

# The Food Safety Consortium Newsletter

University of Arkansas, Iowa State University and Kansas State University • Vol. 18, No. 1 • Winter 2008

## Quick Analysis of Transport Can Save Problems at Processing Plants

The slaughterhouse's holding pen — known also as lairage — is the end of the line for hogs on their way through the food chain. It can also be the beginning of the line for the spread of pathogenic *Salmonella* if processors don't take note of whether incoming hogs are bringing the bacteria with them or developing it at the lairage.

The key is finding out early enough in the process at the lairage. That has led Food Safety Consortium researchers at Iowa State University to look for a way to determine within a few hours whether transport vehicles or lairage facilities have a minimal infective dose of *Salmonella*.

They are trying to do so by using a polymerase chain reaction (PCR), a technique for amplifying specific fragments of DNA sequences for ready laboratory analysis.

"We can get a sample in, and we use our PCR kit on it," explained Stephen Gaul, an ISU researcher who assisted D.L. (Hank) Harris, professor of animal sciences. "It takes about two hours to do the extractions, depending on how many samples we do at one time. Then running the PCR is another four hours."



Stephen Gaul

About six hours after the sample was obtained, Gaul said, "you'd know if it's positive for *Salmonella* and, hopefully, with the standard controls in there you can find out exactly how much there is in that fecal sample."

Once the results would be known, lairage operators would have time to implement sanitation procedures that would bring any *Salmonella* infection levels down to minimal

*Continued on page 2*

## KSU Examines Animal Antibiotic Resistance, Possible Human Link

It's bad enough when pathogenic bacteria work their way into the animal food supply. Here's a related problem that has recently attracted scientists' attention: some of the pathogens may become resistant to the antimicrobials that are used to fight animal disease, and that might lead to more human resistance to the benefits of antibiotics.

"We're speculating that there may be a possibility of a link," said Daniel Fung, a food science professor at Kansas State University who led research into the question for the Food Safety Consortium. "We are looking at it from the food scientist's standpoint. The resistant cultures may get into the food supply

and may get into human beings. But those are speculations only."

The work was done by Maggie Hanfelt and Mindi Russell under the direction of Fung and KSU College of Veterinary Medicine professionals.

Fung's research group targeted lagoons in Midwestern cattle feedlots because of concern over antimicrobial-resistant microbes being transferred into the food supply through water sources. In the feedlots, Fung explained, antimicrobials are used to treat sick food-producing animals such as cattle, poultry and swine. Antimicrobials are also used to prevent disease and to promote growth.

The drawback, Fung said, is that the use of antibiotics as growth promoters appears to create large reservoirs of resistance to antibiotics in animals. That resistance could be transferred to humans who consume the food from those animals.

The KSU group looked at two types of feedlots: natural feedlots, which don't use antimicrobials in the cattle, and commercial feedlots, which use the antibiotics. Tests in the feedlots' lagoon water were conducted to measure the presence of *E. coli* and *Enterobacter*. The results consistently showed that the pathogens were more prevalent in the

*Continued on page 2*

*Quick Analysis of Transport... continued*

level, if necessary.

Few studies have been conducted in transport vehicles to determine whether current steps are sufficiently reducing infectious diseases in pigs. Those that have been done indicated that the level of *Salmonella* in cleaned and disinfected transport vehicles is below the level necessary to infect pigs.

The ISU study concentrated on the slaughter plants' holding pens. Prelimi-

*Lairage operators would have time to implement sanitation procedures that would bring any Salmonella infection levels down to minimal level.*

nary samples of pens in one slaughter plant suggested that the plant's pro-

cedures reduced the transmission of *Salmonella* between different groups of incoming pigs. That could result in a reduction of contaminated carcasses.

Subsequent work will seek to find out if samples from another slaughter plant show effective results in reducing *Salmonella* in its holding pens. Those samples would be compared with the results from the first plant to help make the determination. ■

*KSU Examines... continued*

feedlot lagoons where the antibiotics were used.

Fung emphasized that the study is a preliminary one that raises questions. Veterinary medicine researchers are also interested in the situation and are starting to study gene pools and to track the resistant genes in the environment.

The studies of the lagoons showed that although those feedlots using antibiotics had higher rates of resistance to pathogenic bacteria, the natural feedlots still recorded instances of resistance. That's not unexpected, Fung said.

"That may be because of the naturally resistant organisms already in the environment anyway," Fung said. "They would have some antibiotic resistance because of the organisms around the environment."

Because antibiotics are used in the commercial feedlots, Fung said, it is reasonable to conclude that they would have more antibiotic-resistant cultures than the natural feedlots. But natural feedlots also use antibiotics when animals become ill.

*The use of antibiotics as growth promoters appears to create large reservoirs of resistance to antibiotics in animals. That resistance could be transferred to humans who consume the food from those animals.*



*Daniel Fung*

"The vet school will do a lot more on this subject," Fung said. "If we find out something really interesting that can relate to food safety directly, then we'll do some more work."

In any case, it's still important to find the answers because of the implications for antibiotic resistance in humans, Fung said.

"If humans receive antimicrobial cultures in their system and if they're sick from something, then the antibiotics will not be able to treat human beings. There are many antimicrobials in cultures in hospitals and places like that. And there aren't too many antibiotics discovered in the past 20 years." ■

# Probiotics: Live Organisms as Feed Supplements to Fight *Salmonella*

Here's a new way to reduce *Salmonella* in poultry before they go to the processing plant: use probiotics instead of antibiotics for treatment of the birds.

It's been a complex path getting to this point, and the procedure still raises some other issues to be considered. Still, the development offers a way that makes it easy on poultry growers and enhances food safety.

It's a matter of incorporating the probiotic into either the water or the feed for the poultry, explained Billy Hargis, director of the Poultry Health Research Laboratory at the University of Arkansas System's Division of Agriculture. Results from experiments show that administration of the probiotic can reduce *Salmonella* in either meat-type chicken houses or turkey houses before being transported to the processing plant and reduce the risk of cross contamination among turkeys at the plant.

"It's not a chemical. It's not a drug," explained Hargis, who has pursued the research for the Food Safety Consortium. "These (probiotics) are live organisms."

The term for the probiotic developed in Hargis' lab is FM-B11, also known as a defined lactic acid bacterial culture. Defined cultures eliminate the risk of pathogenic organisms existing within the culture, clearing the way for their effective use in stopping *Salmonella* in commercial poultry.

"Another advantage is that we're talking about organisms that can be produced very cheaply, which keeps the costs of these treatments very low," Hargis said. That's partly because the defined cultures from which the probiotics come are tolerant of oxygen, avoiding the high cost of fermenting undefined cultures that can't grow in the presence of oxygen.

Antibiotics have long been popular among poultry producers seeking to keep their birds healthy and to promote the birds' growth. Pathogenic bacteria that are harmful to humans are increasing the bacteria's ability to resist antibiotics, but pathogens that can cause animal disease have not built up as much resistance.

"The risk factor for antibiotic resistance from food-producing animals is exceedingly low," Hargis said. But the issue of antibiotic resistance is still becoming a driving force that's making antibiotics usage for animals less popular, and poultry producers are under pressure to use fewer antibiotics. Alternatives are necessary.

Probiotics enter the picture as live organisms that serve as microbial feed supplements for animals to improve their intestinal microbial balance. Hargis' research group has taken the lactobacillus probiotic, a form of milk bacteria found in the bird, and added it to poultry water or feed.

More recent efforts are directed toward beneficial bacteria from a totally different genus called *Bacillus*. During the last year, a substantial laboratory effort has been directed toward identification of organisms of this genus that are harmless to the animals or humans, which inhibit certain pathogenic organisms, and which can produce spores that are resistant to heating or storage. The important part of these new efforts is to develop effective probiotics that can be added to feed, which greatly reduces costs associated with delivery in the drinking water at the farm.

"We can add these to the feed even



Billy Hargis

before pelleting," Hargis said. "The beneficial bacteria in the feed have tremendous advantages because now we can talk about continuous administration over time. It makes it very simple. It just comes in with the feed."

Replacing antibiotics with probiotics has definite advantages, but there is some tradeoff. Hargis noted that although animal foods

won't be populated with antibiotic-resistant bacteria, the lack of antibiotics means producers will need to find other ways to promote their birds' growth. That means giving more feed to the birds to accomplish the task.

"It's going to take more feed to raise the same amount of meat," Hargis said. "So that means more land has to be involved in row crop production. There's an effect on the world's small grain supply because we'll be putting more small grains into the same amount of meat than we were before." Meanwhile, the price of grain is already going up to meet demand for biofuels, so the price of meats produced from small grains will also rise.

But the advantages offered by probiotics indicate where the future may be. Hargis cited the new probiotic candidate's stability even in the presence of the heat generated when feed is being turned into pellets and its overall environmental stability. The major plus is its usage in the feed itself, which makes it part of an ongoing process.

"We're using it to prevent problems continuously as opposed to treating problems when they occur," Hargis said. ■

# USDA Web Portal Offers Big Food Safety Benefits for Small Food Processors

The U.S. Department of Agriculture has unveiled a new Internet resource to help smaller companies answer food safety questions and help food processors make science-based food production decisions. The portal, available at <http://www.ars.usda.gov/naa/errc/mfsru/portal>, is one of the most comprehensive decision support tools available.

“Scientists, food safety risk managers, researchers and government decision-makers can use this access to predictive modeling tools and food microbiology information,” said Agricultural Research Service Administrator Edward B. Knipping. “The portal is geared towards small and very small processors, but the information it contains will benefit companies of all sizes.”

“This partnership builds on our extensive efforts to provide more resources and better tools to the small and very small plants so they can enhance the safety of their products,” said Al Almanza, administrator of USDA’s Food Safety and Inspection Service (FSIS).

The Predictive Microbiology Information Portal (PMIP) was developed by scientists with USDA’s Agricultural Research Service (ARS) at Wyndmoor, Pa., working with colleagues at FSIS, Rutgers University and Decisionalysis Risk Consultants, Inc., in Canada. FSIS will also provide a link to the portal to facilitate access by the meat and poultry industry, especially small and very small plants.

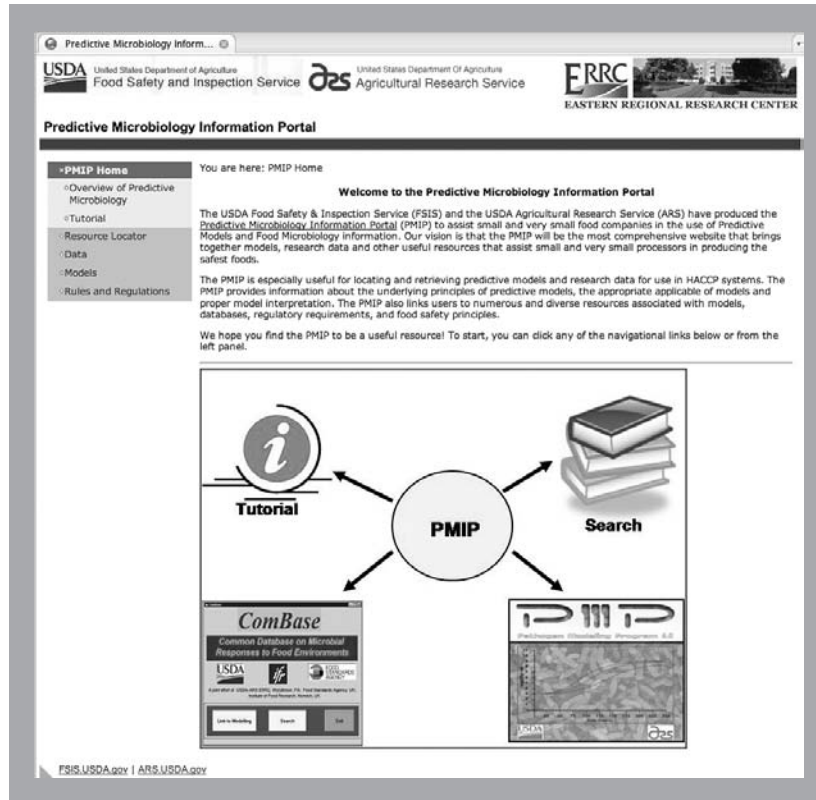
PMIP focuses on processors with 500 or fewer employees, but the information it contains can benefit companies of all sizes. ARS microbiologist Vijay K. Juneja and his ARS and

FSIS colleagues met with many industry members to tailor the Web portal to their diverse needs in providing safe and wholesome products to consumers.

Currently, PMIP offers information on research, regulations and resources related to *Listeria monocytogenes* in ready-to-eat foods, the prototype identified for the project by FSIS. In the coming months, it will be expanded to include other pathogen and food combinations. A searchable database allows users to find information that can also be used by food processors to develop plans for Hazard Analysis and Critical Control Point, to ensure the safety of food processes.

The Web portal also includes a tutorial section with instructions on using and interpreting predictive models and links users directly to the ARS Pathogen Modeling Program and ComBase. The Pathogen Modeling Program is a multi-lingual modeling tool that is used by food processing companies around the world.

ComBase is an international relational database of predictive microbiology information that contains more than 30,000 datasets describing the growth, survival and inactivation of bacteria under diverse environments relevant to food processing operations. ■



Predictive Microbiology Information Portal (PMIP)  
<http://www.ars.usda.gov/naa/errc/mfsru/portal>

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## 2006 Spinach Crisis Also Tested Communications

The outbreak of *E. coli* O157:H7 in bagged spinach during the fall of 2006 created a crisis for regulators and industry officials seeking to track down the origins and cause of the incident. It also gave government officials valuable lessons in communicating the elements of an evolving situation to the public.

“This truly was a test,” said Robert E. Brackett, director of the Food and Drug Administration Center for Food Safety and Applied Nutrition. “It was fast. It was broad and it was scary. We had to move quickly. This was one of the largest outbreaks ever to confront FDA.”

Brackett discussed FDA’s communications strategy for dealing with the crisis during a session at the Institute of Food Technologists annual meeting in July in Chicago.

The outbreak came to public attention in September 2006 and first focused on a California plant where the bagged spinach had been processed. In a report completed in March 2007, the FDA said 13 bags containing *E. coli* O157:H7 isolates had been collected nationwide from sick customers. The FDA determined that the spinach had been possibly contaminated in a field that was near potential contamination sources including wild pigs, irrigation wells and surface waterways exposed to feces from cattle and wildlife. But the precise way that the bacteria spread to the spinach remains unknown because *E. coli* O157:H7 can be transferred in many ways and the contamination occurred before the investigation began.

When the crisis began, FDA was gathering facts and the public wanted to know information as soon as possible. “As you’d expect in an emergency, it was

so fast paced that we almost didn’t have time to breathe,” Brackett said. “FDA was supplying information and updating it as fast as we could. Sometimes this was hourly, especially in the initial stages.”

The message from FDA evolved as more details became available. First, it advised consumers not to eat bagged fresh spinach. A week later the agency advised consumers not to eat fresh spinach until further notice and provided more information on what condition the spinach would be — loose bulk and spinach from farmers’ markets or restaurants.

“This was because information we had learned through the investigation showed that in some cases they were taking the consumer bags, opening them, dumping them and selling them at restaurants or in bulk at grocery stores,” Brackett said.

After the crisis, FDA personnel reviewed the process to determine how well its communications process worked. The lessons indicated that there were needs for news media and for FDA’s internal organization.

Brackett said FDA realized it needed to issue its news releases earlier in the day during the crisis. It was holding a daily conference call with the Centers for Disease Control and Prevention at 3 p.m. to gather information. But it was usually 6 p.m. by the time the call was concluded and administrators had cleared the day’s message for release.

“By that time the main news organizations were already on the nightly news, so nothing got on at night,” Brackett said. “We learned if you’re going to be effective you have got to be ready by noon.”

FDA also learned more about developing goals, plans and strategies. The staff would need to determine early who it would need as partners in crisis communications — for example, would it need USDA, the food industry or academic institutions?

“We found it important early on to have conference calls with other agencies including USDA, even though spinach wasn’t a USDA-regulated product, to let them know what we’re saying and what the basic message was we wanted to give,” Brackett said.

He noted other issues in need of resolution were how frequently to issue communications and who would be responsible for writing, reviewing and sending the messages. The staff also realized more than one communications team was needed, with people working at all hours. “We now have two teams ready so they can switch off and keep fresh during an entire emergency.”

The general approach to a crisis message requires knowing the exact goal or objective. Is the goal, Brackett asked, to rule something out if it’s certain that it’s not a public health emergency? Or is it something that requires rapid information be delivered to the public in as broad a message as possible?

“Written media communication has an exact step-by-step of how you’re going to deal with something,” he said. “If it’s in the middle of an emergency it’s not the time to start thinking about these things.” ■

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## EFSA Launches Draft Opinion on Animal Cloning

The European Food Safety Authority in January released a draft scientific opinion on the implications of animal cloning on food safety, animal health and welfare and the environment. The work follows a request from the European Commission for advice on this issue in February 2007.

EFSA's Scientific Committee led the work as a multidisciplinary issue and was assisted by a working group of scientists with relevant expertise to consider the different aspects of the commission's request.

Some of EFSA's key conclusions of the draft opinion include:

- Although death and disease rates of clones are significantly higher than those observed in conventionally reproduced animals, healthy clones and their offspring indicate that somatic cell nucleus transfer can be successfully used

as a reproductive technique in cattle and pigs. Based on a number of parameters including physiological and clinical ones, healthy clones and healthy offspring do not show any significant differences from their conventional counterparts.

- The health and welfare of a significant proportion of clones were found to be adversely affected. The proportion of unhealthy clones is likely to decrease as the technology improves.

- Food products obtained from healthy cattle and pig clones and their offspring, such as meat and milk, are within the normal range with respect to the composition and nutritional value of similar products obtained from conventionally bred animals. EFSA scientists said that assuming that unhealthy clones are removed from entering the food chain as is the case with conventionally bred animals, it is unlikely that any

difference exists in terms of food safety between food products originating from clones and their progeny compared with those derived from conventionally bred animals.

- No environmental impact is foreseen as a result of animal cloning, but there is only limited data available.

EFSA said its draft opinion acknowledged that somatic cell nucleus transfer is a relatively new technology and the available data for risk assessment are limited. Most studies have been of small sample size and the currently available data only allow for an assessment of cattle and pig clones and their progeny. In addition, as somatic cell nucleus transfer is a developing technology, information on animals reared and remaining alive for considerable periods of time is limited, EFSA said. ■

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## Acheson Appointed Acting CFSAN Director

David A. Acheson was appointed in November as acting director of the Food and Drug Administration's Center for Food Safety and Applied Nutrition. Acheson was assistant FDA commissioner for food protection, a post he retained when he assumed his leadership role at CFSAN.

Acheson replaced Robert Brackett, who left FDA for a position as senior vice president and chief science and regulatory affairs officer with the Grocery Manufacturers/Food Products Association.

Acheson will serve as CFSAN Acting Director until a permanent director is recruited. Von Eschenbach said he would initiate a nationwide search for a perma-

nent CFSAN director as soon as possible.

Acheson has also served as chief medical officer and director of the Office of Food Defense, Communication and Emergency Response at CFSAN, where he played key roles in managing significant food safety issues and emergencies.

Acheson is a graduate of the University of London Medical School, with training in internal medicine and infectious diseases. He has published extensively and is internationally recognized both for his public health expertise in food safety and his research in infectious diseases. He is a fellow of both the Royal College of Physicians (London) and the Infectious Disease Society of America. He is on the editorial board of

*Infection and Immunity* and is currently the special editor on food safety for *Clinical Infectious Diseases*.

Acheson has been a member of the National Advisory Committee for Microbiological Criteria for Foods since 1998 and has served on World Health Organization working groups as well as National Institutes of Health advisory committees. He has also held academic posts at the University of Maryland Medical School in Baltimore, where he focused on research of foodborne pathogens, and at Tufts University in Boston, where he researched basic molecular pathogenesis of foodborne pathogens. ■

## FDA Implementing Initiative to Reduce Tomato-Related Foodborne Illnesses

The Food and Drug Administration will begin a multi-year Tomato Safety Initiative to reduce the incidence of tomato-related foodborne illness in the United States.

“Produce is an important part of a healthy diet, and FDA wants to improve its safety by better understanding the causes of foodborne illness and by promoting more effective methods of safe food production, delivery and preparation,” said Robert Brackett, director of FDA’s Center for Food Safety and Applied Nutrition. “This initiative is part of a strategy to reduce foodborne illness by focusing food safety assessments on specific products, practices and growing areas that have been found to be problematic in the past.”

The initiative, part of FDA’s Produce

Safety Action Plan, is a collaborative effort between FDA and state health and agriculture departments in Florida and Virginia. Several universities and members of the produce industry also are part of the effort.

During the past decade, the consumption of fresh and fresh-cut tomatoes has been linked to 12 different outbreaks of foodborne illness in the United States. Those outbreaks include 1,840 confirmed cases of illness. The majority of these outbreaks have been traced to products from Florida and the eastern shore of Virginia; however, tomato-associated outbreaks also have been traced to tomatoes from California, Georgia, Ohio, and South Carolina. The effort will include identifying practices or conditions that potentially lead to

product contamination, which will allow FDA to continue to improve its guidance and policy on tomato safety. The initiative will evaluate the need for additional produce safety research, education, and outreach.

Other components of the initiative include:

- Continuing outreach with the industry at all points in the supply chain;
- Facilitating and promoting research on tomato safety;
- Communicating early and often in the event of an outbreak; and
- Continuing to build and strengthen collaborative relationships with federal, state and local public health officials in disease prevention, detection and outbreak response. ■

## Rapid Methods Workshop Set for June 13-20

Kansas State University will host the 28th International Workshop and Symposium on Rapid Methods and Automation in Microbiology on June 13-20, 2008, in Manhattan, Kan. Activities will take place at the Clarion Hotel and at the KSU campus.

A mini-symposium is included June 13 and 14 for those unable to attend the full week of programs.

Daniel Fung, KSU professor of food science, is the conference director and is assisted by Beth Ann Crozier-Dodson. Program registration information will be posted on the conference Web site at <http://www.dce.ksu.edu/conf/rapidmethods> or can be obtained by contacting Debbie Hagenmaier at [debbieh@ksu.edu](mailto:debbieh@ksu.edu).

## Papers & Presentations

Curtis Kastner, Abby Nutsch and Justin Kastner, Kansas State, delivered a presentation on “The Interdisciplinary Food System at K-State” in November

at the annual meeting of the Council for Food Science Administrators at Purdue University. ■

# Food Safety Digest

by Dave Edmark

The European Union wants China to step up efforts to improve safety of food and other products it exports. In November, EU Trade Commissioner Peter Mandelson told delegates to an international food safety forum in Beijing that although he had seen positive movement in that direction, “restoring and then maintaining consumer trust and confidence in Chinese products must be China’s priority if it wants to maintain the export growth rates of recent years.”

The Associated Press reported that Mandelson referred to China’s record on product safety after launching a campaign in August aimed at regulating small and illegal enterprises that make up much of the food industry. But Mandelson criticized Chinese assertions that less than 1 percent of China’s exports to Europe had health risks. With Europe importing \$750 million worth of goods each day from China, “even 1 percent is not acceptable,” he said.

Chinese Vice Premier Wu Yi was not pleased with Mandelson’s remarks but didn’t elaborate. He told the assembly that China was “willing to make great efforts, together with countries in the

world, to maintain food safety.” In recent months there have been discoveries of potentially dangerous levels of chemicals and toxins in some Chinese exports of food and other products, the AP said.

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The U.S. plans to watch out for the safety of imported food at its borders under a new plan announced by Health and Human Services Secretary Mike Leavitt. *The Seattle Times* reported that during a visit to the city, Leavitt said the plan calls for certifying the imports before they arrive in the U.S. Third parties would perform mandatory safety certification of riskier products before they could enter the U.S. More American personnel would need to be stationed in foreign ports, Leavitt said. *The Times* said the government would publicize information about certified firms and importers who use only certified firms.

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About 60 percent of New Zealand shoppers are reading the ingredient labels because of concerns over food safety. *The New Zealand Herald* reported that the nation’s Food Safety Authority commissioned a survey showing that the number of people studying the ingredient labels had increased 10 percent in four years.

Sandra Daly, deputy chief executive of the Food Safety Authority, said increased awareness of nutrition was likely why so many people said they were reading labels.

About 85 percent of respondents said chicken was a primary food safety concern, and 95 percent said they were aware of the need for special care when cooking and handling poultry. Seventy-five percent said *Salmonella* was the food safety issue that most concerned them. Antibiotics in meat was cited by 67 percent and *Campylobacter* by 63 percent.

■ ■ ■

Nearby in Australia, a survey by that nation’s Food Safety Information Council showed that men and young adults had the worst knowledge and practice of food safety, although most people have improved their knowledge in the past 10 years.

“I am shocked that ... 7 percent of women and 29 percent of men didn’t wash their hands at all after using the bathroom in the food hall in a shopping center,” said Michael Eyles, FSIC chair. He also was concerned that men’s overall knowledge of food safety continued to be lower than that of women.

“This may not have been an issue in the past but today men play an active role in the kitchen and they could be putting their family and friends at risk,” Eyles said.

There has been some important progress in the past decade. The latest survey indicated that 97 percent of Australians know to wash hands before handling food. In 1997, only 54 percent knew so. ■

## 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.

David Edmark, Editor  
110 Agriculture Building  
University of Arkansas  
Fayetteville, AR 72701-1201  
Voice: 479-575-5647  
FAX: 479-575-7531  
E-mail: [fsc@cavern.uark.edu](mailto:fsc@cavern.uark.edu)  
World Wide Web:  
<http://www.fsconsortium.net>

## The Food Safety Consortium

110 Agriculture Building  
University of Arkansas  
Fayetteville, AR 72701-1201

ADDRESS SERVICE REQUESTED

NON-PROFIT ORGANIZATION  
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PERMIT NO. 278  
FAYETTEVILLE, AR 72701-1201