to do with the Web page is synergize so that we've got different avenues to disseminate the information from the research and make it useful and relevant to practitioners," Strohhenn said.

The hand-washing section of the site includes documents and presentations covering the myths about hand washing (one myth is that hot water is necessary, but it's not; it's the soap that makes the difference), illustrations showing the proper way to wash hands, a fact sheet about soiled hands and illness, the relationship between viruses and unclean hands, and even an audio version of a public service announcement featuring a high

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Beware of Washing Away Pathogens...

(Continued from page 1)

The situation can be remedied, but workers need to be trained how to do so.

is told to be careful, some change in that respect can be made,” Saini said.

The research team ran tests to find out the potential for translocating *L. monocytogenes* from drains to food contact surfaces. The researchers placed stainless steel markers at heights of 1, 3 and 5 feet above the drain level. They checked the markers after using a high-pressure hose to wash the drain and took samples after eight hours and again after 48 hours.

The numbers for both the eight-hour and 48-hour tests showed that bacterial cells from the drain were found at all three height levels, the highest number at the 1-foot level closest to the drain. More bacterial cells were present on the contact surfaces after 48 hours than after eight hours, likely because of the longer time available for the cells to proliferate and form a biofilm — thin, resistant layers of microorganisms — as protection against environmental stress.

“*Listeria* has been known to form biofilms,” Saini said. “Biofilms develop between 36 and 48 hours. If there are biofilms existing in the drain, how those are actually translocated can cause contamination on the line.” ■

Looking for Creative Ways...

(Continued from page 1)

school choir singing a reminder to wash hands after playing with animals. A Yuck Photo Gallery (in English and Spanish) shows microbial growth after hands have touched soiled surfaces.

Food defense, a vital new area of concern for food processors, is also a key component on the site. It features links to several federal agency pages with information on procedures that plants must follow and that retail operations should know.

Strohbehn plans to continue looking for ways to improve the popular food safety lessons page that cover dangerous microorganisms, consumer control points (such as purchasing, storing, preparing, cooking, serving and handling leftovers) and finding the temperature danger zone for foods. The lessons are linked to online quizzes that test knowledge of the topics just covered.

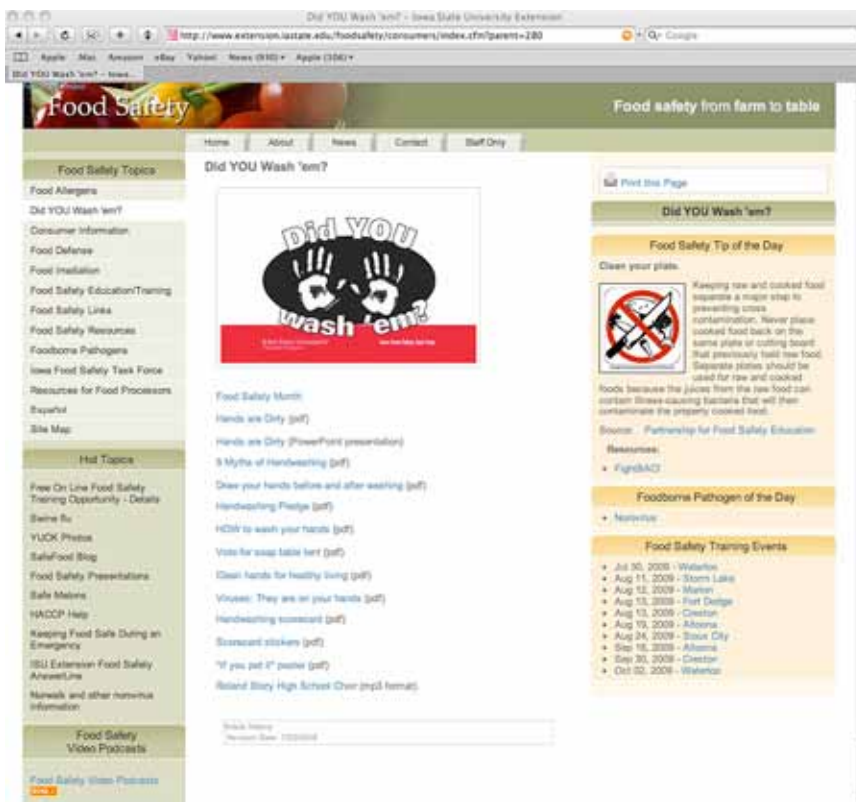
“I’d like to get a better sense of who’s taking those quizzes — the demograph-

ics and the pass rate — to evaluate the effectiveness of those as a learning tool,” Strohbehn said. “We’ve learned from feedback that a lot of family consumer science education teachers are using those in their classroom.”

The site hosts a few video podcasts that demonstrate proper food safety procedures for food service operators to follow. They cover time and temperature issues, cleaning and sanitizing methods and health and hygiene problems. They’re informative industry-oriented productions of a few minutes each. However, they didn’t appear to attract the interest of the college students whom Strohbehn asked to review the videos.

“The bottom line was the students liked the convenience of the Web delivery of the video,” Strohbehn said. “The takeaway was it was boring because it wasn’t ‘edutainment.’ We need to be doing more ‘edutainment.’” ■

The hand-washing section of the site includes documents and presentations covering the myths about hand washing.



They're Starving, Down but Not Out; Pathogens That Live to Cause Trouble

Listeria monocytogenes, a bacterial scourge of food producers and processors, can live too well even when it's hurt. It can rise up after months of inactivity and potentially contaminate raw or processed food. The pending question is whether it's still virulent enough to cause serious listeriosis infections as its uninjured counterparts could.



Michael Johnson

Cells of *L. monocytogenes* and other pathogens such as *Salmonella* and *Campylobacter* may be left for dead after they've been apparently starved from a lack of nutrients such as food, water or oxygen. Not necessarily so, says emeritus food science professor Michael Johnson of the University of Arkansas System's Division of Agriculture, who has researched the cells' reaction to stress for the Food Safety Consortium.

"We're trying to understand starvation and how that would affect the ability of cells to survive in different food processing environments," Johnson said. A cooperative study with Iowa State University a few years ago showed that *L. monocytogenes* cells that had been injured, but not killed, by irradiation treatments used for foods were able to bounce back as virulent pathogens. Johnson said the work at Arkansas is showing that the bacteria can recover not only from a rough blow delivered by irradiation but also from prolonged deprivation of nutrients.

"The starved cells can survive without any added nutrients for nine months to a year in a physiological phosphate-salt water solution," Johnson said.

"These bacteria have figured out ways to survive without additional nutrients. They're not growing but they're still alive. When they get a new set of nutrients, they can grow again."

The mystery that still occupies the Arkansas researchers' efforts is how the inactive but still viable bacteria use the

breakdown waste proteins released by other cells that die from the starvation treatment. The bacterial cells did not die during the stage when they were not getting any new outside nutrients that they were usually accustomed to receiving.

"What key things in the life of a cell are still intact in

the starvation stage so that they keep a cell alive when the nutrients come along?" Johnson asked, posing the question the researchers seek to solve. "These bacteria have figured out a way whereby they go into a completely rested stage of life in which they're apparently not metabolizing, they're not doing anything."

There could be serious implications for people if they consume food that contains these reawakened bacteria. Johnson offered the example of someone eating a piece of soft cheese with recently re-energized *L. monocytogenes* on it, an especially dangerous prospect for an immunocompromised person. Listeriosis can cause serious illness and possibly death for high-risk groups such as pregnant women, newborns and the elderly.

It's not known yet whether the pathogenic cells that had been starved before their rejuvenation are more virulent, as virulent or less virulent than those that have been actively growing and unstarved. What's known for certain is that the formerly stressed pathogens can at least come back to life.

"We expect bacteria to do well

where there are nutrients and moisture," Johnson said. "The big question in food processing is how do they persist when we take away all the life support systems, when we take away the nutrients and take away the water. Do they still remain alive? The answer is yes." ■

The bacteria can recover not only from a rough blow delivered by irradiation but also from prolonged deprivation of nutrients.

Government Launches Food Safety Web Site

The White House Food Safety Working Group, led by Agriculture Secretary Tom Vilsack and Health and Human Services Secretary Kathleen Sebelius, launched a Web site in May to provide information about the group's activities and progress.

The website at <http://www.foodsafetyworkinggroup.gov> will be a resource for people who want to learn about the current food safety network as well as stakeholders and organizations which are working to upgrade the nation's food safety system. The site features social bookmarking tools including an RSS feed and a widget that can be downloaded to help stay informed.

Representatives from the White House Food Safety Working Group met and outlined principles to meet the president's goal. The Food Safety Working Group will provide additional opportunities to engage stakeholders in conversations and help shape these principles.

The working group said in a statement that a comprehensive approach to an improved national food safety system links regulatory actions and public health outcomes. This approach focuses resources according to risk, applies the best available science and high quality data to the decision-making process and strives for seamless coordination among federal agencies and their state, local and international public health partners. ■

Attorney Calls for More Transparency, Research From Food Industry

An attorney with a long record of food and product regulatory law specialization says the food industry needs to demonstrate more transparency to consumers in its marketing practices.

“The food industry has fallen into some bad habits, not at the science level but at the marketing level,” said Susie Hoeller, an international business attorney who practices in Bentonville, Ark., and in April delivered remarks to a University of Arkansas food science department seminar. Prior to opening her own law firm, Hoeller held in-house counsel positions at Wal-Mart Stores and Texas Instruments and practiced in law firms in Dallas, Chicago and Portland, Maine.

“Consumers need to demand greater transparency from the food industry in terms of what disclosures the food industry makes, and this will enable consumers to make better choices when they shop,” Hoeller said.

Hoeller identified shortcomings in transparency, such as the lack of traceability for food products downstream in their supply chains. Companies in Norway, by contrast, “can trace every piece of meat from the animal to the grocery store,” she said. The United States does have country-of-origin labeling, but only for the end product, which means that the origin of a product’s various ingredients isn’t revealed.

For example, Hoeller explained, a box of cereal may contain ingredients from all over the world but all the consumer sees is the location of the food manufacturer in the United States. She said this gives the consumer the false sense of security that the product comes from crops grown only on American farms.

Hoeller does not support more government inspections as the only answer to the nation’s food safety outbreaks and



Susie Hoeller

recalls. Government inspections alone do not address the heart of the problem that Hoeller sees. She said she wants food companies to invest more of their resources in quality assurance and food safety and less on marketing and advertising.

“Marketing and advertising expenditures for the food industry are far too high,” she said. “I pulled financial statements from several of the major publicly traded food companies, and if you look at them the pattern is the same. What they spend on advertising and marketing is

10 times what they spend on research and development. What they spend on quality assurance and food safety is not even disclosed at all.”

She said the relatively low prices that Americans pay for food is at the heart of the industry’s problem. Hoeller said the average American consumer spends only 5.7 percent of income on meals eaten at home, compared with consumers’

expenditures of 8.6 percent in the United Kingdom and levels above 11 percent in Germany, France, Japan and South Korea.

The efficiency of American agriculture makes such low prices possible, Hoeller said, “but this lowering of the price constantly puts a lot of pressure on the industry and doesn’t allow the industry to invest in innovation as much as other industries.”

Hoeller asserted that consumers’ demand for ever lower prices creates a thin profit margin for the food industry, one that does not take into account the social costs of cheap food: obesity; disregard for animal welfare by many producers; food safety shortcuts; and low wages for workers on farms and in processing plants and grocery stores. Hoeller does call for more government assistance to relieve hunger for Americans who need it but believes that for most Americans the problem has been too much cheap food of poor nutritional quality, not too little food.

She also called on reforms in the food industry to include a quality assurance structure more resembling that in high-tech industries. “You don’t see millions of high tech products recalled like we have seen with the rash of food recalls in the past few years,” she said.

Hoeller said the food industry should pay higher wages and provide more training with better career path opportunities to avoid high turnover rates in processing plants and grocery stores.

Hoeller is the author of *The Ethical Food Manifesto* that was published earlier this year and is available at <http://www.booklocker.com>. She is president and founder of the American Center for International Policy Studies. Stephen Terry, a University of Arkansas undergraduate alumnus and law school graduate, who assisted Hoeller with the research and writing of her book, also spoke at the seminar about how to improve school lunch programs and about reforming the regulation of nutritional supplements. ■

‘This lowering of the price constantly puts a lot of pressure on the industry and doesn’t allow the industry to invest in innovation as much as other industries.’

Cargill Executive Cites Single Regulatory Agency as Necessary

Almost all food in the United States is safe despite some isolated failures, says one longtime industry microbiologist who lets it be known he thinks barriers in both industry and government stand in the way of more effective progress in food safety.

Among solutions proposed by William Sperber, who holds the title of global ambassador for food protection at Cargill, Inc., is the establishment of a single food protection agency in the federal government and a worldwide food protection agency within the United Nations. Sperber has previously served as Cargill's chief microbiologist and held similar positions at The Pillsbury Co. and Best Foods.

In a talk at the Institute of Food Technologists annual meeting in June in Anaheim, Calif., he listed "ignorant food company management" as one potential barrier to food safety, often caused by a failure to provide and support adequate resources for those responsible for the task. One solution is for the corporate food safety function to report directly to the company's top management.

In government agencies, Sperber views an absence of expertise in top positions that supervise food safety. Lawyers and former lobbyists fill these jobs, Sperber noted, but rarely anyone from the food industry. "Most knowledge of food safety hazards and control measures resides in the food industry," he said.

Sperber blamed a lack of such background for the Department of Homeland Security's failure to include food within its 2008 44-page strategic plan.

In the early years of regulations, many new rules were beneficial to food safety, Sperber said, citing the federal 1923 pasteurized milk regulations and 1973 canned goods rules. More recently, he said, counterproductive rules and regulations are being implemented.

Sperber criticized the implementation of a 1996 federal rule that mandated the Hazard Analysis and Critical Control Point (HACCP) system in meat and poultry processing operations. The rules contain arbitrary standards for acceptable levels of *Salmonella*, he said. Sperber, who conducted the first hazard analyses of consumer goods in the early days of Pillsbury's HACCP system, asserted that

HACCP itself is not quality control. He called for "hard-wired industry input" to develop food safety regulations.

Unwarranted microbial specifications and testing also remain as barriers, Sperber said. Widespread *Salmonella* contamination drove early quality control programs, "but quality control protocols

cannot detect low levels of contamination." Although HACCP systems can design food safety into a product, quality control testing itself doesn't make food safe, he said.

Sperber said the nation needs a single federal food safety agency because the current division of responsibilities among five federal departments and many state and local agencies has not been an adequate response. He suggested the establishment of a cabinet-level Department of Food Protection, but acknowledged that a more likely solution politically would be to start a single agency within the Health and Human Services Department that would consolidate all existing federal activities in food protection.

The worldwide food protection agency that Sperber wants to see within the United Nations should be modeled after two other U.N. agencies, the World Health Organization and the Food and Agriculture Organization.

"We need the political will and leadership" to accomplish these goals, Sperber said. He said food safety professionals can help by supporting the establishment of the proposed food protection agencies. ■

The corporate food safety function should report directly to the company's top management.



Food Safety Education Conference Set for March in Atlanta

The 2010 Food Safety Education Conference sponsored by the U.S. Department of Agriculture and NSF International is set for March 23-26 in Atlanta at the Hyatt Regency. The theme is "Advancements in Food Safety Education: Trends, Tools and Technologies."

The conference will cover foodborne illness surveillance and epidemiology, Healthy People 2010 and 2020, behavioral and attitudinal research, social marketing advances, outreach to the medical community, food service and retail initiatives, emerging educational trends, tools and technologies, partnerships and collaborations and social networking applications.

Registration information is available at the conference web site at <http://www.fsis.usda.gov/atlanta2010>. ■



Michael Johnson (left) and Justin Morris at University of Arkansas retirement party.

Johnson, Morris Honored in Retirement Sendoff

A combined 70 years of experience is leaving the active faculty ranks in the Department of Food Science at the University of Arkansas System's Division of Agriculture with the retirements of Justin Morris and Michael Johnson. Colleagues honored the two prominent researchers June 25 at a joint retirement party.

Johnson, a professor and former longtime research director of the UA component of the Food Safety Consortium, joined the faculty in 1984 to establish a food microbiology program after several years in industry. Jean-François Meullenet, interim department head, called Johnson the nation's leading expert on *Listeria monocytogenes* and *Salmonella* in poultry products. Johnson has twice been awarded the Division of Agriculture's John W. White award for outstanding service.

"I've always seen my job as adding value to those I come in contact with," said Johnson, who has directed many students' academic research. "People are my books. I try to help them write good things."

Morris, a distinguished professor, joined the faculty in 1964 after earning a Ph.D. at Rutgers University following his time at the U of A as an undergraduate and master's student. He has become widely known for his work as director of the Institute of Food Science and Engineering, his leadership of the Ozark Food Processors Association and his extensive research in viticulture and enology to develop new wine products from grape and fruit blends. He was recently inducted into the Arkansas Agriculture Hall of Fame.

"It was all about serving the people of Arkansas and the people in the areas we work in," Morris said. "Students are an extension of you, what you turn out to the world."

Both Morris and Johnson said they will continue working on research projects in food science as they assume emeritus faculty status. ■

IFT Video Series Focuses on Food Safety

The Institute of Food Technologists has produced a series of videos on MonkeySee.com, an instructional video website, called “Understanding Food Safety and Toxicology” that educates viewers about the safety of the foods they eat.

“Consumers have a lot of questions about chemicals in food, such as pesticide residues on fruits and vegetables,” said Carl Winter, IFT spokesperson and a food toxicologist on the faculty of the University of California at Davis. “The main message we want people to take away from these videos is that the levels of exposure to chemicals in food, such as pesticides, is very low. We hope consumers will take this information and make good choices about food for themselves and their family.”

The eight video segments, each under three minutes in length, address different topics of food safety, such as Basic Principles of Toxicology, Chemical Risks in Food, How Scientists Assess Food Safety Risks and Eating a Balanced Diet.

“When we talk about the presence of very small amounts of chemicals in our food supply, the question is what risks, if any, do they pose to consumers?” Winter said. “Fortunately, for most of these types of chemical contaminants, we find that our typical human exposure is far lower than levels that don’t even cause effects in laboratory animals. Our exposure to these chemicals is low; therefore our risks are very low.”

One video explains how consumers today are free to make many food choices, including purchasing organic food if they are concerned about chemicals. Whether they choose organically grown or conventionally produced food, the goal should be to eat a balanced diet.

“We need to think about having a balanced diet in moderation and that contains fruits and vegetables and grains,” Winter said. “That can significantly decrease the risk of heart disease and many types of cancers. People concerned about potential exposure to chemicals in fruits and vegetables might reduce their consumption. But they should know that the benefits of consuming these foods far outweigh the potential risks from exposure to these very low levels of chemicals.”

The videos are online at <http://tinyurl.com/kqfo6p>.

Understanding Food Safety and Toxicology



Brunton, FSC Founding Board Member, Dies at 66

Ellis Brunton, one of the founding members of the Food Safety Consortium Steering Committee, died July 5, 2009, at his home in Rogers, Ark. Brunton, 66, served on the FSC board from its inception in 1992 until 2003 while he was a senior executive at Tyson Foods in Springdale, Ark.

Brunton joined Tyson in 1989 and served as director of laboratory services, group vice president for research and quality assurance, retiring in 2004 as senior vice president of science and regulatory affairs. He began his career with Holly Farms, Inc., as laboratory director in Wilksboro, N.C., in 1972 and also served as vice president of technical services. He was elected vice president of Balanced Energy Co., a subsidiary of Holly Farms, and served on its Board of Directors in Clinton, Iowa.

He was a member of the technical advisory group for the U.S. Poultry and Egg Export Council and the Science Advisory Committee of the Arkansas Biosciences Institute. He also served as a board member for the Institute of Food Science and Engineering at the University of Arkansas and the Ozark Food Processors Association. He was a member of the Science Advisory Committee of the American Meat Institute. He was also an adjunct professor at the University of Arkansas. He was a member of the Association of Official Analytical Chemists and Society of Sigma Xi. In 2006, the American Meat Institute honored him with its AMI Foundation Scientific Achievement Award in recognition of his efforts in food safety and policy.

Memorial donations can be made to Helping Oncology Patients Excel, which established a fund in his name. Contact Mandy Silberstein at 479-571-4673 or e-mail at mandy@hopenwa.org. Donations can also be made to Circle of Life Hospice, 901 Jones Road, Springdale, Ark. 72762. ■

Food Safety Digest

by Dave Edmark

The federal government says *Salmonella* and norovirus were the leading causes of foodborne disease outbreaks in 2006, with poultry leading the way among commodities causing the largest number of outbreak-associated cases. The poultry industry takes issue with the conclusion, contending that a single incident skewed the results.

The Centers for Disease Control and Prevention said in June that norovirus was responsible for 54 percent of the 1,270 reported foodborne disease outbreaks, followed by *Salmonella* at 18 percent of the outbreaks. The outbreaks resulted in 27,634 illnesses and 11 deaths, CDC said.

Poultry was found to be associated with 21 percent of the outbreak cases, leafy vegetables 17 percent and fruits and nuts 16 percent.

“Determining the proportion of outbreak-associated cases of foodborne illness due to the various food commodities is an important step,” said Patricia M. Griffin, chief of CDC’s Enteric Diseases Epidemiology branch. “Identification of particular food commodities that have caused outbreaks can help public health officials and the food industry to target control efforts from the farm to the table.”

The National Chicken Council pointed out that within the 1,355 outbreak-associated cases that comprised poultry’s 21 percent, 741 cases came from a single incident in an Alabama jail that was suspected to result from *Clostridium perfringens* in baked chicken. The NCC, which represents integrated chicken producers and processors, asserted that without the single jail incident, poultry would have been the source of only 10 percent of the outbreak cases.

“Any case of foodborne illness is unfortunate, but it is unfair to present a picture that is skewed by a single, unusual event,” said Steve Pretanik, NCC director of science and technology.



Confidence in the food industry among grocery shoppers has sunk to less than 20 percent. MedaPost.com’s Marketing Daily reported that IBM sponsored a survey among adult grocery shoppers in the nation’s 10 largest cities. Fewer than 20 percent of respondents trust food companies to provide safe and healthy food products.

Although 72 percent trusted their own local grocery store to properly handle recalls of contaminated food, only 55 percent trust the food manufacturers to do the same (down from 64 percent a couple of years ago).

The survey also found that 57 percent have at least temporarily stopped buying certain foods for safety reasons. Forty-nine percent would cease buying a product permanently if it is recalled because of contamination. Eighty-three percent could name a food product that was recalled in the past two years. Peanut butter topped that list, cited by 46 percent of the respondents, followed by spinach at 15 percent.



Small businesses are finding it difficult to compete with bigger competitors because of food safety checks, according to a report by the United Nations Food and Agriculture Organization and World Health Organization. The Reuters news service reported in June that FAO and WHO said the smaller companies around the world may need help so they aren’t squeezed out because of the expense of meeting new standards.

“Exporters of fresh fruit and vegetables, meat and dairy and seafood must comply with multi-tiered requirements including quality grades and standards, traceability requirements, labels of origin, phytosanitary controls and food safety standards, both of a regulatory and private nature,” the report said. “It is evident that a number of developing countries, and exporters and producers therein, face challenges in complying.” ■

Papers & Presentations

Michael Johnson and Corliss O’Bryan, Arkansas, moderated a symposium on “Organic Poultry and Red Meats — Microbiology Considerations: What Do We Know, What More Do We Need to Know and How Do We Get There?” in June at the Institute of Food Technologists annual meeting in Anaheim, Calif. **Steven Ricke**, Arkansas, delivered a presentation at the symposium on “Current Concepts and Issues for Food Safety in Pasture-Raised Poultry.”

Curtis Kastner, Kansas State, received the Distinguished Achievement in Agriculture award from the KSU chapter of Gamma Sigma Delta, the honor society of agriculture, at its spring program. In May, Kastner spoke to the Kansas Association of College Teachers of Agriculture on “Food Safety and Food Security: A Global Perspective.”

Justin Kastner, Abbey Nutsch and Curtis Kastner, Kansas State, contributed a chapter titled “The Role of Food Safety in Food Security/Defense” in the *Wiley Handbook of Science and Technology for Homeland Security* published by John Wiley & Sons, Inc.

Scott Hurd, Iowa State, testified before a committee of the California legislature in April against a bill to ban the use of sub-therapeutic antibiotics in livestock and would have disallowed school districts from purchasing any meat from animals that had been treated with antibiotics. The bill was defeated in the state Senate. ■