AMI Foundation News 10-Year Anniversary Edition

AMI Foundation News

A quarterly update on research, education and information

OCTOBER 2009 | Volume 11 | Issue 4

LETTER FROM AMIF PRESIDENT

Initiative Marks 10 Years of Advancements

Dear Colleagues:

The year 2009 marks a milestone in the meat and poultry industry's efforts to improve the safety of the nation's food supply. Ten years ago, the American Meat Institute Foundation (AMIF) Food Safety Initiative was established to study ways the industry can produce safer products for our customers.

Over the years, we have detailed our progress and accomplishments in this quarterly newsletter. This issue provides a special opportunity to highlight how the results of these timely AMIF research projects address issues affecting the meat and poultry industry today and can positively affect our businesses and the public and regulatory environment in which we operate.

E. coli O157:H7 contamination continues to be a source of concern for the beef industry, especially non-intact beef products. Moisture enhancement by needle injection to improve the tenderness and flavor of lower valued beef cuts is a common industry practice, *(see page 2)*

> *"The AMIF Research Advisory Committee, comprised of AMI member company representatives and food safety experts, continues to provide a valuable contribution to the industry by anticipating emerging issues and taking action to address them.*
>
> *James H. Hodges, President, AMI Foundation"*

AMI Responds to One-Sided *New York Times* Article on *E. coli* O157:H7 in Ground Beef

The meat industry has made great strides in improving the safety of its products, with the incidence of *E. coli* O157:H7 in ground beef declining 45 percent since 2000 to rate of less than one half of one percent, said AMI President and CEO J. Patrick Boyle in a letter to the editor published recently in the *New York Times.*

The letter was sent to the *Times* in response to a lengthy one-sided article on ground beef safety by investigative reporter Michael Moss that ran on October 4 ("*Woman's Shattered Life Shows Ground Beef Inspection Flaws*"). Despite meeting with Moss in person for 90 minutes in June and subsequently exchanging more than 15 emails and phone calls to respond to follow-up questions, the 5,000 word story excluded all meaningful government data provided regarding the industry's food safety accomplishments over the last 10 years.

Boyle noted that AMI and its members have worked aggressively to develop new technologies and processes to enhance meat and poultry safety. "Using them requires prior approval by the Department of Agriculture. For example, AMI submitted a petition five years ago to use carcass irradiation — a process to reduce or eliminate pathogens like *E. coli* — but we are still waiting for the department to initiate a rulemaking on its efficacy," Boyle explained.

"The meat industry has a single-mindedness when it comes to *E. coli* O157:H7 — we want to eliminate it. But like other facts of nature — from floods to the flu — even when there is a will, there may not always be a way to do it 100 percent of the time. Be assured that *(see page 5)*

AMIF President Details Progress and Accomplishments

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it can also introduce food safety concerns. Findings of AMIF-funded research at Colorado State University will provide useful information for development and improvement of brines that have antimicrobial effects.

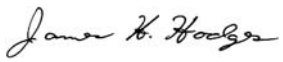
Control of *Listeria monocytogenes* in ready-to-eat meat and poultry products has recently shifted toward preventing cross contamination in the retail deli. The Food and Drug Administration (FDA) and Food Safety and Inspection Service (FSIS) are currently conducting an interagency risk assessment to address this issue. The AMIF Research Advisory Committee anticipated these events and funded research at the University of Arkansas to find more effective cleaning and sanitizing methods for the deli slicer and better ways to communicate this information to employees. Research from the first phase of this study has been submitted to government risk assessors.

Recent recalls involving *Salmonella* contamination in various food products has focused the industry and government attention on products that present special risks. One such product is uncooked, breaded or char-marked meat and poultry products that require proper preparation before consumption to prevent illness. AMIF funded research at Kansas State University on consumer and food service employee behavior to determine how various safe food handling statements are understood and to assess whether the labeling results ensure a safe end-product. Research results will be helpful in validating on-package handling and cooking instructions.

Nitrite safety and cured meat's contribution of nitrite to the human diet continue to be misunderstood and mischaracterized. Recently, the International Agency for Research on Cancer (IARC) classified nitrite as a probable carcinogen under certain circumstances, despite overwhelming evidence from other research organizations including the Department of Health and Human Service's own National Toxicology Program showing that nitrite is safe. A national survey of nitrate and nitrite concentrations in cured meat and highly consumed, raw, nitrate rich vegetables conducted by Texas A&M University provides valuable information to put cured meat's low contribution of nitrite in the diet in its proper perspective.

Issues surrounding meat consumption's connection to human disease are increasingly confronting the industry. Critics have charged that carcinogenic heterocyclic amines (HCA) may be formed during cooking and could cause human health problems. AMIF commissioned E$_x$ponent, an internationally recognized risk assessment organization, to conduct an assessment of the potential human exposure to HCA from cooked meat products. The study will contribute to the body of evidence documenting the meat and poultry safety.

As you can see from this snapshot of recently completed research projects, the AMIF Research Advisory Committee, comprised of AMI member company representatives and leading food safety experts, continues to provide a valuable contribution to the industry by anticipating emerging issues and taking action to address them. For more information on these projects, visit www.amif.org. Thank you from all of us who are a part of this great industry.



▶RESEARCH FOCUS: *E. coli* O157:H7

Study Finds Certain Modified Enhancement Solution Ingredients Effective in Reducing *E. coli* O157:H7

Moisture enhancement of beef products with brining formulations containing cetylpyridinium chloride reduces *E. coli* O157:H7 contamination during product storage, while essential oils, thyme oil and grapefruit seed extract, alone or in combination with other antimicrobials, result in immediate inactivation of *E. coli* O157:H7 in a beef extract with common brine ingredients, an AMIF study has found.

Moisture enhancement of beef products is one alternative used by the meat industry to improve tenderness and flavor of lower valued cuts, and involves multi-needle injection of a brine solution, comprised traditionally of salt, one or more of the sodium phosphates, and water, into the meat. A microbiological safety concern associated with this process is that it may lead to contamination of the interior parts of the products with pathogens, such as *Escherichia coli* O157:H7, either through transfer of the pathogen from the contaminated meat surface to the interior during needle injection, or from the use of brines that have become contaminated.

Subsequent undercooking (due to consumer preference, or accidentally) may result in survival of the internalized pathogen, and possibly lead to human illness. Also, there are concerns that brine ingredients may make the pathogen more difficult to kill during cooking.

Researchers John N. Sofos, Ifigenia Geornaras, Nikos Chorianopoulos, Kyung Yuk Ko, Jeremy M. Adler, Oleksandr A. Byelashov, Shivani Gupta, Cangliang Shen, Keith E. Belk, and Gary C. Smith of Colorado State University evaluated the effect of individual ingredients or combinations of ingredients used for brining (traditional and novel) on destruction of *E. coli* O157:H7, in a meat model system and a beef extract, during storage and simulated (in a water bath) cooking and survival/growth of the pathogen during frozen, refrigerated, or retail-type storage of moisture-enhanced beef steaks and roasts.

Researchers also examined subsequent destruction during cooking by pan-broiling, double pan-broiling and/or *(see page 3)*

▶***Research Focus: Salmonella***

Study: Consumers Disregard Cooking Instructions for Breaded and Char-Marked Poultry Products

While industry actions have improved the safety of heat-treated but not fully cooked or shelf stable poultry products, some of the newer label statements are still unclear, inadequate and/or likely not to be followed by consumers, according to an AMIF-funded study by Randall Phebus, Ph.D., and Douglas Powell, Ph.D., at Kansas State University and Harshavardhan Thippareddi at University of Nebraska.

Researchers compiled a representative collection of consumer handling and cooking instructions found on retail packages of heat-treated but not fully cooked or shelf stable poultry products available in the United States. Specifically raw, breaded, boneless poultry products that also may be stuffed or filled, char-marked, or artificially colored were targeted. These types of products have been implicated in a number of foodborne illness (*Salmonella*) outbreaks.

Product and meal preparation studies were then conducted with representative consumer groups (adolescents and primary meal preparers) to determine how various food safety statements and instructions on packages are interpreted, including individuals' intent to act upon such interpretations. Video observations collected during product preparation and post-meal preparation questionnaires were used to identify gaps between consumer intention and actual execution of food safety steps throughout the meal preparation process.

Researchers also observed additional microwaving practices, such as product flipping and/or using microwavable safe plastic covers and evaluated these practices to determine their impact on end-product safety. Final product temperatures, presence of cold spots, and corresponding *Salmonella* reductions were determined in breaded chicken tenders, chicken cordon bleus and chicken Kievs using inoculated products cooked in 600 and 1000 watt microwave ovens.

The study found that many consumers believe that these products are fully cooked at the time of purchase and need only be reheated, when in fact they are raw products. Fully cooked, pre-browned and uncooked products are being placed in close proximity in many retail display settings, as well as being similarly packaged in many cases, they observed. Most recently, these products are being frequently marketed in single-serving cellophane wrapping, costing less than $1.00 each, and are displayed directly next to fully cooked products. When fully cooked and raw, pre-browned versions of the same products are available, the raw, pre-browned product is generally significantly less expensive, and thus more appealing to budget-conscious consumers.

Consumers continue to use preparation methods not specifically suggested by processors, or in many instances, ignore messages directly instructing not to prepare the product in a microwave oven and promoting food thermometer use.

Researchers who studied two typical consumer groups found that even the small percentage of consumers who attempted to follow safe handling guidelines on packages failed to do so correctly. Use of a thermometer to measure final temperature of this product group seldom occurs.

Controlled cooking studies using microwave ovens commonly purchased through retail outlets revealed that uniform heating is not achieved in this product category regardless of additional treatments such as flipping or covering during cooking. Heating the specific product as a single unit, or heating multiple product units simultaneously, did not impact heating uniformity, end-point internal temperatures or *Salmonella* reductions.

Wattages do impact safety, researchers found. Microwave ovens with wattages below 1000W are readily available and reasonably priced for the average American consumer, according to the researchers, but data show that preparation in ovens below 1000W significantly increases the potential for an undercooked product that may lead to illness.

The researchers recommend that the industry take a proactive approach to minimizing the likelihood that such products lead to adverse public health consequences.

Certain Brining Formulations Effective in Reducing *E. coli* O157:H7

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roasting; and survival of *E. coli* O157:H7 during storage of freshly prepared and recirculated brine solutions containing one or more antimicrobial ingredients.

Findings indicate that moisture enhancement of beef products with brining formulations that contained the antimicrobial, cetylpyridinium chloride (0.2 percent or 0.5 percent), reduced *E. coli* O157:H7 contamination during product storage; the essential oils, thyme oil and grapefruit seed extract, alone or in combination with other antimicrobials, caused immediate inactivation of *E. coli* O157:H7.

Efficiency of destruction of internalized *E. coli* O157:H7 in moisture-enhanced products depended on the cooking method (i.e., pan-broiling, double pan-broiling, or roasting) used; more destruction of the pathogen was obtained in thicker (4.0 cm) than thinner steaks (1.5 or 2.5 cm); and contamination of freshly prepared or recirculated brines can be controlled with the addition of antimicrobials to the solutions, such as AvGard® XP (2.2 percent) or cetylpyridinium chloride (5.5 percent).

The findings of these studies should be useful for development of brines for enhancing the safety of moisture-enhanced meat products.

▶RESEARCH FOCUS: Nitrite/Nitrate

Texas A&M Survey Finds Level of Nitrite/Nitrate in Cured Meat Low, Unchanged from Previous National Survey

An AMIF-funded Texas A&M University survey has found that while the nitrite/ nitrate levels of U.S. cured meat products have remained low and steady since the last the last national survey in 1997, regional variation in the nitrate content of vegetables should be considered when developing predictions based on their consumption. This variation might be of sufficient magnitude to alter dietary epidemiological studies if not considered appropriately.

In this study, researchers Jimmy T. Keeton, Ph.D., Wesley N. Osburn, Ph.D., Margaret D. Hardin, Ph.D., and Nathan S. Bryan, Ph.D., evaluated the major categories of cured meats and highly consumed, raw, nitrate rich vegetables available at retail stores in five geographic regions of the U.S. (Chicago, Dallas, Los Angeles, New York, Raleigh). Comparisons were made with historic databases to determine if changes had occurred in nitrite/ nitrate levels in the past 12 years. Nitrate/ nitrite concentrations of drinking water in 25 U.S. cities were also compiled to evaluate their potential contribution to the total nitrite/ nitrate load in the diet.

Researchers found there were no differences in cured meat nitrite levels between conventional and organic classifications. A few organic products surveyed in certain cities were lower in nitrate content. When evaluated across five cities, nitrite contents of all conventional cured meat categories were not similar. The same was true for most organic products. Nitrite/ nitrate levels in cured meat products evaluated across all metropolitan areas were not appreciably different. Average nitrite/ nitrate levels were recorded for fermented cooked sausage (0.64/ 35.66 ppm), cured dried uncooked sausage (0.74/ 78.81ppm), whole-muscle drycured cooked, cured cooked sausage (1.95/ 67.43 ppm), whole-muscle brine cured cooked (7.16/ 14.81 ppm) and whole-muscle brine cured uncooked (7.31/ 25.57 ppm).

The weighted averages for nitrite/ nitrate across all cured meat categories were 4.54 and 37.07 ppm. Nitrite values observed were consistent within each product category and similar to those previously reported in 1997.This study's nitrite/ nitrate values were substantially lower than those reported in the NAS (1981) study, as well as those from other countries.

Researchers also noted very few differences in nitrite levels of conventional and organic vegetables taken from the five metropolitan cities. Differences in nitrate content between conventional and organic vegetables were observed with organic vegetables being lower. With one exception, organic vegetables had numerically lower nitrate concentrations than conventional vegetables. Nitrate and nitrite concentrations vary from country to country and within the same vegetable category.

The fact that the nitrate and nitrite contents of vegetables are variable (as shown between conventional and organic products and from city to city in this survey) poses a potential dilemma for determining actual vegetable consumption (and in turn nitrate/ nitrite dietary load) of a population. Based on this survey, regional variation may need to be taken into consideration when developing predictions based on consumption of specific vegetables and their contribution to nitrate load.

All drinking water sources surveyed were within the allowable limits for nitrate/ nitrite (if reported) established by the EPA.

▶RESEARCH FOCUS: Heterocyclic Amines

Data Gaps Make Estimating HCA Exposure Difficult

Uncertainties exist with dietary exposure estimates, particularly given data gaps in heterocyclic amine (HCA) levels in foods, according to a new AMIF-comissioned study conducted by E^{x}ponent, an internationally recognized risk assessment organization. The study, which was conducted in an effort to assess the potential human exposure to HCA from cooked meat products, will contribute to the body of evidence documenting the safety of meat and poultry products.

The main objectives of this study were to review of the major categories of fresh and processed meat products that are candidates for heterocyclic amine (HCA) formation and develop a matrix of levels of HCA among the major consumed meat categories (based on data in the published literature); and to conduct an exposure assessment based on known dietary consumption patterns.

The project was comprised of three parts, including: 1) literature review and data compilation, 2) a consumer behavior/preference survey, and 3) a dietary exposure assessment. In phase one, data on HCA formation based on different methods of cooking/processing were reviewed and compiled. In phase two, an Internet survey was conducted to ascertain the prevalence of various meat cooking methods that are preferred among U.S. meat consumers. In phase 3 of the study, data from phases one and two were combined with food consumption data from the National Health and Nutrition Examination Survey 2003-2006 (NHANES 03-06), to derive estimates of exposure to HAs from meat consumption.

Based on the available published data, Exponent created an Excel database of HCA and Benzo(a)pyrene (B[a]P) levels for 83 types of meat cuts by cooking method and degree of doneness that were *(see page 6)*

▶**RESEARCH FOCUS: *Listeria***

Study Evaluates Cost-Effective Treatments to Minimize *Listeria* Contamination of RTE Meats by the Deli Slicer

Two approved red food dyes, FD&C No. 3 and No. 40 vividly stain the protein and fat in bologna and turkey luncheon meats and may be an effective way to improve the ability of deli managers to determine quickly areas of gross contamination, an AMIF-funded study by University of Arkansas researchers has found. Principal investigators for this study were Phil Crandall, Ph.D., John Marcy, Ph.D., Steve Ricke, Ph.D., Mike Johnson, Ph.D., Corliss O'Bryan, Ph.D. and Betty Martin, Ph.D.

Researchers noted that use of a 1:1,000 dilution of these inexpensive dyes enables deli managers to determine whether additional cleaning is required before sanitizing the slicer or beginning operations.

In addition to developing this visual verification system, researchers also investigated the effectiveness of current cleaning sanitation methods and "hot boxes" in removing *Listeria* and *Listeria* biofilms.

In a test of sanitizers against *Listeria* biofilms on aluminum or stainless steel components, the best results were obtained with J512, but there was still only about a reduction log 1.5 log CFU per coupon (or less than 0.5 log/cm2). Barrier II also reduced *Lm* on the stainless by about 1.0 log CFU/ coupon, but reduced *Lm* on the aluminum coupon by almost 2.0 log CFU/coupon. PanClean reduced *Lm* about 1.0 log CFU/ coupon on the stainless but did not reduce *Lm* on the aluminum coupon. SaniWipes reduced *Lm* less than 1.0 log CFU/coupon for both stainless and aluminum. These results call into question whether SaniWipes is an adequate control measure in the working deli.

Researchers found that holding deli slicer *(see page 10)*

AMI Responds to Inaccurate *New York Times* Article on Beef Safety

(from page 1)

the industry will not stop trying," Boyle concluded.

Boyle also took to the airwaves to defend the meat industry's food safety record, appearing on an episode of CNN's "Larry King Live," entitled "Beef: Safe or Scary," which was prompted by the *Times* article.

Boyle was part of a large panel of guests that included attorney Bill Marler, former U.S. Department of Agriculture Undersecretary for Food Safety Elsa A. Murano, Ph.D., Colin Campbell, Ph.D., of Cornell University, Nancy Rodriguez, Ph.D., a professor at the University of Connecticut and chef Anthony Bourdain.

During the segment, Boyle noted that while the industry has a great deal of sympathy and empathy for those affected by *E. coli* O157:H7, the positive development is that these kinds of tragic illnesses are decreasing in America.

"These illnesses are down 60 percent in the last 10 years," Boyle said. "And the reason for that reduction in *E. coli* related illnesses is because the incidence of that pathogen in our beef products has dropped by 45 percent during that same 10-year period and that's not just a random development. It's because of investment, technology, research, more sophisticated process control. So we are making significant progress in taking a very safe food supply and making it even safer."

Attorney Bill Marler agreed with King when he pointed out that the vast majority of people eat hamburgers without any incident. "Absolutely," said Marler. "The industry has done a very good job."

During the segment, which included questions from viewers, Boyle also defended modern agriculture production, noting that low cost, efficient meat and poultry processing facilities give Americans an abundant variety of safe and wholesome products at the lowest price in terms of disposable income of any developed country in the world.

King said that USDA had been invited to participate, but declined. Agriculture Secretary Tom Vilsack provided a statement in which he said, "Recognizing the importance of the food safety issue, President Obama established a Food Safety Working Group within 60 days of taking office. As chairs of that working group, Health and Human Services Secretary Kathleen Sebelius and I led a thorough review of the entire food safety system from top to bottom to look for gaps and failures in the system and identified improvements to prevent such foodborne illness tragedies. We issued our first findings on July 7 and immediately began to implement significant policy changes to reduce foodborne illnesses."

King gave Boyle the last word on *E. coli* at the end of the segment.

"The beef supply is safer today in terms of *E. coli* incidents than it was five years ago," Boyle concluded. It was safer five years ago than it was ten years ago. We continue to make enormous investments in technology and process controls. The industry itself conducts millions of *E. coli* tests within our plants to better understand the effectiveness of our interventions. We need more interventions. For example, five years ago, the American Meat Institute petitioned USDA to allow us to use irradiation on the exterior carcasses. Five years later, the department has yet to commence a rulemaking to determine if we can utilize that technology. We need good responses from USDA."

▶LEGISLATIVE FOCUS: Food Safety Reform

AMI President: Industry Meeting Food Safety Challenges

The meat and poultry industry has made significant progress in enhancing meat and poultry safety and will work toward further improvements, said AMI President and CEO J. Patrick Boyle, who testified this summer before the House Committee on Agriculture.

During the hearing, Boyle detailed some of the significant food safety improvements the meat and poultry industry has made and emphasized the important role that government oversight plays in assuring that the industry meets its responsibility to produce safe food. For example, the industry has reduced the prevalence of *E. coli* O157:H7 in ground beef by 45 percent to less than one-half percent since 2000. *Listeria monocytogenes* in ready-to-eat products has been reduced by 74 percent to less than 0.4 percent. Since 2000, illnesses caused by *E. coli* O157:H7 are down by 40 percent. Listeriosis is down by 10 percent with much of the improvement occurring before 2000, he told the committee.

This was the second time Boyle has been invited to testify this year on the issue of food safety. A sweeping food safety bill that could dramatically affect meat and poultry producers and processors could soon be debated on the floor of the House of Representatives. The overarching goal of the bill, entitled the Food Safety Enhancement Act of 2009, is to increase FDA's food safety related authority in light of the increased focus on recalls and foodborne illnesses attributable to FDA-regulated products.

Boyle noted that the meat and poultry industry has been a strong advocate of a preventative approach and in fact petitioned the United States Department of Agriculture (USDA) to mandate Hazard Analysis and Critical Control Point (HACCP) plans in meat and poultry plants.

"We have a strong meat and poultry inspection system, but it's important to recognize only the industry can produce safe food," Boyle said. "While food processors and handlers can minimize risks through the use of good management practices, we cannot guarantee with absolute certainty that all food products are free from all risks. But progress continues to be made," Boyle testified.

Specifically, Boyle said, government data show a decline in pathogen prevalence on meat and poultry products. He also addressed a number of issues related to the current food safety debate, including whether microbiological performance standards are a useful tool.

"The answer is they can be if properly constructed to achieve a public health objective and if they are scientifically based to measure whether food is safe and not injurious to public health," Boyle said. "Conversely, I would suggest that a performance standard based solely on achieving an arbitrary outcome that yields no public health benefit is inappropriate."

When it comes to enhancing the enforcement powers of the inspection agencies, including civil monetary penalties and other sanctions, Boyle said very severe penalties already are in place. Boyle also said that mandatory recall authority is unnecessary.

"Calls for mandatory recall ignores a simple fact: Industry has every incentive to remove contaminated product from the marketplace to reduce potential liability," Boyle said. "Experience shows us that the speed with which contaminated meat and poultry product is removed from the market will not improve with mandatory recall. In most cases, meat and poultry products are recalled within hours after a problem is discovered. And FSIS' product detention and retention authority provides significant leverage to compel a voluntary recall."

A final concern Boyle addressed is imposition of a user fee that would be paid by the regulated industry for food safety inspection services. Similar proposals for meat and poultry inspection at USDA have been rejected by Congress annually for nearly 30 years.

Boyle also shared with the committee a number of suggestions AMI feels will improve food safety and expressed the industry's desire to work with Obama Administrations' White House Food Safety Working Group on implementing effective programs that benefit consumers, the industry, and our public institutions that safeguard the nation's food supply.

Study Examines HCA Exposure in Meat Products

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included in the consumer behavior/preference survey. Based on NHANES 2003-2006 consumption data and the consumer's behavior/preference internet survey, food intake estimates for the 83 meat cuts by methods of cooking and degree of doneness were tabulated and summarized. The data and methods that were applied to develop dietary exposure estimates for PhIP, MeIQx, DiMeIQx, and B[a]P were summarized.

For the 83 meat cut/degree of doneness, the existing data gaps for PhIP, MeIQx, DiMeIQx and B[a]P are indicated. Overall, the existing data gaps and the extrapolation/surrogating from the available HCA level data present significant uncertainty in the exposure estimates and thus these results should be carefully interpreted. Researchers said that it is possible in the future to fill the HCA data gaps, then they recommend to re-estimating HCA exposure based on these improved data.

Science Soundbites

Processing Reduces *Salmonella* on Carcasses

Although processing lessens carcass contamination with *Salmonella*, antimicrobial-resistant isolates may still be present, a study by the United States Department of Agriculture (USDA) has found.

The study measured the effect of broiler processing on the prevalence, serotype and antimicrobial resistance profiles of salmonellae at 20 U.S. commercial processing plants representing eight integrators in 13 states. In each of four replications, 10 carcasses from one flock were collected at rehang and 10 more carcasses were collected at postchill; each carcass was sampled by whole-carcass rinse.

Salmonella organisms were isolated from carcass rinses by standard cultural techniques, serotypes were determined, and the resistance to 15 antimicrobials was measured. Overall, *Salmonella* was detected on 72 percent of carcasses at rehang (ranging from 35 to 97 percent) and on 20 percent of carcasses postchill (ranging from 2.5 to 60 percent). In every instance, a significant decrease in *Salmonella* prevalence was noted between rehang and postchill.

The four most common serotypes, accounting for 64 percent of all *Salmonella* isolates, were Kentucky, Heidelberg, Typhimurium, and Typhimurium var. 52; most isolates of Kentucky (52 percent), Heidelberg (79 percent), and Typhimurium (54 percent) serotypes were susceptible to all antimicrobial drugs tested. However, only 15 percent of the Typhimurium var. 52 isolates were pansusceptible; more than one-half of the isolates of this serotype were resistant to three or more drugs. No isolate of any serotype exhibited resistance to amikacin, ceftriaxone, ciprofloxacin, or trimethoprim-sulfamethoxazole.

The combined prevalence of multidrug-resistant salmonellae detected postchill from all plants is presented according to OLR chemical. Overall, plants that used no additional chemical in an OLR system had the lowest percentage of pansusceptible salmonellae (8.3 percent). These data were collected as a survey and not designed to test the hypothesis that OLR treatment could affect the antimicrobial resistance of salmonellae. However, the data suggest that more research is needed to study that possibility.

*Journal of Food Protection.*2009.72(8):1610-1615

Applications of Antimicrobials to Steaks Effective in Reducing Internalization of Pathogens

The application of antimicrobials to steaks prior to packaging and shipment is effective in reducing internalization of *E. coli* O157:H7 and *Salmonella enterica* serotype Typhimurium definitive phage type 104 in nonintact beef products, according to a Texas Tech and West Texas A&M University study.

After three different outbreaks were linked to the consumption of nonintact meat products contaminated with *Escherichia coli* O157:H7, the U.S. Department of Agriculture, Food Safety and Inspection Service (FSIS) published a notice requiring establishments producing mechanically tenderized and moisture-enhanced beef products to reassess their respective hazard analysis and critical control point system (HACCP), due to potential risk to the consumers.

The purpose of this study was to determine the effectiveness of different intervention strategies (lactic acid, lactic acid bacteria, and acidified sodium chlorite) to control *E. coli* O157:H7 and *Salmonella enterica* serotype Typhimurium definitive phage type 104 in mechanically tenderized and brine-enhanced beef strip loins when applied to the steaks prior to packaging and shipment for processing.

After the mechanical process, translocation of *E. coli* O157:H7 and *Salmonella* Typhimurium DT 104 from the surface into the internal muscles occurred at levels between 2.0 and 4.0 log CFU/g (from an initial inoculation level of 5.0 log) after mechanical tenderization, and at levels of 1.0 to 3.0 log CFU/g after injection, with all the interventions consistently presenting lower microbial counts (P <0.05) than did the controls.

Lactic acid bacteria reduced internal *E. coli* O157:H7 loads 1.2 to >2.2 log cycles, while the acidified sodium chlorite and lactic acid reduced them between 0.8 and 3.0 log, respectively. *Salmonella* Typhimurium DT 104 was also reduced internally after application of all interventions between 0.9 and 2.2 log.

*Journal of Food Protection.*2009.72 (8):1616-1623

Wet Distillers Grains with Solubles Could increase *E. coli* O157:H7 in Feedlot Cattle

USDA researchers have found an association between feeding wet distillers grains with solubles (WDGS) and increased *E.coli* O157:H7 in feedlot cattle.

The objective of this study was to determine if WDGS from corn in diets affected *E.coli* O157:H7 in growing and finishing cattle; 603 steers were randomly assigned to diets with or without WDGS. Hide and fecal samples were collected monthly (October through June) from each animal for enumeration and enrichment of *E. coli* O157:H7. In the growing phase (0 or 13.9 percent WDGS diets), fecal prevalence for *E. coli* O157:H7 in steers fed a diet with WDGS was twice that of the prevalence in control steers ($P < 0.001$). In the finishing phase (0 or 40 percent WDGS diets), the average prevalence in feces ($P < 0.001$) and on hides ($P < 0.001$) was higher for cattle fed WDGS. The average percentage of fecal *E. coli* O157:H7 enumerable samples during the finishing phase for cattle fed WDGS was 2.7 percent compared with 0.1 percent for control steers ($P < 0.001$).

The average percentage of *E. coli* O157:H7 enumerable hide samples was not different between diets, but the cattle fed WDGS had higher levels ($P < 0.05$) of the pathogen. Animals fed WDGS had higher levels of E. coli ($P < 0.001$), higher pH values ($P < 0.001$), and lower concentrations of L-lactate ($P < 0.001$) in feces than those values of the control steers.

Journal of Food Protection.2009.72 (8):1624-1633

▶LEGISLATIVE FOCUS: Food Safety Reform

FDA Commissioner Hamburg Lays Out Public Health Vision

"The FDA must be vigilant, the FDA must be strategic, the FDA must be quick, and the FDA must be visible," said Food and Drug Administration Commissioner Margaret A. Hamburg, M.D., in a recent speech at a meeting sponsored by the Food and Drug Law Institute in Washington, D.C.

Hamburg said that some FDA enforcement actions over the past several years have been hampered by unreasonable delays and in some cases, serious violations have gone unaddressed for far too long. She added that the pathways for enforcement actions can be too long and arduous when the public's health is in jeopardy. Hamburg highlighted six initial steps designed to hone the effectiveness and timeliness of the FDA's regulatory and enforcement system:

1. Set post-inspection deadlines. The FDA will establish a clear timeline for regulated industry to respond to significant FDA inspection findings, generally giving no more than 15 days to respond to such findings before the agency issues a warning letter or takes other enforcement action.

2. Take responsible steps to speed the warning letter process. The FDA will streamline the warning letter process by limiting review of warning letters by the Office of Chief Counsel to those that present significant legal issues.

3. Work more closely with FDA's regulatory partners. In some cases, such as with food safety issues, state, local, and international officials can act more quickly than the FDA. When public health is at risk, the agency will coordinate with its regulatory partners to take rapid action.

4. Prioritize follow-up on warning letters and other enforcement actions. The FDA will work quickly to assess and follow up on corrective action taken by industry after a warning letter is issued or major product recall occurs.

5. Be prepared to take immediate action in response to public health risks. To better protect the public health, the agency is prepared to act more quickly and aggressively to deal with significant public health concerns and violations. Such actions may occur before a formal warning letter is issued.

6. Develop and implement a formal warning letter "close-out" process. If the agency can determine that a firm has fully corrected violations raised in a warning letter the agency will issue an official "close-out" notice and post this information on the FDA Web site. This will be an important motivator for corrective action by manufacturers.

Hamburg's speech (as prepared) is available at www.fda.gov/NewsEvents.

Nutrition News Corner

Higher Intake of Meat During Middle Age May Prevent Later Decline in Abilities, Study Finds

A higher intake of meat during middle age may prevent a future decline in activities of daily living (ADL) among the elderly, a new study by Kyoto Women's University (Japan) has found.

Researchers examined the association of meat, fish and egg consumption to determine if a risk of mortality and future ADL declines among the elderly existed. This cohort study was made up of 2,316 randomly selected Japanese individuals that were 47-60 years of age in a 19-year period beginning in 1980.

During the study, some of the study's participants were documented as having impairment to their ADL, resulting in some form of a dependency. This dependency was not observed in participants that consumed meat. In fact, a statistically significant decrease in ADL impairment was reported for participants who consumed a higher intake of meat. Interestingly, the researchers found no differences associated with participants that consumed fish and egg proteins. None of the three foods were associated with any changes in mortality.

No Link Between Brain Tumors and Nitrites and Nitrates

Intake of nitrates and nitrites is not related to the risk of glioma (brain tumors found in supportive tissue) as reported through a new study from Imperial College London and Harvard University.

The study, published in the American Journal of Clinical Nutrition, examined the relationship between intakes of meats, nitrate, nitrite and two nitrosamines [nitrosodimethylamine (NDMA) and nitrosopyrolidine (NPYR)] and glioma risk in a prospective analysis that included data from three U.S. prospective cohort studies.

The analysis reviewed 335 glioma cases that were diagnosed during 24 years of follow-up. Dietary intake was assessed with food frequency questionnaires. Nitrate, nitrite and nitrosamine values were calculated based on published values of these nutrients in various foods over different periods in time.

Risk of glioma was not elevated among individuals in the highest intake category of total processed meats, nitrate, nitrites, or NDMA compared with the lowest category.

No effect modification was observed by intake of vitamins C or E or other antioxidant measures.

These results correspond with recent findings that the nitrites and nitrates do not increase the risk of having cancer and, in fact, have health benefits.

AMIF Ongoing Research

E. coli O157:H7

Investigator	Institution	Project Title
Ellin Doyle, Charles Kaspar	University of Wisconsin	White Paper on Non-O157:H7 Shiga-toxin producing *E. coli* from Meat and Non-Meat Sources (Targeted Research)

Listeria monocytogenes

Investigator	Institution	Project Title
Mary Alice Smith, Joseph Frank	University of Georgia	Refinement of *Listeria monocytogenes* (*L. monocytogenes*) Low Dose Data from Pregnant Guinea Pigs for Human Risk Assessment
Charles Carpenter, Jeffrey Broadbent	Utah State University	Validation of Levulinic Acid for Topical Decontamination of Meat Surfaces
Kathy Glass, Jeff Sindelar	University of Wisconsin	Evaluation of anti-Listerial Properties of Natural and/or Organic Ingredients in Ready-to-Eat Meat and Poultry Products
Phil Crandall, John Marcy, Steve Ricke, Mike Johnson, Betty Martin, Corliss O'Bryan, Sara Rose Milillo	University of Arkansas	Cost Effective Treatments to Minimize In-Store Deli Meat Slicer Cross Contamination of Ready-To-Eat Meats by *Listeria monocytogenes*, Phase II
Sophia Kathariou, Dana Hanson	North Carolina State University	Genetic Attributes Associated with the Ability of Different Serotypes of *Listeria monocytogenes* to Colonize the Meat Processing Plant Environment and to Contaminate Read-to-Eat Meat Products (Chicken, Turkey, Pork and Beef)
Richard Meinersmann, Mark Berrang, Tim Hollibaugh, Joseph Frank	Agricultural Research Service, USDA, University of Georgia	Role of Protozoa in the Persistence of *Listeria monocytogenes* in a Ready-to-Eat Poultry Processing Plant

Diet and Health

Investigator	Institution	Project Title
J. Scott Smith, Terry Houser, Melvin Hunt	Kansas State University	Analysis of Heterocyclic Amines (HCAs) Formation in Various Cooked Meat Products (Targeted Research)[1]

Salmonella

Investigator	Institution	Project Title
Annette O'Connor	Iowa State University	A Systematic Review of Literature on Pork Chain Epidemiology[1]
Annette O'Connor	Iowa State University	A Workshop to Develop Reporting Guidelines for Interventions Studies in Food Safety and Production Animal Science: Modifying the CONSORT Statement
Michael Doyle, Tong Zhao	University of Georgia	Reduction of *E. coli* O157:H7 and *Salmonella* in Ground Beef
Margaret Hardin, Jayne Stratton, Marcos Sanchez-Plata	Texas A&M University, University of Nebraska-Lincoln, Inter-American Institute for the Cooperation in Agriculture	Evaluation and Performance of the Premi-Test™ *Salmonella* Serotyping System on Pork and Poultry Isolates from Commercial Sources

[1] Co-funded with the National Pork Board

Other Food Safety

Investigator	Institution	Project Title
Randy Wehling, Michael Zeece, Harshavardhan Thippareddi	University of Nebraska	Evaluation and Analysis of Meat Products Contaminated by Low Levels of Ammonia (Targeted Research)
Ellin Doyle, Kathy Kurth, Andrew Milkowski	University of Wisconsin	White Paper on Effectiveness of Existing Interventions on Virus Inactivation in Meat and Poultry Products (Targeted Research)

[1] Co-funded with the National Pork Board

Study Examines Methods to Reduce *Listeria* in Deli

(from page 5)

components in dry oven conditions at 66, 77 or 82 degrees Celsius, for extended times up to 15 hours was not effective for eliminating *Listeria* on the slicer component surfaces. However, heating the components in moist oven conditions caused the desired five log reduction of *Listeria* within three hours at 82 degrees Celsius.

Although high humidity/high temperature conditions were effective, this treatment would not be feasible to use on the assembled deli slicer because of potential damage to the electrical components. Continuing research involves using various sanitizers alone and in combination with moist heat to further reduce potential *Lm* contamination of disassembled stainless steel and aluminum deli components, the study concluded.

This research will be used to create additional Best Practices to reduce cross-contamination of *Lm* on RTE luncheon meats and help meet consumers' desires for the convenience of RTE foods and still feel that RTE deli meats are safe for their family.

AMI Upcoming Events

Advanced *Listeria monocytogenes* Intervention and Control Workshop
February 3-4, 2010
Westin Michigan Avenue
909 North Michigan Avenue
Chicago, IL

Annual Meat Conference
March 7-9, 2010

Animal Care and Handling Conference
March 25-26, 2010

Conference on Worker Safety, Human Resources and the Environment
April 29-30, 2010

For additional information on upcoming AMI events, go to www.meatami.com and click on "Events/Education."

Staff on the Move

The following is a list of recent industry meetings where AMI staff attended or participated as invited speakers.

Jim Hodges, president, AMI Foundation
Presentation on Food Safety
Annual Center for Food Integrity/National Council of Chainstore Restaurants Conference
Kansas City, Missouri
October 7, 2009

Janet Riley, senior vice president, public affairs and member services, AMI
Communications Update
Shelf-Stable Food Processors Association
October 2009

Scott Goltry, vice president, food safety and inspection services, AMI
"Communicating with Suppliers: Tools and Strategies"
NAMP *E. coli* Prevention Conference
Chicago, Illinois
August 18-19, 2009

Panelist
BIFSCO
Denver, Colorado
August 26, 2009

Betsy Booren, Ph.D., director, scientific affairs
Speaker
Arkansas Food Protection Conference
October 8-9, 2009

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