AMI Foundation News

A quarterly update on research, education and information

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New CDC Data: Fewer Foodborne Illnesses Than Previously Estimated

Two new papers released by the Centers for Disease Control and Prevention (CDC) estimate that 9.4 million illnesses, 55,961 hospitalizations and 1,351 deaths per year are caused by known foodborne pathogens — less than previously estimated by CDC.

The data represents the first comprehensive analysis released by CDC since a 1999 paper published by Paul Mead, M.D., M.P.H. Mead's analysis estimated that known foodborne widely cited pathogens caused 14 million illnesses, 60,000 hospitalizations and 1,800 deaths.

According to the new estimates, the pathogens that caused the most illnesses were norovirus (58 percent); nontyphoidal *Salmonella* spp (11 percent); *Clostridum perfringens* (10 percent), and *Campylobacter* (9 percent). The leading causes of death by pathogen were nontyhpoidal *Salmonella spp* (28 percent); *Toxoplasma gondii* (24 percent); *Listeria monocytogenes* (19 percent) and norovirus (11 percent). The paper does not attribute foodborne illnesses to their food sources.

The CDC said that "unspecified agents" also cause 38.4 million foodborne illnesses, 71,878 hospitalizations and 1,686 deaths annually. The CDC defines unspecified agents as "a group of less understood agents" that may be possible causes of foodborne illness, including mushroom and marine biotoxins and little-

National Health Objectives for 2020 Released

The U.S. Department of Health and Human Services in December released *Healthy People 2020,* the nation's new 10-year goals and objectives for health promotion and disease prevention. These national health objectives have been used to guide regulatory and public health policies for more than three decades.

Healthy People 2020 has 42 topic areas where improvements can be made to affect positive health outcomes. These topic areas include food safety, nutrition and weight status, physical activity, preparedness, cancer and tobacco use among others. The food safety topic area has six objectives:

1. Reduce infections caused by key pathogens transmitted commonly through food.
2. Reduce the number of outbreak-related infections due to Shiga toxin-producing *Escherichia coli* O157, or *Campylobacter*, *Listeria* or *Salmonella* species associated with food commodity groups.
3. Prevent an increase in the proportion

▶ **AMIF Research**

White Paper Highlights Nutritional Benefits of Meat

The "nutrient density" (amount of nutrients relative to caloric content) of red meat is greater than that of poultry and non-meat proteins, according to an AMI Foundation-funded white paper prepared by the University of Illinois examining meat's nutritional benefits.

"Beef, lamb, pork, and poultry all provide 20-30 g of protein/100 calories, however the iron content of poultry is less than half that in beef," noted researchers Susan Brewer, Ph.D., R.D. and Terry Hatch, M.D.

When comparing meat to soybean products, boiled green soybeans and tofu, researchers noted that the soybean products contain about half the amount of protein as red meat and poultry, less iron and no vitamin B12. While corn, rice and kidney beans contain significantly fewer calories than the animal protein sources, they also contain less protein and iron, and no vitamin B12. Soybeans, black beans, pinto beans and kidney beans contain substantially more iron than lamb or beef, however,

CDC Releases Goals and Objectives for Health Promotion and Disease

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of nontyphoidal *Salmonella* and *Campylobacter jejuni* isolates from humans that are resistant to antimicrobial drugs.

4. Reduce severe allergic reactions to food among adults with a food allergy diagnosis.

5. Increase the proportion of consumers who follow key food safety practices.

6. Improve food safety practices associated with foodborne illness in foodservice and retail establishments.

Progress towards Healthy People Objectives for Foodborne Illnesses

*Reported 2009 data are preliminary; FoodNet collects reports of laboratory-confirmed infections, which represent a fraction of the total number of infections in the population, because many infections are not laboratory confirmed

**Shiga toxin-producing *Escherichia coli*
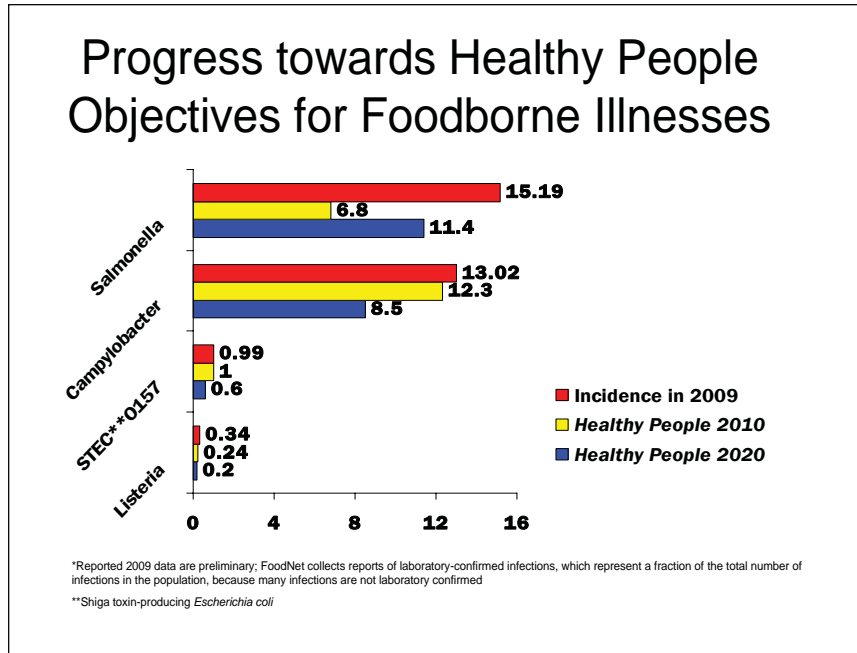
The targets represent a 10 percent reduction of outbreak cases reported to the National Outbreak Reporting System, CDC and State public health agencies from the baseline years of 2005-7.

The 2020 targets and the baseline numbers as cases per year are also listed below.

The food safety 2020 targets for Objective 1 are based upon a specific percent reduction for the pathogen based on the average cases of illnesses from 2006-2008 reported to the Centers for Disease Control and Prevention (CDC) FoodNet program. The targets for 2020 and the percent reductions, along with the 2010 targets and the most current FoodNet data from are outlined in the accompanying chart.

Food Safety Objective 2 is new to *Healthy People 2020*.

	Baseline Data	2020 Targets
Beef	200	180
Dairy	786	707
Leafy Vegetables	205	185
Poultry	258	232
Fruit and Nuts	311	280

Full details of the remaining four objectives, as well as the complete set of *Healthy People 2020* goals, are available at www.healthypeople.gov/2020/

CDC Data Confirm That Food Supply is Safer; Strategies are Working

(from page 1)

known bacterial pathogens like *Aeoromonas, Edwarsiella,* and *Plesiomonas*. Unspecified agents caused 80 percent of all illnesses and 56 percent of all hospitalizations and deaths.
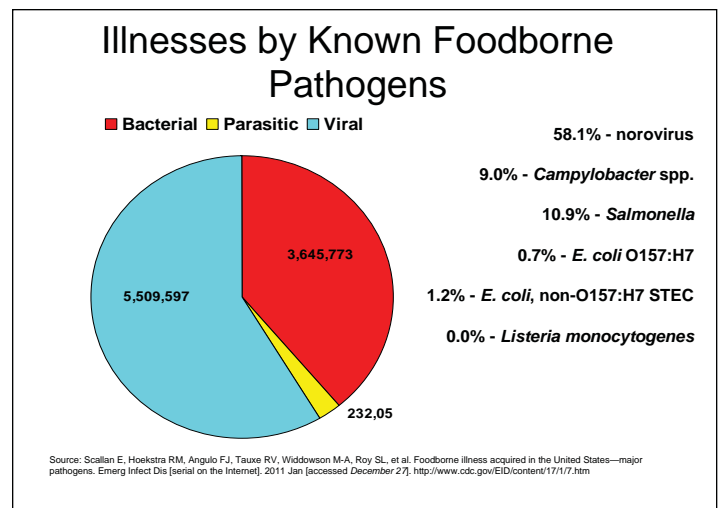
In a press release, the CDC stated that the papers provide the most accurate estimate to date about which foodborne pathogens are causing the most illnesses, as well as estimating the proportion of foodborne illness without a known cause.

"We've made progress in better understanding the burden of foodborne illness and unfortunately, far too many people continue to get sick from the food they eat," said CDC Director Thomas Frieden, M.D., M.P.H.

In a teleconference, the CDC said that annual FoodNet Surveillance monitoring of nine pathogens has shown a 20 percent annual decline in laboratory confirmed illnesses.

"The new data, coupled with FoodNet data trends, confirm what we have known: that our food supply is getting safer every day," said AMI Foundation President James H. Hodges, who oversees the Foundation's food safety research program.

"The new data tell us that our food safety strategies have been working and we need to sustain our research efforts."

Illnesses by Known Foodborne Pathogens

■ Bacterial ■ Parasitic ■ Viral

58.1% - norovirus

9.0% - *Campylobacter* spp.

10.9% - *Salmonella*

0.7% - *E. coli* O157:H7

1.2% - *E. coli*, non-O157:H7 STEC

0.0% - *Listeria monocytogenes*

Source: Scallan E, Hoekstra RM, Angulo FJ, Tauxe RV, Widdowson M-A, Roy SL, et al. Foodborne illness acquired in the United States—major pathogens. Emerg Infect Dis [serial on the Internet]. 2011 Jan [accessed *December 27*]. http://www.cdc.gov/EID/content/17/1/7.htm

Even one foodborne illness linked to meat and poultry products is cause for concern and we will not be satisfied until our food supply is even safer," Hodges commented.

▶**Foundation Focus: Ground Beef Research**

AMIF Continues Long-Term Investment in Improving Beef Safety

Shiga toxin-producing *Escherichia coli* (STEC) research continues to be a significant public health concern to the beef industry and the American Meat Institute Foundation will continue to invest in research aimed at reducing and eliminating *E. coli* O157:H7 in fresh beef.

This long-term investment in research and the meat industry's proactive actions demonstrating its dedication in providing the safest product possible were conveyed in a November 2010 letter from AMIF President James H. Hodges to Under Secretary for Food Safety Elisabeth Hagen, M.D.

Since 1999, 25 research projects funded by the Foundation totaling $2 million have focused on *E. coli* O157:H7 in beef products. These projects have helped develop new technologies to reduce microbial hazards in beef products and to gain a better understanding of the taxonomy of microorganisms to select or create innovative antimicrobials for industry use.

In 2006, the Foundation began to include the non-O157:H7 STECs in its research priorities. This culminated in 2009 with the funding of AMIF's first research project dealing with sources of non-O157 STECs. As USDA's Food Safety and Inspection Service (FSIS) has narrowed its focus on specific STEC strains in addition to O157:H7, so too has the Foundation. This decision was the next logical step to understanding better how *E. coli* O157:H7 and STECs colonize in the same live animal, potentially contaminate the same products, and to determine if the same antimicrobial interventions work equally well for all strains.

During the evaluation of its 2009-2010 request for proposals, the Foundation determined a need for a more focused approach to food safety research on STECs. As a result, a special supplemental request for proposals was distributed to the research community in January 2010. This has led to funding at three institutions. Projects currently under way include:

Antimicrobial interventions/application methods for the reduction of *E. coli* O157:H7 and *Salmonella* in beef trimming and/or ground beef - University of Arkansas, Safe Foods International
The main focus of this research is to utilize and validate antimicrobial properties of peroxyacetic acid, novel organic acids alone or in combination with a non-ionic surfactant on beef trimmings against *E. coli* O157:H7 O26, O103, O111, O121, O45, and O145 and *Salmonella* Typhimurium DT 104, Newport MDR-AmpC.

Evaluation of chemical decontamination treatments for beef trimmings against *E coli* O157:H7, non-O157 shiga toxin-producing *E. coli* and antibiotic resistant and susceptible *Salmonella* Typhimurium and *Salmonella* Newport - Colorado State University
The objective of the proposed study is to determine whether interventions known for reducing *E. coli* O157:H7 contamination on beef trimmings are also effective against *E. coli* O157:H7, non-O157 STEC (O26, O45, O103, O111, O121, and O145), and parent and derived *Salmonella* Typhimurium and *Salmonella* Newport strains.

Efficacy of commonly used antimicrobial compounds on decontamination of Shiga toxin-producing *E. coli* serotypes O45, O121, and *Salmonella* inoculated fresh meat - USDA-ARS-U.S. Meat Animal Research Center
The overall objective is to validate effectiveness of antimicrobial compound treatments on inactivation of STEC and *Salmonella* (MDR versus non-MDR strains) inoculated fresh beef. This study will complete other ARS work by adding the other two non-O157 STECS from the CDCs top six and include MDR and non-MDR *Salmonella* Typhimurium and Newport.

Evaluating the Efficacy of Commonly used Antimicrobial Interventions on Shiga-toxin Producing *E. coli* Serotypes O26, O103, O111, O145 and O157 - USDA-ARS-U.S. Meat Animal Research Center
This research aims to validate the effectiveness of hot water, lactic acid, peroxyacetic acid, and other commercial antimicrobials on the inactivation of STEC inoculated fresh beef.

In addition to research, the Foundation and AMI members believe food safety is further improved through adoption of recommended practices and education programs and have developed a best practices document for consideration when manufacturing retail ground beef patties. A curriculum focusing on the safe production of ground beef, has also been developed by AMI member experts.

AMIF Safe Ground Beef Production Workshop Slated for February 2-3, 2011

The inaugural AMI Foundation ground beef safety workshop will be held on February 2-3, 2011, at the Marriott Country Club Plaza in Kansas City.

This workshop will be led by industry experts who will share their experiences and knowledge on the production of ground beef products within a preventative food safety system. During this workshop, participants will hear detailed case studies about ground beef production and food safety challenges and how companies have tackled them.

The workshop agenda is structured to permit extensive discussion with fellow attendees in an effort that participants return to their companies armed not just with theory, but with practical, new ideas and information that can be implemented.

Topics include: achieving regulatory compliance, design of ground beef patties, understanding risk, developing a supplier specification, verification and testing and lot and traceability.

For additional information on this new workshop, visit the Events/Education section of www.meatami.com.

AMI Foundation White Paper Highlights Nutritional Benefits of Meat

(from page 1)

meat products contain heme iron, while that in vegetable protein sources is in the non-heme form. Absorption of heme iron is efficient while that of non-heme iron is not. Zinc and niacin are required for a number of enzymes in the energy production pathways.

"The majority of the zinc and niacin in the American diet are derived from meat, poultry and fish," the report stated. "Vitamin B12 is required for the formation of red blood cells and for fatty acid metabolism in the formation of the myelin sheath surrounding nerves. It is found in essentially all animal food sources, particularly in fish, milk, eggs, meat, poultry and liver, but not in vegetable foods."

Regarding amino acid balance (5 percent lysine, 3.5 percent sulfur-containing amino acids, 4 percent threonine, 1 percent tryptophan and 7 percent leucine) the study noted that lamb, pork, chicken breast, turkey breast, tuna and salmon meet all the requirements while beef meets the proportional requirements with the exception of tryptophan. Soybeans (boiled, mature), black beans and kidney beans meet all the proportional requirements except the sulfur-containing amino acids. Pinto beans and split peas meet all except for the sulfur-containing amino acids and threonine. The most commonly deficient proportional essential amino acid among the vegetable-based protein sources are the sulfur-containing amino acids.

The study also examined glycemic response, the increase in blood glucose after consuming a food.

"The concept of the Glycemic Index has been controversial because it reflects how quickly a food raises blood sugar levels, but it does not take into account the total carbohydrate content in a serving of the food, which is an important component of the glycemic response. However, animal-derived muscle foods contain no carbohydrate, so they do not increase blood sugar. In addition, dietary protein significantly reduces the glycemic response of carbohydrate. Vegetable protein sources contain varying amounts of carbohydrate which must be considered in the total glycemic load of the food," researchers wrote.

Meat Protein Benefits

Some have theorized that animal protein intake demineralizes bone due to its effects on urinary calcium excretion. However, according to the white paper, there is no consistent evidence for superiority of one type of protein over another on calcium metabolism, bone loss prevention or fracture risk reduction, however total protein does appear to be positively related to bone loss prevention. However, researchers noted that while plant-based diets are often high in phytate and fiber content, which decrease iron, zinc, and calcium bioavailability, they lack vitamin B12, are of low energy density, and contain poorer quality protein than diets that contain some animal-based products.

"This over-all lack of nutrient availability and protein quality may have a greater impact on bone health than any one factor alone," the report stated.

When examining impaired immune responses (cell-mediated immunity, phagocyte function, cytokine production, secretory antibody response, antibody affinity, and the complement system), researchers found red meat and poultry contain greater than 4 mg glutamic acid/100g while plant foods contain significantly less, particularly beans (less than 2 mg/100g). Low vitamin B6 intake is also associated with impaired immune function. Meat, poultry and fish are generally good sources of vitamin B6 (greater than 0.3 mg/100 g) while most plant-derived foods contain considerably less.

While it has been suggested that increasing iron stores from iron derived from red meat initiates oxidative damage and inflammation via free radicals, this white paper noted that increasing red meat intake can reduce leukocyte counts, and pointed to some that studies suggest decreased (rather than increased) oxidative stress and inflammation when lean red meat intake is increased at the expense of dietary carbohydrate-rich foods.

The white paper also addressed the growing body of research indicating that dietary protein intakes above the RDA help maintain muscle function and mobility.

"Dietary leucine appears to have a particular function in that it enhances muscle growth by stimulating mammalian protein synthesis. Meat, poultry and fish are typically excellent sources of leucine, isoleucine and valine suggesting that they would enhance muscle protein synthesis. Meat and poultry products contain more than 2 g leucine/100g of food while most beans and cereal grains contain less than 1g leucine/100g," the study stated.

In conclusion, the white paper highlighted the positive correlation has been reported between diets containing animal protein source foods, iron, zinc and cognitive performance. Animal protein also contributes choline and carnitine which appear to affect/maintain cognition.

The complete white paper is available at www.amif.org.

AMIF to Host Worker Safety, Human Resources and the Environment Conference March 9-10 in Kansas City

The AMI Foundation Worker Safety, Human Resources and Environment Conference will be held March 9-10, 2011, at the Hyatt Regency Crown Center, Kansas City.

Conference sessions will focus on critical topics that address the needs professionals working in the worker safety and human resources arenas.

For the third year, this conference features a track on key environmental issues for the industry. Participants will learn how the industry is dealing with natural resource conservation, climate change and federal regulation on the environment.

For more information, visit the Events section of www.meatami.com.

Study Further Validates Guinea Pigs as Surrogates for Human Listeriosis

University of Georgia researchers have concluded that guinea pigs are effective surrogates for humans when evaluating the risk of low does exposure to *Listeria monocytogenes*. The AMI Foundation funded the research.

To investigate the pathogenicity of *L. monocytogenes,* researchers Mary Alice Smith, Ph.D. and Joseph Frank, Ph.D. used pregnant guinea pigs as an animal model for human listeriosis (Williams *et al*, 2007) demonstrating that maternal exposure to high concentrations of *L. monocytogenes* resulted in the pathogen crossing the intestinal barrier, colonizing maternal and fetal tissues and eventually resulting in stillbirths, the same as seen in humans.

To be useful in assessing human risk from exposure to *L. monocytogenes*, data were needed for exposure to low concentrations. The overall objective of this project was to conduct studies investigating exposures to low doses of *L. monocytogenes*, to identify biomarkers of *L. monocytogenes* infection and to use that information to refine the dose response curve, and ultimately the human health risk assessment for exposure to *L. monocytogenes*. The study's specific objectives were: (1) to use *L. monocytogenes* labeled with green fluorescent protein (gfp) to examine the dose-related invasion of maternal liver, maternal spleen, placenta, fetal liver and fetal brain in guinea pigs, (2) to identify sublethal biomarkers for *L. monocytogenes* infection at low doses, and (3) focusing on the low dose area of the dose response curve, to develop a dose response curve for the sublethal endpoints and ultimately compare these dose response curves to those from primates and the FDA/USDA/CDC human risk assessment.

Using the pregnant guinea pig model, researchers showed that following ingestion of gfp-labeled *L. monocytogenes*, they were able to isolate the pathogen from maternal liver and spleen, placenta, fetal liver and brain. Using fluorescent microscopy, researchers also demonstrated that the gfp maintained its fluorescence throughout the experimental procedure including and in culture without antibiotic pressure. Biomarkers of *L. monocytogenes* infection were identified including hepatic lesions, placental apoptosis, and changes in cytokine levels.

L. monocytogenes cells invaded maternal tissue in pregnant guinea pigs treated with 10^2 *L. monocytogenes* CFU; yet there was no fetal invasion. Exposure to *L. monocytogenes* at an early gestation did not affect invasion of maternal or fetal tissues. Using data from two previously established animal models, the guinea pig and nonhuman primate, researchers calculated LD_{50} values of 10^7 CFU which is similar to the estimate from the FAO/WHO (1.9×10^6 CFU) but unlike the 10^{13} CFU estimation by the FDA/USDA/CDC

The final report is available at amif.org.

IOM Report on Front-of-Pack Labeling Identifies Target Population, Merits

The appropriate target of Front-of-Package (FOP) labeling is the general population, and FOP can help consumers identify foods based on nutrients consistent with the *Dietary Guidelines for Americans,* said the The Institute of Medicine (IOM) in its report on Phase I of its Examination of Front-of-Package (FOP) Nutrition Rating Systems and Symbols.

Phase I focused on the elements of nutrition rating criteria and science underlying FOP systems. This examination was conducted on behalf of the Centers for Disease Control and Prevention (CDC) and the Food and Drug Administration (FDA) at the direction of Congress.

The IOM committee was tasked with identifying front-of-package systems being used by manufacturers, supermarkets, health organizations, and governments in the United States and abroad; considering the purpose and overall merits of front-label nutrition icons; identifying the criteria underlying the systems and evaluate their scientific basis; considering advantages and disadvantages of various approaches for adults and children; and, using knowledge gained from its compilation and assessment of front-of-package systems, plan the second phase.

The committee evaluated more than 20 systems in three categories – nutrient specific, summary indicator and food group.

Six conclusions the committee reached:

1. The appropriate target is the general population. Special subpopulations (*i.e.* children) are not the focus.
2. FOP can help consumers identify foods based on nutrients consistent with the *Dietary Guidelines for Americans*.
3. It is useful to declare calories.
4. Calories, saturated fat, trans fat, sodium and serving size should be shown because they are most closely related to chronic health outcomes (*i.e.* obesity, hypertension).
5. Insufficient evidence exists to include the following on the FOP since they are present on the Nutrition Facts Panel: total fat, cholesterol, protein, fiber, vitamins and minerals, added sugars, *etc*.
6. Displaying the information in nutrient specific or summary indicator are the preferred methods (*ex.* amount per serving, amount of daily value, low, medium, high; numerical value or number of symbols to indicate nutritional quality of product).

These conclusions will influence Phase II of the study which focuses on consumer understanding of front-of-package systems, more specifically the potential benefits of a single, standardized front-label food guidance system regulated by FDA and which icons are most effective with consumer audiences. Phase II will develop conclusions and recommendations about the systems and icons that best promote health and how to maximize their use.

The first meeting of Phase II was held in late October 2010. The half day meeting was presented in three sessions: recent consumer research on front of pack systems and symbols; additional consumer research issues and public comment. The Phase II report is expected to be publicly released in September 2011.

Additional information about both phases of the IOM study is available at www.iom.edu/Activities/Nutrition/NutritionSymbols.aspx.

▶AMIF Ongoing Research

E. coli

Investigator	Institution	Project Title
Norasak Kalchayanand, Terrance Arthur, Joseph Bosilevac, John Schmidt, Steve Shackelford, Tommy Wheeler	USDA-ARS-U.S. Meat Animal Research Center	Evaluation the Efficacy of Commonly used Antimicrobial Interventions on Shiga toxin Producing *E. coli* Serotypes O26, O103, O111, O145 and O157
Fred Pohlman, Steven Ricke, Palika Dias-Morse, Anand Mohan, Sara Milillo, Peggy Cook, Karen Beers	University of Arkansas, Safe Foods International	Antimicrobial interventions/application methods for the reduction of *Escherichia coli* O157:H7 and *Salmonella* in beef trimming and/or ground beef
John Sofos, Hua Yang, Ifigenia Geornaras, Kendra Nightingale, Keith Belk, Dale Woerner, Gary Smith	Colorado State University	Evaluation of chemical decontamination treatments for beef trimmings against *Escherichia coli* O157:H7, non-O157 shiga toxin-producing *E. coli* and antibiotic resistant and susceptible *Salmonella* Typhimurium and *Salmonella* Newport
Norask Kalchayanand, Terrance Arthur, Joseph Bosilevac, Dayna Brichta-Harhay, John Schmidt, Steven Shackelford, Tommy Wheeler	USDA-ARS-U.S. Meat Animal Research Center	Efficacy of commonly used antimicrobial compounds on decontamination of Shiga toxin-producing *Escherichia coli* serotypes O45, O121, and *Salmonella* inoculated fresh meat

Listeria monocytogenes

Investigator	Institution	Project Title
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
Amy Wong, Charles Kaspar, Charles Czuprynski	University of Wisconsin	Formation, Survival, and Virulence of Stress-induced Filamentous *Listeria monocytogenes*
Robin Kalinowski, Erdogan Ceylan	Silliker Inc., Food Science Center	Validation of Quaternary Ammonia for Control of *Listeria monocytogenes* in Ready-to-eat Meat and Poultry Plants

Salmonella

Investigator	Institution	Project Title
Michael Doyle, Tong Zhao	University of Georgia	Reduction of *E. coli* O157:H7 and *Salmonella* in Ground Beef
John Sofos, Ifigenia Geornaras, Jarret Stopforth, Dale Woerner, Keith Belk, Gary Smith	Colorado State University	Development of an Intervention to Reduce the Likelihood of *Salmonella* Contamination in Raw Poultry Intended for use in the Manufacture of Frozen, Not Ready-to-Eat Entrees

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 [1]
Ellin Doyle	University of Wisconsin	Understanding Sodium Replacements from a Food Safety and Health Risk Perspective
Dominik Alexander	Exponent, Inc.	Processed Meat Intake and Stomach Cancer

[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
Ellin Doyle, Amy Wong, Faye Hartmann	University of Wisconsin	Causes of Human Methicillin-Resistant *Staphylococcus aureus* (MRSA) from All Food and Non-Food Vectors (White Paper)

▶Science Soundbites

Study Validates Use of Sprays in Reducing *E. coli* O157:H7 and *Salmonella*

A new study by Texas Tech University has validated the effectiveness of lactic acid bacteria (LAB), acidified sodium chlorite (ASC), and lactic acid (LA) sprays in reducing *E. coli* O157:H7 and *Salmonella* on non-intact meat products.

The study examined the use of these sprays on choice strip loins pieces intended for either mechanical blade tenderization or injection enhancement with a brine solution after an aging period of 14 or 21 days at 4.4 C under vacuum. 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 1.00 and 5.72 log CFU/g, compared with controls. LAB and LA reduced internal *E. coli* O157:H7 loads up to 3.0 log, while ASC reduced the pathogen 1.4 to 2.3 log more than the control (P , 0.05), respectively. *Salmonella* Typhimurium DT 104 was also reduced internally 1.3 to 2.8, 1.0 to 2.3, and 1.4 to 1.8 log after application of LAB, LA, and

ASC, respectively.
Journal of Food Protection. 73 (12): 2169-2179.

Study Examines the Ability to Detect *E. coli* O157:H7 at Low Concentrations

Due to the nonuniform distribution of *E. coli* O157:H7 cells in a 1 CFU/mL suspension, a minimum of 3 CFU/mL may be more effective in order to avoid a large number of noninoculated samples, according to a new study by the U.S. Department of Agriculture's Agriculture Research Service.

Currently, testing programs require the ability to detect *E. coli* O157:H7 in samples of beef trim or ground beef levels as low as 1 CFU/375 g.

However, this study's results show that half of all samples received no cells when 1 CFU was the target concentration and that targets greater than 3 CFU were much more reliable. Detection by culture isolation and two commercial assays, Qualicon BAX-MP and BioControl GDS, detected 94 percent (± 11 percent), 92 percent (± 10 percent) and 92 percent (± 7 percent) of samples inoculated with 5.4

CFU (range 1 to 9 CFU), respectively.

The study also examined the effect of background aerobic plate count (APC) bacteria and fat content effects on the detection of *E. coli* O157:H7. At APC concentrations below 6 log CFU/g, the rapid methods detected all beef trim samples inoculated with 26 CFU of *E. coli* O157:H7 per 65 g. At an APC of 6.7 log CFU/g, culture, BAX-MP, and GDS detected 100, 75, and 13 percent, respectively, of inoculated samples. Neither commercial method detected *E. coli* O157:H7 in the samples when APC was 7.7 log CFU/g, whereas culture was able to detect 63 percent of *E. coli* O157:H7 in the samples when APC was at this concentration. Increased fat content correlated with decreasing recovery of immunomagnetic separation beads, but this was not observed to interfere with detection of *E. coli* O157:H7.

The results provide caveats for situations where temperature abuse may have occurred or when the samples being tested are of varying fat percentages.

Journal of Food Protection. 73 (12): 2180-2188.

▶**Nutrition News Corner**

Study: No Link Between Red and Processed Meats and Prostate Cancer

There is no independent positive association between the consumption of red or processed meats and the development of prostate cancer, according to a new meta-analysis of large scale prospective studies on red and processed meats and cancer published in the *Nutrition Journal*.

Several large epidemiologic investigations of meat intake and prostate cancer have been published over the past decade. Researchers, led by Dr. Dominik Alexander, Ph.D. of Exponent Health Sciences Practice, conducted a meta-analysis of prospective studies to: 1) estimate the summary associations between red meat and processed meat and total prostate cancer; 2) evaluate associations among men with advanced disease; 3) estimate dose response trends; 4) evaluate potential sources of heterogeneity; and 5) assess the potential for publication bias.

The researchers analyzed 26 studies -- 15 on red meat and 11 studies investigating processed meats and cancer risk – and concluded that consumption of red or processed meats overall have no association with prostate cancer.

"The results of this meta-analysis are not supportive of an independent positive association between red or processed meat intake and prostate cancer," researchers concluded.

In the review, the authors note that additional studies are needed to fully evaluate any potential associations between consumption preferences, dietary mutagens and prostate cancer.

The paper, published in *Nutrition Journal* Volume 9, Issue 50, can be found in its entirety at http://www.nutritionj.com/content/9/1/50.

Study: Sodium Levels in Americans Virtually Unchanged Since 1957

Despite the commonly held belief that sodium consumption has increased in the last 20 years and the decades of public education efforts warning Americans about adverse health risks associated with consuming high sodium diets, sodium intake levels have remained virtually unchanged since 1957 according to a new study by Harvard University.

Thirty-eight 24-hour urine sodium excretion studies, published between 1957 and 2003, were analyzed by a multivariate random-effects model. Sodium excretions were found to be unchanged throughout the study years. In the last 50 years, Americans were found to consistently consume 3526 mg of sodium per day. Researchers did note that sodium levels exceeded the recommended sodium intake levels of 2,300 mg/day for adults and 1,500 mg/day for those who are at risk or have high blood pressure.
These results were similar to international sodium intake findings as highlighted in the editorial "Science Trumps Politics: Urinary Sodium Data Challenge U.S. Dietary Sodium Guideline," accompanying the Harvard study in the November issue *American Journal of Clinical Nutrition*. David McCarron, one of the editorial authors, analyzed urinary sodium excretion data from 19,000 people taken from 1984-2008 from 38 different countries. "The current report extends our observations by documenting that, likewise, all the efforts in the United States over the past three decades have had no effect on the population's sodium intake," McCarron stated.

McCarron suggested that sodium "is not a readily modifiable nutritional parameter for the population at large. Furthermore, a substantial body of research in humans provides evidence as to why this latest attempt to modify the general population's sodium intake is doomed to failure."

Earlier this year, two Institute of Medicine reports outlined strategies for reducing sodium intake in Americans. In June, the 2010 Dietary Guidelines Advisory Committee recommended in their technical report to the Departments of Agriculture and Health and Human Services that sodium levels for American adults be lowered to from 2,300 to 1,500 mg/day. *American Journal of Clinical Nutrition* 2010 92(5): 1005-06

Review Finds No Scientific Consensus Linking Processed Meat Intake and Increased Breast Cancer Risk

Red meat and processed meat intake do not appear to be independently associated with a higher risk of breast cancer, according to a new review and meta-analysis of large studies on red and processed meats and breast cancer published in *Nutrition Research Reviews.*

The meta-analysis utilized data from the Pooling Project, a large collection of data from eight cohort studies, combined with data from nine studies published between 2004 and 2009 and one study published in 1996.

The study's researchers, from Exponent Health Sciences Practice and Emory University, concluded that, "Overall, weak positive summary associations were observed across all meta-analysis models, with the majority being non-statistically significant."

*Nutrition Research Reviews.*2010 (23): 349–365.

▶**Staff on the Move**

AMI Senior Vice President of Public Affairs and Member Services Janet Riley delivered two talks on "Meat Myths and Facts" to Certified Angus Beef staff and to local producers, packers and university experts during a trip to Ohio in December.