

The research projects listed below are funded in whole or part by the Beef Checkoff and are intended to help ensure a safe and nutritious beef supply.



Funded by the Beef Checkoff.

Current Research Projects

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Creating Alternative Support for Lethality and Stabilization for Heat Treated and Fully Cooked Meat and Poultry Products, University of Wisconsin, HansonTech

Nearly all meat processors in the United States utilize USDA, FSIS Appendix A and B to ensure adequate thermal lethality and stabilization is achieved for partially and fully cooked products. Through the development and release of updated versions in 2017 and 2021, and the realization that a host of potential food safety vulnerabilities exist, the widespread usefulness and in-plant practical application of these guidance documents has become a significant concern and practical challenge to implement. The primary objective of this study is to develop a scientific-based, regulatory-supported, and industry-useful thermal processing and cooling resource (e.g. cooking and cooling food safety handbook) for validating pathogen destruction and control, and regulatory compliance for partially and fully cooked meat products that can be used in conjunction with or in lieu of USDA, FSIS Appendix A & B.

Funded in part by the Foundation for Meat & Poultry Research & Education

Enhanced Characterization of Sequence Differences Among *Salmonella* isolates within SNP Clusters Identified by the NCBI Pathogen Detection System, USDA-ARS, Meat Animal Research Center

This research intends to better understand the full picture of relatedness within critical *Salmonella* serovars of interest by performing a comparative genomic analyses on currently available data within the Pathogen Detection Isolates Browser (PDIB). An analysis pipeline will be developed to catalogue *Salmonella* SNP cluster diversity in the NCBI PDIB with the goal of producing a white paper to enhance industry use and understanding of this tool, and to enhance public health actions and general understanding of *Salmonella* genomics by identifying isolates for closed genome sequencing that are within 50 SNP differences.

Developing a Quantitative *Salmonella* Baseline from Ground Beef in the United States, Texas Tech University, Kansas State University, University of Georgia, USDA-ARS, Meat Animal Research Center, Food Safety Net Services

The *Salmonella* level in ground beef across the U.S. is unknown. As a result, risk assessments and understanding the public health impact of potential *Salmonella* control programs across the industry are not always accurate. This study intends to conduct a representative *Salmonella* baseline and develop a blinded quantitative *Salmonella* baseline for the U.S. beef industry representing season and geographical waves.

Novel TaqMan assays for the specific detection and simultaneous differentiation of virulent and avirulent non-O157 Shiga toxin-producing *Escherichia coli* strains, Florida State University, USDA-ARS, U.S. Meat Animal Research Center

This study intends to standardize six multiplex TaqMan assays for the identification of virulent strains of *E. coli* O26, O111, O45, O103, O121, and O145 serogroups. Further, it will demonstrate the applicability of the standardized assays in inoculated food samples and red meat enrichments from national red meat surveillance programs through a direct comparison with the FSIS MLG 5C.01 reference method.

Recently Completed Research

Effects of proportioning meat and plant-based protein-rich foods within the U.S. Healthy Eating Pattern on cardiovascular disease risk factors, Purdue University

This project assessed the effects of consuming different proportions of red meat and plant-based, protein-rich foods incorporated into a U.S. Healthy Eating Pattern (HEP) on cardiovascular disease risk factors in adults at high risk of developing a heart-related disease. Improvements in heart disease risk factors and consumer satisfaction among the three HEPs were compared. Unlike most published research that compares red meat-containing diets to vegetarian diets, this project assessed how red meat and plant-based protein-rich foods are complementary for cardiovascular health.

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Dietary modeling the nutritional impact of removing/adding/substituting meat and poultry servings to the healthy dietary patterns, Nutrition Impact LLC, NutriScience LLC

This project modeled the effect of removing or adding a serving of minimally processed and further processed meat and poultry or substituting a serving of various foods with a serving of minimally processed and further processed meat and poultry on nutrient profiles in the healthy dietary patterns identified in the Dietary Guidelines for Americans, 2020-2025.

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Impact of sanitization and natural biofilm communities on *Salmonella* prevalence at processing plants, USDA-ARS, U.S. Meat Animal Research Center

This project evaluated the efficacy of commercial sanitizers against *Salmonella* harbored within environmental mixed biofilms by measuring biofilm forming ability and community structure of environmental biofilms before and after sanitization. It then compared environmental microbial communities and *Salmonella* survival in mixed biofilms before and after sanitization to determine the impact of different sanitizers on controlling *Salmonella*.

Using empirical evidence, modeling, and risk assessment methods to estimate the public health impact of incorporating enumeration and virulence as part of the criteria for evaluation of *Salmonella* contamination in ground beef in the US, EpiX Analytics, Colorado State University

The EpiX analytics team incorporated novel genomics methods into a fully quantitative risk assessment. The genomics methods allowed for the identification and differential targeting of *Salmonella* serovars into higher- and lower-virulence groups. The results of the risk assessment show that considering quantitative criteria to target higher virulence serovars combined with high rates of combo testing can significantly reduce human salmonellosis. Although low virulence serovars cause salmonellosis, targeting these serovars only slightly improved the reduction of illnesses. Using modeling, *Salmonella* prevalence in beef products significantly increased along with the number of cattle coming from the Southwest and Midwest regions. Additionally, prevalence was significantly higher in the summer season and increased with the distance cattle traveled from source to slaughter. There were no significant associations between region or season with high-virulence *Salmonella* serovars.

Contact Bill Sessions at bsessions@meatinstitute.org or Susan Backus at sbackus@meatinstitute.org for more information on post-harvest beef safety research and activities.