

Searchable Validation Databases Now Available on Foundation Website

The Foundation for Meat and Poultry Research and Education (Foundation), a contractor to the Beef Checkoff, released searchable [validation databases](#) that summarize the available scientific literature identifying antimicrobial and other interventions for fresh and processed meat and poultry. Small and very small meat and poultry establishments can use both databases in the design of intervention strategies and as scientific support in the validation of their Hazard Analysis and Critical Control Points (HACCP) systems.

The Foundation, on behalf of the Beef Checkoff, partnered with the University of Wisconsin to create a database of high-quality studies that describe interventions used to reduce microbiological risks in processed meat products. The second database, developed in collaboration with Texas A&M University, presents scientific literature detailing the efficacy of various interventions and antimicrobials at a range of applicable concentrations on fresh beef, veal, pork, lamb and poultry products.

“These comprehensive databases provide a critical resource to small and very small meat and poultry establishments that may not always have the time and resources to gather the necessary, required information to offer support for decisions made related to their food safety systems. By using these databases, establishments will be equipped to meet HACCP requirements and can more easily identify the most optimal antimicrobial and other interventions to ensure product safety,” said Foundation President Susan Backus.

The databases are searchable by type of meat, product, pathogen and intervention.

Interventions addressed in the databases include heat, pH control, chemical and clean-label inhibitors, high-pressure processing and irradiation, among others. *E. coli* O157:H7, non-O157 Shiga toxin-producing *E. coli*, *Salmonella*, *Campylobacter* and *Listeria monocytogenes* are among the microbial pathogens covered in the databases.

Both projects were funded in part by the Beef Checkoff. Future updates will be made to both databases to reflect new research findings. The databases can be found at www.meatpoultryfoundation.org.

The screenshot shows the website's navigation menu at the top: About, Research, Why Donate, Conferences, News & Media, Resources. The main content area is titled "Validation Databases" and contains a descriptive paragraph: "The databases in the links below have been developed to summarize available scientific literature to demonstrate efficacy of various interventions and/or antimicrobials at a range of applicable concentrations for fresh and processed meat and poultry. This databases may be used to identify scientific support for HACCP Systems Validation by small and very small establishments. The database is searchable via the drop-down menu, the type-in search bar or both. Use the category drop-down menu to select specific interests or type in key words in the search bar, or use both to narrow down search results." Below this text are logos for the Beef Checkoff and the Foundation for Meat and Poultry Research and Education. To the right of the main content are several sidebar links: "2017-2018 Request for Proposals", "About", "Board of Directors", "Brochure", "Research Advisory Committee", "Research Priorities", "Staff", "Process lethality spreadsheet" (with a graph icon), and "Validation Databases" (with a list of categories: Processed Meat and Poultry (all species), Fresh Meat and Poultry, Beef, Veal, Pork, Lamb and Goat, Poultry, Added Ingredients, Non-Intact).

High Priority Research Needs: Appendices A&B

The Food Safety and Inspection Service (FSIS) in June 2017 issued revised Appendices A and B, which provide safe harbor guidelines for ready-to-eat (RTE) meat and poultry processors. Appendix A was designed to help meat and poultry processors meet lethality requirements in RTE products and Appendix B was designed to assist processors meet the cooling and stabilization requirements for heat-treated and RTE and non-RTE products.

The revised Appendices highlighted immediate research needs prior to FSIS enforcement on March 22, 2019. As a result, the Foundation issued a mini request for proposals in late May to fill the data gaps particularly addressing relative humidity changes in Appendix A, altering Option 2 in Appendix B, and changes to partially cooked items in Option 1. This mini RFP was conducted on an expedited review and research timeline to ensure findings are available to the industry prior to the enforcement date.

Proposals were solicited on the following topics:

- Evaluate and validate short time (less than one hour), high temperature (above 212°F) cooking processes without relative humidity on the lethality of *Salmonella* in large and small meat and poultry products. 9 CFR 318.17(a)(1) and 381.150 (a)((1))
- Evaluate permeability and denaturation of collagen casings during processing with and without relative humidity, including thermal processing, drying and fermentation. For example, a product cooked in a natural casing and then dried.
- Evaluate and validate growth and toxin formation of *Staphylococcus aureus* under typical processing conditions as well as deviations (outside of 50-130°F in six hours) for low temperature cooked products, e.g. non-cured medium rare roast beef, bacon, cured hams.
- Evaluate *Clostridium perfringens* growth during cooling in large diameter cured and uncured products beyond 120-80°F range in one hour and 80-55°F in five hours as prescribed under Option 2 in [Appendix B](#). 9 CFR 318.17(a)(2) and 9 CFR 381.150 (a)(2)
- Update models used commonly for evaluating pathogen growth during process deviations. Pathogens can include *C. perfringens*, *C. botulinum* and *Bacillus cereus* among others.
- Examine the outgrowth of *Clostridium perfringens* growth during cooling in partially cooked or partially heat treated products. 9 CFR 318.23(c)(1) and 9 CFR 381.150(b)
- Determine the maximum cooling rates that are thermodynamically possible for non-cured beef and turkey products chilled in air-blast chillers.
- Evaluate growth and toxin formation of *Bacillus cereus* and *Clostridium perfringens* under typical processing conditions as well as deviations (outside of 50-130 F in 6 hours) for low temperature cooked products, e.g. non-cured medium rare roast beef, bacon, cured hams.

The Foundation Board of Directors met July 2 to review and approve research projects to address these priorities. Three projects were approved for funding. Details will be forthcoming in the next quarterly newsletter.

KatieRose McCullough Named Foundation's Senior Science Advisor

KatieRose McCullough, Ph.D., MPH has been named Senior Science Advisor to the Foundation. In this role, McCullough will provide scientific and technical support for the Foundation's research agenda.

McCullough also serves as a director of regulatory and scientific affairs at the North American Meat Institute where she provides expertise on a variety of topics including: meat science, meat quality, spoilage, food safety, pathogen control, intervention technologies, HACCP, regulatory issues and more.

Prior to joining the Meat Institute, McCullough designed and conducted research studies related to pathogen reduction, system validation, pathogen identification, shelf-life, and sensory. McCullough also has experience in public health epidemiology, and foodborne outbreaks investigation.



McCullough received her bachelor of science in animal science from Texas Tech University, her master of science in animal science from Oklahoma State University, where her research focused on meat quality, and her doctorate of philosophy in animal science from Colorado State University, where her research focused on food safety. McCullough also holds a master's in public health, with a focus on animals, people and the environment, from the Colorado School of Public Health.

2018 Board of Directors

Tim Arndt, Jack Link's Beef Jerky
Van Ayvazian, Boar's Head Provisions Co. Inc.
Peter Bozzo, Michael's Finer Meats and Seafoods
Terry Coffey, Smithfield Foods, Inc.
Brian Coelho, Central Valley Meat Co.
Bill Eisel, Fresh Mark, Inc.
Tony Gahn, Gahn Meat Company
Eric Gustafson, Coast Packing Company
Tom Hayes, Tyson Foods
Randy Huffman, Maple Leaf Foods, Inc.
Tim Klein, National Beef Packing Co., LLC
Kevin Ladwig, Johnsonville Sausage, LLC
Craig Letch, Beef Products, Inc.
Neal Leonard, Surlean Foods
Carlos Lopez, Bar-S Foods
John Patrick Lopez, Lopez Foods
Joe Maas, JTM Food Group

Shane MacKenzie, Superior Farms
Gary Malenke, Natural Food Holdings
Steve Maxey, Certified Meat Products
Brad McDowell, AB Foods
Dave Miniati, Miniati Holdings
Kathleen O'Donnell-Cahill, Wegmans Food Markets, Inc.
Ken Petersen, OSI Group, LLC
Dave Pyburn, National Pork Board
Mike Satzow, North Country Smokehouse
Suzanne Strassburger, Strassburger Steaks
Hilary Thesmar, Food Marketing Institute
Mike Townsley, Bob Evans Farms, Inc.
Steve VanLannen, American Foods Group
John Vatri, Cardinal Meat Specialists, Ltd.
Dennis Vignieri, Kenosha Beef International, Ltd.
Russ Yearwood, Indiana Packers Corporation

Foundation Co-Sponsors Session on P/Birth-24 Months Dietary Guidelines

The Foundation co-sponsored a Satellite Program focusing on evaluating evidence standards and the impact of including the birth to 24-month population in the 2020-2025 *Dietary Guidelines for Americans* at the annual meeting of the American Society for Nutrition (ASN), on June 11, 2018. The audience of more than 100 attendees included nutrition researchers, scientific affairs personnel, and students.

The Dietary Guidelines are the cornerstone of U.S. government efforts to promote health and prevent the onset of chronic disease through diet and nutrition. The Dietary Guidelines are updated every five years and beginning in the 2020 edition are required to provide guidance for pregnant and lactating women as well as the birth to 24-month population. This session was designed to determine what is currently known about early childhood nutrition; how policies can be developed to positively impact the population; and how the inclusion of these special populations in guidelines could impact existing nutrition policies and programs.

Program speakers were J. Thomas Brenna, Ph.D., professor of pediatrics, University of Texas at Austin; Robert Murray, M.D., professor, Ohio State University; and Kartik Shankar, Ph.D., associate professor of pediatrics, Arkansas Children's Nutrition Center. Brenna, a 2015 Dietary Guidelines Advisory Committee member, provided an overview of the previous Dietary Guidelines development process and discussed how no two processes are the same. Brenna also spoke directly to the issue of determining how key methods, such as dietary patterns or human randomized controlled trials, can be used for infants when they do not exist for this population concluding that, for this population, effort must return to roots of nutrition science so that policies are developed based upon the strongest evidence.

Murray presented on dietary patterns and how this new method changes the way scientists think about food and approach it. Given that the roots of the western dietary pattern are set in toddlerhood and that a quality diet pattern promotes better health and lower risk of disease, it is important to establish a foundation for the child's future life with food affecting the cognitive, motor, social-emotions, nutritional, physical and mental health in the first 1,000 days. According to Murray, huge changes have occurred in feeding. In the past, few foods were introduced in tightly sequenced ways, while presently, diverse foods are offered repeatedly. Lacking nutrients, including iron, zinc, and protein, need to be promoted given the waning use of historical baby food products such as baby beef and fortified infant cereals.

Lastly, Shankar provided an overview of how this life stage sets the stage for long term health implications, and also discussed emerging research and where gaps exist. Shankar noted that the scientific consensus remains unclear about the duration of breastfeeding, delivery mode, milk composition, micronutrient supplementation, diet of the mother, transition to food and many behavioral aspects. Factors that affect all time periods included diet and developmental origins, factors affecting taste, and factors influencing eating behavior.

During the question and answer period, the speakers concurred that cognitive development, a topic area not prioritized by the U.S. Departments of Agriculture and Health and Human Services, should be a key focus area for this population. This session provided a clear understanding that numerous nutrition questions remain relating to the first 1,000 days of life, but that opportunities exist to improve the whole diet, to return to the roots of basic science, and to focus on the areas where scientific consensus exists, such as cognitive development and behavior.

Research Advisory Committee Identifies Industry Research Needs

The Foundation Research Advisory Committee met this Spring to discuss industry research priorities. These priorities address: pathogens on fresh and ready-to-eat meat and poultry products; other food safety issues; product quality; and nutritional sciences. Within the food safety topics, there are several broad areas of interest: cross sector research needs; pre-harvest pathogen control; post-harvest research, *e.g.* intervention technologies; operational control and monitoring; post-production research; and information to enhance current and future public health risk assessments, among others.

These priorities are used when communicating with government agencies, interested stakeholders and the general public, and are intended to show the broad scope and diverse research needs of the industry. Selected priorities will be used to develop the Foundation's annual request for proposals (RFP), which will be issued later this summer. Examples of some of the topics expected to be included in the RFP follow.

- Use whole genome sequencing and other emerging technologies to evaluate the genetic factors allowing bacterial pathogens (*STEC*, *Salmonella* and/or *Listeria*) to live and thrive in processing environments, on food contact surfaces and/or on products.
- What factors should you consider when evaluating regulatory whole genome sequenced isolates, *e.g.* type of pathogen; relatedness of sequences; in plant location of pathogen; potential for harborage or continual reintroduction; what can be learned; and other factors.
- Evaluate methods and mitigation strategies to control and measure sporeformers on raw products prior to packaging to minimize or eliminate adverse quality outcomes like discoloration and blown bags.
- Conduct menu modeling and other analyses to demonstrate that fresh and processed meat and poultry items can be a component of the dietary pattern recommended by the *Dietary Guidelines for Americans*.
- Risk-benefit analysis on the consumption of fresh and processed meat and poultry products as a component of a healthy diet and lifestyle.

The complete list of priorities and proposal submission instructions will be include in the RFP. Please contact [Susan Backus](#) if you would like to receive the RFP.

Foundation Education Programs Schedule of Events

Pathogen Control and Regulatory Compliance in Beef Processing Conference

Rosemont, Illinois
September 5-6, 2018

Animal Care and Handling Conference

Kansas City, Missouri
October 18-19, 2018

Advanced *Listeria monocytogenes* Intervention & Control Workshop

Kansas City, Missouri
October 23-24, 2018

Worker Safety Conference for the Meat and Poultry Industry

Co-located at the International Production and Processing Expo (IPPE)
Atlanta, Georgia
February 11-12, 2019

Environmental Conference for the Meat and Poultry Industry

Co-located at the International Production and Processing Expo (IPPE)
Atlanta, Georgia
February 11-12, 2019

For more information on these programs, please visit the events page at www.meatinstitute.org.

Current Research Projects

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

Pathogen growth in alternatively cured ham and bacon during cooking, cooling, and process deviations

*James Dickson, Joseph Sebranek, Iowa State University
Shannon Cruzen, Hayriye Cetin-Karaca, Smithfield Foods, Inc.*

This project will determine the inhibitory effect of nitrite from a natural source (*i.e.*, pre-converted celery juice powder) in processed meat products with a natural label during “real world” cooking and chilling procedures, which often include instances of process deviation, as well as non-continuous cooling.

Tests of *Salmonella* sub-unit proteins as vaccines for broiler chickens

Hung-Yueh Yeh, USDA-ARS U.S. National Poultry Research Center

Research will identify the *Salmonella* protein antigens that are able to induce humoral immune response in broilers, and consequently if these antibodies can prevent *Salmonella* colonization in the broiler gastrointestinal tracts.

Validation of post-harvest antimicrobial interventions to control *Salmonella* on market hog carcass surfaces and pork products

Sara Gragg, Randall Phebus, Valentina Trinetta, Travis Quinn, Jessie Vipham, Kansas State University

This study will validate the efficacy of lactic acid, sulfuric acid sodium sulfate, bromine, 180°F water, and peracetic acid as post-harvest interventions against *Salmonella*, as well as the impact on product color attributes, on pork carcasses and trim.

Maintenance for Literature Review: Efficacy of Interventions on Pathogens in Processed Meats and Poultry Products

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

This project will update and expand the version 1 of the tabular summary of references describing antimicrobial interventions that have been tested in processed meat and poultry products. The key project objective is to provide small and very small establishments with an accessible, searchable, user-friendly tool to help them identify interventions and suitable scientific support to meet HACCP system validation requirements. *Funded in part by the Beef Checkoff.*

Intervention Validation: A Review — Continued Maintenance

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

This project will review newly identified and/or published literature that encompass multiple commercially applicable intervention strategies against biological hazards of concern for fresh meat and poultry. *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 Setting 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.

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 *Clostridium perfringens*, *Staphylococcus aureus*, *Listeria monocytogenes* and *Salmonella* spp.

Foundation Contributors

The Foundation is supported through the generous contributions of Meat Institute members and individuals.

A to Z Portion Control Meats
AB Foods LLC*
AdvancePierre Foods^{*,2}
Alaska Sausage Co., Inc.*
Allen Brothers
American Custom Meats
American Foods Group, LLC^{*,2}
American Meat Companies
Atlantic Veal & Lamb
Susan Backus²
Bar-S Foods Co.^{*,2}
Beef Products, Inc.^{*,2}
Boar's Head Provisions Co., Inc.^{*,2}
Bob Evans Farms, Inc.^{*,2}
Betsy Booren²
Broadleaf (USA), Inc.^{*,2}
BROPACK ENTERPRISES, LLC
Brown Packing Co., Inc.^{*,2}
Brush Meat Processors
Butterball, LLC*
California Ranch Food Company
Capitol Wholesale Meats
Cardinal Meat Specialists*
Cargill Meat Solutions*
Barry Carpenter²
Catelli Brothers, Inc.^{*,2}
Caviness Beef Packers^{*,2}
Central Valley Meat Company^{*,2}
Certified Meat Products, Inc.*
Clemens Food Group^{*,2}
Cloverdale Meats
Coast Packing Company^{*,2}
Costco Wholesale Meats*
Dale T. Smith & Sons^{*,2}
Del Real, LLC²
Delft Blue
Devault Foods^{*,2}
Dietz & Watson^{*,2}
Ed Miniati LLC^{*,2}
Engelhart Gourmet Foods, Inc.
Eureka Sausage Inc.²
Evergood Sausage Company
Fair Oaks Farms, LLC²
Far West Meats*
FirstClass Foods
Four Star Meat Co., Inc.
FPL Foods, LLC*
Fratelli Berretta USA, Inc.
Fred Usinger, Inc.^{*,2}
Fresh Mark^{*,2}
Gahn Meat Co., Inc.*
Ghiringhelli Specialty Foods
Glier's Meats²
Greater Omaha Packing Co., Inc.^{*,2}
Kelly Green
Eric Gustafson²
Harris Ranch Beef*
Hartley Ranch Angus Beef, LLC*
Hastings Foods LLC
Hempler Foods Group, LLC
Hill Meat Company^{*,2}
Hormel Foods Corporation^{*,2}
HRR Enterprises
Independent Meat/Falls Brand²
Indiana Packers Corporation^{*,2}
JBS USA^{*,2}
Jensen Meat Company*
Jobbers Meat Packing Company^{*,2}
John Soules Foods
John Volpi & Company, Inc.
Jones Dairy Farm^{*,2}
JTM Provisions^{*,2}
Kayem Foods Incorporated*
Kenosha Beef International, Ltd.^{*,2}
Kessler's Inc.*
Keystone Foods*
Kruse & Son, Inc.
Kuna Meat Company
Land O'Frost, Inc.*
John Linker
Long Prairie Packing²
Lopez Foods^{*,2}
Los Banos Abattoir²
Main Street Wholesale Meats
Maple Leaf Foods, Inc.^{*,2}
Mary Ann's Foods
Meat Traders*
Meats by Linz²
Michael's Finer Meats*
Murry's
Natural Foods Holdings
Nicolosi Foods²
Nordic Foods
North Country Smokehouse^{*,2}
NPC Processing
Nueske's Applewood Smoked Meats
OSI Group^{*,2}
P.G. Molinari & Sons, Inc.²
Petschl's Quality Meats
Pineland Farms
Pitman Farms
Plymouth Beef Co., Inc.²
Premiere Brand Meats
Prime Smoked Meats²
Proportion Foods LLC²
Quality Processing Services, LLC
Randolph Packing Co., Inc.²
Red Smith Foods, Inc.
Rite-Way Meat Packers Inc.
Rocky Mountain Natural Meats
Rose Meat Services, Inc.
Rose Packing Company^{*,2}
Russak's Cured and Smoked Products*
Salm Partners, LLC*
Michael Satzow
Serv-Rite Meat Company²
Smith Provisions²
Smithfield Foods, Inc.*
Square H Brands, Inc.
Sterling Pacific Meat Company
Strassburger Meats/Suzy Sirloin Inc.*
Strauss Brands, Inc.^{*,2}
Superior Farms^{*,2}
Surlean Foods^{*,2}
The Meat Market
Pete Thomson
Triumph Foods*
Tyson Foods^{*,2}
Uncle Charley's Sausage Co., LLC²
Unibright Foods, Inc.²
Villari Bros. Foods, LLC²
Vincent Giordano Corporation
Walt's Wholesale Meats, Inc.²
Wasatch Meats, Inc.^{*,2}
West Michigan Beef Co. LLC
William Westman²
Wolverine Packing Company²
Yosemite Meat Co.²

* NAMI Board Member, ² Multi-year contributor

Research Advisory Committee

Aaron Asmus, Hormel Foods Corporate Services, LLC
Sharon Beals, US Foods
Angel Besta, Greater Omaha Packing Co., Inc.
Chris Bodendorfer, Johnsonville Foods LLC
Peter Bodnaruk, Tyson Foods, Inc.
Marisa Boss, Boar's Head Provisions
Melissa Bonorden, Hormel Foods Corporation
Betsy Booren, OFW Law
Ann Brackenridge, Cargill, Inc.
Ted Brown, Cargill, Inc.
John Butts, Land O'Frost, Inc.
Mandy Carr, National Cattlemen's Beef Association
Trevor Caviness, Caviness Beef Packers Ltd
Jorge Correa, Canadian Meat Council
Jeff Cromer, AB Foods, LLC
Mike DeCesare, Daniele, Inc.
Robert Delmore, Colorado State University
Jim Dickson, Iowa State University
Warren Dorsa, Smithfield Foods
Tom Edrington, Diamond V
Tim Freier, Mérieux NutriSciences
Christian Fuchs, Maple Leaf Consumer Foods
Kerri Gehring, Texas A&M University
Kari Godbey, American Beef Packers, Inc.
Katie Hanigan, Smithfield Foods
Matt Henderson, Land O'Frost, Inc.
Travis Holmes, Surlean Foods/L&H Packing Co.
Randy Huffman, Maple Leaf Foods Inc.

Mohammad Koochmaraie, IEH Laboratories & Consulting Group
Mark Kreul, In-N-Out Burger
Steve Larsen, National Pork Board
John Luchansky, Agricultural Research Service, USDA
Mike Luczynski, Boar's Head Provisions Co., Inc.
Brenden McCullough, National Beef Packing Co. LLC
Patrick Mies, National Beef Packing, Co. LLC
Andrew Milkowski, University of Wisconsin
Ali Mohseni, American Foods Group
Cynthia Moore, Tyson Foods
Kevin Myers, Hormel Foods Corporate Services, LLC
Nandini Natrajan, Keystone Foods LLC
Petri Papinaho, Jennie-O Turkey Store
Ken Peterson, OSI Group
Jerri Lynn Pickett, Tyson Foods, Inc.
Curtis Pittman, Harris Ranch Beef Company
Thomas Powell, American Meat Science Association
Rasool Rabbani, Bar-S Foods
Michael Robach, Cargill, Inc.
Scott Stillwell, Tyson Foods, Inc.
Hilary Thesmar, Food Marketing Institute
Melissa VanLaningham, Superior Farms
Tommy Wheeler, Agricultural Research Service, USDA
Martin Wiedmann, Cornell University
Diane Wood, Maple Leaf Consumer Foods
Janice Wynn, Harris Ranch Beef Company



1150 Connecticut Avenue, NW, Washington, DC 20036
www.meatpoultryfoundation.org