



United States  
Department of  
Agriculture

National Institute  
of Food  
and Agriculture

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## PROJECT DESCRIPTIONS

# USDA AWARDS NEARLY \$19 MILLION IN GRANTS TO ENHANCE FOOD SAFETY RESEARCH

**T**HE U.S. DEPARTMENT OF AGRICULTURE'S (USDA) NATIONAL INSTITUTE OF FOOD AND AGRICULTURE (NIFA) announced March 31, 2015 funding awards totaling nearly \$19 million to 36 grantees to ensure the availability of a safe and nutritious food supply while maintaining American agriculture competitiveness. NIFA made the awards through the Agriculture and Food Research Initiative (AFRI), which is authorized by the 2014 Farm Bill.

### EFFECTIVE MITIGATION STRATEGIES FOR ANTIMICROBIAL RESISTANCE (AMR)

**Colorado State University, Fort Collins, CO**  
**\$749,838** | Study the relationship between antimicrobial drug (AMD) use in agriculture and the development of AMR to provide insight into AMR development, ascertain factors that cause the spread of AMR and the unique genes that have not yet been identified.

**University of Florida, Gainesville, FL**  
**\$2,193,556** | Define how AMR microbes, specifically the increasingly prevalent extended-spectrum b-lactamase (ESBL)-producing bacteria, move throughout populations of grass-fed, pre-feedlot cattle by investigating factors such as the source of these microbes in soil and plants and by determining contributions from genetics, physiological factors, and animal husbandry practices throughout the life of the cattle.

**University of Minnesota, Minneapolis, MN**  
**\$2,250,000** | Determine best practices to reduce AMR of *Salmonella* and *E. coli* in hatchery and broiler farms by identifying the effects of antibiotic use on AMR and the relationship between on-farm practices and AMR patterns.

**Wake Forest University, Winston-Salem, NC**  
**\$15,000** | Organize the 2015 Mid-Atlantic Microbial Pathogenesis Meeting to foster communication and collaboration between scientists engaged in microbial pathogenesis research and give students and post-doctoral fellows an opportunity to present research to subject matter experts.

**Texas A&M University, College Station, TX**  
**\$16,500** | Execute the 4th American Society for Microbiology Conference on Antimicrobial Resistance in Zoonotic bacteria and Foodborne Pathogens to engage a broad audience of scientists and federal agencies, including regulators and policy and decision makers, on mitigation strategies, optimal strategy for studies that determine mitigation outcomes, and engaging stakeholder values for optimal policy implementation.

**Virginia Polytechnic Institute and State University, Blacksburg, VA**  
**\$750,000** | Research ways to mitigate AMR contamination in raw produce by determining factors that contribute to the spread of antibiotics and antibiotic resistance genes (ARGs), to include manure and soil types, composting techniques, and more.

**Washington State University, Pullman, WA**  
**\$749,993** | Examine causes and solutions for AMR impact on dairy farms and calf-rearing ranches by researching the effects of different antibiotics on AMR prevalence, the existence of AMR reservoirs and niches, and the maintenance and spread of AMR throughout farms and ranches.

### ENHANCING FOOD SAFETY THROUGH IMPROVED PROCESSING TECHNOLOGIES

**University of Arkansas, Pine Bluff, AR**  
**\$149,000** | Evaluate antimicrobial effects of bacteriophages in edible coatings in combination with natural antimicrobials against foodborne pathogens in ready-to-eat foods.

**University of California, Davis, CA**  
**\$751,000** | Characterize the risk of cross-contamination of fresh produce as a function of flow conditions in a washer and optimize washer design; develop innovative biosensing approaches; evaluate novel sanitizers technologies; engineer self-regenerating antimicrobial coatings to reduce risk of cross contamination.

**University of Maine, Orono, ME**  
**\$900,000** | Develop an integrated project among academia, government, industry partners, and stakeholders to create effective waterless, non-thermal processing technologies to provide consumer with safe, nutritious, high-quality produce and low-moisture foods, equip extension agents with knowledge and tools, and facilitate commercialization of the technology and dissemination of information.

**Michigan State University, East Lansing, MI**  
**\$700,000** | Enhance the development, improvement, and commercial adoption of pasteurization technologies for low-moisture foods, considering efficacy, product quality, regulatory requirements, energy use, and suitability for the target end-users.

**Tennessee State University, Nashville, TN**  
**\$500,000** | Operationally define and engrain a holistic roadmap for accelerating the innovation process in irradiation research that will guide technology deployment for containment treatment.

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### IDENTIFYING AND TARGETING FOOD SAFETY NEEDS

**Illinois Institute of Technology, Chicago, IL**  
**\$50,000** | Provides funding for a conference allowing researchers and subject matter experts to discuss the current status and issues associated with the management of food allergens and summarize and showcase the best practices in managing allergen risks at various stages of the food chain.

### IMPROVING FOOD SAFETY

**University of California, Davis, CA**  
**\$499,812** | Aims to greatly improve understanding of the internalization and survival mechanisms of two major food-poisoning human pathogenic bacteria in fresh produce and guiding development of innovative measure to reduce pathogen load in unprocessed leafy vegetables.

**University of Connecticut, Mansfield, CT**  
**\$49,744** | Develop and implement strategies to enhance the safety of dairy foods by fostering collaboration between animal scientists, veterinarians, food microbiologists, industry partners, extension educators, and artisan producers to identify research, education, and extension needs, as well as identify strategies to proactively address artisan and farmstead cheeses as a vehicle of foodborne hazards, and generate a white paper.

**University of South Florida, Tampa, FL**  
**\$499,972** | Demonstrate improved detection of bacterial pathogens in processed lettuce using a novel dead-end ultrafiltration (DEUF) sampling procedure that rapidly collects, concentrates, and recovers pathogens from large volumes of produce wash water in combination with an ACOC qPCR rapid detection method.

**Emory University, Atlanta, GA**  
**\$499,968** | Evaluate the potential for norovirus (NoV, 39%) and hepatitis A (HAV, 2%) viral contamination on fresh produce in the harvest and post-harvest environment and evaluate the impact of food safety practices on reducing contamination.

**University of Hawaii, Honolulu, HI**  
**\$499,516** | Explore the adhesion mechanics of bacteria on multifunctional nanopillared surfaces and ultimately develop an anti-bacterial surface that is environmentally acceptable, energy-efficient, and economically feasible in the area of food contact surfaces associated with fresh produce production and/or processing.

**University of Massachusetts, Amherst, MA**  
**\$499,567** | Investigate interactions between silver nanoparticles (AgNPs) and leafy vegetables using surface-enhanced Raman spectroscopic (SERS) mapping to understand the physical and molecular mechanism that contribute to AgNPs contaminating fresh produce.

**University of Maine, Orono, ME**  
**\$150,000** | Develop a non-invasive method using magnetic resonance imaging (MRI) to improve the understanding of the internalization of foodborne pathogens in produce.

**University of Minnesota, Minneapolis, MN**  
**\$500,000** | Develop a novel intervention to control the *S. enterica* pathogen in pigs by vaccinating them against *L. intracellularis*, a virus that could increase the risk of salmonellosis in humans.

**North Dakota State University, Fargo, ND**  
**\$135,343** | Provide a comprehensive assessment of pre and post-harvest environmental factors that influence expression of pathogen attachment mechanisms, and thereby attachment of pathogens to different surfaces, such as fresh produce and stainless steel.

**North Dakota State University, Fargo, ND**  
**\$36,996** | Enhance the research capability of university researchers by enabling the measurement of zeta potential, molecular weight of biological particles, and particle size, particularly nanoparticles, through a procured Zetasizer and use these measurements in research pertaining to nanoparticle and food crop interactions.

**University of Nevada-Reno, Reno, NV**  
**\$150,000** | Analyze the impact of aromatic carbon-degrading microorganisms on the transformation, aqueous stability, and tomato plant uptake of carbon nanotubes (CNTs).

**Cornell University, Ithaca, NY**  
**\$479,764** | Examine the significance of water films and droplets on the initial retention and attachment of foodborne pathogens to the surface of fresh produce and explore potential steps to modify conditions of the initial attachment process so that pathogens can be washed off more easily.

**Cornell University, Ithaca, NY**  
**\$499,997** | Execute a three-pronged, interdisciplinary, mechanistic approach involving engineering modeling, microfluids, and microbiology validation to study active and passive attachment and internalization at produce surfaces during exposure to contaminated water during irrigation/washing, as well as passive infiltration into produce from hydro- and vacuum-cooling.

**The Ohio State University, Columbus, OH**  
**\$50,000** | Foster scientific collaboration, information exchange and dissemination on multiple aspects of the detection, diagnosis, prevention, control, mitigation, and treatment of Shiga toxin-producing *E. coli*.

### IMPROVING FOOD QUALITY

**University of California, Davis, CA**  
**\$498,356** | Identify food-relevant traits of plant-associated lactic acid bacteria (LAB) important for the prevention of food spillage and for the production of novel or enhanced fermented plant-based foods that have optimal sensory and nutritional qualities.

**University of Florida, Gainesville, FL**  
**\$499,652** | Explore the process of changing tomato and strawberry volatile profiles predictably and how narrow-bandwidth LED illumination influences other important post-harvest attributes and overall shelf life.

**Iowa State University, Ames, IA**  
**\$420,685** | Elucidate the mechanism of egg yolk gelatin caused by freezing storage, furthering the exploration of practical means to delay and prevent such structural change and ultimately minimize food quality loss.

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**University of Idaho, Moscow, ID**

**\$248,408** | Improve understanding of the interaction between saliva with food components and how it affects perceived food texture using rheological, tribological, and sensory measurements, model systems (stirred acid milk gels) to evaluate in terms of these behaviors.

**University of Illinois, Champaign, IL**

**\$361,748** | Model saltiness of solid foods by quantifiable structural properties of the food matrix which will enable the food manufacturers to strategically design solid food systems to enhance saltiness and achieve sodium reduction in a broad range of products.

**University of Illinois, Champaign, IL**

**\$499,966** | Develop the Hybrid Mixture Theory based three-scale fluid and species transport model describing mechanisms and thermomechanical changes in frozen foods, obtain mathematical parameters and solve the model using the finite element method, and validate predictions of the model.

**Purdue University, West Lafayette, IN**

**\$465,694** | Predict the kinetics of swelling of starch granules and its effect on the rheology of starch suspensions subjected to heating and develop strategies for production of resistant starch through modification with desirable texture.

**University of Massachusetts, Amherst, MA**

**\$499,977** | Design packaging materials with non-migratory, chelating activity to extend food shelf life, improve food quality, and reduce loss of beverages and semi-viscous foods due to microbial spoilage.

**University of Maryland, Princess Anne, MD**

**\$149,998** | Determine the potentials of low-dose irradiation of shell eggs as a means to improve egg white-processing efficiency without adverse effects on physicochemical and functional qualities of egg white products and bioactivities of egg white proteins and peptides.

**University of Maine, Orono, ME**

**\$46,293** | Utilize an ultra-pressure liquid chromatographer (UPLC) system to assist with food quality research of fruits and vegetables and food safety research of vegetables and syrup.

**Michigan State University, East Lansing, MI**

**\$489,528** | Develop low sodium and/or low fat meat products by using cold batter-mixing technology with re-rigor muscle; investigate how this alters protein structure and protein-to-protein interactions what could improve quality and sensory/textual attributes.

**West Virginia University, Morgantown, WV**

**\$435,353** | Create a marketable protein powder from underutilized resources by extracting the water-soluble proteins from fish processing byproducts; drying and assessing the nutritional, sensory, and marketability aspects of the recovered fish protein powder; and determining mineral, amino acid, and fatty acid profiles.