The Food Safety Consortium Newsletter
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Pushing the Border Back as a Food Safety Strategy

Securing the borders is one way of insuring the safety of food imported from other nations, but border management among trading nations also means finding ways to push the border back.

"The border is important as a physical space, but the best way to secure the border is to focus on countries' regulatory systems and harmonize them," explained Justin Kastner, assistant professor of food safety and security at Kansas State University. Kastner's research has found that targeting specific geographical regions within nations is one way of streamlining trade between nations where food safety issues might otherwise cause problems.

Kastner, who has explored the issue for the Food Safety Consortium and has collaborated with Jason Ackleson, an associate professor of government at New Mexico State University, noted that food safety and food security regulators will continue to monitor what crosses the border. But the U.S. border strategy will go beyond that.

Justin Kastner

In North America, the Security and Prosperity Partnership (SPP) Agreement among the United States, Canada and Mexico serves as a mechanism to encourage the three countries to harmonize their systems as much as possible so problems at the border are reduced. An example of that approach is in the Mexican state of Chihuahua, which also shows how regionalization of trade issues affects food safety.

Chihuahua exports about a million cattle a year to the United States. With such a large import of animals comes health and food security concerns for the United States.

"Some of these are animal diseases such as bovine tuberculosis," Kastner

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Ricke Named to National Academy of Sciences Committee for Food Safety Review

Steven C. Ricke, the director of the Center for Food Safety at the University of Arkansas System's Division of Agriculture, has been appointed to serve on a National Academy of Sciences committee that will review how the federal Food Safety Inspection Service examines meat processing plants.

Steven C. Ricke

Ricke, who in 2005 became the first person to hold the Donald "Buddy" Wray Chair in Food Safety at the university, will serve on the Standing Committee on the Use of Public Health Data in FSIS Food Safety Programs. The 29-member committee is comprised of prominent food safety scientists from universities, institutes, organizations, industry and government agencies.

The committee members and others with expertise will examine how data gathered by FSIS, an agency within the U.S. Department of Agriculture, is used to support risk-based food inspections. The committee will review the methods that FSIS uses to assess to what extent certain processing plants' meat products may be at risk of contamination.

"Our committee will meet twice a year and review past studies and the progress of current studies," Ricke said. "We will also be briefed by agency personnel and will identify emerging issues that FSIS may wish to have addressed."

Ricke is a professor in the food science and poultry science departments in the UA System's Division of Agriculture. The bacterium *Salmonella* Enteritidis has been the major focus of Ricke's research. His research team recently reported findings that led to dietary changes for laying hens to prevent *Salmonella* Enteritidis infection during molting, a periodic shedding of feathers.

Ricke received his B.S. degree in

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Pushing the Border Back… *continued*

said. "We are concerned about how we can ensure that cattle imported from that region are healthy. The state of Chihuahua is economically invested in trading with us, and they have an economic interest in maintaining high levels of animal health."

The result is that the United States will follow a targeted policy when deciding what to import from Mexico. "For example, we will import with regards to certain animals and certain diseases from particular sub-national regions in Mexico, but not other regions in Mexico," Kastner said. "That's a principle called regionalization, a concept we believe works for large countries. In the SPP agreement, the spirit is to allow such concepts as regionalization to be implemented."

> *'The best way to secure the border is to focus on countries' regulatory systems and harmonize them.'*

Kastner noted that as the United States begins a new presidential administration, some scholars speculate that the SPP's spirit will continue, but re-emerge in a different policy form.

Using regionalization, the United States has some leverage that gives Chihuahua some incentive to make sure its cattle meet U.S. standards. "Were it not for the economic stakes, it is doubtful that this state in northern Mexico would put forth the regulatory effort to ensure, for example, that animals from certain areas are not transported and offloaded into other areas," Kastner said.

Geographic proximity itself is enough incentive to encourage U.S.-Mexico trade. Some previous global trade negotiations have failed, which has led to a greater emphasis on encouraging regional economic growth.

"So for us as a country to be competitive we need to be regionally competitive, which means we need to be more efficient on a regional basis, which means we need to be integrated with Canada and Mexico," Kastner said. "We're much more harmonized with Canada than with Mexico. But by using such concepts as regionalization, we can concentrate on a region of Mexico."

Regionalization also works to ensure food safety efforts are followed within other nations. The Guangdong region of China exports food to Hong Kong, where the private importers insist on higher levels of safety and quality than the government would ordinarily enforce. Private supply chain audits and standards are raising the quality of food that Hong Kong receives. It's a lesson the United States can follow.

"That shows that even in China there are private interests working to raise food safety levels, but it remains to be seen if that's going to help clean up China's food safety problems," Kastner said. "We in the United States import from China, so we need to figure out how can we get some of those private economic incentives to work in our favor. We are now placing U.S. Food and Drug Administration inspectors in the Chinese regulatory infrastructure."

Kastner said China is not likely to develop a robust and error-proof food safety system at the national level, and the demands of Hong Kong's private supply chains won't likely rid Guangdong of all its food safety problems. But the private audits and market forces can still raise standards in key regions. ■

Ricke Named… *continued*

animal science in 1979, an M.S. degree in ruminant nutrition in 1982 from the University of Illinois and his Ph.D. degree in 1989 from the University of Wisconsin with a co-major in animal science and bacteriology. From 1989 to 1992 Ricke was a USDA-ARS postdoctorate in the Microbiology Department at North Carolina State University. He was at Texas A&M University for 13 years and was a professor in the Poultry Science Department with joint appointments on the food science and technology, molecular and environmental plant sciences and nutrition faculties and the Veterinary Pathobiology Department.

He received the Poultry Science Association Research Award in 1999 for outstanding research published in the previous year and received the American Egg Board award in 2006. He has also been honored with an appointment in 2002 as a Texas Agricultural Experiment Station Faculty Fellow for outstanding research accomplishments.

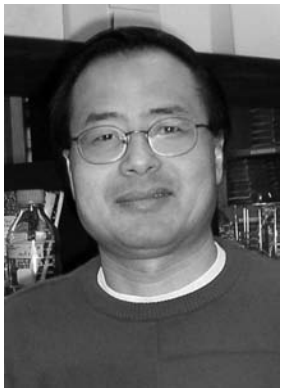
He also has academic appointments in both the UA Poultry Science Department and the Food Science Department and is a faculty member of the Cellular and Molecular Graduate program. He is currently serving as an editorial board member of several journals and is editor-in-chief of the international journal, *Bioresource Technology*. He has published 56 review articles and book chapters, 200 original research papers and given 68 invited talks. ■

ISU *Campylobacter* Research Looks for Antibiotic Resistance

Antibiotics are common tools for fighting pathogenic bacteria in swine production. Iowa State University researchers have found that certain antibiotics encounter more resistance from *Campylobacter coli* than other antibiotics, with some variation of resistance levels between farms. Researchers are still looking for more clues to determine the significance of the variations.

"If we can eventually figure out what the actual risk factors are associated with resistance we'll be able to manage that and reduce the risk," said Qijing Zhang, an ISU professor of veterinary microbiology who managed the project for the Food Safety Consortium.

Zhang's team, in collaboration with Irene Wesley at the U.S. Department of Agriculture National Animal Disease Center, gathered *C. coli* isolates from different production stages at two Iowa swine farms and tested their ability to resist five different antibiotics. The pathogens were unable to resist two antibiotics — gentamicin and meropenem — but there were varying levels of resistance to three other antibiotics.



Qijing Zhang

Those three antibiotics' abilities to stave off *C. coli* varied among each other and between the farms. The levels ranged from 65 percent of *C. coli* isolates on one farm resisting one antibiotic to 7.3 percent on the other farm. The antibiotic doxycycline encountered the most resistance, with the antibiotics erythromcin and ciprofloxacin encountering lower resistance rates.

"Two of the three antibiotics to which we noticed *Campylobacter* developed a resistance were those that are used fairly often in swine production," Zhang said.

The researchers also noticed that *Campylobacter* is prevalent within both swine and poultry production systems. "That has nothing to do with the production management," Zhang noted. "It's just that *Campylobacter* is naturally associated with swine and poultry."

The ISU researchers are considering following with another phase of research into the subject. "We're not going to abandon this project," Zhang said. "This is a long-term interest for our research." ■

Food Safety Blogs Become Key Way to Reach New Generation

The growing presence of blogs make the new form of media a key way to inform consumers about safe food practices and to reduce the incidence of foodborne illnesses, according to a Kansas State University food scientist.

K-State's Doug Powell, associate professor of diagnostic medicine and pathobiology, is a co-author of the article "New Media for Communicating Food Safety" in the January issue of *Food Technology*, which is published by the Institute of Food Technologists.

In the article, Powell and the other researchers describe how methods of informing consumers must evolve to fit a new generation of food handlers.

Blogs have become a common form of communication, and this is especially true for people born between 1977 and 1997 who grew up using the Internet, according to Powell. In addition, after the produce outbreaks in 2006, there was an upsurge of food safety news on the Internet, and consumers have continued to return to the Internet for information on food safety, he said.

Blogs on food safety are an innovative way to communicate with today's food handlers, Powell said.

"It is especially important to reach younger individuals, who at some point might handle food in a food service business and who get their information from nontraditional media like blogs," he said.

One such blog is Powell's Barfblog.com, a site that receives more than 5,000 visitors daily. The site operates with the understanding that to compel audiences to change their food-handling behaviors, the messages should be rapid, reliable, relevant and repeated, Powell said. The blog is available at http://www.barfblog.com.

The content combines pop culture references and current events with food-handling information to engage readers. The posts also combine food safety messages with personal experiences, which connect readers to the effects of foodborne illness on families and communities, he said.

"Up to 30 percent of all Americans will get sick from the food and water they consume each year. That's just way too many sick people," Powell said. "The site is all about providing information in

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UA Researcher Receives NRI Fellowship to Study Gene Regulation in Foodborne *Salmonella*

A research project at the University of Arkansas System's Division of Agriculture will explore new ways to reduce *Salmonella* contamination of poultry. The study will examine how effective certain antimicrobial treatments are in mitigating *Salmonella* and also conduct a genetic analysis of the *Salmonella* that survive the treatments.

Sara Milillo has received a two-year National Research Initiative postdoctoral fellowship grant for $113, 383 from the U.S. Department of Agriculture. Milillo, a post-doctoral research associate at the UA Center for Food Safety, is under the supervision of Steven Ricke, the UA Center for Food Safety director who also holds the Wray Endowed Chair in Food Science.

"Though this is an experimental system, the results could be adapted for use in poultry processing," Milillo said. "This future use could provide much needed insight into the gene regulation of *Salmonella* existing on chicken surfaces."

Upon completion of the project, the researchers will develop strategies to use safe antimicrobial treatments to further reduce foodborne pathogens on poultry. Previous research has shown that injured foodborne pathogens can actually become more virulent after surviving attempts to reduce their levels through the use of antimicrobial treatments. This project's efforts will be aimed at determining the treatments' effects on *Salmonella* virulence gene expression.

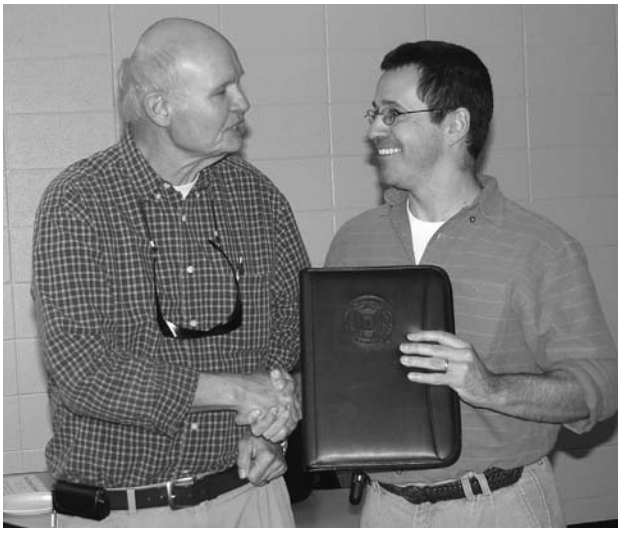
The results are expected to develop a safe and mild antimicrobial treatment that can reduce *Salmonella* on poultry in addition to establishing a method for determining *Salmonella's* genetic response to stresses from various combinations of antimicrobial treatments.

"This research will be beneficial long term to the food safety research community in establishing a system for evaluation of new antimicrobial treatments for safety and effectiveness on a genetic basis," Milillo said. ■

Seeking a Better Understanding of Pathogens' Pathways

The problem with *Listeria monocytogenes* is how much of it gets into people's digestive systems.

"Everyone gets exposed, but few people get sick," explained Martin Wiedmann of Cornell University during a seminar in October at the University of Arkansas. *L. monocytogenes* is widespread and each person is likely to ingest between 1 million and 1 billion of the bacterium a year. Those who ingest too much are the ones who become ill, Wiedmann said. The majority of listeriosis outbreaks come from contaminated deli meats.



Michael Johnson (left), University of Arkansas professor of food science, presents a planner to Martin Wiedmann of the Cornell University food science faculty following his presentation to a seminar at the UA.

Wiedemann is an associate professor of food science at Cornell where he also serves as his department's graduate studies director. He spoke to a UA food science seminar on molecular studies of the transmission of *L. monocytogenes*.

"Our overall goal is to generate an improved understanding of the transmission of foodborne bacterial pathogens from farm animals and from foods to humans," Wiedmann said of his Cornell laboratory's work. "A better understanding of the transmission pathways of foodborne pathogens is nec-

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Seeking… *continued*

essary to design better strategies to prevent and control human disease. Both basic and applied research work in our lab is thus targeted towards developing the scientific knowledge necessary to improve our ability to prevent foodborne diseases."

Specifically, Wiedmann's research seeks to understand the differences among the abilities of strains of *L. monocytogenes* to cause disease in humans and animals. His team's work also explores the role of stress response systems in the pathogen's ability to survive in foods and cause disease. Other objectives in Wiedmann's lab include better understanding of the evolution of *L. monocytogenes*' virulence and of *Salmonella's* ecology transmission.

Wiedmann noted his research team collaborates frequently with other institutions and agencies. One example was a project with the New York State Department of Health on molecular fingerprinting of *L. monocytogenes*.

"Our research group recently contributed to the detection of a large multistate outbreak of human listeriosis cases which was ultimately linked to consumption of contaminated hot dogs and deli meats," Wiedmann said. ■

Grad Student Represents UA Center at Conference in India

Less than a semester into beginning his career as a University of Arkansas graduate student in food science, Sean Pendleton of Fayetteville was asked to take on an assignment usually reserved for faculty or more experienced graduate students. He went to India to present a scientific paper at an international conference of researchers.

Sean Pendleton

"We needed to send someone from our department to report on our research. Sean knew the material and was ready for the job," said Steven C. Ricke, director of the Center for Food Safety in the UA System's Division of Agriculture. Pendleton is a graduate research assistant at the CFS.

Ricke thanked Lalit Verma, interim dean of the Dale Bumpers College of Agricultural, Food and Life Sciences, for providing logistical support and advice that enabled Pendleton to complete the requirements for obtaining the Indian visa necessary to participate in the conference.

Pendleton, a 2004 gradate of Fayetteville High School who received a bachelor of science degree in biochemistry from the U of A in 2008, attended two events meeting simultaneously in November in Hyderabad, India: the International Conference on Bioprocesses in Food Industries and the Convention of the Biotech Research Society.

Pendleton presented a research paper on systematic approaches for reducing *Salmonella* in organic and all natural poultry products in the United States. The paper's main authors were three food science professors — Ricke, Navam Hettiarachchy and Philip Crandall — and two postdoctoral associates, Corliss O'Bryan and Satchi Eswaranandam.

"I delivered the paper, and the audience asked me some good questions when it was over," Pendleton said. "It went well."

Pendleton is pursuing a master of science degree in food science and hopes to earn a doctoral degree next. His career goal is to work for the federal Centers for Disease Control. ■

KSU Gets Nod as National Animal Health Lab Site

Kansas State University was selected in December as the site for the relocation of a federal animal health laboratory. The National Bio and Agro-Defense Facility, known as NBAF, will be located adjacent to the K-State campus, bringing hundreds of animal health researchers with it.

"This might very well be the most important thing that has happened to Kansas State University in the entire history of the university," said K-State President Jon Wefald. "Never before in the history of Kansas has a national federal laboratory of this magnitude been sited in the state. We are talking about a half-billion dollar animal health facility that will be the finest laboratory of its kind in the entire world. After all, there will be hundreds of world-class scientists doing research in this facility."

K-State has more than 150 of its own faculty and staff active in the food safety and animal health arenas. Since 1999, K-State has dedicated more than $70 million to related research. K-State's expertise in animal health has a huge impact on human health as well. Many of K-State's researchers focus on zoonotic diseases — that is, diseases that can be transmitted between humans and other animals.

K-State claims nationally prominent medical defense researchers and veterinarians Jerry Jaax and Nancy Jaax. Jerry Jaax is K-State's associate vice president for research compliance and university veterinarian; Nancy Jaax is special projects officer for University Research Compliance. They were key participants in dealing with the 1989 Reston Ebola outbreak. The outbreak was detailed in Richard Preston's best-selling book, *The Hot Zone*.

Bringing renowned researchers from across the world to campus is not unusual. Juergen Richt is Regents Distinguished Professor of diagnostic medicine/pathobiology and Kansas Bioscience Authority Eminent Scholar at K-State. In November he was host of an Emerging Infections Symposium that brought nearly 150 researchers from around the world to K-State from across North America, Europe, Asia and the Middle East.

As the U.S. Department of Homeland Security weighed five other sites for the location of the new federal laboratory, Ron Trewyn, K-State's vice president for research, led the effort to secure NBAF. He emphasized K-State's research while coordinating outreach efforts with the Kansas Bioscience Authority, as well as with the Midwest Research Institute and the Kansas City Area Life Sciences Institute. Trewyn and the K-State team worked with Tom Thornton and his staff at the Kansas Bioscience Authority to coordinate collaborative efforts with multiple states and universities.

Wefald said that having NBAF near K-State will boost all sciences across campus.

"This facility will not only ratchet up all of the biosciences and all of the sciences in the Colleges of Veterinary Medicine, Agriculture, Human Ecology, Arts and Sciences and Engineering, but it also will definitely accelerate K-State's progress in terms of having the greatest food safety and security and animal health programs anywhere in the world," he said.

"In short, this decision will extraordinarily enhance K-State's standing as one of America's great research universities." ■

Papers & Presentations

Curtis Kastner, Kansas State, moderated a panel on "Food Defense Educational Programs: Status, Focus and Future" at the International Association for Food Protection annual meeting in August in Columbus. ■

Food Safety Blogs... *continued*

a compelling manner, using pop culture and different languages, to ultimately have fewer sick people."

The other authors of the article include: Amy Hubbell, K-State assistant professor of modern languages; Casey Jacob, K-State research assistant in diagnostic medicine and pathobiology; and Benjamin Chapman, food safety extension specialist at North Carolina State University. ■

When the Educators Speak, the Public Needs to Listen

Food safety education is better than ever before, as Christine Bruhn says, and more information is available to tell people what they need to know. But educators such as Bruhn must wonder on some days if anyone is paying attention.

"People consider themselves invincible — foodborne illness doesn't happen to me," said Bruhn, the director of the Center for Consumer Research at the University of California-Davis. "They think safe handling doesn't matter. 'My grandmother did it this way.'"

Bruhn, who spoke on the subject at the Institute of Food Technologists annual meeting in July in New Orleans, told about a survey conducted on the National Mall in Washington. The questioners found that more than 80 percent said they know what they're doing and that they don't need any more food safety information. The problem, Bruhn said, is that further investigation reveals they don't know the details of the information they think they know.

> *They don't know the details of the information they think they know.*

For example, ground meat needs to be cooked to an internal center point temperature of 160 degrees Fahrenheit to be considered safely done. Bruhn's survey found that only 29 percent used a meat thermometer, meaning the other 71 percent were guessing or using unreliable means such as looking to see if the food appeared to be done.

"One out of four burgers will turn brown before it has reached the appropriate temperature," Bruhn said. Conversely, sometimes a burger that still appears to be slightly pink in the center has actually reached the 160-degree mark. A thermometer provides the only way to know for sure.

"We have also found that many people don't know how to store leftovers. So the temperature quickly leaves the danger area," she said. "It's very common for people to put the big pot of stew, the huge casserole or the big pot of chili in the refrigerator."

The "danger zone" that Bruhn mentioned means that cooked foods must be refrigerated within two hours, or one hour on a hot day. Bacteria will grow on food while it's exposed to a temperature range from 40 to 140 degrees F, so it's important that the food be refrigerated under 40 degrees as soon as possible. Once refrigerated, those leftovers should be eaten within three to five days.

Bruhn emphasized that the leftovers should be kept in relatively thin containers that will accommodate chilling. She has demonstrated this to consumers by placing leftovers in a 2-inch-thick container and putting it in a refrigerator. Every 20 minutes, she would have a person in one of her training sessions measure its temperature.

"It illustrates that if you put something in a big pot, you're going to be in a danger zone for many hours," Bruhn said. "But if you put it in a thin container and you stack it so the air flows around it, you're going to be out of the danger zone relatively quick."

Bruhn's center at UC-Davis trains people who serve food to special audiences such as seniors, youth groups or community organizations. The servers may not realize that groups such as pregnant women and people with diabetes are at increased risk.

Bruhn finds there is still much work to be done among the public.

"People still don't know all the details and we're still making a drop-in-the-bucket contribution," she said. "They don't follow all the recommendations, even those who are at the most risk. Education alone is not sufficient. We still need to focus on making products that we are consuming to be either raw or fully cooked. We have to bring them to a higher level of safety through our care in production, processing, handling and distribution." ■

Food Safety Digest… *continued*

authority and not wait for Congress to grant specific authority for FDA to do so. It also said there needs to be reform in the public health system to improve coordinated responses to outbreaks. It also advocated improving risk communication plans, noting there were "dueling" public health messages from various agencies that announced last summer's outbreak. ■

Food Safety Digest

by Dave Edmark

IBM released a study in December that shows concern over food safety among the Chinese has risen in the past two years. Dow Jones Newspapers reported that the study by IBM's Institute for Business Value revealed 65 percent of Chinese consumers are distrustful of food manufacturers during recalls and 59 percent don't trust retailers. Chinese milk has recently been the subject of a controversy over tainted products, which prompted the government to announce a four-month food safety campaign aimed at illegal or excessive chemicals in food.

IBM said Chinese companies should build trust in their brands by making products traceable, and non-Chinese companies that use materials imported from China should also be more transparent.

■ ■ ■

Slaughterhouses in Ontario aren't doing enough to make sure they are in compliance with food safety laws, the province's government said in a recent report. According to the Canadian Press, Ontario Auditor General Jim McCarter said half of the province's abattoirs and free-standing meat processors were not in compliance with at least 10 percent of standards regulating them.

McCarter also found that several of Ontario's dairy processing plants need to improve their sanitation procedures. Four plants had bacterial levels exceeding the limits, but there was no threat to health. In other cases, McCarter found that some plants' licenses were renewed before their inspections were completed.

McCarter recommended stronger legislation to give the province greater authority to enforce food safety for fruits and vegetables. For produce, he said, the province currently can do little more than educate producers how to prevent high levels of chemicals and contaminants.

■ ■ ■

The Food and Drug Administration defended its food safety record in a report released in December. David Acheson, FDA's assistant commissioner for food protection, said its new worldwide focus was a major development.

"Another big success is the strategic change we are making with regard to imports," Acheson said in *U.S. News and World Report*. "What you could call the 'globalization of FDA,' which is shifting our emphasis on inspection on the port of entry only to more of a product-life cycle approach. We are focused on building the systems to better understand what's going on in foreign manufacturing."

FDA cited its plans to open offices staffed with its inspectors in China, India, Europe, Latin America and the Middle East. It also noted its recent meetings with Chinese officials to discuss global food safety issues, its plan to hire an international notification coordinator who will be a liaison between FDA and other nations and its approval of irradiation of iceberg lettuce and spinach.

The agency also said it has hired two people to improve its response to emergencies involving animal feed and it has reached agreements with six states to create rapid response teams for foodborne illness outbreaks.

FDA still has its critics. Patty Lovera, assistant director of Food and Water Watch, told *U.S. News* she thought FDA was too reliant on industry and not regulating enough. "There is not an overall commitment to enforcement domestically or abroad," she said.

■ ■ ■

A study by the Produce Safety Project at the Pew Charitable Trusts has criticized government's response to the *Salmonella* Saintpaul outbreak in raw tomatoes in the summer of 2008. The outbreak caused more than 1,400 people to become ill.

The report called for the Food and Drug Administration to establish mandatory and enforceable safety standards for fresh produce through its existing

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