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Food Safety Consortium Newsletter, Winter 2011

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the Food Safety Consortium newsletter

University of Arkansas Division of Agriculture, Iowa State University and Kansas State University

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

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If Avian Flu Strikes, Look for Poultry Consumption Drop, but Not Much

The prospect of what would happen to the poultry industry economically if an avian flu outbreak occurred in the United States is a hypothetical situation that no one wants to put to the test in real life. But if it did happen, the results of a survey indicate that poultry consumption patterns would decrease at varying levels around the nation.

“Overall, only a very small proportion of the people said they would stop consuming poultry,” said Sean Fox, a professor of agricultural economics at Kansas State University who researched the impact of an outbreak in a Food



Sean Fox

Safety Consortium-supported project. “You do have your 15 to 20 percent saying they would stop consuming poultry. This is what people say they would do. What they would actually do is probably very different.”

Fox bases that prediction on what happened in 2003 when the discovery case of BSE in the United States led to South Korea cutting off U.S. beef imports until 2008. Fox surveyed the public to find out people’s plans for beef consumption. Respondents to his 2004 research inquiry showed that 15 to 30 percent said they would stop consuming beef if additional cases of BSE were discovered.

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ISU Team Seeks Blood Test to Identify Level of *Salmonella* Shedding

By Melea Reicks Licht, Iowa State University

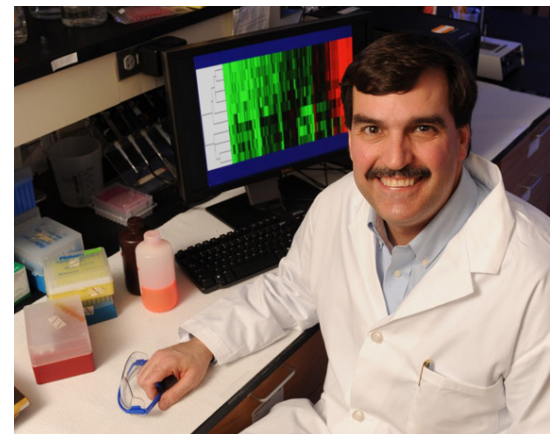
In an effort to improve animal health and food safety, Chris Tuggle and colleagues at Iowa State University are finding new ways to identify animals harboring *Salmonella*.

“We are developing a blood test to identify animals that shed the least amount of *Salmonella* into the environment,” Tuggle said.

Pigs can contract and carry *Salmonella* without showing any symptoms. Infected animals shed the bacteria in their manure, which often is used to fertilize crops.

Tuggle, professor of animal science, and his research team examine the genetic makeup of pigs and sample blood and fecal matter for evidence of *Salmonella*. Then they look for relationships between the expression of genes in blood and the level of *Salmonella* shed by the pig.

Their findings have identified a gene expression signature, or classifier, that can predict the level to which an animal will carry or



Chris Tuggle

transmit *Salmonella*. These results can help weed out pigs who are *Salmonella* “shedders” from swine herds through traditional animal breeding

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If Avian Flu Strikes... (Continued from page 1)

More cases were reported in later years, but beef consumption didn't drop.

Fox sent a mail survey to 800 residents each in Wichita, Kan., and Los Angeles and received responses from 346 in Wichita and 139 in Los Angeles. About half the respondents in each city said they were unconcerned about getting sick from bird flu. In Los Angeles, 28 percent were concerned about getting the disease compared to 15 percent in Wichita.

As to poultry consumption habits upon the hypothetical discovery of bird flu in the United States, 70 percent of Wichita respondents and 50 percent of Los Angeles respondents said their consumption levels would remain the same. In Los Angeles, 14.6 percent said they would stop consuming poultry while 7.8 percent of those in Wichita said they would do so.

Two versions of the survey were distributed with some including a statement that proper cooking would kill any bird flu virus in poultry, but the inclusion of that information had no effect on respondents' attitude toward whether their consumption habits would change.

"My reading of the numbers is that there will be a very minimal effect on demand."

"This suggests a limited ability for the industry to effectively reassure consumers in the event the disease is discovered in the United States," Fox said.

He noted that there are similarities between this survey and the one he sent to consumers in 2004 asking what they would do if more BSE cases were discovered.

"The evidence that we had suggested that those numbers greatly exaggerated what happened in the marketplace when those scenarios actually did play out," Fox said. "My reading of the numbers that we got here is that if we do find a case of avian flu in the United States that there will be a very minimal effect on demand."

Fox said the research didn't indicate how long a boycott of poultry would go on among people who cease buying the product, but he believed it wouldn't last long. He recalled that during the 2004 BSE situation the drop in domestic consumption of beef was short lived and that later in the year the demand bounced back to a stronger level than in the previous year. ■

ISU Team Seeks Blood Test... (Continued from page 1)

methods or manipulation of the guilty genes.

"*Salmonella* is present in more than half of U.S. swine herds. It results in more than \$100 million in annual production losses," Tuggle said. "But more importantly, what's driving this research is the food safety issue.

There are 1.4 million cases of salmonellosis in U.S. annually. Our results have the potential to not only decrease *Salmonella* contamination in pork, but also on sprouts, peppers or any other vegetable

The research results can potentially decrease Salmonella contamination in pork, sprouts, peppers or any other vegetable crop for which manure is used as fertilizer.

crop for which manure is used as fertilizer."

Preventing the occurrence or spread of *Salmonella* in swine herds through genetic selection is also a way to use less antibiotics in pork — addressing new regulations, consumer trends and decreased antibiotic effectiveness.

"It takes a collaborative effort to approach this," says Tuggle. "I work with animal scientists, statisticians, computer scientists and immunologists." ■

Global Harmonization Initiative...

(Continued from page 3)

Science and Technology. GHI is registered in Austria as a nonprofit organization and Lelieveld is based in The Netherlands. Lelieveld said GHI accepts money only from scientific organizations. Individual scientists are welcome to join the organization with no dues charged.

To meet its objectives, GHI holds meetings of member scientists to collect data and produce consensus proposals regarding food safety legislation. Such meetings have been held recently in the United States, The Netherlands, India, China, the Czech Republic, Hungary, Mexico, Turkey and South Africa.

"GHI has formulated approaches to critically reevaluate the scientific evidence used to support existing global regulations in the areas of product composition, processing operations and technologies or measures designed to prevent foodborne illness," the organization's website said. ■

Frontier Program Helps Students Understand Import Security and Food Safety

A group of Kansas State University undergraduate and graduate students received an exclusive look at border security during a field trip last fall to Washington and the Port of Baltimore.

Through the Frontier program, which is partially funded by the Food Safety Consortium, the students met with Department of Homeland Security officials who are responsible for making sure containers of food that come into the Baltimore port are safely and properly inspected.

The students also received career insight and valuable information for research projects with the Frontier program, a cooperative educational program between K-State and New Mexico State University that focuses on border security, food security and trade policy.

"Border cooperation and border security are complex matters," said K-State's Justin Kastner, co-director of the Frontier program and assistant professor of diagnostic medicine and pathobiology. "It's important that students be encouraged to develop the depth of insight regarding the complexity of those issues."

The field trip included 16 students from K-State, New Mexico State, the University of Minnesota, Michigan State University and the University of Arizona.

Seven students were K-State students who share an interest in issues related to food protection, food defense and border security.

"We want to give them opportunities, such as the field trip to Baltimore, to learn about the complexity of agriculture, the food system and international trade," Kastner said. "We want to learn how to help ensure the security of our food supply."

For many students, the weekend trip provided an opportunity to talk with government officials and gain insight for their research projects.

"It is surprising that there are so many people involved in port security," said K-State's Shweta Gopalakrishnan, a master's student in public health who is researching the significance of public-private partnerships in health and trade security. "The U.S. imports goods worth billions of dollars each year. Everybody should play their role and act properly to have a safe country."

Julianne Jensby, a senior in food science, was especially excited to see the Port of Baltimore after viewing a border

crossing at the U.S.-Mexico border last year with the Frontier program.

"It was interesting to compare and contrast how inspections are set up at a land crossing versus a seaport. There are differences based on the types of products that were imported to those places, and differences in infrastructures and cargo containers," said Jensby, who is studying how to secure borders against public

health threats and how governance can help prevent the spread of disease.

After the tour, some students attended Career Pathways, a Department of Homeland Security-sponsored weekend conference for students who received Career

Development grants. The conference offered career guidance and a chance for students to explore employment opportunities with the DHS.

"We take very seriously our mission as faculty and staff to provide as many interesting and meaningful learning opportunities as we can, and that's why we do the field trips for the Frontier students," Kastner said. ■

"We want to give them opportunities to learn about the complexity of agriculture, the food system and international trade."

Global Harmonization Initiative Pursues Impact on World Food Safety

An effort by an international organization seeks to influence food safety regulations around the world by pushing for a consensus on the science of food safety laws among the nations. The Global Harmonization Initiative has been working on the issue since 2004 and is looking

for support from food scientists across borders.

Huub Lelieveld, GHI president, said at a presentation in July at the Institute of Food Technologists in Chicago that GHI has established an ambassador program to engage scientists in Iran, Montenegro,

Russia and South Africa to translate scientific documents into accessible languages and serve as local leaders to provide resources and information.

GHI is a joint activity of the IFT and the European Federation of Food

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UA Center for Food Safety

Sirsat Examines *Salmonella's* Ability to Survive

If *Salmonella* Typhimurium is hurt, but not killed, by high temperatures when poultry is being cooked, the surviving pathogens might emerge strong enough to contribute to foodborne disease. That scenario became apparent from studies led by Sujata Sirsat, a food safety researcher in the University of Arkansas Division of Agriculture who earned a doctoral degree in poultry science with major adviser Steven C. Ricke in December after investigating the issue.

Sirsat, who worked on various research projects for the three-state Food Safety Consortium and the UA Center for Food Safety, found that using sublethal levels of heat on poultry affected particular genes in the bacterium. "The results indicated a role of physiological stress in *S. Typhimurium* in promoting microbial virulence and host cell vulnerability to infection," Sirsat said.

The pathogen's survival is aided by the stress that it endures, Sirsat explained. The genes that are crucial to the bacterium's survival are induced so that they thrive and strengthen *S. Typhimurium*.

Sirsat's experiments included a combination of two antimicrobials, lactic acid and lauric arignate, to determine what impact they would have on *S. Typhimurium* in poultry. No significant effect was detected, likely because of a lack of synergy when they each induce or repress certain genes within the pathogen. The key lesson is that food processors would need to screen potential antimicrobials to determine their likelihood of enabling a pathogen to resist them. Sirsat said future studies should be designed to explore the value of using other antimicrobials in combination with lactic acid and lauric arginate.

Ricke stated that molecular assays such as microarrays offer a potentially intriguing tool for broad spectrum screening to identify not only the best antimicrobial candidates for practical applications but perhaps how and when to apply them.

"A key to Sujata's research is that by using a microarray approach she could assess gene responses from the entire genome of *Salmonella* in a single step," Ricke said. "Generating data in such a comprehensive manner will hopefully get us much closer to a better understanding of pathogens in food environments and in turn increase our ability to limit the impact of these pathogens in food systems." ■



Sujata Sirsat



Erin Shannon

Shannon Probes Orange Derivatives to Fight *L. monocytogenes*

Both the bacteriocin nisin and a natural derivative from orange peels are known to inhibit the spread of *Listeria monocytogenes*. Combining them with the right technologies can serve as a natural alternative to chemically-based antimicrobials, according to research conducted by Erin Shannon in the University of Arkansas Division of Agriculture Center for Food Safety. Shannon investigated the topic and delivered a seminar presentation as part of her work toward the master of science degree in food science that she received in December.

The orange peel derivative is a natural antimicrobial known as cold pressed terpeneless Valencia oil (CPTVO). To evaluate its potential synergism with nisin, Shannon tested a sequential hurdle technique when combining the two antimicrobials. Hurdle technology generally uses combinations of different techniques to prevent the survival and regrowth of pathogens. Both nisin and CPTVO have similar targets for their inhibitive traits, including *L. monocytogenes*.

Shannon's work showed that not only does direct contact of the combined antimicrobials inhibit *L. monocytogenes*, but also that the exposure to CPTVO's vapors inhibits the pathogen. ■

Food processors would need to screen potential antimicrobials to determine their likelihood of enabling a pathogen to resist them.

Food Safety Digest

by Dave Edmark

The United States needs more veterinarians who are qualified to care for food animals. Ron DeHaven, CEO of the American Veterinary Medical Association, said only 8,500 of the nation's 61,000 veterinarians in private practice care for 9.4 billion head of livestock. The remainder are predominantly involved in pet care. Those numbers could threaten the nation's food supply, DeHaven said in remarks reported in *Food Safety News*.

DeHaven told a U.S. Senate committee last year what factors he believes are responsible for the shortage: veterinary student debt loads, non-competitive salaries, limited ability to increase the number of graduates and the population shift from rural to urban and suburban areas. Proposed solutions include reducing student debt for graduates who agree to work in regions with a shortage of food-animal veterinarians.

Reuters news service surveyed Americans to find out their thoughts on the safety of imported food. The survey got responses from 571 people with 81 percent of them saying they thought China had the poorest food safety oversight. Mexico was cited by 51 percent followed by Africa at 48 percent, South America at 27 percent and the United States at 11 percent.

Seventy-five percent listed China when asked to pick two regions from which they avoid buying food because of safety concerns. Africa was picked by 42 percent, Mexico by 41 percent and South America by 24 percent.

Seventy-nine percent said the United States needed more government oversight of food safety. Fifty percent said pesticides and hormones were their biggest concerns in food production with 49 percent most concerned about bacteria from food handling.

Phil Lempert, editor of SupermarketGuru.com that conducted the survey for Reuters, said he didn't expect higher prices for domestic food would drive shoppers to buy cheaper foods from other countries instead. "Safety is No. 1," he said.



In Germany, dioxin-contaminated eggs became the source of a food safety crisis in December. *Time* magazine reported that the dioxin was first found in animal feed and then in eggs on several farms. The German government said the contamination levels weren't high enough to pose a threat to human health. By January other countries removed food products such as cakes and quiches that contained eggs from Germany. German officials halted sales of eggs, poultry and pork from 4,700 farms.

Time said German law does not require animal-feed manufacturers to perform tests for dioxin, prompting consumer advocacy groups to call for new food safety legislation. Organic eggs have become popular because the animal feed in the dioxin case is not used in organic farming, but 20 percent of the respondents to a survey said they were abandoning eggs entirely.



A packaging material with silver nanoparticles could possibly preserve food by protecting against bacteria that cause spoilage. The American Chemical Society announced in January that scientists in Israel's Bar-Ilan University have been researching the potential for silver nanoparticles as germ-fighting coatings for plastics, fabrics and metals. The development could overcome antibiotic resistance of bacteria and serve as an alternative to food preservations methods such as radiation, heat treatment and low-temperature storage, according to United Press International. ■

Papers & Presentations

Catherine Strohbehn, Iowa State, delivered a presentation on "Consumer Concerns and Retail Foodservice Standards and Regulations" in November to a delegation of Cochran Fellows at the ISU campus. She was also interviewed in November by the BBC website "Travelwise" for an article on how to eat healthy on the road and in October by the *Toronto Star* for an article on why local restaurant food is more expensive. Also in October, she was interviewed by KCCI-TV in Des Moines about the levels of bacteria found on cell phones.

Justin Kastner, Kansas State, has edited a book, *Food and Agriculture Security, An Historical, Multidisciplinary Approach*, published by Praeger. Other authors are **Jason Ackleson** of New Mexico State University, a co-director with Kastner of the Frontier program, and K-State Frontier students **Kathryn Krusemark**, **Edward Nyambok** and **Cobus Block**. The book is a multidisciplinary explanation of the complexities of the food system in the United States and around the world, spanning the beginning of the modern era to today's globalized, interconnected market. The book examines the food system in its entirety, discusses threats to food and agriculture security in America and abroad, and covers trade policy issues and U.S.-specific regulations affecting the food supply chain security. Emerging models of cross-border cooperation in food and agriculture security are also described. ■