

Food Safety Advances and Collaborations Here and Abroad

The safety of the food supply has become an increasingly visible global public health issue. Outbreaks of foodborne illness are seen as a major cause of morbidity, mortality, and economic burden. The cause of many outbreaks remains unresolved, and issues such as increased international trade, changes in eating habits, and increased travel abroad complicate investigations.

Persistent outbreaks that may directly affect public health, industry, and trade require the immediate attention of the nation's food safety team.

The Agricultural Research Service's national program on Food Safety provides, through research, the means to ensure that food and feed meet foreign and domestic regulatory requirements and are safe for consumers. The program's research, described in its 2011-2015 Strategic Action Plan (available as a pdf at tinyurl.com/FoodSafetyPlan) seeks ways to assess, control, or eliminate potentially harmful food contaminants, including both introduced and naturally occurring pathogenic bacteria, viruses, and parasites, as well as toxins and non-biological-based chemical contaminants, mycotoxins, and plant toxins.

Food safety research has changed during the past decade, moving past simple surveillance procedures to asking complex questions relative to public health. The food chain is a single entity, where each stage of production, processing, and distribution is part of a larger system. Consequently, the program is creative, considering alternate perspectives, exploiting new opportunities and technologies, and crossing conventional boundaries.

Safe food is not just a local issue; it's a global one. Therefore, ARS's efforts involve both national and international collaborations through formal and informal partnerships. Accomplishments and outcomes from research efforts benefit agencies both here (like the U.S.

Department of Agriculture's Food Safety and Inspection Service, the U.S. Food and Drug Administration, and the U.S. Environmental Protection Agency) and abroad (the United Kingdom's Food Standards Agency, the European Food Safety Authority, and the World Health Organization), as well as commodity organizations, industry, and consumers.

During the past few years, there have been many accomplishments from the ARS Food Safety national program. A new method was developed to detect Shiga-toxin-producing non-O157:H7 enterohemorrhagic *E. coli*, which causes an illness in humans similar to that caused by *E. coli* O157:H7. And dioxin surveys have substantiated the safety of the U.S. meat and poultry supply here and abroad.

Other new technologies include a process imaging system for the USDA's Agricultural Marketing Service to detect small cracks, blood spots, and structural deformities in eggshells and a process for detecting ricin, staphylococcal enterotoxins, and botulinum neurotoxins in foods. These new technologies are superior to any others that were commercially available.

Another new technology, called "QuEChERS," was developed to monitor chemical residues in foods. The method was successfully validated for implementation in regulatory monitoring labs in the United States, the European Union, and other countries and is considered the gold standard for residue detection.

Other research endeavors include determining a baseline for the environmental prevalence of *E. coli* O157 and non-O157 *E. coli* in the Salinas Valley, providing the first epidemiological data in the area known as the "Salad Bowl of America." This was in collaboration with the University of California-Davis and the USDA Animal and Plant Health Inspection Service's Wildlife Services-California.

Our researchers are also conducting studies to better understand the long-term

effects of antibiotic use and find alternatives to control foodborne pathogens. The ARS Food Safety national program involves extensive national and international collaborations and scientific exchanges with many sources. Our scientists work with the Center for Food Safety Engineering at Purdue University to develop new technology platforms for improving microbial and chemical hazard detection. We contribute to Combase, the international database resource on the behavior of pathogens in foods. We work with various international partners in the European Commission on integrated projects such as MycoRed, which aims to find strategies to reduce mycotoxins in feed and food. Work is also under way with the Shanghai Jiao-Tong University in China; the Academy of Finland; Teagasc and University College in Dublin, Ireland; the Institute of Chemical Technology in Prague, Czech Republic; the National Veterinary Institute in Oslo, Norway; the University of Tasmania in Tasmania, Australia; the International Institute of Tropical Agriculture in Nigeria, Africa; and the Institute of Food Research and the Food Standards Agency in the United Kingdom.

No single program can solve the food safety challenges and issues that confront us now or in the future. Multidisciplinary collaborations are necessary to integrate resources and develop strategies for solving specific problems. In this way, the research program as a whole is expected to substantially enhance the global safety of the food supply.

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