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AMI President Tells Congress Industry Has Made Great Food Safety Gains

The meat and poultry industry is continuously working to improve the food safety profile of its products and has made great progress in recent years, according to AMI President and CEO J. Patrick Boyle, who testified recently before the House Committee on Agriculture, Subcommittee on Livestock, Dairy and Poultry.

"We all know that food safety has been in the news and because of that publicity a common refrain heard in Washington and other venues is that the U.S. food safety regulatory system is broken and has failed the American people," Boyle testified.

"Indeed, a great deal of attention has been devoted to what is wrong and the changes needed to assure us that the food we consume is safe. Although some of the criticism may be warranted, a closer look at our meat and poultry food safety systems yields a different conclusion."

Boyle told the Subcommittee that both pathogenic bacteria on meat and poultry products and associated foodborne illnesses have declined markedly in the last decade. Since 2000, the industry has reduced the prevalence of *E. coli* O157:H7 in ground beef by 45 (see page 6)

"The meat and poultry industry has been working to meet the challenge of continuously improving the safety of the products produced. Industry pledges to cooperate with all parties to ensure that the U.S. maintains the safest meat and poultry supply in the world."



- J. Patrick Boyle, president and CEO, American Meat Institute

Foundation Board Approves Funding for 2009 Projects Totaling Nearly a Half a Million Dollars

Eight research projects totaling nearly half a million dollars have been approved for funding by the AMIF Board of Directors for 2009.

Projects were awarded based on their applicability to the commercial processing plants and ability to improve food safety in the meat and poultry industry. The recommendations come from the AMIF Research Advisory Committee and include:

1. Effective Treatments to Minimize In-Store Deli Meat Slicer Cross Contamination of Ready-To-Eat (RTE) Meats by *Listeria monocytogenes*, Phase II

Phil Crandall, John Marcy, Steve Ricke, Mike

Johnson, Betty Martin, Corliss O'Bryan, Sara Rose Milillo, University of Arkansas.

The focus of this project will be on developing more effective cleaning and sanitizing measures designed specifically for the retail deli slicer. This focus is warranted because of the intimate and repeated contact that RTE deli meat has with the retail deli slicer.

Researchers anticipate at the completion of this research to deliver to meat companies and deli operators additional Best Practices based on new data that demonstrates a significant reduction in *Lm* on the deli slicer.

(see page 5)

CDC Data Shows Little Change in Incidence of Infections

New Centers for Disease Control and Prevention (CDC) data shows little change in the incidence of some foodborne infections for 2008 when compared to the preceding three years. The findings are from 2008 data reported to the CDC as part of the agency's Foodborne Diseases Active Surveillance Network, FoodNet.

Campylobacter, *Listeria*, *Salmonella*, *Shigella*, *E.coli* O157, *Vibrio* and *Yersinia* did not change significantly when compared to the previous three years. The report notes that although there have been significant declines in the incidence of some foodborne infections since surveillance began in 1996, these declines all occurred before 2004.

AMI Welcomes Formation of Food Safety Working Group

The American Meat Institute welcomed the recent creation of a Food Safety Working Group by President Barack Obama.

In his weekly address to the nation on March 14, President Barack Obama announced the creation of the new group, which will be chaired by the secretaries of Health and Human Services and the Department of Agriculture.

The primary role of the Working Group will be to advise the President on which laws and regulations need to be changed, to foster coordination across federal agencies and to ensure that laws are enforced.

AMI President and CEO J. Patrick Boyle stated in a letter to Obama that this group "will help ensure that changes to the food safety system in the United States are done in a manner consistent with the scientific principles you recently articulated and in a way that helps maintain public confidence in the food supply."

Boyle said that food safety has been and will continue to be AMI's number one priority and that AMI members have repeatedly demonstrated their commitment to food safety. The letter noted that AMI members have contributed more than \$6 million to facilitate a public/private partnership with government to fund food safety research.

Boyle underscored AMI's ongoing commitment to food safety and the integrity of the food supply, stating, "Food safety research projects sponsored by the AMI Foundation Food Safety Initiative over the last several years have helped reduce the incidence of various foodborne pathogens, as evidenced, for example, by the precipitous decline in the incidence of *E. coli* O157:H7 and *Listeria monocytogenes* in meat and poultry products over the past decade," Boyle added.

Boyle also offered the scientific and food safety expertise of the AMI and its members to participate in and contribute to the Food Safety Working Group.

In an "editorial note," the report comments that efforts to reduce contamination in meat and poultry are ongoing and cites a 2006 Food Safety and Inspection Service (FSIS) program aimed at preventing *Salmonella* contamination of meat and poultry.

The report says that "industry response to the program has resulted in a decrease in the percent positive rate for *Salmonella* in raw broiler chickens from 11.4 percent in 2006 to 7.3 percent in 2008."

The full report is available online at www.cdc.gov.

Many Consumers Ignore Food Product Recalls, New Study by Rutgers Finds

Many Americans fail to check their homes for recalled food products, a new study by Rutgers University's Food Policy Institute has found.

According to the study, only about 60 percent of those surveyed reported ever having looked for recalled food in their homes, and only 10 percent said they had ever found a recalled food product in their home. The study was based on a survey of 1,101 Americans interviewed by telephone from Aug. 4 to Sept. 24, 2008.

Approximately 12 percent reported eating a food they thought had been recalled. In contrast, some consumers take a "better safe than sorry" attitude.

More than 25 percent reported that they had simply discarded food products after hearing about a recall. Many consumers also avoid purchasing products not included in the recall but which are similar or from the same manufacturer.

Most respondents said they pay a great deal of attention to food recalls and, when they learn about them, they tell many other people. But 40 percent of these consumers think the foods they purchase are less likely to be recalled than those purchased by others, appearing to believe that food recalls just do not apply to them.

Nearly 75 percent of those surveyed said they would like to receive personalized information about recalls on their receipt at the grocery store, and more than 60 percent said they also would also like to receive such information through a letter or an e-mail.

To view this study, go to www.foodpolicy.rutgers.edu/.

Salmonella Can Develop Increased Thermal Resistance Due to Sub-Lethal Injury, AMIF-Funded Study Finds

Salmonella can develop significantly increased thermal resistance due to sub-lethal injury that can occur during short cooking times for whole-muscle meat and poultry products used to make RTE foods, according to a study conducted by Michigan State University. The study was funded by the AMI Foundation as part of an ongoing and long-term research goal of developing improved methods for the design and operation of thermal processing systems for meat and poultry products.

In addition, the study concluded:

- Traditional inactivation models (D and z) based on isothermal inactivation studies can significantly over-predict the actual lethality of *Salmonella* in slow-cooked meat and poultry products, with the degree of over-prediction increasing with the extent of sub-lethal heating.
- There is some uncertainty underlying thermal process validations, which increases significantly when scaling predictions from laboratory- to pilot-scale (and presumably commercial-scale) applications.
- Whole-muscle turkey and beef products cooked in a moist-air convection oven to a core temperature of 71.1°C all exceeded the lethality performance standards.
- There was a significant risk of *not* achieving the lethality performance standards for whole-muscle turkey and beef products cooked just to the target lethality (i.e., 7.0 or 6.5 log₁₀ reductions, respectively), computed via traditional methods (D and z from laboratory studies).

In this study, turkey and beef products were inoculated with an eight-serovar *Salmonella* cocktail and subjected to thermal process trials at three scales: (1) non-isothermal heating of 1 g samples (ground) in a thermocycler, (2) cooking of 25 g samples (whole-muscle and ground) in a laboratory-scale, moist-air convection oven, and (3) cooking of ~1 kg samples (whole-muscle) in a pilot-scale, moist-air convection oven according to a variety of typical cook schedules (1.4-5.5 h total cooking time).

Results from all three test series showed that traditional inactivation parameters (D and z, previously determined via isothermal laboratory studies) over-predicted actual mean *Salmonella* lethality ($P < 0.05$), with over-prediction errors as high ~8, 4, and 5 log₁₀ for the three cooking systems, respectively.

Additionally, the error increased with increasing sub-lethal heating (as occurs with increasing total cook time). Therefore, the data from the 1 g samples were used to estimate parameters for the new inactivation model, which accounts from the effect of sub-lethal history (which occurs during the early phase of

cooking) on subsequent lethality.

When applied to these data, the improved model reduced the mean over-prediction errors from 4.6 and 3.5 log₁₀ (for turkey and beef, respectively) to -0.03 and -0.02 log₁₀, which were insignificant mean errors ($\alpha = 0.05$). The pilot-scale data also revealed two significant results. First, variability and uncertainty in *Salmonella* lethality increases significantly when scaling-up inactivation results from laboratory to pilot-scale, which needs to be considered when computing process lethality.

Secondly, for inoculated whole-muscle roasts cooked to a core temperature of 71.1°C (160°F) in the pilot-scale oven, no salmonellae were recovered via standard plate counts, indicating that there was no significant under-processing of those products.

However, for slow-cooked roasts cooked to a target computed lethality (e.g., 6.5 log₁₀ reductions), the results indicate that there is significant risk of not meeting the lethality performance standards. Therefore, particular caution (and/or improved modeling methods) should be exercised for marginally-processed products.

This AMIF study is available in its entirety at www.amif.org.

Nutrition News Corner

Study Finds Incidence of Colorectal Cancer Higher in Vegetarians

A new study by European Prospective Investigation into Cancer and Nutrition–Oxford (EPIC-Oxford) analyzed the cancer incidence among vegetarians and found that the incidence of colorectal cancer was higher in vegetarians than in meat eaters, which stands in contrast to some recent claims. The study, recently published in the *American Journal of Clinical Nutrition*, also found the risk of malignant tumors was similar between vegetarians and non-vegetarians.

The study, which included 63,550 men and women recruited throughout the United Kingdom between 1993 and 1999, found that the incidence rate ratio (IRR) for colorectal cancer in vegetarians compared to meat eaters was 1.39 (95 percent CI: 1.01, 1.91). The use of IRR allowed comparison of people with no prior malignant cancer for various factors like smoking, body mass index, alcohol consumption and dietary consumption of meat, fish, eggs, and dairy products.

The EPIC-Oxford cohort is one component of the EPIC, a collaborative study of 500,000 men and women in 10 European countries recruited between 1993 and 1999.

To view this study, go to www.meatami.com.

AMIF White Paper Examines Human Illnesses Caused by *Salmonella* from Food and Non-Food Sectors

A new AMIF white paper by University of Madison Wisconsin has found trends in *Salmonella* data and some contrasts between the U.S. and other countries that are of interest, which may suggest the need for further research and interventions.

Serotypes

Researchers found that *S. enteritidis* is by far the most common serotype in Europe and Japan while *S. typhimurium* is the most common in Australia. In the U.S., *S. enteritidis* and *S. typhimurium* appear to have a similar prevalence. The reason that *S. enteritidis* is uncommon in Australia is likely due to it not becoming established in chickens in that country. This led researchers to question—are some serotypes better adapted for surviving in our food and agricultural production and processing systems?

Researchers reported fatality rates for different serotypes varied 100-fold with *S. choleraesuis* and *S. dublin* being significantly more virulent than many other serotypes. Researchers also noted that the investigation of factors that increased pathogenicity of certain serotypes may yield information useful in preventing or treating future infections.

In its investigation of salmonellosis outbreaks traced to mung beans in 2000, researchers found that those in U.S. were caused by rare phage types of *S. enteritidis*. In some of the incidents, mung bean seeds were known to have been imported from China.

Whether or not these rare phage types originated in China or were a previously unrecognized phage type already present in North America remains a concern. The data indicates that prevalence of antibiotic sensitivity in *Salmonella* isolated from turkeys, swine, and cattle has decreased between 1999 and 2006, while that of chicken isolates has remained about the same.

More than 65 percent of isolates from turkeys and swine demonstrate resistance to at least one antibiotic while 30 to 40 percent of isolates from chickens and cattle exhibit some level of resistance. Resistance to multiple antibiotics has increased over time and may be a concern in the prevention of treating infections.

Antibiotic Resistance

Researchers found that *S. typhimurium* DT104, resistant to five or more antibiotics, appears to have decreased in prevalence in recent years in the U.S., but there are increasing reports of significant antimicrobial resistance in *S. newport* and *S. paratyphi*. Additionally, antibiotic-resistant strains of salmonellae are being disseminated internationally believed to be linked to food. There is some evidence that antibiotic-resistant strains are more virulent, which may need to be examined more closely, researchers believe.

Vehicles of Infection

The report found that outbreaks and cases of many foodborne pathogens have increased as people consume more fresh fruits and vegetables and as the production and processing of these commodities have become more concentrated. Some serotypes are more often associated with these outbreaks than others.

Importation of foods from underdeveloped countries carries the risk that sanitary practices may not be adequate to produce safe and healthy foods, the report stated.

Some European countries have undertaken well organized, nationwide programs to control *Salmonella* in poultry and swine. Some of their practices may be useful in improving U.S. production systems, according to researchers.

To view this white paper in its entirety, go to www.amif.org.

FDA Finalizes Feed Rule, Full Compliance Required by Oct. 26

The Food and Drug Administration (FDA) confirmed April 27, 2009, as the effective date for the final feed rule, but full compliance will not be required until October 26, 2009.

The new final rule, “Substances Prohibited from Use in Animal Food or Feed,” prohibits the use of certain cattle parts in ALL animal feed, including pet food. Prohibited parts consist primarily of brains and spinal cords from cattle 30 months of age or older, and the entire carcass of dead stock cattle, unless such cattle are shown to be less than 30 months of age or the brains and spinal cords are removed.

According to FDA, the extended compliance date will permit renderers more time to comply with the new requirements and will give cattle producers and packers more time to identify appropriate methods for disposing of prohibited materials.

In related news, the Environmental Protection Agency (EPA) announced that “cattle material prohibited in animal feed” (CMPAF) is non-hazardous solid waste and thus can be disposed of in landfills.

Since the publication of new feed regulations last year, many sectors have been concerned about alternative disposal of CMPAF and dead stock that will no longer be rendered.

Solid waste is regulated by state and local governments. While state/local governments and private landfills are free to apply restrictions on CMPAF, this clarification from EPA gives them a green light to accept.

Foundation Approves Funding for Eight Research Projects

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2. White Paper on Non-O157:H7 Shiga-toxin Producing *E. coli* from Meat and Non-Meat Sources

Ellin Doyle, Charles Kaspar, University of Wisconsin

The goals for this research are to: summarize available global epidemiological data on cases and outbreaks caused by non-O157:H7 Shiga-toxin producing *E. coli* (STEC) including those associated with both meat and non-meat vehicles; evaluate the prevalence of non-O157:H7 STEC in meat and non-meat sources; evaluate the effectiveness of existing interventions for controlling non-O157:H7 STEC; and assess methodologies for detecting non-O157:H7 STEC in animals, meat, other animal products, and other foods.

Scientific literature databases, U.S. government publications from CDC, FDA, and USDA, relevant government publications from other countries and industry publications will be searched for data on outbreaks caused by non-O157 STEC *E. coli* and for information on prevalence of these bacteria in meat, meat-producing animals and other potential food and non-food vectors. Information will also be sought on the effectiveness of current interventions for controlling these foodborne pathogens and on recently devised methods for detecting these bacteria.

3. Genetic Attributes Associated with the Ability of Different Serotypes of *Listeria monocytogenes* to Colonize the Meat Processing Plant Environment and to Contaminate Ready-to-Eat Meat Products (Chicken, Turkey, Pork and Beef)

Sophia Kathariou, Dana Hanson, North Carolina State University

The overall project goal is to characterize the genetic basis for the apparent differences in prevalence of different serotypes and strain types of *L. monocytogenes* in the processing plant environment and in foods. The eventual goal is to develop improved strategies for targeted interventions aimed at reduction of *Listeria* burden in the processing plants, and in RTE foods of special relevance regarding risk for listeriosis, such as RTE meats. To contribute to this long-term objective, the project's specific objective will be to investigate expression of genes mediating adaptations highly relevant to the ability of the pathogen to colonize the processing plant and contaminate RTE meats.

4. Role of Protozoa in the Persistence of *Listeria monocytogenes* in a Ready-to-Eat Poultry Processing Plant

Meinersmann, Mark Berrang, Tim Hollibaugh, Joseph Frank, Agricultural Research Service, USDA, University of Georgia

Researchers will test the hypothesis that bacterivorous protozoa (protozoa that ingest bacteria) contribute to shaping bacterial communities in food processing plants and influence the survival of *L. monocytogenes* in floor drains. The proposed project is designed to identify *Listeria*-lytic protozoa and isolate them for further research for use in naturally decontaminating floor drains.

5. Reduction of *E. coli* O157:H7 and *Salmonella* in Ground Beef

Michael Doyle, Tong Zhao, University of Georgia

The goal of this project is to develop a safe, practical, easy-to-use, cost-effective and environmental-friendly surface treatment method to substantially reduce *E. coli* O157:H7 and *Salmonella* contamination in beef. This project will include three phases. Phase 1 will evaluate *E. coli* O157:H7 and *Salmonella* inactivation at 5-8°C on beef pieces by different combinations of levulinic acid and SDS. Phase 2 will evaluate with *E. coli* O157:H7 or *Salmonella* inactivation in ground beef treated with levulinic acid and SDS and stored frozen (-20°C) for up to 6 months. Phase 3 will simulate larger scale contamination and treatment conditions.

6. Evaluation and Performance of the Premi-Test™ *Salmonella* Serotyping System on Pork and Poultry Isolates from Commercial Sources

Margaret Hardin, Jayne Stratton, Marcos Sanchez-Plata, Texas A&M University, University of Nebraska-Lincoln, Inter-American Institute for the Cooperation in Agriculture

The overall goal of this project is to validate an alternative methodology that will be easy to use, rapid and convenient for processors to identify the types of strains of *Salmonella* present at different stages in their processing environments. To achieve this, researchers will evaluate the performance of the Premi-Test® *Salmonella*, a rapid serotyping methodology, to identify strains of *Salmonella* spp. isolates collected from pork and poultry sources. This kit will be evaluated on performance and compared to the current alternative available for *Salmonella* serotyping at the USDA, APHIS National Veterinary Services Laboratories in Ames, Iowa.

7. White Paper on Effectiveness of Existing Interventions on Virus Inactivation in Meat and Poultry Products

Ellin Doyle, Kathy Kurth, Andrew Milkowski, University of Wisconsin

The goals for this research are to: describe viruses associated with human disease and with animal disease that may potentially be present in meat and poultry products; review thermal and non-thermal methods for inactivation of viruses and their effectiveness and practicality in meat and poultry matrices; assess GMPs and SSOPs for their effectiveness in preventing viral contamination and destroying any viruses present in meat and poultry products; and determine and discuss current data gaps regarding inactivation of viruses.

8. A Workshop to Develop Reporting Guidelines for Interventions Studies in Food Safety and Production Animal Science: Modifying the CONSORT Statement

Annette O'Connor, Iowa State University

The overall goal of this workshop is to improve the quality and utility of intervention research, thereby making it more useful for decision makers. To achieve the goal of improving the reporting of food safety studies researchers propose to modify a document called the CONSORT statement (Consolidated Standards of Reporting Trials) that has been used to improve the quality of reporting on interventions trials in human medicine.

AMI President: Industry Has Made Great Food Safety Progress

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percent to less than one-half percent. The prevalence of *Listeria monocytogenes* in ready-to-eat products has been reduced by 74 percent to less than 0.4 percent. Similar improvements in the incidence of foodborne illness have also been reported by the Centers for Disease Control and Prevention (CDC). In that regard, since 2000, illnesses caused by *E. coli* O157:H7 are down by 40 percent and listeriosis is down by 10 percent with much of the improvement occurring before 2000.

Further, CDC data show that illnesses from pathogens most commonly associated with meat and poultry comprise a fraction of the total foodborne illnesses and deaths in the U.S.

When it comes to oversight, Boyle said that the meat and poultry industry supports a strong federal inspection system like the one in place at USDA. He told the committee that the approximately 8,000 employees of USDA's Food Safety Inspection Service (FSIS) inspect approximately 6,300 domestic meat and poultry operations and an additional 2,000 federal employees provide supervision and support services, at a total cost of more than one billion dollars. Plants processing live animals are inspected during all hours the plant is operating. Plants that further process meat and poultry products are inspected at least daily.

Boyle also said that the meat and poultry industry has been a strong advocate of a preventative approach and in fact petitioned USDA to mandate Hazard Analysis and Critical Control Point (HACCP) plans in and meat and poultry plants. That requirement took effect a decade ago and has helped enhance meat and poultry safety.

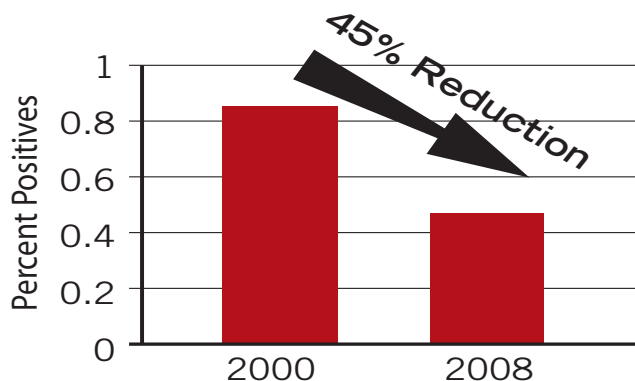
As part of HACCP programs, records are kept and made available to FSIS inspectors for review and procedures are established to verify that the system is working properly. During the course of a year, FSIS conducts more than 80,000 microbiological tests to verify that federally inspected establishments' production processes are under control.

Boyle said that federal law requires that foreign countries exporting to the U.S. must have an inspection system equivalent to the U.S. system. Thirty-three foreign countries are currently approved to ship products to the U.S. Meat and poultry products arriving at U.S. borders are also routinely inspected and sampled for laboratory analysis.

In concluding his remarks, Boyle detailed actions that the Institute believes will further improve food safety, including:

- A focus on government inspection programs that are designed and implemented to have a direct effect on improving public health
- Continual improvement of mandatory Hazard Analysis Critical Control Points (HACCP) and Standard Sanitary Operating Procedures (SSOP) that focuses on prevention versus detection

Prevalence of *E. coli* O157:H7 in Ground Beef



AMI President and CEO J. Patrick Boyle provided members of Congress with data reflecting the progress the meat industry has made in food safety.

- Full funding of government agencies to assure the safety of domestically produced and imported food is maintained

- Allocation of resources based on the public health risk posed by a particular food and the control measures that are used during the manufacturing and distribution process to control such risk
- Objective and achievable food safety standards that are scientifically determined to measure whether the food is safe for human consumption

- Compatibility of U.S. food safety standards with internationally

recognized standards such as Codex Alimentarius to protect the health of consumers, ensure fair trade practices and promote coordination of food standards development by the international community

- Government agencies involved in investigations of foodborne disease outbreaks or product recalls should be required to report the reasons such incidences occurred
- Rigorous government inspection and testing is needed to verify that consumer-ready products meet objective food safety standards
- Establishment of a public/private partnership to design and implement a comprehensive research program to improve food safety is needed

“It is indisputable that producing safe food is good for customers and good for business,” Boyle concluded. “To that end, the meat and poultry industry has been working to meet the challenge of continuously improving the safety of the products produced. Industry pledges to cooperate with all parties to ensure that the U.S. maintains the safest meat and poultry supply in the world.”

To view a copy of Boyle's testimony or the accompanying slides, go to www.meatami.com.

Science Soundbites

Irradiation Has Minimal Effect on Fatty Acid Composition

The effect of irradiation on beef fatty acid composition is minimal, a study by the United States Department of Agriculture (USDA) has found.

The study was conducted to investigate the possible formation of trans fatty acids due to the irradiation of ground beef and frankfurters. Ground beef and frankfurters were irradiated at doses of 0, 1 and 5 kGy at 4 degrees Celsius, and stored at 4 degrees Celsius for seven days (ground beef) or 3 months (frankfurters).

After irradiation and storage of the samples, trans fatty acids, along with other fatty acids, were analyzed. Irradiating to 1 kGy did not induce any change in the amount of measurable trans fatty acids. However, irradiating to 5 kGy level caused a small but statistically significant increase in the dominant trans fatty acid, C18.1 trans, which increased from 3.99 percent to 4.05 percent on the ground beef and from 1.21 percent to 1.28 on the frankfurter.

Irradiation had no apparent effect on C16:1 and C18.2 trans fatty acids. In addition, irradiation slightly decreased the relative amount of poly-unsaturated fatty acids in ground beef and frankfurters, particularly after storage. Compared to variations in trans fatty acid content and fatty acid composition naturally occurring in meat products, the changes due to irradiation were negligible.

Journal of Food Science, 74(2): C70-C84, 2009

Use of Ultraviolet Light in Combination with Potassium Lactate and Sodium Diacetate Could Reduce the Prevalence of *Listeria monocytogenes*

The use of ultraviolet light (UVC) in combination with potassium lactate

and sodium diacetate has the potential to reduce the number of frankfurter recalls and foodborne illness outbreaks, a study by the United States Department of Agriculture (USDA) has found.

In this study, the ability of UVC to inactivate *L. monocytogenes* on frankfurters containing potassium lactate (PL) and sodium diacetate (SDA), either before or after packaging, was investigated. UVC irradiation of frankfurters that were surface-inoculated with *L. monocytogenes* resulted in a log reduction of 1.31, 1.49, and 1.93 at doses of 1, 2 and 4 j/cm², respectively. Frankfurters treated with UVC doses up to 16 j/cm² did not increase mutagenesis in bacterial or human cells. UVC treatment of single-layer frankfurter packs at a dose of 2 J/cm² resulted in a 0.97 log reduction of *L. monocytogenes*.

Following eight weeks of refrigerated storage, *L. monocytogenes* levels decreased by only 0.65 log in non-UVC-treated frankfurter packs compared with 2.5 log in the UVC-treated packs.

Journal of Food Science, 74(3): M114-M119, 2009

Zinc Oxide Nanoparticles in Food Systems May Inhibit Certain Pathogens

The application of zinc oxide quantum dots (ZnO QDs) in food systems may be effective in the inhibition of certain pathogens, according to a new study by Texas A&M University.

ZnO QDs are nanoparticles of purified powdered ZnO. These were evaluated for antimicrobial activity against *Listeria monocytogenes*, *Salmonella* Enteritidis and *E. coli* O157:H7. The ZnO QDs were utilized as a powder, bound in a polystyrene film (ZnO-PS) or suspended in a polyvinylprolidone gel (ZnO-PVP). Bacteria were inoculated into culture media or liquid egg white (LEW) and incubated at 22 degrees Celsius. The inhibitory efficacies of ZnO QDs against the three pathogens were concentration

dependent and also related to the type of application.

The ZnO-PVP treatment resulted in a 5.3 log reduction of *L. monocytogenes* and 6.0 log reduction of *E. coli* O157:H7 in growth media after 48 hours of incubation when compared to the controls. *Listeria* in the LEW control increased from 3.8 to 7.2 log CFU/mL during the eight days of incubation, while the samples treated with 1.12 and .28 mg ZnO/mL were reduced to 1.4 and 3.0 log CFU/mL, respectively. After eight days of incubation, the cell populations of *Salmonella* in LEW in the presence of 1.12. and 0.28 mg ZnO/mL were reduced by 6.1 and 4.1 log CFU/mL over that of controls, respectively.

ZnO powder and ZnO-PVP showed significant antimicrobial properties against all three pathogens in growth media and LEW. ZnO-PVP had less inhibitory effect than the direct addition of ZnO-PVP. No antimicrobial properties of ZnO-PS film were observed.

Journal of Food Science, Vol.74, No.1, 2009

Restructuring Formulations Without Lactic Acid May Not Enhance Thermal Inactivation of *E. coli* O157:H7

Restructuring beef with salt/phosphate, algin, calcium, Aactiva RM or Fibrimex may not affect inactivation of internalized *E. coli* O157:H7 in undercooked ground beef, a study by Colorado State University has found. Inclusion of a lactic acid in non-intact beef products, however, may enhance inactivation when cooked to medium-rare degree of doneness.

Researchers mechanically mixed ground beef samples with a five-strain composite of *E. coli* O157:H7 and then with the restructured formulation with or without lactic acid. Product portions were extruded into plastic test tubes and stored before heating in a circulating water bath to simulate rare (*see page 10*)

AMIF Ongoing Research

Ongoing AMIF Research – *E. coli* O157:H7

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

Ongoing AMIF Research – *Listeria monocytogenes*

<u>Investigator</u>	<u>Institution</u>	<u>Project Title</u>
Mary Alice Smith, Joseph Frank	University of Georgia	Refinement of <i>Listeria monocytogenes</i> (<i>L. monocytogenes</i>) 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, Corliss O'Bryan, Betty Martin	University of Arkansas	Minimizing <i>Listeria</i> Cross Contamination of Ready-to-Eat Poultry Meats by the In-Store Deli Meat Slicer
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 <i>Listeria monocytogenes</i> , Phase II
Sophia Kathariou, Dana Hanson	North Carolina State University	Genetic Attributes Associated with the Ability of Different Serotypes of <i>Listeria monocytogenes</i> 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 <i>Listeria monocytogenes</i> in a Ready-to-Eat Poultry Processing Plant

Ongoing AMIF Research – Other Food Safety

<u>Investigator</u>	<u>Institution</u>	<u>Project Title</u>
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)

AMIF Ongoing Research

Ongoing AMIF Research – Salmonella

<u>Investigator</u>	<u>Institution</u>	<u>Project Title</u>
Annette O'Connor ¹	Iowa State University	A Systematic Review of Literature on Pork Chain Epidemiology
Randall Phebus, Douglas Powell, Harshavardhan Thippareddi	Kansas State University, University of Nebraska	Beyond Intent: Assessment and Validation of On-package Handling and Cooking Instructions for Uncooked, Breaded Meat and Poultry Products to Promote Consumer Practices that Reduce Foodborne Illness Risks (Targeted Research)
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 <i>E. coli</i> O157:H7 and <i>Salmonella</i> 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™ <i>Salmonella</i> Serotyping System on Pork and Poultry Isolates from Commercial Sources

¹Co-funded with the National Pork Board

Ongoing AMIF Research – Diet and Health

<u>Investigator</u>	<u>Institution</u>	<u>Project Title</u>
J. Scott Smith, Terry Houser, Melvin Hunt ²	Kansas State University	Analysis of Heterocyclic Amines (HCAs) Formation in Various Cooked Meat Products (Targeted Research)
Arthur Miller, Leila Barraj, Nga Tran, Terry Troxell ²	Exponent, Inc.	Assessment of the Potential Human Exposure to Heterocyclic Amines from Various Cooked Meat Products (Targeted Research)

Ongoing AMIF Research – Sodium Nitrite

<u>Investigator</u>	<u>Institution</u>	<u>Project Title</u>
Jimmy Keeton, Wes Osburn, Margaret Hardin ²	Texas A&M University	A National Survey of the Nitrite/ Nitrate Concentrations in Cured Meat Products and Non-meat Foods Available at Retail (Targeted Research)

²Co-funded with the National Pork Board

Science Soundbites

(from page 7)

or medium-rare degree of doneness in beef. Thermal destruction at 60 degrees Celsius was not different among all treatments and the control. Greater thermal inactivation of *E. coli* O157:H7 was obtained in samples treated with lactic acid alone when heated to 65 degrees.

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Researchers Develop Mathematical Equations for Predicting Growth of *Staphylococcus aureus* on RTE Meats

Researchers at the University of Wisconsin-Madison have developed mathematical equations for predicting whether *S. aureus* would grow in vacuum-packed, RTE products. Twenty-four commercial RTE meat products and 10 intentionally misprocessed products were inoculated with a five-strain cocktail of *S. aureus*, vacuum packaged, and stored at 21 degrees Celsius. Initial, 7-day, and 28-day *S. aureus* counts were recorded. The pH, water activity values, moisture: protein ration and percentage of water-phase salt were also determined for each sample.

Researchers found that *S. aureus* grew only in the intentionally misprocessed products and in some commercial products labeled “keep refrigerated.” Using bias reduction logistic regression data analysis, researchers found that the probability of *S. aureus* growth could be predicted by two equations. The first equation was based on pH and water activity values and the second was based on pH and percentage of water-phase salt levels. These equations accounted for observed *S. aureus* growth-no growth results and will be a useful tool for evaluating the shelf stability of RTE meats.

Journal of Food Protection, Vol. 72, No. 3, Pages 539-548

Staff on the Move

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

Jim Hodges, executive vice president, AMI

“The Future of Food Safety Regulation”
Farm Foundation Forum, Washington, D.C.
April 7, 2009

Janet Riley, senior vice president, public affairs and member services, AMI

Nutrition Update
Annual Meat Conference, Denver, Colo.
March 10, 2009

Crisis Communication: Managing a Crisis Effectively
Annual Meat Conference
Denver, Colo.
March 10, 2009

Scott Goltry, vice president, food safety and inspection services, AMI

“Safe Meat Supply”
National Institute for Animal Agriculture, Louisville, Ky.
April 1, 2009

“The Management of Food Safety: Practical Approaches”
Third Governor’s Conference on Ensuring Food Safety,
Lincoln, Neb.
May 5-7, 2009

Ashley Peterson, Ph.D., director, legislative affairs, AMI

“Animal Transportation Audits”
Livestock Transportation Conference, Alberta, Canada
January 29, 2009

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