

## Meat Foundation

AR# 2510-R

AR Title: Post-Harvest Safety Research

### AR Purpose and Description:

The strategies and tactics described in this Authorization Request (AR) support the Checkoff program category for Research. Detailed descriptions for post-harvest beef safety research 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 research plays a key role 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.

**CBB Budget Category:** Research

**Start Date:** 10/1/2024

**End Date:** 9/30/2027

FY25 CBB/BPOC Funding Request		
Direct Costs	Implementation	Total
\$440,000.00	\$160,000.00	\$600,000.00

Beef Industry Long Range Plan (LRP) Core Strategies Addressed by this AR:

- Improve the Business and Political Climate of Beef
- Safeguard and Cultivate Investment in Beef Industry Research, Marketing and Innovation

## TACTIC DESCRIPTION:

Food safety is critical to ensuring confidence in the beef products consumers choose to buy and feed their families. Foodborne pathogens can be introduced to beef products during harvesting and processing, among other times. Shiga toxin-producing *Escherichia coli* (STEC) O157:H7; O26, O45, O103, O111, O121, and O145 are classified as adulterants and prohibited from the beef supply. Data from the Food Safety and Inspection Service (FSIS) show the prevalence of STEC O157:H7 at 0.15 percent for raw ground beef components and 0.04 percent for ground beef in fiscal year (FY) 2023.<sup>1</sup> The prevalence of *Salmonella* spp. on raw ground beef components is 4.25 percent and 1.95 percent in raw ground beef in FY 2023.<sup>2</sup> Contamination of ready-to-eat meat and poultry, which is not broken out by species, by *Listeria monocytogenes* has remained relatively steady at a little more than one-half of one percent over the last few years.<sup>3</sup> While current levels of pathogen contamination are relatively low, there remain areas for improving beef's safety profile.

Because of the significant public health concerns around *Salmonella*, FSIS issued a "Roadmap to Reducing *Salmonella*" as well as held a public meeting on the state of science in 2020.<sup>4,5</sup> While current regulatory activities focus on *Salmonella* reduction efforts in poultry, these efforts can be instructive. FSIS has indicated they are considering replicating activities undertaken to reduce *Salmonella* in poultry for beef if they are successful. FSIS is proposing a new regulatory framework targeted at reducing *Salmonella* illnesses associated with poultry products. This proposed framework includes final product standards that would define whether certain raw poultry products contaminated with certain *Salmonella* levels and serotypes are adulterated and prohibited from commerce; requirements pertaining to how establishments monitor and document whether their processes for preventing microbial contamination are in control; and focuses on a non-regulatory approach for controlling *Salmonella* on incoming flocks.<sup>6</sup> Further on May 1, 2024, FSIS issued its final determination that not ready-to-eat (NRTE) breaded stuffed chicken products that contain *Salmonella* at levels of 1 Colony Forming Unit per gram or higher are adulterated within the meaning of the Poultry Products Inspection Act (PPIA).<sup>7</sup> When proposing the determination in 2023, FSIS included the rationale that, "Comminuted products are those that are ground, mechanically separated, or hand- or mechanically deboned and further chopped, flaked, minced, or otherwise processed to reduce particle size. Because of the nature of comminuted processes, *Salmonella* contamination in chicken skin and bone can spread throughout an entire batch or lot through cross contamination."<sup>8</sup> Through this logic FSIS has addressed previous lawsuits that ruled *Salmonella* was inherent to the product and therefore could not be an adulterant but claiming *Salmonella* is only inherent to certain products within a carcasses (i.e. lymph nodes) and not all products like intact muscle. Although the determination addresses chicken there likely could be an application of the same reasoning to comminuted beef products. An

application of such logic to beef would likely be spurred by an event such as a widespread foodborne illness outbreak. Research shows that pre-harvest, 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 continually 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.

The Interagency Food Safety Analytics Collaboration (IFSAC) released foodborne illness attribution estimates for 2021 in late 2023. 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 *Salmonella* illnesses came from a wide variety of foods, with 75 percent coming from seven food categories. Beef is attributed as the source of 6.5 percent of foodborne *Salmonella* illnesses, up one-half of a percent from 2020. Over 80 percent of *E. coli* O157 illnesses were linked to vegetable row crops, e.g., leafy greens, and beef. Specifically, beef is estimated to cause 20.9 percent of STEC O157 illnesses, showing declines from 22.8 percent in 2020 and 23.4 percent in 2019.<sup>9</sup>

Pathogens in beef remain a critical public health concern and ground beef remains a significant vulnerability. Healthy People 2030 have set public health goals to reduce illnesses attributed to STEC, *Salmonella* and *Listeria* as well as to reduce outbreaks attributed to STEC, *Campylobacter*, *Listeria*, and *Salmonella* infections linked to beef.<sup>10</sup> It is clear regulatory and public health agencies are committed to reducing foodborne illnesses attributed to beef. While most consumers trust America's meat industry to create products that are safe to eat, research shows that food safety is an ongoing concern, with concerns about raw meat contamination higher than that of raw produce.<sup>11</sup>

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. FSIS now includes the FSIS Number – the whole genome sequencing (WGS) identifier assigned for pathogens – and allele codes with date stamps in laboratory sampling datasets. The FSIS Number applies to sampling results for *Listeria monocytogenes*, *Salmonella*, *Campylobacter*, and Shiga toxin-producing *Escherichia coli*, and this information is posted publicly. 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.<sup>12</sup> 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 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 safe and wholesome 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 experts 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. The Foundation, as a contractor to the Beef Checkoff, has a demonstrated history of bringing together funding partners. 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. Additional stakeholder outreach opportunities, including to small and local processors, through USDA programs and other channels will be explored. The dissemination of research findings to the food safety community will aid the safety of, and consumer confidence in, beef products.

**Citations:**

1. Sampling Results for FSIS Regulated Products. [https://www.fsis.usda.gov/sites/default/files/media\\_file/documents/Dataset\\_QSR\\_SamplingProjectResultsData.pdf](https://www.fsis.usda.gov/sites/default/files/media_file/documents/Dataset_QSR_SamplingProjectResultsData.pdf). Accessed May 30, 2024.
2. Ibid.
3. Ibid.
4. FSIS Roadmap to Reducing *Salmonella*: Driving change through Science Based policy. <https://www.fsis.usda.gov/wps/wcm/connect/388d5b27-b821-42ba-a717-526f3bc68b4a/FSISRoadmaptoReducingSalmonella.pdf?MOD=AJPERES>. Accessed May 30, 2024.
5. <https://www.federalregister.gov/documents/2020/08/14/2020-17827/salmonella-state-of-the-science>. Accessed May 30, 2024.
6. <https://www.fsis.usda.gov/inspection/inspection-programs/inspection-poultry-products/reducing-salmonella-poultry/proposed>. Accessed May 30, 2024.
7. <https://www.fsis.usda.gov/policy/federal-register-rulemaking/federal-register-rules/salmonella-not-ready-eat-breaded-stuffed>. Accessed May 30, 2024.
8. <https://www.federalregister.gov/documents/2023/04/28/2023-09043/salmonella-in-not-ready>

to-eat-breaded-stuffed-chicken-products. Accessed May 30, 2024.

9. Interagency Food Safety Analytics Collaboration. Foodborne illness source attribution estimates for 2021 for Salmonella, Escherichia coli O157, and Listeria monocytogenes using multi-year outbreak surveillance data, United States. GA and D.C.: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Food and Drug Administration, U.S. Department of Agriculture's Food Safety and Inspection Service. 2023.

10. <https://health.gov/healthypeople/objectives-and-data/browse-objectives/foodborne-illness>. Accessed May 30, 2024.

11. Technomic. NAMI Protein PACT Q4 2023 Report. January 2024.

12. Hoffmann, Sandra, Bryan Macculloch, 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](https://www.ers.usda.gov/webdocs/publications/43984/52807_eib140.pdf?v=42136). Accessed May 30, 2024.

## **Measurable Objectives:**

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### **Measurable Objective #1**

Manage the execution of a minimum of two research projects addressing current knowledge gaps. Topics may include but are not limited to: Evaluating points and indicators for *Salmonella* transmission and control in and throughout beef supply chain; determining the most effective location(s) from harvest to shipping to maximize reduction of microbial contamination in beef processing; identifying and validating antimicrobial interventions targeting *Salmonella*, *E. coli* O157:H7 and non-O157:H7 STECs in raw ground beef components; identifying and validate critical control points targeting *Salmonella*, *E. coli* O157:H7 and non- O157:H7 STECs, among other pathogens, in further processed beef items including dry fermented beef sausage.

### **Measurable Objective #2**

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.

### **Measurable Objective #3**

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

#### **Measurable Objective #4**

Conduct a webinar to highlight post-harvest safety research funded by the Beef Checkoff. Target audience of 200 food safety practitioners and interested stakeholders. Participants will be surveyed on the application of research findings, both past and present.

#### **Performance Efficiency Measures:**

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N/A on Research ARs

#### **LRP Initiatives Addressed by this Tactic:**

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##### **Improve the Business and Political Climate of Beef**

- Drive continuous improvement in food safety

##### **Safeguard and Cultivate Investment in Beef Industry Research Marketing and Innovation**

- Encourage the cooperation and collaboration of existing industry advisory committees to identify and prioritize research efforts

**Checkoff Program Committee(s):** Safety & Product Innovation

#### **Supplemental Information for This AR**

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**1. Please explain significant changes from the FY24 approved AR.**

Potential research topics have been updated in Tactic A.

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

None

**3. Will all work with vendors/agencies be competitively bid? If no, please provide a brief description as to why.**

Work will be awarded through a request for proposals (RFP) process. An RFP is typically distributed in the early summer with a brief two-page pre-proposal due in late summer. Based upon the review and evaluation of a standing research advisory committee comprised of industry and academic food safety experts, select pre-proposals will be developed to a full proposal for review and funding consideration. Full proposals are reviewed by the research advisory committee in late fall with recommended proposals receiving funding approval in January. However, the request for proposals and subsequent funding recommendations and approvals are not limited to this timeline and can be conducted on an as needed basis in order to fill high priority research needs/gaps.

**4. Has this AR built upon past work or projects that have been previously funded by the BPOC? If yes, please provide a detailed list and background information on the**

**project and contractor(s) involved.**

The Foundation for Meat and Poultry Research and Education and North American Meat Association previously administered post-harvest beef safety research through ARs # 1405, 1504, 1603, 1705, 1811, 1910, 2010 and 2110. FMPRE has also administered processed beef nutrition research under ARs # 1910, 2010, 2110. FMPRE currently administers post-harvest beef safety research through AR # 2210, 2310, and 2410.

**5. If applicable, explain how this AR can be extended by state beef councils or other contractors.**

Outcomes and results will be shared with State Beef Councils and contractors for further dissemination and use. Efforts on topics of common interest among contractors will be shared to maximize Checkoff reach.

**Detailed Budget Summary**

The tables in the following three sections report program budget information from the following funding sources:

- Cattlemen's Beef Board/Beef Promotion Operating Committee (CBB/BPOC) Funding
- Other Funding sources such as:
  - Federation of State Beef Councils (FSBC) Funds
  - Individual Qualified State Beef Council (QSBC) Funds
  - Government Funds (e.g., Market Access Program, Foreign Market Development)
  - Grain/Oilseed Funds (e.g., National Corn Growers Association, American Soybean Association) Corporate Funds (e.g., tech and pharma companies)
- Other

**Section 1 – FY25 Funding Requested by Tactic**

**FY25 CBB/BPOC Funding Requested by Tactic**

The following table outlines the amount of CBB/BPOC funding that is being requested for each tactic within this AR, and the committee(s) that has been selected to score each tactic.

FY25 CBB/BPOC Funding Requested by Tactic					
Committee Name	Tactic	Tactic Name	Direct Costs	Implementation	Total
Safety & Product Innovation	Tactic A	Post-Harvest Beef Safety Research	\$440,000.00	\$160,000.00	\$600,000.00
		<b>Total</b>	<b>\$440,000.00</b>	<b>\$160,000.00</b>	<b>\$600,000.00</b>

**FY25 Other Funding Sources Requested by Tactic**

The following table reports the amount of proposed and/or anticipated Other Funding sources that would be applied to this AR's tactics. The funding information in this table is for informational purposes only and demonstrates external collaboration as delineated in the 2021-2025 Beef Industry Long Range Plan.



FY25 Other Funding Sources Requested by Tactic (Informational Only)			
Funding Source	Tactic	Tactic Name	Total
Other: N/A	Tactic A	Post-Harvest Beef Safety Research	
		<b>Other Funding Total</b>	

Use the space below if you wish to provide additional comments/information on the FY25 CBB/BPOC or Other Funding amounts that are being requested for this AR's tactic(s).

N/A

## Section 2 – Summary of FY24 AR Budgets and Expenses

**Classification:** This AR is a continuation of, or builds upon, program work from last year. CBB will report information in the "FY24 CBB/BPOC Funding" table and the contractor will provide information for the "FY24 Other Funding Sources" table.

### FY24 CBB/BPOC Funding

This table reports the amount of awarded and expended CBB/BPOC funding for this Authorization Request in FY24.

FY24 CBB/BPOC Funding			
<i>Note: The Cattlemen's Beef Board completed the fields in this table.</i>			
	AR# 2410-R		
	Direct Costs	Implementation	Total
<b>Funds Awarded</b>	<b>\$350,000.00</b>	<b>\$150,000.00</b>	<b>\$500,000.00</b>
<b>Actual Expenses</b> <i>(October 1, 2023 - June 30, 2024)</i>	<b>\$25,984.00</b>	<b>\$88,101.00</b>	<b>\$114,085.00</b>

### FY24 Other Funding Sources

The following table reports the amount of committed and expended "Other Funding Sources" for this AR in FY24. The funding information in this table is for informational purposes only and demonstrates external collaboration as delineated in the 2021-2025 Beef Industry Long Range Plan.

FY24 Other Funding Sources (Informational Only)			
	AR# 2410-R		
	Other Funding Source	Funds Committed	Funds Expended <i>(October 1, 2023 – June 30, 2024)</i>
<b>A</b>	Other: N/A		

Use the space below if you wish to provide additional comments/information on the FY24 CBB/BPOC or Other Funding amounts that are being requested for this AR's tactic(s).

N/A

### Section 3 – Historical Summary of AR Budgets and Expenses

**Classification:** This AR is a continuation of, or builds upon, program work from the last two years or more. CBB will report information in the "CBB/BPOC Historical Summary" table and the contractor will provide information for the "Other Funding Sources Historical Summary" table.

#### CBB/BPOC Funding – Historical Summary

The following table reports the amount of awarded and expended CBB/BPOC funding for this AR in FY21, FY22, and FY23.

<b>CBB/BPOC Funding - Historical Summary</b>				
<i>Note: The Cattlemen's Beef Board completed the fields in this table.</i>				
		<b>FY23 AR# 2310-R</b>	<b>FY22 AR# 2210-R</b>	<b>FY21 AR# 2110-R</b>
<b>AR Period<sup>1</sup></b>	<i>Start Date:</i>	<i>Oct. 1, 2022</i>	<i>Oct. 1, 2021</i>	<i>Oct. 1, 2020</i>
	<i>End Date:</i>	<i>Sep. 30, 2025</i>	<i>Sep. 30, 2025</i>	<i>Sep. 30, 2024</i>
<b>Funds Awarded</b>		<b>\$450,000.00</b>	<b>\$500,000.00</b>	<b>\$646,144.00</b>
<b>Actual Expenses<sup>2</sup></b>		<b>\$136,542.00</b>	<b>\$253,510.00</b>	<b>\$645,591.00</b>

<sup>1</sup>For multiyear ARs, the "End Date" reflects the date that the AR is scheduled to be completed.

<sup>2</sup>If the AR "End Date" has not occurred, actual expenses will be reflective of the following time period:  
AR Start Date - June 30, 2024.

#### Other Funding - Historical Summary

The following table reports the amount of "Other Funding Source" expenditures for this AR in FY21, FY22, and FY23. The funding information in this table is for informational purposes only and demonstrates external collaboration as delineated in the 2021-2025 Beef Industry Long Range Plan.

<b>Other Funding Sources – Historical Summary (Informational Only)</b>						
	<b>FY23 AR# 2310-R</b>		<b>FY22 AR# 2210-R</b>		<b>FY21 AR# 2110-R</b>	
	<b>Other Funding Source</b>	<b>Total Expenditures</b>	<b>Other Funding Source</b>	<b>Total Expenditures</b>	<b>Other Funding Source</b>	<b>Total Expenditures</b>
<b>A</b>	Other: N/A		Other: N/A		Other: N/A	

Use the space below if you wish to provide additional comments/information on the historical CBB/BPOC or Other Funding budget and expense summaries.

N/A