

Dear NAMI Members and Stakeholders,

Welcome to the inaugural quarterly report of the Foundation for Meat and Poultry Research and Education (Foundation). The Foundation is a non-profit research, education and information foundation established to study ways the meat and poultry industry can produce better, safer products and operate more efficiently. The Foundation engages leaders from industry, academia and government to advance scientific understanding related to food safety, nutrition, the environment and worker safety, among other issues. In these quarterly reports, we will highlight the Foundation's initiatives to provide scientific evidence and context through research and education.

The Foundation has over seven decades of history beginning as the American Meat Institute Foundation in 1944 and with the merger of the American Meat Institute and North American Meat Association in 2015, the Foundation was established in its current form.

Since 1999, the Foundation's research initiative has focused on improving the safety profile of meat and poultry products. The original goal of the initiative to reduce or eliminate Shiga toxin-producing *Escherichia coli* in fresh beef and *Listeria monocytogenes* in ready-to-eat meat and poultry products has resulted in dramatic declines in foodborne illness outbreaks associated with these products. *Salmonella* control later emerged as a top priority for both the industry and the regulatory agencies. More resources than ever are being devoted to understanding and developing innovative strategies to control these pathogens.

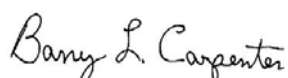
The Foundation is a contractor to the Beef Checkoff, which affords us the opportunity further research efforts on post-harvest beef safety. Together, we are able to leverage our resources and deliver greater value to livestock and meat industry.

Both new and old challenges still confront the meat and poultry industry. Recent reports have called into question the health benefits of meat and poultry products, linking intake to adverse health outcomes like chronic diseases or cancer. Demonstrating the important nutrient contributions that animal proteins make to the diet is integral to the industry's viability.

Responding to increasing concern about the healthfulness of meat and poultry and animal production, the Board of Directors voted to expand the Foundation's research scope in July 2017. Research programs will now also focus on nutritional sciences, animal production and product quality.

As we embark on this exciting opportunity, we are identifying experts in these areas to join meat and poultry safety experts to serve in a critical capacity, the Research Advisory Committee, which sets research priorities and directs research activities.

The research activities highlighted in this report would not have been possible without the coordination and dedication of industry, academic and government partners. We gratefully thank you for your support and look forward to continuing the work started more than seven decades ago to improve the quality and safety of meat and poultry products consumed around the world.



Barry Carpenter
Chairman

Best regards,



Susan Backus
President

Research Priorities

Each year, the Research Advisory Committee (RAC) establishes a set of industry research needs. These needs are used when communicating with governmental agencies, interested stakeholders and the general public and are intended to show the broad scope and diverse food safety research needs of the industry. Critical priorities designated by the RAC serve as the basis for the Foundation's Request for Proposals, which is released each summer.

The 2017-2018 Request for Proposals solicited research to:

- Evaluate ingredients, antimicrobial treatments, or other non-thermal intervention technologies used to inhibit microbial (STEC, *Salmonella*, *Listeria* and/or *Campylobacter*) growth that can be used in the production of clean label, "natural" or organic products, including RTE and fresh meat and poultry parts and products.
- Identify and validate interventions to inhibit *Salmonella* and STEC on pork including carcasses, primals, trim and ground product.
- Identify and validate interventions to reduce pathogen contamination of beef and pork head or cheek meat.
- Identify and validate interventions to reduce pathogen contamination of poultry parts.
- Identify and validate antimicrobial interventions to reduce pathogen contamination of beef edible variety meats.
- Investigate efficient and sustainable application of antimicrobials to reduce pathogens on meat and poultry carcasses as well as primals and parts.
- Evaluate common production processes used during the production of alternatively cured bacon and ham to better understand the lethality of certain thermal processes and cooling procedures that are currently being extrapolated from Appendices A and B. The research should explore the addition of nitrite and nitrate, including preconverted, as an ingredient in alternatively cured bacon(s) and ham(s), especially for the production of clean label, "natural" or organic products.

More than 70 proposals were submitted this year and the initial evaluations were conducted September 20 and 21. Subsequent reviews of selected proposals will culminate in recommendations for funding in January 2018. The Foundation has an extremely competitive research initiative with less than 10 percent of all proposals receiving funding.

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Current Research Projects

Complete summaries of research underway are available on meatpoultryfoundation.org.

Assessing the impact in red meat processing of a mobile genetic element that imparts extreme heat resistance to *E. coli*

Mick Bosilevac, Norask Kalchayanand, John Schmidt, USDA-ARS-U.S. Meat Animal Research Center

This research will assess where in red meat processing extreme heat resistant *E. coli* may pose a problem, how easily the locus of heat resistance can be shared between bacteria and if current non-thermal interventions offer effective control

Funded in part by the Beef Checkoff

Efficacy of antimicrobial interventions in reducing *Salmonella*, STECs, *Campylobacter*, and *E. coli* Biotype I Surrogates on pork carcasses, chilled pork products, beef and pork head meat, cheek meat, livers and hearts

Ashley Arnold, T. Matthew Taylor, Kerri Gehring, Jeffrey Savell, Texas A&M University

This project will document the efficacy of approved interventions in reducing pathogen contamination on pork carcasses and chilled pork subprimals; pork head or cheek meat; beef head or cheek meat; pork hearts and livers; beef hearts and hot-boned pork. Research will also evaluate the color of pork following the application of antimicrobial.

Funded in part by the Beef Checkoff

Reducing *Salmonella* serotypes on Chicken Carcasses by Sodium Bisulfate (SBS) and Investigation into its Reuse to Reduce Water Consumption

Steven Ricke, Peter Rubinelli, Si Hong Park, Casey Owens, University of Arkansas

Research will test the ability of sodium bisulfate (SBS) to kill *Salmonella* on fresh chicken carcasses and measure the efficacy in eliminating pathogens after multiple reuse of the SBS-containing rinse. Potential color and flavor effects of the SBS will also be addressed as well as any barriers to regulatory approval of SBS for this application.

Research Priority Meeting for Certain By-Products

There is limited research on the impact of rendering on foodborne pathogens, particularly with the implementation of the Food Safety Modernization Act. The Foundation will work with allied stakeholders in the rendering, pet food and cosmetic industries throughout North America to assemble a meeting where industry standards can be discussed to better inform future research priorities and projects. There is a dearth of critical parameters for this type of research.

Intervention Validation: A Review

Ashley Arnold, Kerri Gehring, Jeffrey Savell, Texas A&M University

This project will collect and summarize available scientific literature to demonstrate efficacy of various interventions and/or antimicrobials at a range of applicable concentrations on fresh beef, veal, pork, lamb and poultry products.

Funded in part by the Beef Checkoff

Literature Review: Efficacy of Interventions on Pathogens in Processed Meats

Wendy Bedale, Jeff Sindelar, Kathy Glass, University of Wisconsin

This project will generate a comprehensive review of high-quality studies that describe interventions used to reduce microbiological risks in processed meat products. The output of this project will be a searchable database that can be used in the design of intervention strategies and as scientific support in the validation of their HACCP system.

Funded in part by the Beef Checkoff

Using Bioluminescent *Salmonella* to Identify Infection Sites Contributing to Contamination of Ground Turkey Meat

Monique França, John Maurer, University of Georgia

The intent of this research is to reveal harborage sites in turkeys following *Salmonella* infection as a source of contamination in ground poultry products. *Salmonella* harborage sites in ground product components and the ability of *Salmonella* to localize in microscopic lymphoid tissue and feather follicles will be assessed utilizing a bioluminescence imaging system in order to visualize infected tissues and to monitor *Salmonella* dissemination over time.

Validation of lethality and stabilization processes for products with slow come up time: bacon and bone-in ham

James Dickson, Joseph Sebranek, Joseph Cordray, Iowa State University

Jeff Sindelar, Kathleen Glass, University of Wisconsin
Robert Hanson, HansonTech

Research will determine the effect of slow come up time and slow stabilization during the thermal processing of bacon and bone-in ham on the survival of *C. perfringens*, *Staphylococcus aureus*, *Listeria monocytogenes* and *Salmonella* spp.

Recent Research Findings

The Foundation has received several research findings in 2017. Executive summaries, and final reports when available, of each project are available on meatpoultryfoundation.org

Application of non-O157 STEC-attacking Bacteriophages to Reduce STEC on Beef Cattle Hide Pieces

T. Matthew Taylor, Jason Gill, Thomas Hairgrove, *Texas A&M University*

The results from this project indicate commercial phages were capable of infecting and killing STEC isolates from differing serogroups to differing degrees. The optimal STEC infection and inactivation by phage treatment on live animals is best accomplished using a multi-phage blend to infect and kill multiple varying STEC. Findings also indicate while more phages applied to the live animal will have greater opportunity to contact and infect a susceptible STEC isolate, phages are capable of infection and inactivation of the host even when they only lowly outnumber the host.

Consumer Food Safety Education Conference Sponsorship

The Consumer Food Safety Education, hosted by the Partnership for Food Safety Education, focused on using behavior change to improve food safety practices at home and at work. The Conference provided an opportunity to network and engage in collaborative dialog with health and food safety educators from federal agencies, non-profit organizations, higher education, and the food industry. More than 400 food safety educators attended the Conference.

Salmonella Contamination in Poultry – Are We Missing a Potential Vector?

Jennifer N. Martin, Keith E. Belk, Dale R. Woerner, Ifegenia Geornaras, Hua Yang, Robert J. Delmore, *Colorado State University*

Chance Brooks, *Texas Tech University*

Results of the study suggest that *Salmonella* may be present in the synovial fluid of broilers. Although prevalence was relatively low among sampled joints and in the synovial fluid per broiler carcass, when extrapolated to the scale of broilers produced, this information provides valuable insight into potential poultry contamination pathways.

Determination of the Prevalence of Resistance to Biocides in Salmonella and Identification of the Genetic Mechanisms of Resistance

Jonathan Frye, Charlene Jackson, *USDA-ARS-Russell Research Center*

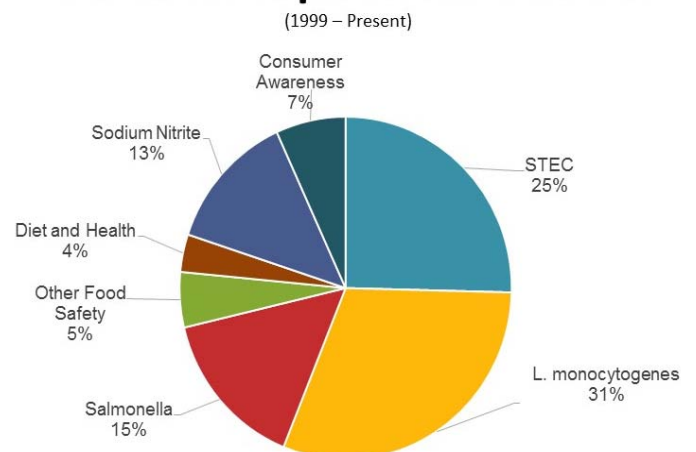
This study detected resistance to some biocides including arsenic compounds containing a specific gene. This gene was located in the chromosome of the isolates and was not linked to antimicrobial resistance genes. The serotypes of the isolates were not associated with an animal's source or with use of arsenic compounds. Overall, a correlation between biocide resistance and antimicrobial resistance was not detected.

The dynamics of Salmonella infection in cattle and their peripheral lymph nodes

Michael McClelland, *University of California*

Feedlot cattle and their lymph nodes are routinely colonized by *Salmonella*. A combination of an innovative bacterial transdermal delivery method and DNA-based molecular barcoding strategies was used to study how *Salmonella* travels from different entry sites within and between infected animals, and whether the bacterium can flourish within animal sites other than the gut. This study revealed that steer may infect each other by the feco-oral route, but also in ways that do not require fecal shedding or oral uptake.

Research Topic Areas Funded



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