FOUNDATION FOCUS

FOUNDATION LOOKING AHEAD TO 2021

2020 was a year of great challenges. As the Foundation looks forward to a less complicated 2021, a brief review of the work of the Foundation shows a commitment to the Foundation's mission to conduct research and disseminate information that drives continuous improvement in the meat and poultry industry. The Foundation continues work that will enable meat and poultry companies to exceed expectations in key areas like food safety, nutrition, animal welfare and sustainability. In 2020, the Foundation undertook an ambitious research agenda with the Foundation's Board of Directors approving funding for six research projects. Signifying the importance of this research, several of these projects are jointly funded.

Funded by the Beef Checkoff, Foundation and Pork Checkoff

- Improving Validation Methods for *Salmonella* Lethality on the Surface of Multiple Impingement-Cooked Meat and Poultry Products
- Validation of a novel method for the detection of select *Salmonella* serovars in raw meat enrichments

Funded by the Beef Checkoff and Foundation

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

Funded by the Beef Checkoff and Administered by the Foundation

- Using whole genome sequencing to evaluate short- and long-term genetic variation of Shiga toxin-containing *Escherichia coli* O157:H7 in cattle to improve interpretations of isolate relatedness in outbreak investigations
- Efficacy of common antimicrobial interventions at and above regulatory allowable pick up levels

FOUNDATION LOOKING AHEAD 2021 (CONTINUED)

Funded by the Foundation

- Using Rapid Evaporative Ionization Mass Spectrometry (REIMS) as a novel, minimally invasive, real time method for characterization of metabolic variation contributing to flavor, tenderness, and color stability of beef

While the Foundation focuses on disseminating research to meat and poultry industry stakeholders, outreach to audiences beyond the meat and poultry community is also critical. The Foundation prepared a guide to meat processing for the nutrition community to help demystify processed meats by detailing common processed meat products and ingredients; as well as nutrition benefits and public health implications. The white paper was provided to the 2020-2025 Dietary Guidelines Advisory Committee for consideration in their scientific review. The Foundation's Senior Science Advisor, KatieRose McCullough, Ph.D., MPH, presented on the Partnership for Food Safety Education's webinar "Protein Power Hour: Home Grilling #AloneTogether," which focused common foodborne pathogens to look out for during grilling season. Both of these outreach activities featured work conducted by the Foundation on behalf of the Beef Checkoff.

To further advance the scientific knowledge, in July the Foundation issued its three concurrent requests for proposals (RFP) on key topics in food safety, nutritional sciences and product quality. The proposals submitted in response to the RFP were reviewed by the Foundation's Research Advisory Committee. Select projects were recommended for funding and will be evaluated by the Foundation's Board of Directors in January 2021.

FSIS ANNOUNCES FOUR FOOD SAFETY FELLOWS

USDA's Office of Food Safety (OFS) and the Food Safety and Inspection Service (FSIS) have selected four Food Safety Fellows through the Oak Ridge Institute for Science and Education (ORISE) program. The fellows are students currently working toward their doctoral degrees and have an interest in improving food safety and public health. During their fellowships they will learn how to apply their scientific and technical knowledge to inform FSIS decision making and improve the safety of the food supply. They will collaborate with FSIS scientists on projects related to the agency's research priorities. The four fellows are: Darwin Bandoy, University of California at Davis; Aaron Beczkiewicz, The Ohio State University; Colette Nickodem, Texas A&M University; and Ilya Slizovskiy, University of Minnesota. For more information about FSIS research priorities, click here.

FSIS, FDA AND CDC POST OUTBREAK DATA

In an effort to improve outbreak investigations communications and transparency with the public, starting on Nov. 18, 2020, the Food Safety and Inspection Service (FSIS), Centers for Disease Control and Prevention (CDC) and FDA began publishing information on all active foodborne illness investigations. Publicly sharing information on active investigations aims to increase awareness for consumer and industry stakeholders, help mitigate surprises, and improve internal and interagency coordination.

FSIS Food Outbreak Investigations can be found here. The table below is a screenshot of the Outbreak Investigations which lists outbreaks confirmed or suspected to be associated with FSIS-regulated products.

The Outcomes & References column includes links to recall notices, public health alerts, and after-action review reports, as well as CDC outbreak notices for selected multistate foodborne outbreaks, which provide additional information.

Outbreak Year	Pathogen	Product	Outcomes & References
2020 open investigations	*Listeria monocytogenes*	Italian-style deli meats (suspect)	CDC Investigation Notice
2019	Shiga toxin–producing *E. coli* O157:H7	Beef, ground	*FSIS After-Action Review:* 2020-04
2019	*Salmonella* Dublin	Beef, ground	FSIS Recall: 113-2019 *FSIS After-Action Review:* 2020-01 CDC Notice: Dublin-11-2019
2019	Shiga toxin–producing *E. coli* O103	Beef, ground	FSIS Recall: 047-2019 CDC Notice: O103-04-2019
2019	*Salmonella* Schwarzengrund	Turkey, ground	FSIS Recall: 030-2019 *FSIS After-Action Review:* 2019-06 CDC Notice: Schwarzengrund-03-2019
2018	*Listeria monocytogenes*	Pork patty rolls	FSIS Recall: 116-2018 CDC Notice: *Lm*-11-2018
2018	*Salmonella* Reading	Turkey, ground	FSIS Recall(s): 112-2018; 124-2018 *FSIS After-Action Review:* 2018-05 CDC Notice: Reading-07-2018
2018	*Salmonella* Newport	Beef, ground	FSIS Recall(s): 085-2018; 085E-2018 CDC Notice: Newport-10-2018

FSIS will be updating this table weekly. For information on outbreaks investigated by CDC and FDA, visit the CDC outbreaks table and the FDA outbreaks table.

CDC PUBLISHES INVESTIGATIONS OF *SALMONELLA, E. COLI, LISTERIA MONOCYTOGENES* OUTBREAKS

The Centers for Disease Control and Prevention (CDC) published its investigations of possible multistate outbreaks of *Salmonella,* Shiga Toxin-Producing *E. coli* (STEC) and *Listeria monocytogenes* infections. The investigation occurred between the beginning of 2016 and the end of 2017. The investigation found that during the 2016 reporting period, CDC assessed 230 possible multistate outbreaks of infections caused by *Salmonella*, STEC, and *L. monocytogenes.* Of these 230 possible outbreaks, 174 were investigated, 50 were determined to be outbreaks, and 39 were solved. Of the 56 possible multistate outbreaks that were not investigated, 25 appeared to be single-state outbreaks, 19 had illnesses caused by a strain that was not reported more frequently than expected, six had a majority of illnesses that occurred too far in the past to gather enough quality exposure data to identify a source, three appeared to be associated with international travel, and three did not have a reason recorded.

The findings in this report establish a baseline to help assess changes in outbreak detection, investigation and response after implementation of new technologies for subtyping and other improvements in traceback and outbreak communications. A more detailed description of the investigation and its results are available here.

NIFA SEEKING APPLICATIONS FOR SUSTAINABLE AGRICULTURE SYSTEMS PROGRAM

The National Institute of Food and Agriculture (NIFA) seeks creative and visionary applications that take a systems approach for projects focused on the themes in the USDA Science Blueprint: (1) sustainable agricultural intensification; (2) agricultural climate adaptation; (3) value-added innovation; and/or (4) food and nutrition translation. These projects are expected to significantly improve the supply of affordable, safe, nutritious and accessible agricultural products, while fostering economic development and rural prosperity in the U.S. Applications to the Agriculture and Food Research Initiative - Sustainable Agricultural Systems (SAS) Request for Applications (RFA) must focus on approaches that promote transformational changes in the U.S. food and agriculture system. "The new NIFA research program is exciting," said Senior Science Advisor KatieRose McCullough, Ph.D., MPH. "It aligns with the meat and poultry industry's goals and can help support the role meat and poultry products play as a sustainable nutrient-dense food." More details on the application are available here.

The Foundation for Meat and Poultry Research and Education is governed by a Board of Directors, which provides scientific leadership and financial oversight, and acts upon recommendations from the Foundation's Research Advisory Committee. The North American Meat Institute's Executive Board is afforded the opportunity to serve on the Foundation's Board of Directors or appoint a designee to serve on their behalf. In an effort to broaden the scope of influence and direction, representatives from the livestock (beef, pork, poultry and egg), retail, academic, government agency and consumer sectors, among others, are invited to serve on the Board of Directors. Terms are for one year.

Kevin Addesso, Johnsonville Sausage, LLC
Al Almanza, JBS USA
Jonathan Amidei, Swaggerty's Sausage Company
Tim Arndt, Jack Link's Protein Snacks
Van Ayvazian, Boar's Head Provisions Co., Inc.
Chad Bower, Certified Meat Products
Peter Bozzo, Michael's Finer Meats & Seafoods
Robert Cannell, National Beef Packing Co, LLC
Doug Clemens, Clemens Family Corporation
Brian Coelho, Central Valley Meat Co.
Jeff Cromer, AB Foods, LLC, an Agri Beef Company
Andy Curliss, Smithfield Foods, Inc.
Henry Davis, Greater Omaha Packing Co., Inc.
Martin Eckmann, Alaska Sausage Company
Adam Edwardson, empirical foods
Neil Genshaft, Fresh Mark, Inc.
Eric Gustafson, Coast Packing Company
Barry Hays, Sigma
Denise Heard, US Poultry and Egg Association
Megan Hobbs, Cargill, Inc.

Randy Huffman, Maple Leaf Foods, Inc.
Neal Leonard, Surlean Foods
Joe Maas, JTM Food Group
Shane MacKenzie, Superior Farms
Matt Malott, Multivac, Inc.
Dave Miniat, Miniat Holdings
Kathleen O'Donnell Cahill, Wegman's Food Markets
Ken Petersen, OSI Group, LLC
Dave Pyburn, National Pork Board
Scott Rich, Wasatch Meats
Ed Sanchez, Lopez Dorado Foods, Inc.
Suzanne Strassburger Reidy, Strassburger Meats
Hilary Thesmar, FMI - The Food Industry Association
John Randal Tyson, Tyson Foods, Inc.
Steve Van Lannen, American Foods Group, LLC
Dennis Vignieri, Kenosha Beef International, Ltd.
Russell Yearwood, Indiana Packers Corporation

2020-2021 RESEARCH ADVISORY COMMITTEE

The Foundation's Research Advisory Committee (RAC) develops meat and poultry research priorities which serve as the basis for the Foundation's research agenda and also communicates the areas of greatest research needs to the government, public and interested stakeholders. The RAC is made up of four subgroups across minimally processed (fresh) meat and poultry safety, further processed meat and poultry safety, nutrition sciences and product quality.

Emily Arkfeld, Triumph Foods [Q]
Aaron Asmus, Hormel Foods Corporation [R, P, FP]
Sharon Beals, CTI Foods [R, B, FP]
Chris Bodendorfer, Johnsonville Sausage LLC [R, FP]
Dustin Boler, Top Pigs [R, P, Q]
Melissa Bonorden, Hormel Foods Corporation [R, N]
Jordan Bowers, Hormel Foods Corporation [CT]
Anna Carlson, Cargill, Inc. [R, CT]
Cole Cheatwood, Bar S Foods [FP]
Cindy Moore, Tyson Foods [N]
Joel Coble, Tyson Foods [R, B, P, FP, Q]
Kaitlyn Compart, Smithfield Foods [R, FP]
Clay Eastwood, National Pork Board [R, P]
Jacquelyn Fletcher, Wellshire Farms [R, FP, N, Q]
Heather Fowler, National Pork Board [R, P]
Devin Gredell, Tyson [Q]
Wade Fluckey, Clemens Food Group [R, P]
Katie Hanigan, Smithfield Foods [R, P]
Barry Hays, Bar S Foods [R, FP]
Susan Jaxx, Cargill, Inc. [N]
Collette Kaster, American Meat Science Association [R, P, Q]

Mark Kreul, In n Out [R, B, Q]
John Luchansky, USDA ARS [R, B, P, FP, N, Q, CT]
Mike Luczynski, Boars Head Provisions [R, FP]
Deidrea Mabry, American Meat Science Association [B]
Pat Mies, National Beef Packing Co., Inc. [R, B]
Curtis Pittman, Harris Ranch Beef Company [R, B, FP]
John Scanga, Meyer Natural Foods [R, Q]
Sue Schwartz, Miniat [R, FP]
Mark Seyfert, Birchwood Foods [R, B, FP]
Subash Shrestha, Cargill, Inc. [R, FP]
Sally Staben, Hormel Foods Corporation [P, FP]
Ben Stellmacher, Johnsonville Sausage [P]
Tommy Wheeler, USDA ARS MARC [R, B, P, Q]
Amanda Wilder, Boars Head Provisions [FP]
Barry Wiseman, Triumph Foods [R, P, N]

[R] – Research Advisory Committee
[P] – Minimally Processed Pork Safety Subgroup
[B] – Minimally Processed Beef Safety Subgroup
[FP]- Further Processed Meat and Poultry Safety Subgroup
[CT] – Minimally Processed Poultry Safety Subgroup
[Q] – Product Quality Subgroup
[N] – Nutrition Sciences Subgroup

FOUNDATION EDUCATION SCHEDULE

Environmental Conference for the Meat and Poultry Industry
Feb. 9-12, 2021

Worker Safety Conference for the Meat and Poultry Industry
Feb. 9-12, 2021

Annual Meat Conference
March 22-25, 2021

Advanced *Listeria monocytogenes* Intervention and Control Workshop
April 21-22, 2021

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

Improving Validation Methods of *Salmonella* Lethality on the Surface of Multiple Impingement - Cooked Meat and Poultry Products, Michigan State University, University of Wisconsin

The study will identify critical limits (i.e., humidity, air velocity, surface time-temperature), relative to achieving target *Salmonella* lethality on the surface of impingement-cooked products. A spreadsheet-based solution for calculating surface lethality of *Salmonella* on multiple products will be developed and cross-validated. Findings are intended to improve the ability of the meat and poultry industry to comply with Appendix A requirements.

Research funded in part by the Beef Checkoff and the Pork Checkoff.

Validation of a novel method for the detection of select *Salmonella* serovars in raw meat enrichments, USDA-ARS-Meat Animal Research Center

The project will evaluate the sensitivity and specificity of a novel multiplex PCR assay for the detection of four of the leading disease causing *Salmonella* serotypes, including Enteritidis, Typhimurium, (1,4,[5],12:i:-), and Newport, as well as the invasive serotype Dublin. This assay will be used to detect *Salmonella* in raw meat enrichment samples that will be analyzed using current industry methods so that the results are readily applicable to the needs of the meat industry.

Research funded in part by the Beef Checkoff and the Pork Checkoff.

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 will assess the effects of consuming different proportions of red meat and plant-based protein-rich foods incorporated into a U.S. Healthy Eating Pattern on cardiovascular disease risk factors in adults at high risk of developing a heart-related disease.

Research funded in part by the Beef Checkoff.

Using Rapid Evaporative Ionization Mass Spectrometry (REIMS) as a novel, minimally invasive, real time method for characterization of metabolic variation contributing to flavor, tenderness, and color stability of beef, Texas Tech University, USDA-ARS-Meat Animal Research Center

This project will explore the ability of REIMS as a real time predictor of beef tenderness and sensory attributes, including flavor and evaluate the ability of REIMS as a real time measure and predictor of color stability of beef longissimus steaks.

How Does Analytical Approach Impact Pathogen Population Structure When Analyzing Whole Genome Sequence Data?, University of Minnesota, IBM

The overall goal of this project is to support an accurate, reproducible, transparent and uniform approach to whole-genome sequence (WGS) analysis for purposes of outbreak detection and pathogen surveillance. The overarching objective is to demonstrate how different analytic approaches to whole-genome sequence analysis can impact analysis results.

Research funded in part by the Beef Checkoff.

Effects of Red Meat Consumption on Gut Microbiota in Young Adults, Purdue University, University of Colorado

Gut microbiota are an important contributor to human metabolic health and the impact of animal-based foods, unprocessed and processed red meat in particular requires investigation. Results from a recent study with rats suggest that consuming processed vs. unprocessed red meats may differentially influence gut microbiota profile. This project intends to determine the effect of unprocessed and processed red meat on gut microbiota.

Research funded in part by the Beef Checkoff.

Meat as a First Solid Food on Risk of Overweight and Neurodevelopment in Infants, University of Colorado Anschutz Medical Campus, University of Colorado Denver

Early complementary feeding is a unique and malleable period to prevent rapid weight gain and later obesity, and is also a critical phase for neurodevelopment. Meat is an excellent source of high-quality protein and micronutrients, which are critical for the normal development of older infants. This research will conduct a randomized controlled trial to comprehensively evaluate the effect of meat on growth, body composition, risk of overweight and neurodevelopment, with a protein intake at the reported population median. Findings from this study will be generalizable and help inform future dietary guidance.

Research funded in part by the Beef Checkoff.

Development and Validation of Dynamic Predictive Models for Growth and Toxin Formation by *Staphylococcus aureus* in Low Temperature Cooked Products, University of Georgia

The overall project goal is to develop and validate predictive models for growth and toxin formation of *Staphylococcus aureus* in uncured roast beef, bacon and hams.

Research funded in part by the Beef Checkoff and Beef Industry Food Safety Council.

Pathogen Growth in Alternatively Cured Ham and Bacon during Cooking, Cooling, and Process Deviations, Iowa State University and Smithfield Foods
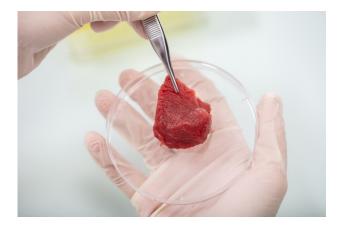
The overall goal of the project is to determine the inhibitory effect of nitrite from a natural source (i.e., pre-converted celery juice powder) in processed meat products with a natural label during "real world" cooking and chilling procedures, which often include instances of process deviation, as well as non-continuous cooling.

Tests of *Salmonella* Sub-unit Proteins as Vaccines for Broiler Chickens, USDA-ARS U.S. National Poultry Research Center

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

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.

The Foundation is supported through generous contribution of companies and individuals. Company names with an asterisks indicate NAMI Board of Directors companies.

A B Foods, LLC*
American Foods Group, LLC*
Boar's Head Provisions Co., Inc.*
Broadleaf Venison (USA), Inc.*
Brush Meat Processors
Cardinal Meat Specialists, Ltd*
Catelli Brothers, Inc. *
Caviness Beef Packers Ltd*
Central Valley Meat Company, Inc.*
Certified Meat Products, Inc.*
Clemens Family Corporation*
Coast Packing Company *
Costco Wholesale Meats*
CTI Foods*
Dietz & Watson, Inc.*
Ed Miniat, LLC*
Empirical foods*
Evergood Fine Foods
Fair Oaks Farms, LLC
FPL Food, LLC*
Fred Usinger, Inc.*
Fresh Mark, Inc.*
Glier's Meats
Greater Omaha Packing Co., Inc.*
Harris Ranch Beef Co.*
Hill Meat Company*
Independent Meat Co.*
Indiana Packers Corporation*
Interbay Food Company
Jobbers Meat Packing Company, Inc.*
John Volpi & Company, Inc.

Johnsonville Sausage, LLC*
Jones Dairy Farm*
JTM Food Group*
Kenosha Beef International, Ltd.*
Lopez Foods, Inc*
Los Banos Abattoir
Meyer Natural Foods
National Beef Packing Co., LLC*
Northern Beef Products, Inc.
Nueske's Applewood Smoked Meats*
OSI Group, LLC*
OWB Packers
P.G. Molinari and Sons
Perdue Premium Meat Company*
Premium Iowa Pork, LLC
ProPortion Foods LLC
Randolph Packing Co., Inc.
Seaboard Foods*
Sigma*
Smithfield Foods, Inc.*
Strassburger Meats/Suzy Sirloin Inc.*
Superior Farms*
Surlean Foods*
Swaggerty Sausage Co.*
The Taylor Provision Company
Tyson Foods, Inc.*
Uncle Charley's Sausage Company*
VPP Group, LLC
Wasatch Meats, Inc.*
Yosemite Foods, Inc.

FOUNDATION FOR
MEAT & POULTRY
RESEARCH & EDUCATION