

AMIF Foundation News

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Study Affirms Effectiveness of *Lactobacillus* in Reducing *E. coli* O157:H7 in Cattle

New research has shown the cattle fed a high level dose of *Lactobacillus acidophilus* strain 51 (HNP51) were 77 percent less likely to shed *E. coli* O157:H7.

The commercial-scale research conducted by Dr. Mindy Brashears of Texas Tech and Dr. Guy Lonergan of West Texas A&M University, affirms earlier, more limited research by Brashears which showed similar reductions in *E. coli* O157:H7 shedding when cattle were fed *Lactobacillus acidophilus*. The project was co-funded by AMIF and the National Cattlemen's Beef Association.

The study objective was to evaluate the effects of three different doses of *Lactobacillus acidophilus* strain NP 51 and a combination treatment of NP51 and NP45 on prevalence of *E. coli* O157:H7 in finishing beef cattle.

Lower doses of NP51 also decreased the fecal prevalence of *E. coli* O157:H7; however the higher doses were most effective. Of the cattle receiving direct fed microbials (DFM), a lower percentage had detectable levels on their hides, than the control groups. Cattle receiving low-level dosage (LNP51) and medium level dosage (MNP51) were 63 and 66 percent less likely to shed *E. coli*.

Three hundred steers were sorted into twelve blocks, according to body weight. Within each weight block, cattle received one of five treatments through out the feeding period: high, medium or low dose levels of NP51, a combination of NP51 and NP45, or control (no DFM). The finishing diet was steam-flaked corn-based (92 percent concentrate). All treatments contained *Propionibacterium freudenreichii* to enhance animal performance.

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E. coli O157:H7 Illnesses Drop 36 Percent

CDC Data Affirms Industry Food Safety Strategies

New data released by the Centers for Disease Control and Prevention (CDC) show that *E. coli* O157:H7 infections declined 36 percent between 2002 and 2003, the largest decline ever. Since 1996, *E. coli* O157:H7 infections have declined 42 percent.

While a variety of foods have been linked to these infections, efforts by the meat industry to reduce *E. coli* O157:H7 on beef products are clearly contributing to this downward trend, according James Hodges, president of the AMIF.

CDC also said that *Campylobacter* illnesses have dropped 28 percent, *Salmonella* illnesses have decreased by 17 percent and *Yersinia* illnesses dropped 49 percent since 1996. Illnesses caused by *Listeria monocytogenes*, which have been sharply decreasing for the last decade and which have very nearly reached the U.S Department of Health and Human Services *Healthy People 2010* public health goal of no more than 2.5 cases per million people, showed no statistically significant increase for 2003.

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Science Soundbites: A review of recent research

Diet-Heart Hypothesis

An article in the *Journal of the American College of Cardiology* March 3, 2004, argues that the diet-heart hypothesis may not be scientifically valid.

According to Sylvan Lee Weinberg, MD, MACC, director of medical education at the Dayton Heart Hospital, the idea that reducing the fat in one's diet can reduce the risk of coronary artery disease (CAD), has been controversial to date. In fact, he says the low-fat, high-carbohydrate diet has previously been promoted as responsible for decreasing serum cholesterol thus impacting CAD.

In his article, Weinberg says that following a clinical trial led by the National Institutes of Health, the medical community made broad conclusions regarding the health benefits of the diet. These conclusions were heralded by many in the medical community and triggered the introduction of large numbers of "low-fat" foods in retail establishments.

However, he says that this type diet has contributed to the increase in obesity, abnormal lipid patterns, type II diabetes and the metabolic syndrome. Separate studies by Yancey, WS, Jr. and Rosenman, RH, he notes, warned that there is no strong correlation between serum cholesterol and diet; therefore no connection to CAD. However, many individuals adjusted their diets accordingly, only to be disappointed with the results.

Now, Weinberg says the low-carb, high-protein diet has been evidenced to improve certain chemical balances and weight loss. Upon review of the studies on both diets, scientists have called for more study with longer duration to analyze possible effects on

cardiovascular outcomes and overall safety, according to Weinberg.

He argues that accolades for the diet heart hypothesis may have been premature.

Competitive Exclusion Bacteria Can Reduce *Listeria* in Floor Drains

Competitive exclusion can be used to reduce *Listeria* in floor drains in food processing plants, according to a new study by the University of Georgia College of Agricultural and Environmental Sciences.

The study sought to characterize microorganisms that could thrive with *Listeria* in biofilms in lower temperatures and that could control growth and/or eliminate *Lm*. Researchers noted that the cool temperature present in plants and drains, as well as moisture and biofilm development, can be difficult to overcome. Biofilms in particular make *Listeria* resistant to cleaners and sanitizers.

Two competitive exclusion (CE) bacteria in combination were chosen and a field trial was conducted at a poultry plant. Selected floor drains were tested five times at 2-week intervals and one time after sanitation for baseline counts (pre-CE application). CE was then applied four times during week one to each drain after normal sanitation. The CE treatment was applied twice per week, for three weeks.

After five weeks, results indicated that the CE bacteria substantially reduced *Listeria* in floor drains of the poultry plant.

For more information, contact Dr. Michael Doyle, University of Georgia - Center for Food Safety, 770-228-7284 or mdoyle@uga.edu.

Irradiation and Food Safety

According to Michael T. Osterholm, Ph.D., M.P.H. and Andrew P. Norgan, physicians and other health care professionals should advocate food irradiation to prevent foodborne illnesses.

Osterholm and Norgan made their comments in an article, *The Role of Irradiation in Food Safety*, *New England Journal of Medicine*, April 29, 2004. In fact, the authors argue that health care professionals need to educate the patients and the public on causes of foodborne illness. As with pasteurization, the health community can be vital to public acceptance, they say.

Osterholm and Norgan say that food safety benefits of irradiation outweigh its shortfalls.

Irradiation of food is not a new process — just under utilized. In fact, they note it has been used by hospitals, by NASA for food for astronauts. In addition, the U.S. School Lunch Program approved irradiated hamburgers in 2004.

The article notes that irradiation is supported both nationally and internationally by medical, scientific and public health organizations. Both the World Health Organization and the European Commission's Scientific Committee on Food have studied the safety and benefits of food irradiation.

The authors believe that most opposition comes from misinformation regarding irradiation and misunderstanding the causes of foodborne illness.

"The irradiation of food is not a panacea," wrote Osterholm and Norgan. "Toxins and prions are not eliminated by irradiation at standard commercial doses. Irradiation of food does not prevent subsequent contamination by food service workers or consumers."

Ongoing *Listeria monocytogenes* Research Projects

<u>Investigator</u>	<u>Institution</u>	<u>Project Title</u>	<u>Timeline</u>
Michael Doyle	University of Georgia	Recovery, Development and Validation of Appropriate Surrogate Microorganisms in Meat and Poultry Emulsions for In-plant Critical Control Point Validation Studies	Two years
Michael Doyle	University of Georgia	The Role of Aerosols in Transmission of Microorganisms (including <i>Listeria</i>) to Ready-to-Eat Meat/Poultry Products	Two years
Ferencz Denes	University of Wisconsin-Madison	Plasma-Enhanced Disinfection of Surfaces, Air, and Water in Ready-To-Eat (RTE) Meat and Poultry Processing Environments	Two years
ILSI Steering Committee	International Life Sciences Institute	Expert Scientific Review Panel on <i>Listeria monocytogenes</i> In Foods	18 months
Eric Johnson and Kathleen Glass	University of Wisconsin – Madison	Intervention Strategies: Control of <i>Listeria monocytogenes</i> in Processed Meat and Poultry by Combinations of Antimicrobials	Two years
Bradley Marks, Alden Booren and Elliot Ryser	Michigan State University	Verifying and Improving the Utilization of Microbial Pathogen Computer Models for Validating Thermal Processes in the Meat Industry	Two years
John Sofos	Colorado State University ^x	Comparison of Use of Activated Lactoferrin with Use of a ‘Gold Standard’ Combination/Concentration of Antimicrobials for Post-Processing Control of <i>Listeria monocytogenes</i> in Ready-to-Eat Meat Products	One year
Kumar Venkitanarayanan	University of Connecticut ^x	Inactivation of <i>Listeria monocytogenes</i> on Ready-to-Eat Meat Products (Deli Turkey Breast and Frankfurter) by Monocaprylin	Two years
Peter Muriana, J. Roy Escoubas	Oklahoma State ^x	Pre- and Post-package Pasteurization of RTE Meats for Reduction of <i>Listeria monocytogenes</i>	18 months
Barbara Petersen, Leila Barra	Exponent, Inc.	FSIS Risk Assessment for <i>Listeria monocytogenes</i> in Deli Meats	One year
Robert Vinopal, Richard Jadamec	University of Connecticut	Development of Ion Mobility Spectrometry (IMS) Applications for <i>Listeria</i> Detection and Monitoring In-Plant Food Processing Plants	Two years

Ongoing *E. coli* O157:H7 Research Projects

<u>Investigator</u>	<u>Institution</u>	<u>Project Title</u>	<u>Timeline</u>
Alison O’Brien	Uniformed Services University of the Health Sciences	<i>E. coli</i> O157:H7 Intimin Expressed by Transgenic Plant Cells as a Candidate Oral Vaccine for Cattle	Three years
Michael Doyle	University of Georgia	Methods to Control <i>E. coli</i> O157:H7 in Drinking Water for Cattle	Two years
Chobi DebRoy	Pennsylvania State University	Competitive Exclusion of <i>Escherichia coli</i> O157 using Non Pathogenic Colicin Producing <i>Escherichia coli</i> Strains	One year
Charles Kaspar	University of Wisconsin	The Use of Egg Yolk Anti-O157:H7 Immunoglobulin to Clear <i>E. coli</i> O157:H7 from the Intestinal Tracts of Cattle	Two years
Mindy Brashears ¹ , Michael Galyean ¹ , Guy Loneragan ² , Springs Younts Dahl ¹	¹ Texas Tech University, West Texas A&M University ²	Reduction of <i>E. coli</i> O157:H7 in Beef Feedlot Cattle using Varying Doses of a Direct-Fed Microbial	One year
Mohammed Koohmaraie	USDA, ARS, MARC	Beef Carcass Surface Irradiation (Co-funded by the Cattlemen’s Beef Board)	Two years
Ann Marie McNamara	Silliker Lab	Comparison of Rapid Test Methods & Validation of Composite Sampling for Detection of <i>E. coli</i> O157:H7 in Raw Beef Trims & Raw Ground Beef (Co-funded by the Cattlemen’s Beef Board)	10 months
John Seanga	Colorado State ^x University	Use of Warm (55°C) 2.5% or 5.0% Lactic Acid for: (A) Reducing Microbial Counts on Beef Subprimal Cuts & Beef Trimmings Fol. Fabrication, and (B) Reducing Incidence of <i>E. coli</i> O157:H7 in Combo-Bins of Beef Trimmings and Inside (in the interior) Beef Cuts Subjected to Blade/ Needle or Moisture-Enhancement Tenderization	One year
Kumar Venkitanarayanan	University of Connecticut ^x	Inactivation of <i>Escherichia coli</i> O157:H7 in Drinking Water of Cattle by Sodium Caprylate	One year

x - newly approved in Jan. 2004

First International Meat Animal Welfare Research Conference Draws 100 Attendees

A roster of some of the top scientists and researchers in livestock handling and animal science told attendees at the industry's first-ever research conference on animal handling that "there are no easy answers to developing animal welfare strategies" that effectively balance ethics, economics and consumer demands.

Nonetheless, it is clear that scientific research must pave the way for advances in animal welfare, the conference's moderator said, and progress on such research is best supported in the kind of collective effort represented at the conference.

"A sustained dialogue on important animal handling issues will translate into a better understanding of the science surrounding livestock welfare," said Randall Huffman, AMI Foundation vice president of Scientific Affairs, who served as moderator. "By setting aside the emotions associated with what at times are highly charged issues and focusing on scientific research related

to animal welfare, I firmly believe we can make the best decisions and achieve the most progress."

The IMAWRC meeting, co-sponsored by the Federation of Animal Science Societies, included presentations from nine expert speakers discussing cattle and pig welfare during livestock production, transportation and processing.

Public perceptions continue to shift.

Keynoter Jeff Armstrong, Ph.D., Michigan State University, described how public perception of the meat industry has changed as society has evolved from its agricultural roots and as activist organizations impact public opinion, both in the United States and worldwide.

Armstrong provided a real-world example from the egg industry. Despite the relatively well-known science surrounding space allocation for laying hens, the public's perception of how that issue should be managed is different

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(E. coli at Feedlots) from page 1

To determine prevalence, fecal and hide samples were collected. Rectal samples were collected upon arrival to the feedlot and every 28 days throughout the feeding period. Hide samples were collected at the end of the feeding period, prior to harvest. On the day of harvest, fecal and hide samples were collected at the feedlot. Techniques were used to avoid cross-contamination. Hide samples were taken using a sponge swabbed over an area of the perineum, on the animal's right side. With regard to hide prevalence, cattle receiving HNP51 were 62 percent less likely to be carrying *E. coli* O157:H7 on their hides than the control group.

Methods used to identify the presence of *E. coli* O157:H7 were based on immunomagnetic separation procedure followed by selective plating, biochemical testing and latex agglutination tests.

Feedlot performance and feed efficiency were measured. At harvest, carcass data including hot carcass weight, back fat thickness, longissimus muscle area, percentage of pelvic and heart fat and

percentage of carcasses grading USDA Choice was also captured.

Descriptive statistics were generated for the prevalence of *E. coli* O157:H7 in fecal matter and on hides and was presented in tabular and graphic formats. The research was conducted between April 1, 2003, and March 30, 2004.

This study results pointed to two conclusions: 1) finishing diets supplemented with high levels of NP51 lower the shedding of *E. coli* O157:H7 and 2) lower doses of NP51 may also be effective during the feeding period. Additional findings show that NP51 and NP45 may be antagonistic. There was a higher prevalence of *E. coli* in cattle receiving a combination of NP51 and NP45 than those receiving only NP51.

"This research provides important information about the value of direct-fed microbials as an effective pre-harvest, food safety strategy," according to AMIF vice president of scientific affairs Randall Huffman, Ph.D.

Fallout from BSE Case Continues to Challenge Industry; AMI Foundation Makes Case for Science-Based Policies

Fallout from a single case of BSE diagnosed in Washington State cow Dec. 23 continues to challenge the beef industry as export markets - which normally purchase ten percent of annual U.S. beef production — remain largely closed except for a partial reopening of Canada and Mexico.

Since January, U.S. meat packers have implemented extraordinary new measures aimed at taking the near zero risk that BSE poses to other U.S. cattle and to the public health even closer to zero. These measures include a prohibition on the processing of non-ambulatory animals, a prohibition on air-injected pneumatic stunning (which the industry voluntarily discontinued more than five years ago), removal of specified risk materials from the human food chain and new restrictions on the use of advanced meat recovery systems.

U.S. negotiators have met repeatedly with major trading partners in an effort to address concerns about the U.S. BSE prevention and surveillance system and to educate international officials about what has been done in the U.S. to mitigate risk. Mexico and Canada have restored partial trade with the U.S., but Asian markets have remained solidly closed to U.S. beef.

Japan and the United States have announced that working groups are being established to begin intensive negotiations about reestablishing trade. Japanese officials have indicated that the nation's 100 percent BSE testing policy - a practice they are seeking from U.S. exports of beef to Japan - is being reevaluated. Japan is the only nation with a 100 percent testing policy in place. The Japanese market alone is valued at \$1.2 billion.

In a direct response to recommendations from an International Review Team, Agriculture Secretary Ann Veneman announced that USDA would increase its cattle surveillance program for BSE from the 20,000 tests conducted in FY 2003 (which exceeded international standards by 40 times) to a new, one-time level of nearly 300,000 over the next 12-18 months. That surveillance will focus on non-ambulatory animals and those displaying neurological symptoms, but will also include 20,000 older, healthy animals.

The AMI Foundation has offered public support for aggressive surveillance. However, AMIF has said that calls for 100 percent testing, which would include younger animals, is without scientific merit. The limitations of the diagnostic test kits dictate that the test will only work about 1-6 months prior to clinical onset of disease. On average, clinical onset occurs at about 5 years of age. More than 80 percent of U.S. cattle are slaughtered prior to 2-1/2 years of age. Notably, the one of the nation's leading BSE experts, Dr. Will Hueston, DVM, of the University of Minnesota recently told *Feedstuffs* that if he ordered a BSE test on a young animal, that would constitute veterinary malpractice.

Media Tours

In an effort to convey the facts surrounding the U.S. BSE risk and to provide an overview of mitigation measures taken to reduce that risk, AMIF President Jim Hodges and Vice President of Scientific Affairs Randy Huffman have engaged in dozens of briefings for reporters and editorial boards in a dozen cities nationwide.

In addition, Hodges led a briefing for international media based in Washington April 8 to detail the health of U.S. herds and the safety of U.S. beef.

In all meetings, AMIF officials have explained that under Office of International Epizootics (OIE) guidelines, no nation with BSE should ever be prohibited from exporting beef so long as they have taken appropriate, science-based risk mitigation measures to address their nation's BSE risk issues. AMIF officials have expressed concern that although these guidelines exist, member nations - including the United States - are not following them.

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than what the science indicates is necessary or appropriate. "But do not confuse being proactive with caving-in to activists," Armstrong cautioned, noting the relatively small number of researchers working on animal welfare and the need for greater focus and funding.

Armstrong's takeaway message was straightforward: "Collectively, the meat industry and the research community must be part of the solution by working together and by implementing science-based guidelines focusing on welfare, economics, food safety and consumer concerns."

Key issues in cattle production.

Karen Schwartzkoph-Genswein, Ph.D., a research scientist from Agriculture and Agri-Foods Canada in Lethbridge, Alberta, Canada, reviewed the scientific literature on castration, dehorning, tail docking and branding to evaluate the benefits and outcomes of the welfare-related research and potential alternatives.

Castration: Genswein said that "burdizzo" a bloodless castration method that crushes the spermatic cord, might cause less acute pain than the knife or rubber band method. The research indicates that surgical knife and burdizzo methods may cause less chronic pain than the rubber band method. Pain can be managed by performing the procedure before eight weeks of age or using a local anesthetic if the calf is older than eight weeks.

Dehorning: This process, which is done to reduce risk of bruising of adjacent animals during rearing and transport, can be performed with at least six methods of dehorning, electri-

cal and scoop methods being most prominent. Although research is limited, the scoop method is generally considered to cause greater animal discomfort than the electrical method. Genswein suggested "polled genetics" as a viable alternative, and the use of local anesthetic and analgesics as pain management techniques.

Tail docking: Practiced in the dairy industry to enhance udder cleanliness, reduce disease transfer and reduce milker discomfort, research has discounted these benefits. Genswein provided two alternatives to tail docking in dairies: Don't do it, or remove the switch only.

Branding: Using innovative means to measure cattle discomfort, Genswein demonstrated that both hot branding and freeze branding cause significant pain. However, the data indicate that freeze branding may be preferable. The alternatives include simply eliminating branding or replacing it with the use of an electronic identification system.

Issues in cattle transportation.

Temple Grandin, Ph.D., a University of Colorado associate professor and world-renowned animal-handling expert, explained that the most important issue is ensuring that animals are fit for transport, as determined primarily by body condition score and lameness score. Grandin emphasized the importance of careful driving and proper loading of trucks, indicating that there is an optimum stocking density for cattle trucks — both too few or too many cattle can increase the amount of bruising.

Grandin commented on how the factors that increase bruising may be reduced when producers or shippers

are held accountable financially. She also presented results showing that multiple auction barn stops increase the rate of bruising, versus cattle marketed directly from the farm. She also stressed the importance of using non-electric driving aids and having fully trained handlers. "What gets measured gets improved," Grandin said.

The impact of non-ambulatory cattle.

Carolyn Stull, Ph.D., University of California-Davis, provided data from a California study showing that 91 percent of non-ambulatory in the state are from dairies. In one economic study calculating condemn rates and other cost associated, the actual value of each non-ambulatory cow was only \$28.70 a head. In California, the average herd has about nine non-ambulatory cows a year; thus the total value of such cows per herd averaged about \$258 a year.

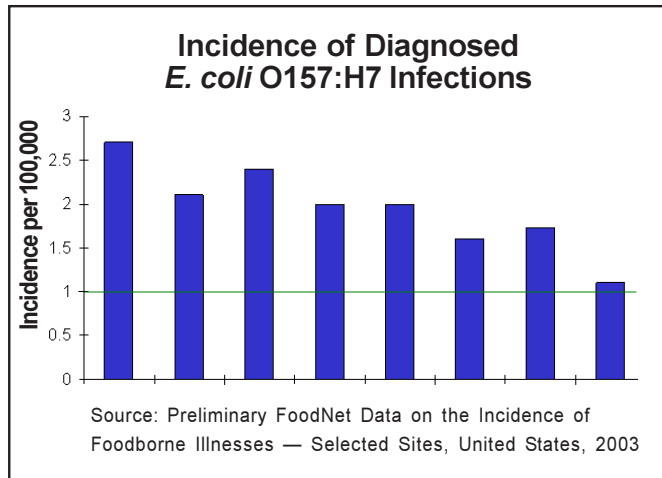
Stull described some of the animal welfare challenges resulting from new USDA regulations regarding the disposition of non-ambulatory animals. She emphasized the need for appropriate care and training for on-farm euthanasia, since a great number of these non-ambulatory animals will now be diverted from the processing plants.

Heat stress on feedlot cattle.

Frank Mitloehner, Ph.D., University of California-Davis, reviewed four, Texas Tech University studies on the effects of shade, misting and sprinklers on cattle stress. The general conclusion was that providing shade for feedlot cattle could have a positive impact on well-being and improve performance and carcass characteristics. The costs of installing shade were

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These data confirm that efforts to control *Listeria monocytogenes* in the meat industry are having a sustained and measurable impact on meat safety.

In *Morbidity and Mortality Weekly Reports* CDC said, “The changes in the incidence of these infections occurred in the context of control measures implemented by government agencies and the food industry, enhanced food-safety education efforts, and increased attention by consumer groups and the media.”

In a media teleconference, USDA Under Secretary for Food Safety Dr. Elsa Murano noted, “The reduction in *E. coli* O157:H7 illnesses brings the U.S. very close to achieving the ‘Healthy People 2010’ goal of 1.0 case per 100,000 people.”

“Efforts by industry, efforts by individuals and efforts by regulatory agencies seem to have us headed in the right direction,” said Dr. Robert Tauxe of the CDC.

“In 2001, the AMI Foundation declared that its two priorities would be to reduce and ultimately eliminate *E. coli* O157:H7 on fresh beef products and *Listeria monocytogenes* on ready-to-eat products,” Hodges said. “Data collected by USDA have demonstrated sustained decreases over time in bacteria on the products themselves. CDC’s new data tell us that the enhanced safety of our products are having public health benefits.”

According to Hodges, AMI member companies in 2001 declared food safety a non-competitive issue. The industry

also invested several million dollars in research aimed at finding new and better ways to eliminate bacteria.

In addition, a number of new and important technologies and practices have been implemented:

- Enhanced aggressive microbiological sampling and testing programs for *E. coli* O157:H7, *Listeria*, *Salmonella* and other bacteria;
- Changes to cattle feeding practices that reduce bacteria in live animals;
- Anti-pathogen technologies like steam pasteurization cabinets, steam vacuum systems and carcass washing systems in fresh meat plants that destroy bacteria on carcasses and meat cuts during processing;
- New ingredients that are added to some ready-to-eat meat and poultry products that prevent the growth of bacteria;
- New principles for sanitary design of plants producing ready-to-eat meat and poultry that help better sanitize and destroy bacteria in the environment.

Research is ongoing to find additional technologies that will reduce bacteria even further.

Charts showing foodborne illness declines and decreases in bacteria levels on meat and poultry can be viewed at www.AMIF.org

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AMIF-sponsored conferences and educational events

Facility Sanitary Design Workshop

When: Sept. 29, 2004

Where: Gaylord Opryland Resort and Convention Center
2800 Opryland Drive, Nashville, Tenn. • (615) 889-1000

What: Facility layout and design are key factors in ensuring the safety of meat and poultry products. This AMI Foundation seminar will help companies design, renovate, and remodel facilities for enhanced sanitation and food safety. The Facility Sanitary Design Workshop will be held prior to the 2004 Annual Convention and Innovation Show case.

Contact: To register, contact Katie Brannan at 703-841- 3621 or kbrannan@meatami.com.

2004 AMI Annual Convention featuring the Innovation Showcase

When: Sept. 30 – Oct. 2, 2004 (Sept. 30 - Oct. 1, Exhibits Open)

Where: Gaylord Opryland Resort and Convention Center
2800 Opryland Drive, Nashville, Tenn. • (615) 889-1000

What: This is a valuable opportunity in 2004 to gain the latest insights and perspectives on the meat and poultry industry. Visit with some of the most creative companies in the industry at the Innovation Showcase. This convention is the perfect place to discuss the future of the industry with those that will help to create it.

Contact: To register, contact Katie Brannan at 703-841- 3621 or kbrannan@meatami.com.

Meat Industry Research Conference

When: Sept. 30 – Oct. 2, 2004

Where: Gaylord Opryland Resort and Convention Center
2800 Opryland Drive, Nashville, Tenn. • (615) 889-1000

What: MIRC is an educational track of the annual convention, which focuses on meat science and scientific research. This year, the topics will include food safety issues and updates: pathogens, antibiotic use and nutrition; traceability issues; and quality and consistency.

Contact: To register, contact Katie Brannan at 703-841- 3621 or kbrannan@meatami.com.

Listeria Intervention and Control Workshop

When: November 3-4, 2004

Where: Hyatt Regency O'Hare, 9300 W. Bryn Mawr Ave.
Rosemont, IL • (847) 696-1234

What: This workshop is designed to help AMI members examine the issues surrounding testing and to provide experience in the development of standards and procedures for processing RTE products under FSIS's finalized rule. The Food Safety and Inspection Service will soon require plants producing RTE products to implement an environmental testing program for *L. monocytogenes*.

Contact: To register, contact Katie Brannan at 703-841- 3621 or kbrannan@meatami.com.

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offset by the improved cattle performance and carcass quality.

Interestingly, there were behavioral differences noted in these studies: At the plant.

Matt Ritter, a graduate student at the University of Illinois, presented a relatively new definition of non-ambulatory animals:

NAI : "Non ambulatory, injured"

NANI: "Non ambulatory, non injured"

Ritter indicated that no solid data on the prevalence of these two classifications of pigs is available, although FSIS data shows the rate of "dead on arrival" (DOA) pigs is about 0.25 percent. Ritter described a study showing a strong correlation between DOA and non-ambulatory pigs. Moreover, data show that NANIs are not simply related to handling but are likely affected by multiple factors associated with stressors on the farm and during handling and transport.

Non-ambulatory pigs are a significant animal welfare issue and economic issue, Ritter concluded and the industry needs more research. However, by applying existing knowledge and practices about handling the incidence can be reduced.

Issues related to sow gestation housing.

Ed Pajor, Ph.D., Purdue University, described the current science and controversies surrounding gestation sow housing and the pros and cons of both gestation crates and "group housing" as they relate to floor feeding, trickle feeding, feed stalls, electronic systems, group size issues and type of flooring.

Pajor highlighted the discrepancies in the scientific literature regarding comparative production data on the two systems. For instance, a 1991 review of 15 research studies comparing group housing to stall housing showed eight group systems with better reproduction and four stalls with better reproduction.

"This issue will continue to be contentious," Pajor stated, and proper stockmanship and husbandry — along with economics and management — will remain the focal point of future research.