

Listeria monocytogenes

Innovative Pathogen Intervention Technologies

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

08-207 Richard Meinersmann, Mark Berrang, Tim Hollibaugh, (\$40k, 1.5 Years)
Joseph Frank, Agricultural Research Service, USDA,
University of Georgia

This research will determine if bacterivorous protozoa contribute to shaping bacterial communities in food processing plants and influence the survival of *Listeria monocytogenes* in floor drains. The proposed project is designed to identify *Listeria*-lytic protozoa and isolate them for further research in the use of naturally decontaminating floor drains.

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)

08-217 Sophia Kathariou, Dana Hanson, (\$136k, 2 Years)
North Carolina State University

The study will 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, specifically if genes mediating adaptations are highly relevant to the ability of the pathogen to colonize the processing plant and contaminate RTE meats.

Evaluation of anti-Listerial Properties of Natural and/or Organic Ingredients in Ready-to-Eat Meat and Poultry Products

07-205 Kathy Glass, Jeff Sindelar, University of Wisconsin (\$95k, 2 Years)

The study will identify ingredients to suppress growth of *Listeria monocytogenes* in ready-to-eat (RTE), deli-style, meat and poultry products that meet “natural” or organic requirements defined by USDA.

Validation of Levulinic Acid for Topical Decontamination of Meat Surfaces

06-201 Charles Carpenter, Jeffrey Broadbent, Utah State University (\$63k, 2 Years)

This project assessed if levulinic acid, as a topical treatment, was effective against pathogenic bacteria. It evaluated whether topical application imparts residual protection against pathogen growth. This research was a follow up to previous research on the anti-listerial action of levulinate.

Minimum Nitrite Levels Required to Control Listeria monocytogenes on Ready-to-Eat Poultry Products Manufactured with Lactate and Diacetate

05-226 Kathleen Glass, James Claus, University of Wisconsin (\$85k, Completed)

This project identified the minimum level of sodium nitrite required to suppress growth of *L. monocytogenes* in ready-to-eat meat and poultry products manufactured with lactate and diacetate.

Anti-Listeria Action of Levulinate

04-205 Charles Carpenter, Jeff Broadbent, Utah State University (\$50k, Completed)

This research evaluated the extent to which levulinate, a 5-carbon organic acid, inhibited growth of *Listeria monocytogenes* in ready-to-eat meat products as compared to, and in combination with, lactate and diacetate.

Controlling Listeria monocytogenes on Ready-to-Eat Meat and Poultry Products Using Food-Approved Antimicrobials Benzoate, Propionate, and Sorbate

04-221 Kathleen Glass, James Claus, University of Wisconsin (\$97k, Completed)

This research followed up on previous research that demonstrated the effectiveness of antimycotic agents in controlling *Listeria*. The resulting data has been used to obtain provisional FSIS approval of sorbate, benzoate and propionate.

Comparison of Use of Activated Lactoferrin with Use of a 'Gold Standard' Combination/Concentration of Antimicrobials for Post-Processing Control of Listeria monocytogenes in Ready-to-Eat Meat Products

03-412 John Sofos, Ioanna Barmpalia, Patricia Kendall, Keith Belk, John Scanga, Gary Smith, Colorado State University (\$61k, Completed)

This study showed that lactoferrin added as a formulation ingredient in bologna was not as effective as the combination of other antimicrobials, but when used in frankfurters, lactoferrin combined with other antimicrobials was effective.

Inactivation of Listeria monocytogenes on Ready-to-Eat Meat Products (Deli Turkey Breast and Frankfurter) by Monocaprylin

03-427 Kumar Venkitanarayanan, Cameron Faustman, David Dzurec, University of Connecticut (\$67k, Completed)

The research determined that surface treatment using monocaprylin with acetic acid was effective in reducing *Listeria monocytogenes* on frankfurters. As an ingredient added to the product, monocaprylin was only moderately effective.

Controlling Listeria monocytogenes on Ready-to-Eat Meat and Poultry Products using Food-Approved Antimicrobials

02-222 Kathy Glass, Eric Johnson, University of Wisconsin (\$59k, Completed)

This study evaluated the efficacy of antimycotics (sorbate, propionate and benzoate) to control the growth of *L. monocytogenes* in uncured turkey and cured bologna. The addition of 0.1% combined antimycotic agents effectively delayed or prevented growth of *L. monocytogenes* in cured processed meat.

Antimicrobial Effects of Surface Treatments and Ingredients on Cured RTE Meat Products

00-211 Jimmy Keeton, Texas A&M University (\$45k, Completed)

Combinations of a novel ingredient called Safe₂O™HOH were evaluated along with lactic acid, potassium lactate and propionic acid to determine the inhibitory effects of each of these products singly and in combination to retard and/or eliminate the growth of *Listeria monocytogenes* in packaged ready-to-eat meat and poultry products.

Pathogen Inhibition and Shelf-Life of Raw and Precooked Meat with Protamine

00-213 Kenneth McMillin, Jack Losso, Louisiana State University (\$24k, Completed)

This project determined the antimicrobial activity of different levels of protamine, a natural antimicrobial, on *Salmonella*, *E. coli* and *Listeria monocytogenes* on meat and poultry before and after cooking.

Elite Herb Extracts Containing High Rosmarinic Acid and Inhibition of Listeria monocytogenes In Meat and Poultry Products

99-206 Kalidas Shetty, University of Massachusetts (\$55k, Completed)

This study investigated herbal extracts high in rosmarinic acid (rosemary antioxidants) as *Listeria monocytogenes* inhibitors.

Use of Pediocin with Other Barriers for Control of L.m. in RTE Processed Meats

99-212 Joseph Sebranek, Iowa State University (\$82k, Completed)

Pediocin, a natural antimicrobial, was evaluated as a topical treatment for finished ready-to-eat products to determine if it will retard *Listeria monocytogenes* growth. The results indicated that the pediocin significantly reduced the number of *Lm* on packaged frankfurters and delayed growth of the remaining cells during storage.

Control of Listeria monocytogenes in Ready-to-Eat Meats using Cetyl Pyridinium Chloride (CPC) and Shelf Life Extension of RTE Meats Treated with CPC

99-404 Harshavardhan Thippareddi, Kansas State University (\$74k, Completed)

Cetyl pyridinium chloride (CPC) was evaluated through various application parameters for its antimicrobial effects on ready-to-eat meat and poultry products in an effort to retard growth of and/or eliminate *Listeria monocytogenes*.

Operational Control and Monitoring of the Processing Environment

Cost Effective Treatments to Minimize In-Store Deli Meat Slicer Cross Contamination of Ready-To-Eat Meats by Listeria monocytogenes, Phase II

08-211 Phil Crandall, John Marcy, Steve Ricke, Mike Johnson, (\$88k, 2 Years)

Betty Martin, Corliss O'Bryan, Sara Rose Milillo,

University of Arkansas

This study is the 2nd phase of this research, and will further evaluate deli slicers to reduce the risk of listeriosis in commercial settings. Best practices will be validated, as well as, the comparison of cleaning and sanitizing compounds used on deli slicers.

Minimizing Listeria Cross Contamination of Ready-to-Eat Meats by the In-Store Deli Meat Slicer

07-229 Phil Crandall, John Marcy, Steve Ricke, Mike Johnson, (\$70k, Completed)

Corliss O'Bryan, Betty Martin, University of Arkansas

This study focuses on current cleaning and sanitizing methods of the deli slicer to determine if more effective methodologies are needed to further reduce the risk of listeriosis. Best practice and employee training materials will also be developed.

Pre- and Post-package Pasteurization of RTE Meats for Reduction of Listeria monocytogenes
03-428 Peter Muriana, J. Roy Escoubas, Oklahoma State University (\$137k, Completed)
This research showed that combinations of pre- and post-packaging processing were effective in reducing levels of *Listeria monocytogenes*. Research also demonstrated that some pre-packaging antimicrobials were more effective than others, with most not effective on uncured turkey products.

Improving the Utilization of Microbial Pathogen Computer Models for Validating Thermal Processes in the Meat Industry
02-226 Bradley Marks, Alden Booren, Elliot Ryser, (\$70k, Completed)
Michigan State University

This research provided a complete secondary model for log-D with temperature, fat content and moisture content as independent variables. It also expanded thermal inactivation parameters for *Salmonella* lethality models. The results led to improved user interface and functionality for the AMI Process Lethality Spreadsheet.

The Role of Aerosols in Transmission of Microorganisms (including Listeria) to Ready-to-Eat Meat/Poultry Products
01-206 Michael Doyle, University of Georgia (\$165k, Completed)

This study demonstrated that aerosol particle size, relative humidity and distance from the air handling unit impacted settling rate and potential that exposed ready-to-eat products may become contaminated.

Plasma-Enhanced Disinfection of Surfaces, Air, and Water in Ready-To-Eat (RTE) Meat and Poultry Processing Environments
01-208 Ferencz Denes, University of Wisconsin-Madison (\$75k, Completed)

This research focused on developing advanced atmospheric-pressure Array Electrode Reactor plasma-aided technologies for an in-line, continuous disinfection of product contact surfaces in ready-to-eat meat and poultry processing facilities.

Development of Ion Mobility Spectrometry (IMS) Applications for Listeria Detection and Monitoring In-Plant Food Processing Plants
01-222 Robert Vinopal, Claudia Koerting, University of Connecticut (\$118k, Completed)
This research continued the development of IMS for detection of *Listeria*. It also focused on developing sample mechanisms for direct and aerosol sampling that would allow the samples to be analyzed directly by IMS techniques.

Development and Validation of Thermal Surrogate Microorganisms in Ground Beef for In-Plant Critical Control Point Validation Studies
01-201 Michael Doyle, University of Georgia (\$137k, Completed)

This study identified a non-pathogenic bacterium that has heat resistance properties similar to *Listeria* and *Salmonella* in meat and poultry. Research developed protocols for the use of a non-pathogenic surrogate organisms in processing facilities to validate thermal processing.

Reduction of Listeria monocytogenes Biofilm Formation in RTE Meat Processing Environments
99-205 Amy Lee Wong, University of Wisconsin (\$183k, Completed)

This research investigated methods to reduce biofilms of *L.m.* on equipment and floor surfaces in RTE meat processing environments, by removal and inhibition of initial attachment and biofilm formation. The research evaluated the efficacy of cleaners and sanitizers on *L.m.* biofilms, including the assessment of various surface coatings that will inhibit attachment.

Optimum Radiation Dose to Eliminate Listeria monocytogenes in Packaged RTE Processed Meats and Survival of Listeria monocytogenes in RTE Processed Meats after Irradiation Processing
99-208 James Dickson, Iowa State University (\$72k, Completed)
This study investigated the optimal radiation dose required to eliminate defined loads of *Listeria monocytogenes* in packaged ready-to-eat meat products.

Validation of the Use of Composite Sampling for Listeria monocytogenes in Ready-to-Eat (RTE) Meat and Poultry Products
99-229 Michael Curiale, Silliker Laboratories (\$81k, Completed)
This study determined what were the most reliable methods for detection of *Listeria* spp. and *Listeria monocytogenes* in RTE products and if RTE meat products could be composited into analytical units greater than 25g as a means of reducing the labor and cost.

Control of Listeria monocytogenes in Food Processing Facilities by Competitive Exclusion Microorganisms
99-401 Michael Doyle, University of Georgia (\$95k, Completed)
This research determined whether the introduction of harmless bacteria in the food processing facilities would reduce and/or eliminate *Listeria monocytogenes* via competitive exclusion.

Risk Assessment Enhancement Research

Refinement of Listeria monocytogenes (L. monocytogenes) Low Dose Data from Pregnant Guinea Pigs for Human Risk Assessment
05-224 Mary Alice Smith, Joseph Frank, University of Georgia (\$150k, 2 Years)
This research will use animal models to develop dose response information for human listeriosis risk assessment modeling. It will gather information on the low dose region of the dose response curve and attempt to identify mechanisms by which *L. monocytogenes* causes illness and death.

Review of FSIS Risk Assessment for Listeria monocytogenes in Deli Meats
03-600 Barbara Petersen, Leila Barraji, Exponent, Inc. (\$41k, Completed)
This project reviewed the FSIS Risk Assessment for *Listeria monocytogenes* in Deli Meats and examined the model assumptions and model construct to determine whether they were appropriate and applicable to actual industry “what if” scenarios.

Expert Scientific Review Panel on Listeria monocytogenes In Foods
02-201 International Life Sciences Institute Risk Science Institute (\$50k, Completed)
This comprehensive review by an international panel of experts focused on use of a risk-based approach to identify strategies that will have the greatest impact on reducing foodborne listeriosis. The resulting report was submitted to the Codex Committee on Food Hygiene and the *Journal of Food Protection*.

Review of Scientific Literature Related to Survival of Pathogenic Foodborne Bacteria during Cooling of Heat-treated, RTE Meat and Poultry Products and Thawing of Frozen Raw Meat and Poultry
00-218 Ellin Doyle, University of Wisconsin (\$ 9k, Completed)
A review of the scientific literature on the survival of pathogenic foodborne bacteria during the cooling of heat-treated, ready-to-eat meat and poultry products and the thawing of frozen raw meat and poultry products.



Food Safety Initiative
Funded Research Projects

E. coli O157:H7

Pre-Harvest Interventions

Role of Super-shedders in Determining Feedlot Pen Prevalence of E. coli O157:H7

04-107 Roland Cobbold, Dale Hancock, Tom Besser, Washington State University; Janice Berg, Lakeside Research (\$120k, Completed)

This research confirmed the role of super-shedders cattle in the transmission of *E. coli* O157:H7 to other cattle in a feedlot environment. Removing a super-shedder from a pen resulted in a decrease in shedding and/or pen prevalence; however the effect was not statistically significant. The addition of a super-shedder to a naïve pen did lead to a statistically significant increase in shedding and prevalence.

Funded in part by the National Cattlemen’s Beef Association.

Inactivation of Escherichia coli O157:H7 in Drinking Water of Cattle by Sodium Caprylate

03-317 Kumar Venkitanarayanan, University of Connecticut (\$38k, Completed)

This research evaluated the addition of sodium caprylate, a natural eight-carbon fatty acid, to cattle drinking water in order to inactivate *E. coli* O157:H7. The addition of sodium caprylate proved to significantly reduce the presence of *E. coli* O157:H7 in water for a sustained period of time even in the presence of fecal matter or residual feed.

Reduction of E. coli O157:H7 in Beef Feedlot Cattle Using Varying Doses of a Direct-Fed Microbial

02-123 Mindy Brashears, Michael Galyean, Spring Younts Dahl, Texas Tech University; Guy Loneragan, West Texas A&M University (\$155k, Completed)

This research evaluated three different doses of *Lactobacillus acidophilus* strain NP 51 and a combination treatment of NP51 and NP45 on the prevalence of *Escherichia coli* O157 in finishing beef cattle. The highest concentration of NP51 was the most effective in reducing fecal shedding. There were no detrimental effects of the treatments used in these studies on animal performance.

Funded in part by the National Cattlemen’s Beef Association.

E. coli O157:H7 Intimin Expressed by Transgenic Plant Cells as a Candidate Oral Vaccine for Cattle

01-100 Alison O’Brien, Uniformed Services University of the Health Sciences (\$59K, Completed)

This study focused on the development of a vaccine that would be delivered orally through corn using intimin_{O157} to prevent cattle from becoming infected with *E. coli* O157:H7. Further studies are being conducted on intimin.

Methods to Control E. coli O157:H7 in Drinking Water for Cattle

01-106 Michael Doyle, University of Georgia (\$138k, Completed)

This study developed practical interventions for use on on-farm and feedlots to control *E. coli* O157:H7 in cattle drinking water. Specific competitive exclusion microorganisms were highly effective in reducing the presence of *E. coli* O157:H7.

Competitive Exclusion of Escherichia coli O157 using Non Pathogenic Colicin Producing Escherichia coli Strains

01-109 Chobi DebRoy, Pennsylvania State University (\$37k, Completed)

This research evaluated the ability of various non-pathogenic colicin producing strains of *E. coli* to inhibit the growth of *E. coli* O157 and Shiga-toxin producing strains. Selected strains were able to inhibit the growth of O157:H7 in a laboratory environment.

The Use of Egg Yolk Anti-O157:H7 Immunoglobulin to Clear E. coli O157:H7 from the Intestinal Tracts of Cattle

01-121 Charles Kaspar, University of Wisconsin (\$129k, Completed)

The research demonstrated that egg antibodies were an effective antibody production method. It also showed, unexpectedly, that chitosan, the carrier of the antibody, showed a statistically significant reduction in shedding *E. coli* O157:H7.

Testing of Probiotic Bacteria for the Elimination of Escherichia coli O157:H7 in Cattle

00-100 Mindy Brashears, Texas Tech University (\$124k, Completed)

Probiotic bacterium (*Lactobacillus acidophilus*; NPC 747 and NPC 750) was added to cattle feed to determine its effect on the elimination or reduction of *E. coli* O157:H7 in cattle. The probiotic bacterium significantly decreased the number of cattle shedding *E. coli* O157:H7, and had either no effect or slightly improved the feedlot performance of finishing beef steers.

Evaluation of the Efficacy of a Bacteriophage System in Preventing or Modulating E. coli O157:H7 Infection of Cattle

00-123 Dale Hancock, Washington State University (\$166k, Completed)

This research evaluated a specific bacteriophage treatment intended to reduce the probability of infection with *E. coli* and/or the amount shed if an infection was present. The bacteriophage treatment was not effective in reducing shedding of *E. coli* O157:H7 in calves. A "Trojan calf" model was developed which showed that all animals that come in contact with an animal shedding *E. coli* in a confined space will test positive.

Post-Harvest Research

Effect of Traditional and Modified Enhancement Solution Ingredients on Survival of Escherichia coli O157:H7 during Storage and Cooking of Moisture-Enhanced Beef

07-110 Ifigenia Geornaras, John Sofos, Colorado State University (\$81k, Completed)

This research identified ingredients used in brining solutions that may have antimicrobial effects during storage and/or enhance thermal inactivation of *Escherichia coli* O157:H7 during cooking of moisture-enhanced beef products.



Food Safety Initiative
Funded Research Projects

Salmonella

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

08-302 Michael Doyle, Tong Zhao, University of Georgia (\$73k, 2 Years)

The use of levulinic acid and sodium dodecyl sulfate has been shown to be effective in reducing *E. coli* O157:H7 and *Salmonella* contamination in culture and non-meat food products. This study will examine their effectiveness when applied to ground beef as a surface treatment method to substantially reduce *E. coli* O157:H7 and *Salmonella* contamination.

Evaluation and Performance of the PremiTest™ Salmonella Serotyping System on Pork and Poultry Isolates from Commercial Sources

08-322 Margaret Hardin, Jayne Stratton, Marcos Sanchez-Plata, (\$49k, 1 Year)
Texas A&M University, University of Nebraska-Lincoln,
Inter-American Institute for the Cooperation in Agriculture

This study will validate the Premi-Test® *Salmonella*, a rapid serotyping methodology, to identify strains of *Salmonella* spp. isolates collected from pork and poultry source. This method is rapid and convenient for processors to identify the types of strains of *Salmonella* present at different stages in their processing environments.

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

08-319/135 Annette O'Connor, Iowa State University (\$5k, 1 Year)

The objective of this workshop is to improve the quality and utility of intervention research, by modifying the [CONSORT](#) statement (Consolidated Standards of Reporting Trials). CONSORT statement is intended to improve the reporting of randomized controlled trials (RCT), enabling readers to understand a trial's design, conduct, analysis, and interpretation, and to assess the validity of its results.

Evaluation of Alternative Cooking and Cooling Procedures for Large, Intact Meat Products to Achieve Lethality and Stabilization Microbiological Performance Standards

06-407 Jeffrey Savell, Kerri Harris, Alejandro Castillo, (\$75k, Complete)
Wesley Osburn, Texas A&M University

This project validated the safety of slower cooking and cooling times for large whole-muscle meat products to meet FSIS lethality and stabilization microbiological performance standards.

A Systematic Review of Literature on Pork Chain Epidemiology

06-317 Annette O'Connor, Iowa State University (\$66k, 2 Years)

This systematic review will identify areas in the pork production chain where research is repetitive or lacking, and can be used as a resource allocation tool to “fill in the gaps” in risk assessment models. The process of systematic review reduces bias in the selection of research studies by the comprehensiveness and reproducibility of the search strategy and the transparent selection of articles included in review.

Funded in part by the National Pork Board.

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

06-411 Randall Phebus, Douglas Powell, Kansas State University; (\$95k, 2 Years)
 Harshavardhan Thippareddi, University of Nebraska

This research will create a representative inventory of consumer handling and cooking recommendations on packages of heat treated not fully cooked, not shelf stable poultry products available at retail and for food service in the U.S. Observation of product preparation by consumers and food service employees and in-depth interviews will be used to identify gaps between the intention of the handling statements and actual behavior. This will determine whether the current guidelines are adequate.

Determining the Likelihood That Salmonella Develops Heat Resistance During Thermal Processing of Commercial, Whole-Muscle, Ready-to-Eat Meat Products

05-410 Bradley Marks, Alicia Orta-Ramirez, Alden Booren, (\$97k, Completed)
 Elliot Ryser, Michigan State University

This research will adapted and validated a model to predict the rate of *Salmonella* thermal inactivation as a function of both product temperature and prior sublethal thermal history. It also evaluated whether any resulting increase in *Salmonella* thermal resistance would have an impact on the compliance of typical commercial cooking operations with USDA-FSIS lethality performance standards for RTE products.

White Paper on Human Illness Caused by Salmonella from All Food and Non-Food Vectors

07-403 Charles Kaspar, M. Ellin Doyle, John Archer, (\$5k, Completed)
 University of Wisconsin

This white paper examined current methods for surveillance, and the collection of epidemiological information related to foodborne outbreaks caused by *Salmonella* spp. were analyzed to assess their effectiveness and limitations. Information on illness caused by salmonellae was critically evaluated with research projects and modifications of epidemiological data collection needed to close gaps in our understanding of these issues were suggested.

Projected is co-funded with National Pork Board.



Food Safety Initiative
Funded Research Projects

Sodium Nitrite

Ensure That Sodium Nitrite is Not Listed as a Developmental Toxicant Under Proposition 65 in California

#1 Coughlin & Associates; Morrison & Foerster (\$860k, Completed)

This project successfully defended sodium nitrite's use in cured meat products against the state of California's first attempt to list it as a developmental or reproductive toxicant under Proposition 65. As a result of a random drawing based on the California lottery, sodium nitrite may now be one of 50 chemicals that would be examined relative to cancer effects under Proposition 65. Proposition 65 requires products containing "listed" substances shown to be carcinogens and/or developmental or reproductive toxicants to carry warning labels.

A National Survey of the Nitrite/ Nitrate Concentrations in Cured Meat Products and Non-meat Foods Available at Retail

07-408 Jimmy Keeton, Wes Osburn, Margaret Hardin, (\$112k, Completed)
Texas A&M University

This research will analyze representative samples of the major categories of cured meat products for residual nitrite/nitrate selected from retail outlets and supermarket chains in targeted geographic regions of the United States to estimate the present-day level of dietary nitrite/nitrate exposure from cured meat sources. Analysis of highly consumed raw vegetables for nitrate/nitrite content to determine the concentrations of nitrite/nitrate contributed to the diet by these foods to project the current total level of nitrite/nitrite exposure from cured meat and non-meat food items.

Projected is co-funded with National Pork Board.

Market Basket Survey of Nitrate and Nitrite in Foods in the United States

#2 Dennis Buege, University of Wisconsin (\$15k, Completed)

This project examined the nitrate and nitrite content of the major classes of food commonly found in diets around the United States.

Manage Outcome of National Toxicology Program Review of Sodium Nitrite

#3 Coughlin & Associates (\$221k, Completed)

This project helped provide technical input during the National Toxicology Program's consideration of the results of a sodium nitrite cancer bioassay.

Conduct Proactive Public Relations Campaign on Sodium Nitrite

#4 Fleishman Hillard Public Relations (\$38k, Completed)

Given the favorable outcomes of both Proposition 65 and the National Toxicology Program, this project acted as an outreach program to influential groups and media to convey recent findings about the safety and essential nature of sodium nitrite in cured meats.

Ensure that Sodium Nitrite is Not Listed As a Carcinogen or Developmental Toxicant Under Proposition 65 in California – Second Review

#7

Coughlin & Associates

(\$46k, Ongoing)

The project continues to monitor the state of California's intention to amend its Proposition 65 law which would allow for the listing of sodium nitrite as a developmental or reproductive toxicant. This project also allowed a toxicologist to attend the International Agency for Research on Cancer discussion on sodium nitrite in 2006.



Food Safety Initiative
Funded Research Projects

Diet and Health Research

Analysis of Heterocyclic Amines (HCAs) Formation in Various Cooked Meat Products

07-402 J. Scott Smith, Terry Houser, Melvin Hunt, (\$49k, 2 Years)
 Kansas State University

This research will examine the occurrence and levels of heterocyclic amines (HCA) in various meat products, including meat products containing antioxidant containing marinades and enhancement with various ingredients. An extensive literature review and evaluation of potential exposure and risk will be undertaken during the course of this research.

Projected is co-funded with National Pork Board.

Assessment of the Potential Human Exposure to Heterocyclic Amines from Various Cooked Meat Products

07-414 Arthur Miller, Leila Barraaj, Nga Tran, Terry Troxell, (\$28k, 6 Months)
 Exponent, Inc

This evaluation will review and perform a risk assessment of the major categories of fresh and processed meat products that are candidates for heterocyclic amine formation during handling, preparation and cooking and determine the impact of processing procedures, added ingredients, packaging and cooking methods, and other factors known to affect heterocyclic amine formation.

Projected is co-funded with National Pork Board.



Food Safety Initiative
Funded Research Projects

Other Food Safety Activities

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

08-404 Ellin Doyle, Kathy Kurth, Andrew Milkowski, (\$10k, 6 Months)
University of Wisconsin

This white paper will cover information on the distribution of viruses in infected animals, shedding of animal and human viral pathogens, persistence of viruses in foods and the environment, thermal and non-thermal methods for destruction of viruses, and other industry practices, including GMPs and SSOPs, designed to prevent contamination of meat.

Evaluation and Analysis of Meat Products Contaminated by Low Levels of Ammonia

06-406 Randy Wehling, Michael Zeece, Harshavardhan (\$67k, 2 Years)
Thippareddi, University of Nebraska

This project will develop a practical method for measuring ammonia contamination levels in meat products. The method will then be used to study the uptake of ammonia by meats, and the effectiveness of methods designed to decrease contamination levels.

Destruction of H5N1 Avian Influenza in Meat and Poultry Products

06-403 M. Ellin Doyle, Ronald Weiss, Stacey Schultz-Cherry, (\$10k, Completed)
University of Wisconsin; Michael Robach, Cargill, Inc

This white paper determined the generally accepted time and temperature requirements for inactivation of the H5N1 virus in meat and poultry products. It reviewed non-thermal methods for inactivation of the H5N1 virus and their effectiveness and practicality in meat and poultry matrices. Finally, data gaps regarding inactivation of these viruses were identified.

Microbial Risk Factors and Consequences Associated With Condensation in Fresh and Ready-to-Eat Processing Facilities

05-402 Mindy Brashears, Mark Miller, Chance Brooks, John (\$95k, Completed)
Blanton, Christine Alvarado, Texas Tech University;
Guy Loneragan, West Texas A&M University

This study determined the microbial risk associated with condensation and identify controllable risk factors associated with its formation. The risk factors of condensation in processing environments where both fresh and ready-to-eat products are produced was examined.

Efficacy Of Chlorine Dioxide Against Listeria Monocytogenes In Brine Solutions

05-422 Catherine Cutter, Ed Mills, W. B. Valderrama, (\$30k, Completed)
Pennsylvania State University

This study evaluated the survival of *Listeria monocytogenes* in brine solutions containing chlorine dioxide. It determined to be an effective antimicrobial, the residual chlorinated compounds on RTE products, levels of chlorine dioxide in brine solutions, microbiological profile of treated and untreated products, and the organoleptic/sensory properties of the treated and untreated products were evaluated.

AMR Baseline Study

#1 Glenn Schmidt, Colorado State University (\$15k, Completed)

This study, co-funded by AMIF and the National Meat Association, compared the fluorescent glial fibrillary acidic protein (GFAP) enzyme linked immunosorbent assay to ELISA test kits for GFAP manufactured by R-biopharm. The study documents that the R-biopharm test kits provided a reliable field method of estimating the presence of GFAP in meat produced from AMR equipment and may have utility as a process control tool for ensuring that GMPs for spinal cord removal are effective.

Economic Analysis of Measures Proposed by FSIS to Reduce Human Exposure to the BSE Agent in Human Food

#2 William Motes, Mark Jekanowski, Sparks Companies, Inc. (\$19k, Completed)

This report analyzed each of the potential regulatory options outlined by FSIS in their “BSE Current Thinking Paper.” The analysis described and quantified potential food industry costs expected by the industry to include unintended consequences from widespread abandonment of certain practices, including the use of advanced meat recovery systems, which could significantly increase production costs and jeopardize worker safety.



Food Safety Initiative
Funded Research Projects

Consumer Awareness/Issues Management

Develop Food Safety Advisory Council

#1 Fleishman-Hillard Public Relations (\$78k, Completed)

A Food Safety Advisory Council was developed to provide perspective and commentary of food safety issues related to *Listeria monocytogenes*, *E. coli* O157:H7 and irradiation to interested media. The council is being retained for future needs.

Conduct a Food Safety Communications Training Session for AMIF and Industry Spokespeople to Ensure Consistent, Well-Communicated Messages

#2 Fleishman-Hillard Public Relations (\$0, Completed)

AMIF staff and industry spokespeople were trained in food safety message development and media relations to ensure that accurate information is provided to sustain consumer confidence.

Educate Consumers About Their Role in Preventing Foodborne Illness

#3 Partnership for Food Safety Education (\$385k, Ongoing)

This project helps fund the Partnership for Food Safety Education to develop messages and materials specific to consumers and appropriate food handling practices.

Maintain National Hot Dog and Sausage Council as the Face of the Hot Dog and Sausage Industry

#4 AMI Foundation (\$139k, Ongoing)

This project helps sustain a small promotional council as the face of the hot dog and sausage industry. The council works to build strong relationships with media and consumers regarding the positive attributes of these products so that it may act as an industry shield during a time of crisis.
