

AUTHORIZATION REQUEST FOR FY 2021

CBB Budget Category: **Research**

Name of Contractor: **Foundation for Meat and Poultry Research and Education**

Name of Organization Subcontracting:

Start Date: **10/1/2020**

End Date: **9/30/2023**

AR OVERVIEW

AR Description:

The strategies and tactics described in this authorization request (AR) support the CBB budget category for research. Detailed descriptions for post-harvest beef safety and processed beef nutrition research and education and outreach are included in the following sections. Around the world, consumers of U.S. beef demand high quality, safe and nutritious products. Beef safety and nutrition research play key roles in the dialogue with domestic and foreign consumers of U.S. beef as their access to protein choices expands and the demand for product information continuously increases. Effective communications must be based in science. Disseminating science-based information and data to diverse audiences is a fundamental role that will be filled through the programs outlined in this AR. Collaborative efforts will be utilized to ensure broad distribution and effective engagement with all stakeholders.

| Funding | Direct Costs | Implementation | Total |
|----------------------------------|---------------------|-----------------------|--------------|
| CBB/BPOC Funding Request: | \$1,000,000 | \$400,000 | \$1,400,000 |

| Other Potential Funding | Direct Costs | Implementation | Total |
|---|---------------------|-----------------------|--------------|
| Federation of SBCs Pledges: (Informational Only) | \$0 | \$0 | \$0 |
| Other Funding: (Informational Only) | \$0 | \$0 | \$0 |

Long Range Plan Core Strategies Addressed by this AR (Check all that apply)

| Grow Beef Exports | Consumer Trust | Protect & Enhance | Beef's Value Proposition |
|--------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

PROGRAM INFORMATION FOR THIS AR**Tactic A**

Tactic Name: *Post-harvest Beef Safety Research, Knowledge Dissemination and Stakeholder Engagement*

Tactic Description:

Food safety is critical to ensuring consumer confidence in the beef products they choose to buy and feed their families. While current levels of pathogen contamination on beef remain relatively low, there continue to be areas for improvement in its safety profile. Sampling results from the Food Safety and Inspection Service (FSIS) show the prevalence of Shiga toxin-producing *Escherichia coli* (STEC) O157:H7 at 0.08 percent for raw ground beef components and less than 0.01 percent for ground beef in calendar year (CY) 2018.¹ Comparing the STEC results to 2014, there have been significant decreases of the prevalence of STEC in raw ground beef components and raw ground beef, which were present at 0.72 percent and 0.07 percent, respectively.² FSIS recently announced plans to expand routine verification testing to include the six non-O157 STECs (O26, O45, O103, O111, O121, or O145) in addition to *E. coli* O157:H7, to ground beef, bench trim, and raw ground beef components other than raw beef manufacturing trimmings.³ The agency also intends to test for these non-O157 STECs in retail ground beef and imported raw beef products. This expansion could have a significant impact on the number of beef samples testing positive for STEC as FSIS estimates that for every one O157:H7 positive there are 2-3 non-O157 positives.⁴

There are additional pathogens of concern on beef products. The prevalence of *Salmonella* spp. for raw ground beef components is 6.57 percent and 2.2 percent in

¹ Sampling Results for FSIS Regulated Products. https://www.fsis.usda.gov/wps/wcm/connect/df529ce7-575a-43e7-9219-48be29c80fa5/Sampling_Project_Results_Data.xlsx?MOD=AJPERES. Accessed June 12, 2020.

² Microbiological Testing Program for *E. coli* O157:H7 and non-O157 Shiga Toxin-Producing *E. coli*: Individual Positive Results for Raw Ground Beef (RGB) and RGB Components. <https://www.fsis.usda.gov/wps/portal/fsis/topics/data-collection-and-reports/microbiology/ec/positive-results-current-cy/2014-ecoli-positives>. Accessed June 12, 2020.

³ FSIS Notice and request for comments: Expansion of FSIS Shiga Toxin-Producing *Escherichia coli* (STEC) Testing to Additional Raw Beef Products. 85 *Fed. Reg.* 34397-34402 (June 4, 2020).

⁴ Personal Correspondence. KatieRose McCullough, Ph.D., MPH and Paul Kiecker, Administrator, FSIS

raw ground beef in CY 2019.⁵ FSIS' "Nationwide Microbiological Baseline Data Collection Program: Beef-Veal Carcass Survey," conducted from August 2014 – December 2015 showed 27 percent of beef carcasses tested positive for *Salmonella* post hide removal.⁶ Contamination of ready-to-eat meat and poultry, which is not broken out by species, by *Listeria monocytogenes* has remained relatively steady at less than one-half of one percent over the last few years.⁷

Research shows that post-harvest, multiple hurdle beef safety interventions and other process controls are effective in reducing the prevalence of pathogenic bacteria. However, the threat posed by pathogens is not static, rather it is constantly emerging and antimicrobial interventions and other process controls must be constantly upgraded to address these emerging threats. Without these continuous improvements, incidence levels would have most likely increased. Many of the interventions and process controls now used in the beef industry are the result of checkoff funded research and continued investment is necessary for further improvement.

According to the Centers for Disease Control and Prevention 2019 FoodNet report, *Salmonella* is the second most common source of infection, and the incidence has not declined compared with the previous three years.⁸ The report notes STEC illnesses increased by 34 percent when comparing 2019 to 2016-2018 data, while illnesses attributed to STEC O157:H7 appear to be decreasing.⁹ The incidence of illnesses attributed to *Listeria* has remained relatively unchanged for the past several years at 0.3 cases per 100,000 population.

The Interagency Food Safety Analytics Collaboration (IFSAC) released foodborne illness attribution estimates for 2017 in 2019. IFSAC used outbreak data to update previous analyses to estimate which foods are responsible for illness related to *Salmonella*, *Escherichia coli* O157, *Listeria monocytogenes*, and *Campylobacter*. IFSAC considers these priority pathogens because of the frequency (estimated 1.9 million illnesses each year combined) and severity of illness they cause, and because targeted interventions can significantly reduce these illnesses. The report noted that

⁵ Sampling Results for FSIS Regulated Products https://www.fsis.usda.gov/wps/wcm/connect/df529ce7-575a-43e7-9219-48be29c80fa5/Sampling_Project_Results_Data.xlsx?MOD=AJPERES. Accessed June 12, 2020.

⁶ Nationwide Microbiological Baseline Data Collection Program: Beef-Veal Carcass Survey. <https://www.fsis.usda.gov/wps/wcm/connect/b03963cc-0845-4cfe-b94e-2c955ee5e2ef/Beef-Veal-Carcass-Baseline-Study-Report.pdf?MOD=AJPERES>. Accessed June 12, 2020

⁷ FSIS Microbiological Testing Program for Ready-to-Eat (RTE) Meat and Poultry Products, 1990–2017. https://www.fsis.usda.gov/wps/wcm/connect/df529ce7-575a-43e7-9219-48be29c80fa5/Sampling_Project_Results_Data.xlsx?MOD=AJPERES. Accessed June 12, 2020.

⁸ Tack DM, Ray L, Griffin PM, et al. Preliminary Incidence and Trends of Infections with Pathogens Transmitted Commonly Through Food — Foodborne Diseases Active Surveillance Network, 10 U.S. Sites, 2016–2019. *MMWR Morb Mortal Wkly Rep* 2020;69:509–514. DOI: <http://dx.doi.org/10.15585/mmwr.mm6917a1>.

⁹ Centers for Disease Control and Prevention. Foodborne Disease Active Surveillance Network (FoodNet) 2018 Preliminary Data: Tables. <https://www.cdc.gov/foodnet/reports/prelim-data-2018.html>. Accessed June 14, 2019.

Salmonella illnesses came from a wide variety of foods, with more than 75 percent coming from seven food categories, including beef. Also, nearly 75 percent of *E. coli* O157 illnesses were linked to vegetable row crops, e.g., leafy greens, and beef.¹⁰

There have been several high profile pathogen outbreaks attributed to ground beef. In 2018, there were 18 illnesses associated with *E. coli* O26 in four states, 33 percent of those infected were hospitalized and there was one death. There was also an outbreak of *Salmonella* Newport beginning in 2018 and ending in 2019 which resulted in over 400 illnesses in 40 states with 34 percent requiring hospitalization. It is clear pathogens in beef remain a critical public health concern and ground beef remains a significant vulnerability.

Like pathogens, science and detection technologies have also continued to evolve. Public health officials and regulatory agencies are using whole genome sequencing (WGS) technology for genetic typing of bacteria, including pathogens relevant to food safety. WGS allows for significant improvement in foodborne disease outbreak detection and source traceback compared to earlier technologies. To improve public health, it is important to gain a better understanding of the virulence factors of pathogens found on beef. Learning why and how pathogens cause illness will enable the beef industry to more appropriately target interventions to minimize their presence and make improvements in public health.

The economic burden of illness is another factor in the costs associated with pathogen contamination. According to the U.S. Department of Agriculture's Economic Research Service, illnesses attributed to *Salmonella* cost \$3.6 billion, STEC (non-O157 and O157) cost nearly \$300 million, and *Listeria* costs \$2.8 billion in the 2013.¹¹ These costs resulted from medical costs, lost productivity, and death. There are no acceptable levels for pathogenic organisms in beef products as evidenced by the level of foodborne illnesses in the United States. Because *Salmonella* is a significant source of illnesses, hospitalizations, deaths and related costs, research efforts focused on mitigating this threat in the beef supply will continue to be a key priority.

Another beef industry cost associated with pathogen contamination is the reduced value of products testing positive. When a raw material or finished product tests positive for a pathogen, it cannot enter commerce unless it is thermally processed. If the product has already entered commerce, the product is subject to a recall. In both

¹⁰ Interagency Food Safety Analytics Collaboration. Foodborne illness source attribution estimates for 2017 for *Salmonella*, *Escherichia coli* O157, *Listeria monocytogenes*, and *Campylobacter* using multi-year outbreak surveillance data, United States. Atlanta, Georgia and Washington, District of Columbia: U.S. Department of Health and Human Services, CDC, FDA, USDA/FSIS. September 2019, Updated January 2020.

¹¹ Hoffmann, Sandra, Bryan Maculloch, and Michael Batz. *Economic Burden of Major Foodborne Illnesses Acquired in the United States*, EIB-140, U.S. Department of Agriculture, Economic Research Service, May 2015. https://www.ers.usda.gov/webdocs/publications/43984/52807_eib140.pdf?v=42136. Accessed June 14, 2019.

cases, a substantial reduction in value for the pathogen positive product and significant recall costs are incurred by the packer or processor.

The total costs of safety interventions and processes, medical and missed opportunity claims, recalls and reduced value of contaminated products cannot always be passed on to consumers. Most often these costs are borne by the industry and eventually passed on to beef producers through reduced live cattle values. Accordingly, there is a direct economic incentive for beef producers to invest in beef safety research to further reduce pathogenic contamination levels in raw materials and finished products to increase the value of their cattle and their return on investment.

For the foregoing reasons, foundational, applied research is the focus in this program. Integrated communication and educational initiatives will ensure that the data collected are shared with targeted audiences for application across the processing sectors. Outreach with stakeholder groups will inform and impact collaborative research and communication programs addressing the safety of U.S. beef products.

The beef industry must consistently produce products that are wholesome and safe to maintain and bolster consumer trust and grow demand. International and domestic consumers must have confidence that the U.S. beef items they and their families consume are produced using the best processes available, which are supported by science-based research. The threats in the microbial environment are constantly evolving and posing new risks to the safety of the beef supply. These changes can lead to new regulatory initiatives and require adaptations or scientific support for compliance. Yet, not all research is applicable to all facilities as they vary in size, capacity and types of beef products produced. It is imperative that the beef processing industry have access to the most up- to-date science-based research to mitigate both current and emerging threats. A one size fits all approach does not work when ensuring safe beef. As a result, while there may be a large body of scientific evidence in the literature, post-harvest beef safety research investments must continue to address these differences and emerging challenges. This tactic provides practical, science-based research that can be used by in-plant personnel and others to ensure the safety of the U.S. beef supply.

A standing advisory committee of industry and academic experts, including other contractors to the beef checkoff, and practitioners will establish research priorities and evaluate proposals. As needed, a select group of beef industry members may be identified to develop and evaluate specific research projects in consultation with the standing advisory committee. Based upon their recommendations, contracts are awarded based on merit and priority need. Funding partners are identified as appropriate. After the award, the research contracts will be closely monitored to ensure timely and complete research work products are available for distribution to the industry.

Research findings will be disseminated to stakeholders and safety professionals through many means. Investigators will present their research at regional, national

and international technical conferences as well as publish work in peer-reviewed materials. Research findings will also be shared with regulatory agencies to ensure they have all the evidence when making decisions impacting beef safety. AR activities and related outcomes will be shared during sponsorship events and exhibits. The dissemination of research findings to the food safety community will aid the safety of, and consumer confidence in, beef products.

Measurable Objectives (*List relevant outcome-based objectives for this tactic*):

- Manage the execution of a minimum of three research projects addressing current knowledge gaps. Topics may include but are not limited to: investigating internalized contamination present in the major lymph nodes of cattle; evaluating and determining the effectiveness of non-thermal and non-chemical intervention technologies to reduce pathogen loads on beef products; identifying and validating antimicrobial interventions to reduce pathogen contamination of raw ground beef components intended for use in ground products; investigating the optimal areas in production to apply interventions (trim, in grind or post grind) to reduce *Salmonella* and STEC contamination in beef; and developing methods for quantitative *Salmonella* enumeration and methods based on virulence factors rather than serotypes.
- Assess research impact over time by cataloging citations for research funded by the Beef Checkoff and administered by the Foundation. Initial target is to identify 10 references citing Beef Checkoff funded research used as a foundation for other research projects, to develop regulatory guidelines, standard operating procedures or best practices by the end date of this AR.
- Facilitate the dissemination of research data and knowledge sharing through at least cumulatively four meetings, webinars, documents or other events targeted to safety professionals.
 - Reaching at least 1,000 stakeholders through combined activities
 - Newsletter distribution will achieve at least 27 percent open rate.
- Conduct a webinar series, at least two per year, to highlight post-harvest safety research funded by the Beef Checkoff. Target cumulative audience of 500 food safety practitioners and interested stakeholders.

Performance Efficiency Measures

Consumer Reach Goal: N/A

Consumer Engagement Goal: N/A

KOL Reach Goal: N/A

KOL Engagement Goal: N/A

LRP Strategic Initiatives Addressed by this Tactic (Check all that apply)

| | | | |
|---------------------|---------------------|------------------------------------|--------------------------|
| Drive Export Growth | Grow Consumer Trust | Protect & Enhance Business Climate | Beef's Value Proposition |
|---------------------|---------------------|------------------------------------|--------------------------|

- | | | | |
|---|--|--|---|
| <input type="checkbox"/> Adopt animal I.D. traceability systems | <input type="checkbox"/> Ensure antibiotic stewardship | <input type="checkbox"/> Research & innovate new production technologies | <input type="checkbox"/> Revolutionize beef marketing & merchandising |
| <input type="checkbox"/> Increase market access | <input type="checkbox"/> Certify & verify production practices | <input type="checkbox"/> Ensure beef's inclusion in dietary recommendations | <input type="checkbox"/> Measure & improve our sustainability |
| <input type="checkbox"/> Promote unique attributes of U.S. beef | <input checked="" type="checkbox"/> Ensure beef safety | <input type="checkbox"/> Motivate producers & stakeholders to engage in issues | <input type="checkbox"/> Research & communicate beef's nutritional benefits |
| | <input type="checkbox"/> Protect beef's image | <input type="checkbox"/> Develop crises management plans | <input type="checkbox"/> Connect & communicate directly with consumers |
| | <input checked="" type="checkbox"/> Engage beef advocates | <input checked="" type="checkbox"/> Defend beef's product identity | <input checked="" type="checkbox"/> Improve our product |

Committee(s) to Score this Tactic (Check all that apply)

| Consumer Trust | Export Growth | Innovations | Nutrition & Health | Safety | Investor Relations | Mkt. Research |
|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Tactic B

Tactic Name: *Science-Based Research on the Nutritional and Health Benefits of Processed Beef, Knowledge Dissemination and Stakeholder Engagement*

Tactic Description:

All meat is processed to varying degrees. This can include any meat product produced via the physical or biochemical transformation of meat from its native form (*i.e.* carcass, wholesale cut) into a final or finished product deemed desirable by consumers.

For this purpose, the definition of further processed, as defined by the American Meat Science Association Meat Science Lexicon, will serve as the definition of processed meat.

Further Processing:

Any process where meat products undergo a transformation, beyond minimal processing, containing approved ingredients, and may be subjected to a preservation

or processing step(s) through the application of salting, curing, fermentation, thermal processing (smoking and/or cooking), batter/breading, or other processes to enhance sensory, quality, and safety attributes. These products may include ready-to-cook and ready-to-eat products.¹²

Within this definition, there are varying degrees or levels of complexity of processing ranging from seasoning and drying to make a product like beef jerky to multipart recipes requiring ingredients, formation and cooking for products like beef hot dogs. Given the differences in preparation, there are thousands of different varieties of processed meats.

Processed beef products can fit easily into healthy meals. Products such as marinated beef fajita strips and beef dinner sausage can be center of the plate food items joining vegetables and grains which together can lead to greater nutrition and nutrient absorption. Deli roast beef can easily be incorporated into a sandwich or as a salad topping for a healthy meal. Menu models have demonstrated how these processed products fit in a dietary pattern.

Research conducted within this tactic will provide scientific evidence to support the beef industry's ability to produce, market and maintain the public enjoyment of processed beef products as a convenient, affordable and safe source of high-quality protein. While the scope of processed beef products is broad in general, specific product types will be selected for research. These products may include, but are not limited to, beef jerky, beef snack sticks, deli beef products, beef hot dogs and beef sausages. Through science-based research, the role of processed beef products in a healthy, well-balanced diet will be defined. Data collected will be shared with key nutrition opinion leaders, regulatory authorities and all stakeholders, including State Beef Councils and producers.

Promoting processed beef products is critical to the bottom line of producers. A major component of many ready-to-eat and ready-to-cook processed beef items is 50 percent chemical lean (CL) beef trim. Approximately 10 percent of the weight of a fed steer carcass ends up as 50 percent CL trim, which is essentially, the largest "wholesale cut" on the beef carcass. Accordingly, the market value of the 50 percent CL trim, like the cut-out values of whole muscle cuts, directly affects live cattle prices. By creating demand for processed beef items, demand is created for 50 percent CL, which in turn bolsters live cattle prices and ROI for producers. If 50 percent CL were not used, the product would be rendered, which could result losses approaching \$1 per pound.

¹² Seman, D. L., D. D. Boler, C. C. Carr, M. E. Dikeman, C. M. Owens, J. T. Keeton, T. D. Pringle, J. J. Sindelar, D. R. Woerner, A. S. de Mello, and T. H. Powell. 2018. Meat Science Lexicon*. Meat and Muscle Biology 2:1-15. doi:10.22175/mmb2017.12.0059.

Retail reports underscore how promoting processed beef products is critical to the bottom line of cattle producers. The *Power of Meat 2019* report provides insights into consumer purchasing behaviors, preferences and beef's role in the meat case.

- Last year's retail data indicates that the processed meat category represents over \$34 billion in sales. Beef alone has approximately \$5.9 billion in sales.
- Nielsen data from January 2019 cites that \$23 billion of meat items are sold beyond the fresh meat department – including \$13 billion in the deli department.¹³
- In a given month, shoppers are buying meat across the store including 37% in the deli, 39% fully-cooked, and 49% frozen.¹⁴
- “The *Sealed Air/Cryovac National Meat Case Study* finds that 66 percent of the packages in the self-service case are fresh meat (beef, pork, lamb, veal, chicken and turkey) with the remaining 34 percent being items such as processed, fully-cooked and value-added meat/poultry.”¹⁵

Applying the Meat Science Lexicon definition, fully-cooked meat products are processed meats. Fully-cooked meat and poultry products accounted for nearly \$11 billion in storewide sales last year, an increase of 2.5 percent in dollar sales. A majority of fully-cooked meat sales come from the deli department, which represents \$6.1 billion in sales, growing 5.4 percent over last year. Fully-cooked beef accounted for \$117 million in sales, a 7 percent increase. While fully-cooked chicken and pork currently have greater shares of sales, sales of each decreased by 2 to 7 percent respectively.¹⁶ Sales of fully-cooked beef are growing faster than other species in this category.

Sixty-four percent of processed meat buyers surveyed had a brand preference.¹⁷ According to IRI, branded meat products, both manufacturer and private, accounted for \$32 billion in sales and beef's share is \$10.9 billion. Beef saw increases in both sales and volume, 1.3 and .5 percent respectively. While chicken had a similar increase in sales, pork sales decreased by 8 percent. Beef was the only species to increase in volume.¹⁸ Data did not detail sales or volume for branded processed beef.

The *Power of Meat 2020 report*, which examined many new topics but did not carry forward several topics from 2019, showed that value-added meat products provided for \$4.7 billion in sales in 2019. Sales in dollars increased by 3.9 percent and volume by 3.7 percent. Beef represented nearly half of value-added meat sales at \$2.3 billion.¹⁹ According to the *Power of Meat*, value-added products are “addressing several trends driving growth in the perimeter and center-store categories: convenience and

¹³ 202 Analytics. *2019 Power of Meat: An In Depth Look at Meat Department Through the Shoppers Eyes*. Food Marketing Institute and Foundation for Meat and Poultry Research and Education.

¹⁴ *Ibid.*

¹⁵ *Ibid.*

¹⁶ *Ibid.*

¹⁷ *Ibid.*

¹⁸ *Ibid.*

¹⁹ 202 Analytics. *2020 Power of Meat: An In Depth Look at Meat Department Through the Shoppers Eyes*. Food Marketing Institute and Foundation for Meat and Poultry Research and Education.

adventurous eating, the quest for fun and different flavor profiles, and the growing popularity of international cuisines, such as pre-marinated fajita meat.”²⁰ No matter how you slice it, processed beef is extremely valuable to our industry.

However, a number of significant challenges face the processed beef category and are rooted in the same dogma—limit the consumption of red and processed meat for optimum health. The Scientific Report of the 2020 Dietary Guidelines Advisory Committee (Report) recognizes lean meat as part of healthy dietary patterns. However, the Report also finds dietary patterns lower in red and processed meats have a reduced risk of colorectal cancer, type 2 diabetes, cardiovascular disease and all-cause mortality. Red and processed meats are often grouped together as foods to reduce or limit, and lean meats as foods to encourage. Rarely is it recognized that red meat and processed meats can be different foods or the same, and that they can be lean. The Secretaries of Agriculture and Health and Human Services will use the Report as they develop the *Dietary Guidelines for Americans*, which is the basis for all federal nutrition policies and programs. Continued research demonstrating the role of processed beef in healthy dietary patterns is critical to ensure they remain a part of federal dietary guidance.

There are also several other reports questioning the role of processed beef in dietary patterns. In January 2019, the EAT-*Lancet* report on “Food in the Anthropocene: the EAT-*Lancet* Commission on healthy diets from sustainable food systems” was published. The report outlined dietary recommendations it claims are ideal for human and planetary health. The diet suggested that people limit red meat consumption to one serving per week and poultry to two servings per week.

The International Agency for Research on Cancer (IARC) published the long awaited the monograph declaring processed meats and red meats as carcinogenic agents in March 2018.²¹ IARC is an authoritative body and this monograph can be included as support for federal or state polices or regulations. The World Cancer Research Fund’s (WCRF) *Third Expert Report: Diet, Nutrition, Physical Activity and Cancer: a Global Perspective*, released in May 2018 is another challenge. The Report’s Cancer Prevention Recommendations include “limit red and processed meat – eat no more than moderate amounts of red meat, such as beef...eat little, if any, processed meat.”²² More recently, the American Cancer Society updated it’s Guidelines for Diet and Physical Activity for Cancer Prevention. These guidelines include a recommendation that a healthy eating pattern limits or does not include red and processed meats.²³

²⁰ *Ibid.*

²¹ IARC Monographs on the Evaluation of Carcinogenic Risks to Humans Volume 114: Red Meat and Processed Meat. <http://publications.iarc.fr/564>. Accessed June 12, 2020.

²² World Cancer Research Fund Third Expert Report, “Diet, Nutrition, Physical Activity and Cancer: a Global Perspective.” 2018. <https://www.wcrf.org/dietandcancer/recommendations/limit-red-processed-meat>. Accessed June 12, 2020.

²³ American Cancer Society Guideline for Diet and Physical Activity for Cancer Prevention, CA Cancer J Clin 2020;0:1-27.

By demonstrating how processed beef products fit in a healthy dietary pattern associated with positive health outcomes, the conversation can be turned towards how these products can contribute to overall health and well-being and away from the focus on negative health outcomes. Research findings will be critical to ensure processed beef remains in dietary guidance. Every opportunity will be pursued to submit scientific research to add to the body of evidence in support of this effort.

A standing advisory committee of industry and academic experts, including other contractors to the beef checkoff, and practitioners will establish research priorities and evaluate proposals. Based upon their recommendations, contracts are awarded based on merit and priority need. After the award, the research contracts will be closely monitored to ensure timely and complete research work products are available for distribution to the industry. This tactic is focused on processed beef. If complementary research with other meat animal species is developed, they will be expected to contribute proportionally to the research funding.

Addressing Nutrition and Health Committee Comments:

Comments: Better tracking of the BEEF checkoff dollars as you work through this AR. Need to know the ROI for Nutrition and Health Purpose Statement. Would like evaluation and results from the first research project as funding moves forward.

The research is better suited for industry partnership.

Response: The Foundation for Meat and Poultry Research and Education (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. The Foundation does not engage in policymaking, but as needed provides scientific evidence and context to governmental agencies. The Foundation is supported by voluntary contributions from industry.

Because the Foundation funds research across all meat animal species and product types there are opportunities for collaborative funding. These types of projects could address multiple species or types of beef products and expand the overall nutrition knowledge base and return on your investment.

The Foundation has been a contractor to administer processed beef nutrition research since FY 19. The timeline for most research projects ranges from 12-24 months. As such, all of the projects outlined below are underway and not yet complete. All projects are jointly funded.

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.

The study is funded equally by the Beef Checkoff and the Foundation for Meat and Poultry Research and Education. FY19

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.

The unprocessed red meat portion of the study was funded by the North Dakota Beef Commission and National Pork Board.

The processed red meat portion of the study is funded equally by the Beef Checkoff and the Foundation for Meat and Poultry Research and Education. FY19

Effect of Minimally Processed Meat and Further Processed Meat on Biomarkers and Risk Factors for Cancer and Cardiovascular Disease—Phase I, USDA-ARS-Beltsville Human Nutrition Research Center

A randomized diet-controlled crossover study will be conducted with diets containing either minimally processed or further processed meat to assess how the diet effected biomarkers associated with cardiovascular disease. This study will also examine the effect of the background diet on health outcomes.

Funded by the Foundation for Meat and Poultry Research and Education and the National Cattlemen’s Beef Association (NCBA) on behalf of the Beef Checkoff. NCBA has primary oversight responsibility for this project. FY19

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. The three HEP interventions will be: high red meat, low plant-based protein; moderate red meat, moderate plant-based protein; and low red meat, high plant-based protein.

The study is funded equally by the Beef Checkoff and the Foundation for Meat and Poultry Research and Education. FY20

Comment: This is rather vague on how the money will be spent. Please be specific on who is doing the research and the elements of nutrition that are being researched on the BEEF products.

Response: Each year a request for proposals (RFP) is distributed to leading universities and research institutions. Research priorities are identified by the nutrition sciences subgroup of the Foundation's Research Advisory Committee, which is comprised of representatives from industry, academia and government. Researchers will propose a project that aligns with the priorities. The proposal will detail the type of research and products. The Foundation undertakes a two-step review process. The initial proposals are reviewed by the Research Advisory Committee. Only proposals with significant interest will advance to the second round. Any suggestions, requests for clarifications, refinement of objectives, or types of processed products, will be shared with the selected researchers to be addressed in their second round proposals. The Research Advisory Committee will review the selected proposals, once resubmitted, and make recommendations for funding. All recommendations for funding are presented to the Board of Directors for approval. All projects are presented as if they are to be funded by the Foundation, although certain projects may be identified beforehand as Beef Checkoff funding eligible. This process ensures all projects and research funding is looked at objectively and the merits of the project are the key funding determinant. Foundation funding, Beef Checkoff funding, and collaborative funding are determined once the projects are approved.

Comment: Specify the type and percentage of processed/prepared BEEF that will be researched.

Response: Since the projects are developed by the investigators, the processed beef products will vary. As the proposal goes through the review process, specific products may be recommended for inclusion. Prepared beef products included in research projects will meet the American Meat Science Association definition of further processed. Examples of those types of products are deli roast beef; pastrami; corned beef; marinated beef fajita strips; beef hot dogs (100% and animal-based protein blends), beef dinner sausage, among others.

Comment: Clarity on safety and other ingredients of processed/prepared Beef in a healthy diet.

Response: Generally, the main ingredients used in preparing many processed beef are water, salt, nitrite or nitrate, phosphates, sugar, spices, and fat, which are recognized as safe by the Food and Drug Administration. Many ingredients serve multiple purposes. They can be used for flavor, functionality, enhanced nutrition profile, and microbial safety. For example, salt plays a critical role in producing meat products – whether used by large commercial processors, local butchers, or in the consumer's home – to improve the flavor, texture, and safety of those products.

Several processing techniques can be used when preparing these products. Processed beef products can be smoked, dried, cured, cooked, ground, and marinated, among other processes. These processes add flavor, texture, or can act as a preservation step to extend a product's shelf-life.

Common processed beef products are deli meats like roast beef, pastrami, and corned beef. Other common products are sausages and salami. Each product can be prepared with different ingredients and product formulations. Additional information on understanding processed meat products can be found in the Beef Checkoff resource: A Guide to Meat Processing for the Nutrition Community.²⁴

Measurable Objectives *(List relevant outcome-based objectives for this tactic):*

- Manage the execution of a minimum of three research projects addressing current knowledge gaps. Topics may include but are not limited to: a risk-benefit analysis on the consumption of further processed beef as a component of a healthy diet and lifestyle; comprehensive white paper(s) to assess what is currently known and any potential data gaps on the mechanistic development of cancer in humans for processed beef components; and menu modeling demonstrating the role of further processed beef in the healthy dietary patterns identified in the 2020-2025 Dietary Guidelines.
- Assess research impact over time by cataloging citations for research funded by the Beef Checkoff and administered by the Foundation. Since Foundation administered research in this area is relatively new, the initial target is 2 references citing Beef Checkoff funded research used to develop regulatory guidelines, standard operating procedures or best practices by the end date of this AR.
- Facilitate the dissemination of research data and knowledge sharing through cumulatively four meetings, webinars, documents or other events targeted to nutrition and beef industry professionals, key opinion leaders, registered dietitians, healthcare professions and retail influencers.
 - Reach at least 1,000 stakeholders through combined activities.
 - Newsletter distribution will achieve at least 27 percent open rate.

Performance Efficiency Measures

Consumer Reach Goal: N/A

Consumer Engagement Goal: N/A

KOL Reach Goal: N/A

KOL Engagement Goal: N/A

²⁴ A Guide to Meat Processing for the Nutrition Community.
<http://www.meatpoultrynutrition.org/sites/default/files/infographics/NAMI-Prepared-Meat-White-Paper.pdf>.

LRP Strategic Initiatives Addressed by this Tactic (Check all that apply)

| | | | |
|---------------------|---------------------|------------------------------------|--------------------------|
| Drive Export Growth | Grow Consumer Trust | Protect & Enhance Business Climate | Beef's Value Proposition |
|---------------------|---------------------|------------------------------------|--------------------------|

- | | | | |
|---|--|--|--|
| <input type="checkbox"/> Adopt animal I.D. traceability systems | <input type="checkbox"/> Ensure antibiotic stewardship | <input type="checkbox"/> Research & innovate new production technologies | <input type="checkbox"/> Revolutionize beef marketing & merchandising |
| <input type="checkbox"/> Increase market access | <input type="checkbox"/> Certify & verify production practices | <input checked="" type="checkbox"/> Ensure beef's inclusion in dietary recommendations | <input type="checkbox"/> Measure & improve our sustainability |
| <input type="checkbox"/> Promote unique attributes of U.S. beef | <input type="checkbox"/> Ensure beef safety | <input type="checkbox"/> Motivate producers & stakeholders to engage in issues | <input checked="" type="checkbox"/> Research & communicate beef's nutritional benefits |
| | <input checked="" type="checkbox"/> Protect beef's image | <input type="checkbox"/> Develop crises management plans | <input type="checkbox"/> Connect & communicate directly with consumers |
| | <input type="checkbox"/> Engage beef advocates | <input type="checkbox"/> Defend beef's product identity | <input type="checkbox"/> Improve our product |

Committee(s) to Score this Tactic (Check all that apply)

| Consumer Trust | Export Growth | Innovations | Nutrition & Health | Safety | Investor Relations | Mkt. Research |
|--------------------------|--------------------------|--------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

SUPPLEMENTAL INFORMATION FOR THIS AR

1. Please explain changes from FY 2020 approved AR:

Potential research topics have been updated in each tactic. Provided additional context on the importance of research topics based on foodborne outbreaks attributed to beef in Tactic A and the potential for additional reports questioning the role of processed beef in a healthy dietary pattern in Tactic B.

2. List any proposed vendors/agencies that will be used to complete the work in this AR.

None at this time.

3. Will all work with vendors be competitively bid?

No

If not, why not?

Work will be awarded through an RFP process and evaluation of research proposals by a standing committee comprised of industry and academic food safety and nutrition practitioners.

4. Please list any relationships between this AR and projects previously funded by the Operating Committee:

The Foundation for Meat and Poultry Research and Education and the North American Meat Institute previously administered post-harvest beef safety research through ARs # 1405, 1504, 1603, 1705, 1811 and 1910. FMPRE currently administers post- harvest beef safety and processed beef nutrition research through AR # 2010.

DETAILED BUDGET SUMMARY:

AR# 2110-R

CBB/BPOC Funding Request:

| Committee Name | Tactic | Tactic Name | Funding Source | Direct | Implementation | Total |
|----------------------|--------|---|----------------|---------------------|-------------------|---------------------|
| Safety | A | Post-Harvest Beef Safety Research, Knowledge Dissemination and Stakeholder Engagement | BPOC | \$ 600,000 | \$ 250,000 | \$ 850,000 |
| Nutrition and Health | B | Science-Base Research on the Nutritional Benefits of Processed Beef, Knowledge Dissemination and Stakeholder Engagement | BPOC | \$ 400,000 | \$ 150,000 | \$ 550,000 |
| AR Totals | | | | \$ 1,000,000 | \$ 400,000 | \$ 1,400,000 |

Federation of SBCs Pledges/Other Funding Source(s): (Informational Only)

| Committee | Tactic | Tactic Name | Funding Source | Direct | Implementation | Total |
|----------------------|--------|---|----------------|-------------|----------------|-------------|
| Safety | A | Post-Harvest Beef Safety Research, Knowledge Dissemination and Stakeholder Engagement | Federation | \$ - | | \$ - |
| Nutrition and Health | B | Science-Base Research on the Nutritional Benefits of Processed Beef, Knowledge Dissemination and Stakeholder Engagement | Federation | \$ - | | \$ - |
| AR Totals | | | | \$ - | \$ - | \$ - |

Summary of Prior Year AR Budgets and Expenses:

| Summary of Prior Year Budget: | FY 2020 Approved Budget | | | | | | |
|-------------------------------|-------------------------|-------|-----------------|------------|-------------|------------|------------|
| | CBB/BPOC | FSBCs | Other Source(s) | Total | Direct Cost | Impl. | Total |
| AR Totals | \$ 798,057 | \$ - | \$ - | \$ 798,057 | \$ 500,000 | \$ 298,057 | \$ 798,057 |

| FY 2020 Actual Expenses (through June 30, 2020) | FY 2020 Actual Expenses | | | | | | |
|--|-------------------------|-------|-----------------|------------|-------------|-----------|------------|
| | CBB/BPOC | FSBCs | Other Source(s) | Total | Direct Cost | Impl. | Total |
| AR Totals | \$ 169,404 | \$ - | \$ - | \$ 169,404 | \$ 105,034 | \$ 64,370 | \$ 169,404 |

Historical Summary of Budgets and Expenses: (includes all funding sources listed in original AR)

| | Total Approved Budgets | | | Total Actual Expenses | | |
|-----------|------------------------|------------|------------|-----------------------|------------|------------|
| | FY 2019 | FY 2018 | FY 2017 | FY 2019 | FY 2018 | FY 2017 |
| AR Totals | \$ 800,000 | \$ 500,000 | \$ 500,000 | \$ 485,754 | \$ 378,321 | \$ 468,378 |