The Food Safety Consortium Newsletter

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If Avian Flu Hits, Look for Drop in U.S. Poultry Market

If a case of avian flu is discovered in a U.S. poultry flock, it's likely that poultry consumption would decline. The level of decline would also be likely to vary in different parts of the nation.

Kansas State University surveyed 2,000 people by mail in Wichita, Kan., and Los Angeles — 1,000 in each city — to find out their reactions to various food safety situations. About 30 percent responded to the Food Safety Consortium-funded survey with the higher response rate coming from Wichita.

The avian flu scenario presented in the survey supposed that a case of the disease was found in Montana and asked how respondents' poultry consumption would change.

"Seventy percent of Wichitans said their consumption wouldn't change, whereas the corresponding percent for Los Angeles was 50 percent," said Sean Fox, a KSU agricultural economics professor who supervised the research. Fourteen percent of Los Angeles respondents said they would stop consuming poultry entirely, while only 7 percent in Wichita said they would do so.

Sean Fox

Fox explained that the survey was designed to quantify the potential impact on the poultry industry of a domestic avian flu outbreak. No outbreaks have occurred in the United States, but a 2003 outbreak in Southeast Asia spread to 41 other countries in the next four years. More than 300 million poultry in Asia were lost.

"We figured the risk to commercial poultry flocks in the U.S. was very low, but there were indications that bird flu was being carried by migratory birds, and the chances of it appearing in a wild bird were reasonably high, though it hasn't happened yet," Fox said.

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ISU Seeks Link Between Pathogens and Illness

No food processor wants pathogens contaminating the product in the plant for at least one obvious reason; the product on sale at retail might carry the risk of foodborne illness. Beyond that, it isn't clear what are the chances that a consumer will become ill.

Helen Jensen and colleagues are seeking to connect the dots to determine how changes in the pork production process affect the predicted number of people who become ill with salmonellosis because of pork and how food safety interventions affect risk as well as industry costs. By learning that information, the meat industry would be able to figure the costs of intervening at points in the production process that would be the most effective in making the product safer.

"We think this model will be helpful for the industry whether it's the packing plant or the Pork Board," said Jensen, an Iowa State University professor of economics. She has collaborated with Scott Hurd, an associate professor of veterinary diagnostic and production animal medicine who is spending most of 2008 on leave from ISU as deputy undersecretary for food safety at the U.S. Department of Agriculture. They are pursuing the research with support from the Food Safety Consortium.

Helen Jensen

Jensen said in discussing the subject with the pork industry, the key question has been whether to invest resources in the farm or in the slaughterhouse. "Then if we do invest resources in the slaughterhouse or on the farm, what's the gain we're going to get? Gain in this situation is measured by reduction in the number of human cases of illness," she said.

It's unusual to carry the research all the way to measuring the number of human illnesses. Jensen noted that U.S. research has not explored that angle to the extent that Europeans have done. Data are limited on *Salmonella* in the United States for anyone

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If Avian Flu Hits… *continued*

The discovery of avian flu in a U.S. flock might result in restrictions against the nation's poultry by importing countries. If that happened, Fox noted, prices of U.S. birds would decrease, and production would then be reduced.

"We don't yet have estimates of what the supply response would be," Fox said. "Knowing or getting an estimate of what the demand reduction might be would give us an estimate of what the price reduction would be."

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The different reactions from survey respondents in Wichita and Los Angeles might be explained by Kansans' greater familiarity with agricultural issues, Fox said. In Los Angeles, those who did respond may be people who are generally more concerned about food safety issues.

The KSU survey also covered other food safety-related topics. Asked about how they reacted to the contamination of spinach by *E. coli* O157:H7 in the summer of 2006, 45 percent of the Los Angeles respondents reported no change in their purchasing habits. In Wichita, 55 percent said they didn't change their spinach purchases.

Concerning irradiation of food as a way to kill pathogenic bacteria, 40 percent of the respondents had not heard of the procedure prior to being questioned in the survey. When provided with a description of the technology, the Los Angeles respondents were less likely to buy an irradiated food product than those in Wichita.

The survey also showed that Wichita respondents preferred to purchase cheaper meats from animals treated with antibiotics, but Los Angeles respondents preferred antibiotic-free meats at a higher price.

Also, Wichita respondents reported they ate more beef than the Los Angeles respondents, who ate more vegetables than their Wichita counterparts. Both cities reported about the same level of chicken consumption. ■

ISU Seeks Link… *continued*

seeking to find out about its seroprevalence – the number of persons who test positive for a disease stemming from the bacterium.

"We're mostly depending on one study done here at Iowa State which has found that the really large swine farms have a somewhat higher seroprevalence than everybody else," Jensen said. "Now we're converting our data by size categories so that we can put them into our model and say, 'If that's true for the whole U.S. and we apply those data across all herds in the U.S., how is that going to work out as far as the number of contaminated carcasses?'" The epidemiological model is being integrated with a multi-market economic model that evaluates producer and processor behavior and the economic effect on the pork industry.

'What's the gain we're going to get? Gain in this situation is measured by reduction in the number of human cases of illness.'

One significant question to follow is what interventions can be made during the production process that will have an effect on curbing human illness. It isn't an easy matter to resolve.

"There's a tendency to think that there's a nice linear relationship — every reduction of *Salmonella* on the pig farm is going to reduce human health risk by the same portion. And that's just not true, for a number of reasons," Jensen said.

Hurd analyzed data from Denmark, which has kept more extensive records of the cause-and-effect situation than has the United States. In Denmark, the data show that pathogen reduction on the farm had little impact on human health risk. But pathogen reduction in the slaughterhouse did make a difference.

"The Danish study showed the most cost effective place to invest resources was in the slaughterhouse, because you get a better return on your investment when return is measured in terms of human health cases," Jensen explained. "How many human cases of *Salmonella* can we reduce per dollar invested?" ■

New Project Targets *Salmonella* in Organic Poultry

Organic food is all the rage, but despite popular opinion it's not automatically safer than conventionally grown foods. A team from several institutions led by University of Arkansas System's Division of Agriculture food and poultry scientists has been awarded a three-year grant for nearly $600,000 from the U.S. Department of Agriculture's National Integrated Food Safety Initiative grant to do food safety research in natural and organic poultry.

Dr. Steven Ricke, a professor in the UA Food Science Department and the Center for Excellence in Poultry Science, serves as the project leader with Dr. Phil Crandall, a professor in Food Science, and Dr. Frank Jones, associate director for Extension in Poultry Science.

The term "organic" is strictly defined by the USDA National Organic Program to include poultry raised with no antibiotics, fed 100 percent organic feed and given access to outdoors. The USDA definition for "natural" for meat and poultry products specifies no artificial ingredients or added color and only minimal processing. However, the market for "natural" is rapidly changing, and this definition is being updated. USDA has also proposed voluntary standards for "naturally-raised" livestock to be raised without antibiotics and not fed animal by-products.

Organic poultry currently accounts for no more than two percent of the total poultry market, but it is the largest share of the organic meat market and is growing by leaps and bounds. Between 1997 and 2003, sales of organic broilers increased from about 38,000 to 6.3 million birds.

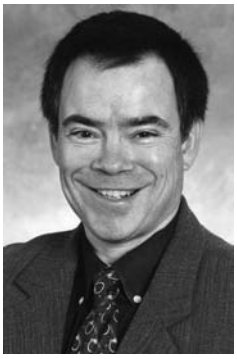
The meteoric rise in popularity of organic poultry has prompted a need for a comprehensive study of how to ensure its safety, Ricke said.

Organic and natural poultry are currently produced and processed in smaller facilities than is conventional poultry. "However, small production is usually not integrated, providing less opportunity for the control of product quality, including food safety, as in large-scale, integrated production," Ricke said. "Almost no university research has focused on small-scale poultry production systems or their food safety issues," said Ricke, who also holds the Wray Endowed Chair in Food Safety and serves as director of the UA Center for Food Safety.

> *The rising popularity of organic poultry prompts a need for a study of how to ensure its safety*

Ricke and his team leaders will coordinate 13 research specialists on four teams from the U of A, Texas A&M University, West Virginia University, Cornell University, Purdue University and along with Dr. Anne Fanatico of the National Center for Appropriate Technology.

"Each team consists of faculty who can address the complex nature of the problems associated with food safety in organic and natural poultry," Ricke said. "Our Extension specialists have existing close relationships with growers and processors statewide and nationally, as well as food safety education and communication specialists who can address the complex issues to the grower, processor, consumer and retail industries."



Steven Ricke

Among the expected results of the project is a plan to write guidelines for Good Agricultural Practices — a recognized collection of principles for production and processing — for food safety on natural and organic poultry farms. The guidelines will focus on developing plans that are relevant to plants of particular sizes. Ricke said a set of Good Agricultural Practices will play a critical role in ensuring safety.

"Because natural and organic poultry production does not use antibiotics or other medications, Good Agricultural Practices are even more important," Ricke explained.

The project will also include meetings and workshops with industry personnel. That will include a local one-day workshop on natural and organic poultry production focusing on food safety and bird health.

"The impact of completing this grant is huge, as it has the potential to reach large- and small-scale producers, processors, policymakers and stakeholders who need assistance in food safety management," Ricke said. ■

To Generate Discussion, They Started 'Barfblog'

A couple of food safety researchers were worried a few years ago that "maybe the traditional, sanitized, generic messages" to promote food safety weren't working. They sought to generate discussion that would get some attention. They did so by starting a blog with the definitely unsanitized name of Barfblog.com.

"Generating dialogue is a huge thing for us, and we really think that to do that you have to be entertaining to get into people's minds," said Ben Chapman, a doctoral student at the University of Guelph in Ontario. He started Barfblog with Doug Powell, who was then a Guelph food science faculty member and now supervises the blog for the International Food Safety Network from his faculty position at Kansas State University.

Chapman, who discussed the blog in a talk at the Institute of Food Technologists convention in June in New Orleans, said there was a need to make available information about food safety that would be accurate and interesting to the general public.

"There is the scientific assessment of risk and the public perception of risk," Chapman said. "We're right in the middle of something called the information vacuum. It's up to us as professionals in food safety and nutrition experts to fill that information vacuum because you need to be able to talk about what you're doing, why you have this production practice. In the absence of this information, this vacuum gets filled by whomever."

Chapman saw how fast things could move during the 2006 outbreak of *E. coli* O157:H7 on California spinach. A half hour after the federal Food and Drug Administration announced the outbreak, Google had 225 links to news items about it. Within four days, Wikipedia had a page of 75 contributors discussing the subject. "We'd never seen anything like this before," Chapman said.

Noting that 39 percent of Internet users surveyed said they read blogs, Chapman and Powell have found Barfblog to be a way to engage in the international conversation. On one day in the June 2008, the site had 2,200 unique viewers. On a given day, 20 to 50 e-mail posts come from readers.

The site started with the idea of focusing on celebrity foodborne illness. It has expanded beyond that, but the site still pays homage to the sick and famous with its section titled "Celebrity Barf."

But the overall purpose, described in Powell's biographical sketch on the site, is a serious one. The blog seeks to find "innovative ways to compel everyone in the farm-to-fork food safety system — individual producers, retail employees and consumers, among others — to acknowledge and adopt best practices to reduce the risk of foodborne illness."

Barfblog's correspondents also write about their own observations of food safety problems in restaurants, stores or anyplace else.

Put another way, "it's about telling stories," Chapman said. "We try to do it so how I would tell a story in a bar is how I would tell it on Barfblog."

The content consists of food safety information drawn from news sources across the Web and analyzed for a lay audience by Barfblog's food safety scientists. Its correspondents also write about their own observations of food safety problems in restaurants, stores or anyplace else.

In July, Powell quoted from an overseas newspaper article about hamburgers in a Dubai restaurant coming with a legal waiver, if they are ordered less than well done, prompting Powell to ask if the hotel is using meat thermometers properly to determine the burgers' doneness. Earlier that week, Powell aimed his attention closer to home when one of his students told him that a farmers' market in Kansas was selling buffalo meat with the assurance that it would be all right to undercook it with no fear of *E. coli* O157:H7 contamination. Powell refuted the notion by providing the scientific research from a food safety journal proving that buffalo meat does require thorough cooking to avoid contamination.

"Backing it up is one of the things we really focus on and having references," Chapman said. "We need to be able to source information and point people to other directions where they can go for more information. And the last thing we focus on is making it fun with pop culture references."

For example, Powell has referred in the blog to a research paper he wrote a few years ago that chronicled the incorrect food handling practices that several celebrity chefs committed on their television cooking shows. Earlier this year, he blogged about a news report that Chef Emeril Lagasse's Miami restaurant was cited for 13 critical food safety violations.

The lesson here, Chapman said, is that "to become a good blogger, definitely plug into celebrities." ■

K-State Awarded Nearly $1 Million to Study *E. Coli*, Distillers' Grains

A research team, headed by Kansas State University *E. coli* O157:H7 expert T.G. Nagaraja, has been tapped by the U.S. Department of Agriculture to study both the connection between feeding distillers' grains and *E. coli* O157:H7 in cattle and several strategies to reduce the presence of the naturally occurring pathogen in the animals.

The group has received a $939,220 National Research Initiative in Food Safety grant. Nagaraja, a university distinguished professor of microbiology, said the issue of meat safety is receiving full attention from both researchers and the meat industry and is being addressed.

"This research project will greatly enhance our understanding of the exact relationship between dietary distillers' grains and *E. coli* 0157:H7 in cattle, as well as provide us with an opportunity to look at novel ways to mitigate the potential risks of feeding this valuable co-product," Nagaraja said.

Distillers' grains are a byproduct of ethanol produced from cereal grains that are used in cattle feed. They are rich in fiber, energy and protein.

The research team will look at ways to reduce the amount of *E. coli* O157:H7 present, such as administering a probiotic, an experimental vaccine and feeding brown seaweed, a plant shown to have an effect in reducing *E. coli* O157:H7 prevalence in cattle. In addition, they also will study whether feeding varied amounts of the distillers' grain or making it dry or wet has an effect on the prevalence of *E. coli* O157:H7 detected in the feces.

Along with Nagaraja, the research team includes K-State professors David Renter, Mike Sanderson and Dan Thomson, and doctoral student Megan Jacob.

The grant builds upon the long history of K-State researchers focusing on food safety. An example of that work that has direct application to the consumer comes from meat scientist Melvin Hunt.

"Despite care in food processing and provision, there is a possibility that food can become contaminated with potentially harmful bacteria," Hunt said. "Occasional recalls of potentially contaminated ground beef in recent years are a sign that safety checks are working — hamburger lovers do not need to give up their favorite food."

Consumers need to be mindful that recommendations for cooking ground beef have changed. Generations have been brought up to think that when ground beef browns, it's cooked. That's no longer true, Hunt said.

In the mid-1980s, K-State meat science researchers were asked to study the possibility of reducing the percentage of fat in ground beef without compromising taste and texture.

As the K-State researchers studied ground beef with differing proportions of fat, they observed how the meats cooked and noted that some ground beef browned prematurely, before it had reached the safe-to-eat temperature of 160 degrees Fahrenheit.

The color of meat depends on the oxygen in the muscle cells, Hunt said. As an example, he explained that fresh ground beef is bright red because oxygen is incorporated into the meat as it is ground. As the meat ages, it loses oxygen, which causes the color to change. The oxygen in the muscle is carried by myoglobin, which is similar to hemoglobin that carries oxygen in humans.

Observations during the study prompted researchers to recommend that temperature — not color — should be used as a test for doneness, Hunt said.

In a restaurant, consumers are advised to order a ground beef patty cooked to at least medium, or 160 degrees F. At home, they are advised to check end-point temperature with a meat thermometer.

"Using a meat thermometer is the only sure way to tell if meat is properly cooked," Hunt said. ■

Texas Tech Study Measures Food Safety in Popular Cooking Shows

While the masterful chefs of the highly-popular Food Network cook up plenty of finger-licking-good food, a new Texas Tech University study on food safety measures suggests that it's not a good idea for some of their stars to actually lick their fingers while cooking the grub.

These days fewer Americans learn how to cook during childhood or high school. High schools have scaled back on offering consumer science, traditionally known as home economics.

"Many people learn how to cook by watching these highly popular and entertaining cooking shows," said Erica Irlbeck, an agricultural education and communications instructor.

Last year researchers set out to determine the scope of the televised food safety problem by studying Food Networks' heavy hitters: "30 Minute Meals with Rachael Ray," "The Essence of Emeril," "Everyday Italian," "Paula's Home Cooking" and "Semi Homemade Cooking with Sandra Lee." The Food Network is distributed to more than 85 million households in the United States and is considered the giant in food programming, ranked number one out of 50 cable channels.

Researchers analyzed 49 shows airing over a two-week period and used 17 different coded categories: six positive and 11 negative. Positive categories included hand washing, cleaning equipment, washing fruits and vegetables, adequate refrigeration and use of a thermometer.

Negative behaviors included food from unsafe sources, failure to use a thermometer, use of food from the floor, failure to refrigerate perishables, failure to wash fruits or vegetables, inadequately washing equipment, sampling food or licking fingers, cross contamination of ready-to-eat or raw foods and touching the face.

The results weren't exactly savory with 118 positive food safety measures and 460 poor food-handling incidents. Among the most noticeable culprits were not washing fruits, vegetables and herbs properly and a lack of hand washing in general.

"These are important behaviors because if they are not followed, you can become ill," said Mindy Brashears, associate professor and director of the International Center for Food Industry Excellence at Texas Tech. "Many food borne illnesses can be prevented by proper food handling, and that's why it's important these popular stars follow good food safety practices."

Foodborne illnesses are costly. The World Health Organization estimates major pathogens can create up to $35 billion annually in medical costs and lost productivity.

"We realize these are time-limited entertainment programs and not documentaries, but some food safety behaviors could be better incorporated," said Cindy Akers, associate professor and director of the Texas Tech College of Agricultural Sciences and Natural Resources Student Services Center.

"For example, at the end of a segment the host could say, 'We're going to take a break now, and I'm going to wash my hands. You should always wash your hands after handling raw meat.' Another way to boost food safety would be to add post-production pop-up graphics containing pertinent safety information," Akers said.

For the record, "30 Minute Meals" and "Semi-Homemade Cooking with Sandra Lee" virtually tied for having the most positive behaviors at the time the programs were aired last year. The worst was "Paula's Home Cooking," in part for her affinity for licking her fingers more than 20 times while preparing her down-home favorites. On the other hand, Paula Deen demonstrated sampling food properly more than any of the others.

The researchers noted that they were frequently asked who was the safest or least-safe host on the Food Network. Their response was there's not really a fair way to name one person as best or worst. For example, one show had the most positive observations, yet it also had the second-highest negatives. ■

Marinades on Meat May Prevent Cancer

New research shows that marinating meats decrease the cancer-forming compound called heterocyclic amines (HCA), which is produced during grilling, by over 70 percent.

Researchers from Kansas State University tested three commercial spice containing marinade blends — Caribbean, Southwest and Herb — on eye of round beef steaks. The steaks were marinated for one hour then grilled at 400 degrees Fahrenheit.

Food scientists found that steaks marinated in the Caribbean blend produced the highest decrease in HCA content (88 percent), followed by the Herb blend (72 percent) then the Southwest blend (57 percent).

"Commercial marinades offer spices and herbs which have antioxidants that help decrease the HCAs formed during grilling," said J. Scott Smith, the principal KSU researcher on the project. "The results from our study have a direct application since more consumers are interested in healthier cooking." ■

Papers & Presentations

Evelyn Nystrom, National Animal Disease Center, reported the following presentations:

- Scherer, A.M., C.M. Menge, K.R.K. Winter and E.A. Dean-Nystrom. 2007. Flow cytometric detection of Shiga toxin binding to porcine granulocytes *in vitro*. Abstract. Conference of Research Workers in Animal Diseases, Dec. 2-4, 2007, Chicago. Poster P29.
- Scherer, A.M., C.M. Menge, V.K. Sharma and E.A. Dean-Nystrom. 2008. Effects of Shiga toxin on isolated porcine granulocytes. 48th Interscience Conference on Antimicrobial Agents and Chemotherapy/46th Infectious Diseases Society of America Annual Meeting, Oct. 25-28, 2008, Washington. Slide presentation B-1682.

Nystrom also reported publication of these journal articles:

- Menge, C., and E.A. Dean-Nystrom. 2008. Dexamethasone depletes {gamma}{delta}T cells and alters the activation state and responsiveness of bovine peripheral blood lymphocyte subpopulations. Journal of Dairy Science, 91: 2284-2298.
- Dean-Nystrom, E.A., W.C. Stoffregen, B.T. Bosworth, H.W. Moon and J.F. Pohlenz. 2008. Early attachment sites for Shigatoxigenic *Escherichia coli* O157:H7 in experimentally inoculated weaned calves. Applied Environmental Microbiology, doi:10.1128/AEM.00636-08.
- Stamm, I., M. Mohr, P.S. Bridger, E. Schropfer, M. Konig, W.C. Stoffregen, E.A. Dean-Nystrom, G. Baljer and C. Menge. 2008. Epithelial and mesenchymal cells in the bovine colonic mucosa differ in their responsiveness to *Escherichia coli* Shiga toxin 1. Infection and Immunity, doi:10.1128/IAI.00553-08.

Daniel Fung, Kansas State, delivered five scientific presentations at the International Association for Food Protection national meeting in August in Columbus. In September, he served as director of the 19th annual Kansas State University Excellence in Food Science Day. He also was the keynote speaker at the Third International Conference in Food Safety in October in San Francisco and was an invited scholar that month at the City University of Hong Kong. Also in October, he presented a scientific paper at the 14th World Congress of Food Science and Technology in Shanghai. In November, Fung was the keynote lecturer at the 10th International Food Safety Conference in Puerto Vallarta, Mexico, and was the keynote presenter and lecturer at the Spanish rapid Methods in Food Microbiology Workshop in Barcelona, Spain. ■

Food Safety Digest

by Dave Edmark

Years after federal regulators permitted the use of irradiation, it remains the subject of debate rather than a procedure that's used much. A report in September by ThePacker.com explained how food safety experts at a research conference in California were still coming to terms with what role irradiation should play.

Robert Buchanan, director of the Center for Food Systems, Security and Safety at the University of Maryland, said irradiation is a good food safety tool, but it's too costly to set up an irradiation facility in most regions of the country. He said the Salinas, Calif., area would be able to support one because many fresh produce growers and shippers would use one. Elsewhere, cooperatives would need to be established to support a facility.

Irradition might be a "silver bullet" for food safety, said Michael Osterholm, director of the Center of Infectious Disease Research and Policy at the University of Minnesota. That prompted consumer food marketing specialist Christine Bruhn of the University of California-Davis to offer some qualified support.

"Osterholm has been a leader in introducing irradiation in supermarkets, and we share similar views, but it is not a silver bullet," Bruhn said. "We must continue to have appropriate sanitation practices, but it is an additional step at the end of processing that can give the level of safety the public expects."

■ ■ ■

A listeriosis outbreak in Canada has been blamed for at least 19 deaths and was called the worst such epidemic in the world by the *Canadian Medical Association Journal*. The outbreak began in August from foods contaminated at a Maple Leaf Foods meat plant in Toronto. The medical journal called for a full-sale public inquiry.

The Canadian Press reported that *Listeria* was found embedded in the slicing equipment. The company then issued a nationwide recall for many of its products. About 220 products were contaminated. *The Globe and Mail* of Toronto reported that Ontario health officials learned on Aug. 14 that the Canadian Food Inspection Agency had some test results revealing that Maple Leaf deli meats contained *Listeria monocytogenes*. On Aug. 17, the CFIA issued an alert about two Maple Leaf products. On Aug. 19, the company announced its broad recall of deli meats.

■ ■ ■

The president of China let a dairy executive know how he felt about food safety during a visit to a dairy company in an eastern province. President Hu Jintao shook his finger at the executive and said, "Food safety is a matter of the health of the people. Of course, it's also an issue of companies' survival. You have to learn the lesson from Sanlu's experience and improve your management to ensure that all products that reach the market are up to the standards."

Hu's mention of Sanlu referred to a Chinese dairy firm that is blamed for much of an outbreak of toxic milk that was found and pulled from store shelves in China in September. At least four children have died from the milk, and tens of thousands of people became ill.

The recalls grew more widespread as the Reuters news agency reported that Unilever Plc/NV recalled four batches of Lipton milk tea powder that was found to contain the industrial chemical melamine. Also, the British confectionary group Cadbury Plc withdrew its 11 chocolate products over concern of possible melamine contamination at its Bejing plant.

Reuters said Zhou Bohua, head of the State Administration for Industry and Commerce, said on Chinese state television that authorities were redoubling their efforts to remove all tainted products from store shelves. They had disposed of 8,256 tons of tainted milk and milk powder so far. ■

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