

**USDA-ARS NATIONAL PROGRAM 108: FOOD  
SAFETY RESEARCH**

# 2021- 2025 Action Plan

## National Program 108 Food Safety

### **Vision**

Enhance and protect public health and agriculture through the development of technologies, strategies, and data that safeguard food from pathogens, toxins, and chemical contaminants during production, processing, and preparation, thus increasing the safety of the U.S. food supply.

### **Mission**

The Program's *mission* is to provide through research, the means to ensure that the U.S. food supply is safe for consumers; and that food and feed meet domestic and foreign regulatory requirements.

# **Component 1. Foodborne Contaminants**

## **Problem Statements**

- 1. Characterize the Movement, Structure, and Dynamics of Microbial Populations.**
- 2. Characterize the Systems Biology of Microorganisms in the Food Continuum.**
- 3. Develop Technologies for Detecting and Characterization of Microbial Contaminants.**
- 4. Elucidating the Methodology, Toxicology, and Toxinology for Detecting and Characterizing Chemical and Biological Contaminants.**
- 5. Develop, Validate and Implement Intervention and Control Strategies to Reduce or Eliminate Pathogens in the Food System.**
- 6. Develop Predictive Microbiology Models and Informational Databases.**
- 7. Develop Solutions to Reduce the Impact of Foodborne Antimicrobial Resistant Microorganisms.**

## NP108 Food Safety Program Goal

In *collaboration* with regulatory agencies, industry, academia and other stakeholder and partners, the Program through research provides the means to ensure that the food supply is safe for consumers and that food and feed meet foreign and domestic regulatory requirements.

*Research* seeks ways to *assess, control or eliminate* potentially harmful food contaminants, including both introduced and naturally occurring *pathogenic bacteria, viruses and parasites, toxins and non-biological-based chemical contaminants, mycotoxins and plant toxins.*

*Technology Driven: mixture of basic & applied research:* accomplishments & outcomes after evaluation & validation, are *utilized in national & international strategies* delivering research results & advances to regulatory agencies, commodity organizations, industry, academia, research & extension agencies & consumers.

Programs **major stakeholders (FSIS/FDA/CDC etc.)**,  
**Collaborate** with agencies/organizations, industry and academic researchers  
in (**> 60 countries**) internationally.



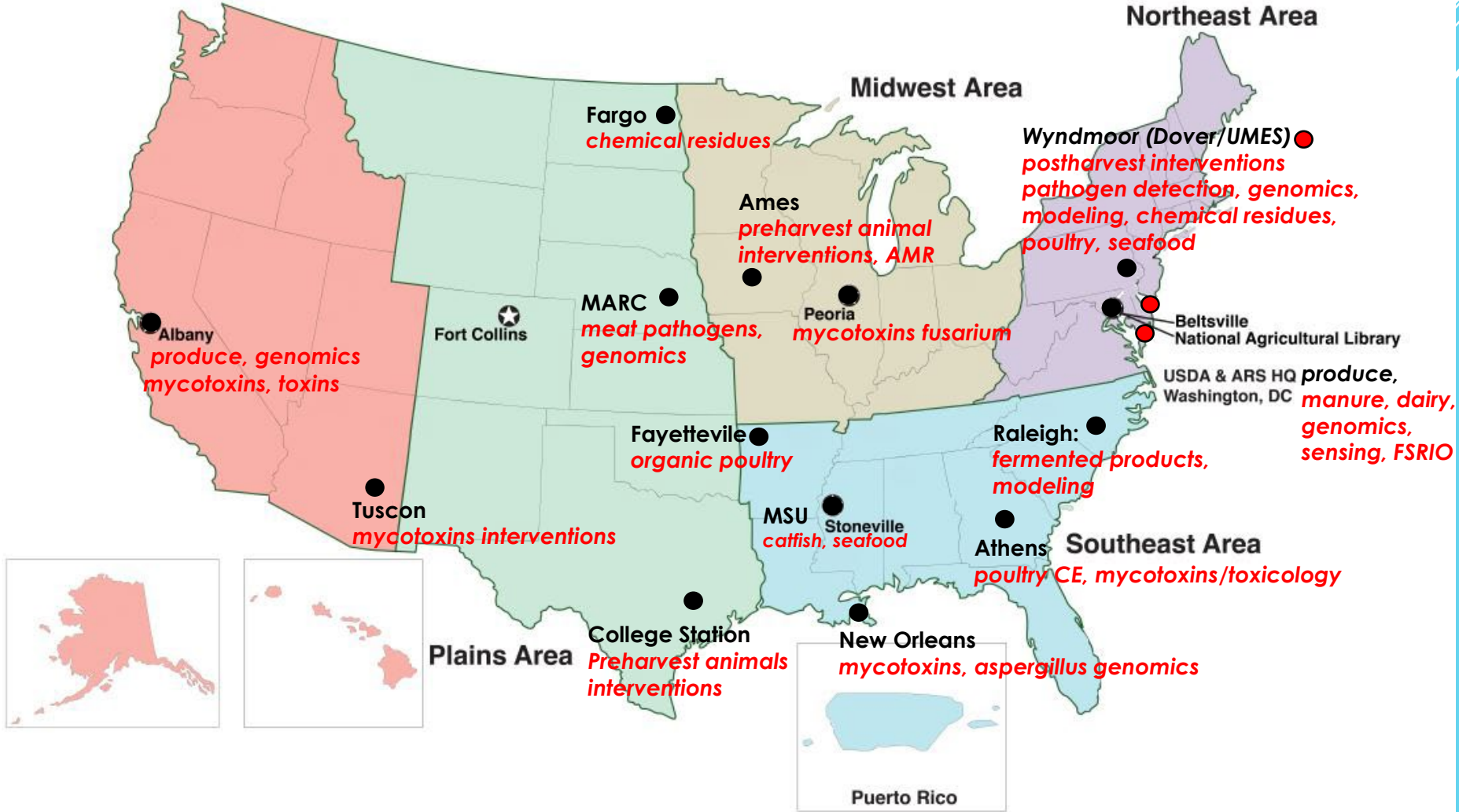
Agricultural Research Service

# Research Locations

Pacific West Area

Northeast Area

Midwest Area



## **Food Safety Research Falls Under Various Goals/Plans**

USDA Strategic Goal 7.

<https://www.usda.gov/sites/default/files/documents/usda-strategic-plan-2018-2022.pdf>

REE Goal 5, Food Safety. Performance Measure 1.

<https://www.ars.usda.gov/ARSUserFiles/00000000/NPS/OAA/Annual%20Report%20on%20Science/ARS%20Annual%20Report%20on%20Science%20FY%202018.pdf>

ARS Strategic Plan for 2018-2022.

<https://www.ars.usda.gov/ARSUserFiles/00000000/Plans/2018-2020%20ARS%20Strategic%20Plan.pdf>

ONP Food Safety Program Action Plan 2021-2025

<https://www.ars.usda.gov/ARSUserFiles/np108/NP%20108%20Action%20Plan%202021-2025%20final%20for%20WEB.pdf>

## **The Office of National Programs web site**

<https://www.ars.usda.gov/nutrition-food-safetyquality/food-safety-animal-and-plant-products/>

<https://www.ars.usda.gov/ARSTUserFiles/np108/Annual%20Report/108%20RRAccomplishment%20Documentforweb0213.pdf>

<https://www.ars.usda.gov/ARSTUserFiles/np108/Annual%20Report/108%20RRAccomplishment%20Report%20Publicationsforweb0213.pdf>

## **Other Critical Resource:**

<https://www.nal.usda.gov/fsrio>



The initial focus within FSMA was the Produce Safety Rule, and the Food Safety Program established Agreements with the FDA to conduct research which addressed issues within the Rule.

## Pathogen Introduction into Environment and on/in Produce

- prevalence and levels in environment
- prevalence and levels in water sources
- production (farming) systems
- adjacent land use, buffer zones
- environmental factors
- transference: edible surfaces/internally
- soil amendments
- water
- farm animals, wildlife

## **Identify environmental factors that affect the persistence and transmission of enteric pathogens in the produce production environment for risk assessment**

- 5-years prevalence data for enteric pathogens in watersheds near leafy green growing regions of California (Salinas, CA)
- Developed a predictive geospatial risk assessment model (PGRAM) to estimate the spread of pathogens in 5- watersheds in produce production environment.
- Outcome: The prevalence of enteric pathogens data enabled the generation of time-dependent incidence maps to inform FDA, growers and exporters of indicators of elevated pathogen risk.

<https://doi:10.3389/fcimb.2014.00030>

## Use of untreated biological soil amendment of animal origin

- Determination of appropriate time interval between manure application to soils and crop harvest to ensure reduction/die-off of foodborne pathogens in soils.
- Outcome: Provides farmers with a specific factor that affects and promotes pathogen survival in pre-harvest produce growing environments.
- Outcome: Two large multi-year data sets for FDA analysis, data for model development, and use in their rule-making progress

<https://doi.org/10.1128/AEM.02392-18>

<https://doi.org/10.1111/risa.13491>

<https://doi.org/10.1128/AEM.02418-20>

## **Water: Potential sources and routes of contamination relevant to agricultural water in the pre-harvest produce production setting.**

- Collaborated (through the CONSERVE Project) on determining E. coli levels in surface waters in the Mid-Atlantic and applying proposed FSMA standards on bacterial die-off for their appropriate use in water.

<https://www.ars.usda.gov/research/publications/publication/?seqNo115=365007>

[https://doi: 10.1128/AEM.00342-20.](https://doi.org/10.1128/AEM.00342-20)

<https://doi.org/10.1016/j.envres.2019.02.019>

[https://doi: 10.1371/journal.pone.0229365.](https://doi.org/10.1371/journal.pone.0229365)

## **Develop and validate novel monitoring methods for the microbial quality of irrigation water sources.**

- Application of the UAV-based and drone hyperspectral imaging to quantify lateral patterns of indicator and pathogen bacteria concentrations in irrigation ponds.
- Quantify movement indicators and pathogens from bottom sediment to stream water column at base flow conditions.
- Develop the microbial fate and transport modeling capabilities for APEX and the microbial index modeling method for site-specific evaluation of risks exceeding microbial water quality standards in surface water sources for irrigation.

<https://doi.org/10.1016/j.scitotenv.2019.135757>

<https://doi.org/10.3390/w12061708>

<https://fedtechmagazine.com/media/video/drones-search-irrigation-water-contamination>

## BARC: Wash Water

- ARS research was used by the FDA to develop the FSMA Rule/Guidance Documents. Specifically, research was cited in the FSMA guidance document “Guide to Minimize Food Safety Hazards of Fresh-cut Produce” (21 CFR Part 117. Docket No. FDA–2018–D–3583) as they pertain to wash water sanitation and prevention of pathogen cross-contamination.

[https://doi: 10.4315/0362-028X.JFP-10-429](https://doi.org/10.4315/0362-028X.JFP-10-429)

[https://doi: 10.4315/0362-028X.JFP-16-258](https://doi.org/10.4315/0362-028X.JFP-16-258)

[https://doi: 10.1016/j.fm.2017.09.013](https://doi.org/10.1016/j.fm.2017.09.013)

- In addition to the above FSMA Preventive Control for Human Food Rule, ARS studies on temperature control for food safety was also used by the FDA in the FSMA Sanitary Transportation of Human and Animal Food Rule. Two USDA publications were [supposedly] cited by the FDA for the Uniform Food Code, which was further included in this Sanitary Transportation Rule. (note this needs confirmation)

[https://doi: 10.4315/0362-028x-72.10.2038](https://doi.org/10.4315/0362-028x-72.10.2038)

[https://doi: 10.1111/j.1750-3841.2010.01722.x](https://doi.org/10.1111/j.1750-3841.2010.01722.x)



**Meat Safety and Quality, Clay Center, NE**  
**Pathogens such as *E. coli* O157:H7 can be transported from a cattle feedlot to leafy greens**

Outcome: Leafy Green industry guidance set-back distances were at the time, which were 400 feet (120 meters) from the edge of the crop to the edge of the concentrated animal feeding operation (CAFO). In 2018, revised LGMA food safety guidelines extended the guidance on setback distances to 1,200 feet (366 m) from the edge of CAFOs with >1,000 head, and 1 mile (1.6 km) from the edge of CAFOs with >80,000 head.

<https://doi.org/10.4315/0362-028X.JFP-18-601>

<https://lgma.ca.gov/>