ENHANCING FOOD SAFETY AND QUALITY

Foodborne illnesses affect 48 million Americans each year.

Research and education have led to major advances in food safety, but challenges remain. Many methods that use heat or chemicals to ensure food safety are not 100% effective and can damage food color, texture, flavor, and nutrients.

Researchers at 32 land-grant universities are collaborating on innovative solutions for food safety and quality.

Their work is helping meet consumer demand for minimally-processed, additive-free food items with longer shelf lives, higher nutrient content, and less potential to cause foodborne illnesses.

Collaboration is key.

Working together, the team is able to share tools, labs, expertise, and other resources to conduct cutting-edge food safety research on a variety of foods and food processing environments. Partnering with other universities, the U.S. Food and Drug Administration, and the food industry further enhances research capacity and impact. With members in 30 states, the team can reach a wide audience with food safety education and training.

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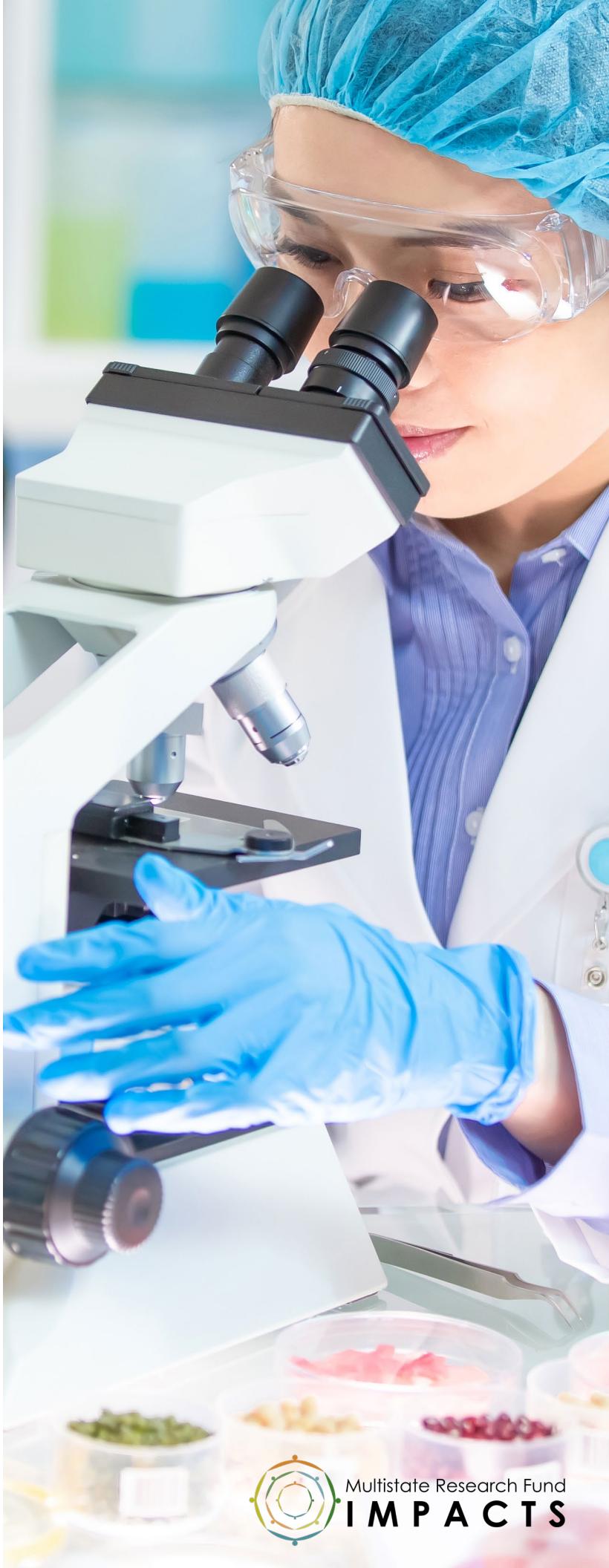
Learn more: bit.ly/NC-1023



Multistate Research Fund
IMPACTS

RESEARCH HIGHLIGHTS

Scientists examine food properties.

Michigan State University and Purdue University researchers designed a device that rapidly measures thermal properties, providing crucial information for predicting heat transfer in food processing systems.

University of California scientists developed powerful imaging techniques to examine food digestion processes. This can help determine if foods with added protein or nutrients are having their intended effects.

Scientists developed models that help food companies understand, predict, and optimize food processes.

For example, researchers developed a model to simulate infiltration of bacteria into fresh leafy greens, showing companies how to ensure food safety (Cornell University and Ohio State University).

New technology extends shelf life.

University of Hawaii scientists developed innovative supercooling technology for beef steaks. Because it does not create ice crystals like traditional freezing, supercooling better preserves food texture and other qualities. This technology is drawing attention from food companies as well as the biomedical industry for use preserving tissues and organs.

Scientists at Oregon State University identified essential oil coatings that protect fruit during storage (University of Tennessee) and created nanocellulose-based coatings that extend the shelf life of fresh fruit.

South Dakota State University showed that ultrasound extends the shelf life of pasteurized milk.

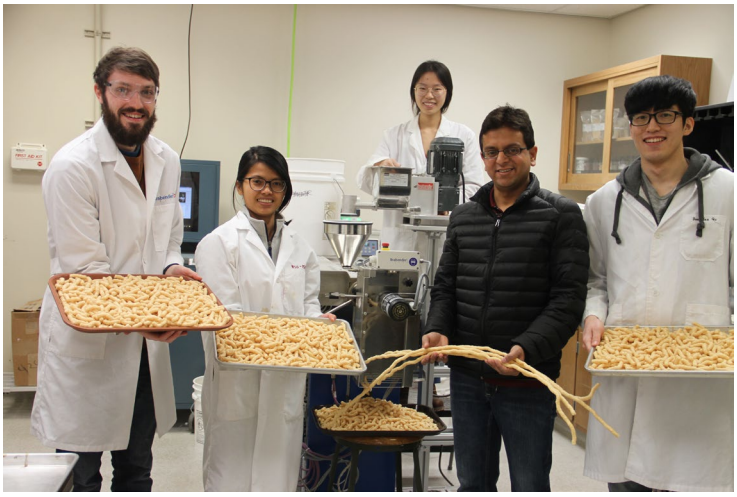
Iowa State University scientists are finding ways to preserve cheese-making ingredients so they can be used during long space missions.

Washington State University scientists created a new kind of flexible, multilayer, metal oxide-coated packaging that extends the shelf life of ready-to-eat meals for soldiers and astronauts.

Researchers developed new tools for sterilizing food and processing environments, including:

- Processes that do not rely on heat to kill bacteria, which means they require less energy and do not damage the nutritional and sensory qualities of the food (University of Minnesota).
- Food-grade nanoparticles to help deliver antimicrobials into foods, reaching areas that are difficult to access using conventional sanitization methods (Texas A&M University).
- Nanoparticle coatings that inhibit microbial growth on aluminum surfaces of food processing equipment (University of Hawaii).
- Alternatives to chlorine washes for sanitizing fresh produce (University of California, University of Delaware, University of Maryland, Rutgers University).
- Technologies that inactivate allergens, helping food companies avoid inaccurate labeling, which can lead to recalls that result in loss of revenue and credibility (University of Maine).
- Technologies for reducing pathogens in low moisture foods like flour and spices (Michigan State University, University of Minnesota, Washington State University, University of Arkansas, University of Georgia, Illinois Institute of Technology, U.S. Food and Drug Administration).
- More efficient methods for using X-rays to kill harmful bacteria in oysters without affecting oyster quality (Mississippi State University).

Researchers at Washington State University developed and licensed microwave assisted pasteurization and sterilization systems (a pilot pasteurization system is pictured above). The pasteurization systems kill bacterial and viral pathogens during production of chilled and frozen ready-to-eat meals, extending their shelf life. The sterilization systems can be used to process up to 150 meals per minute and make shelf-stable meals for military rations, space missions, and retail. Photo courtesy of Washington State University.



Washington State University scientists used innovative tools to find more successful ways to add healthy fiber to popular puffed snacks and cereals without affecting their shape or crunch. Photo courtesy of Washington State University.

Innovative food processing makes foods healthier, tastier, and better looking.

Researchers found ways to reduce fat uptake in fried foods (University of Illinois and Washington State University) and tested technology for enriching potato chips with antioxidants (Texas A&M University).

University of Idaho research is helping create reduced-fat and reduced-calorie food products with more palatable textures.

University of Arkansas scientists are using 3D food printing to improve the nutritional value of food.

Using high pressure technology, Rutgers University scientists enriched baby carrots with calcium without affecting their texture or color.

Oregon State University scientists added nano-sized fish bone to fish sticks and fish burgers to increase calcium content.

Scientists tested nanoemulsions, liquid mixtures with nano-sized particles, that could be used to encapsulate and deliver nutrients, coloring, flavoring, and antimicrobials into food products (Mississippi State University, University of Tennessee).

New processing strategies retain nutrients in juices and purees (University of California, Cornell University) and maximize antioxidants in chocolate (Pennsylvania State University).

New packaging, storage, and transportation strategies minimize temperature changes and maintain frozen potato quality (University of Illinois, Washington State University, University of Wisconsin).

Scientists incorporated nanocellulose into food coatings that retain the color, texture, and nutritional quality of canned fruit (Oregon State University).

Research reduces food waste.

Adding recycled plastic films to packaging can prevent discoloration of deli meat, reducing the amount of food wasted due to unappealing appearance and diverting plastic waste from landfills (Iowa State University).

Researchers found ways to extract functional components (like protein, fiber, and antioxidants) from food processing byproducts and reuse them in other foods. This captures value that would otherwise be lost and reduces food waste (University of California, Iowa State University, University of Kentucky, University of Nebraska, Oregon State, Michigan State University, University of Minnesota, Mississippi State University, Purdue University, Virginia Tech, Washington State University).

New Mexico State University scientists used cottonseed meal—a byproduct of cotton production—to create an affordable, high-protein feed for aquaculture species.

Mississippi State University developed extraction technologies to recover functional proteins from catfish waste of heads, bones, and skin.

To make the byproducts of wine grapes and apple and tomato juice processing more useful, scientists developed drying techniques that do not damage sensory and nutritional quality (University of Georgia, Iowa State University).

Land-grant universities are meeting the need for better food safety education.

Universities are working with major food companies to turn educate hired engineers.

Researchers created simulations, online modules, videos, and games that have increased food science student learning and engagement. Research and Extension have also improved food safety outreach and training for farmers, food processors, and regulators, helping them meet Food Safety Modernization Act requirements.