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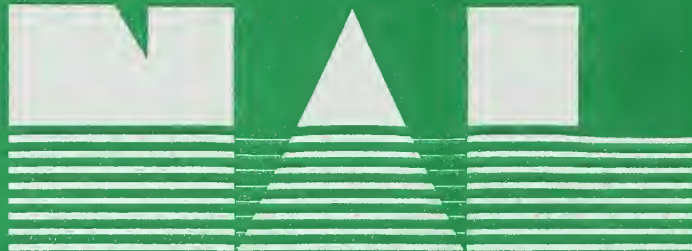
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ERS Program Activities in Support of Food Safety

Briefing for Senior USDA Policy Officials
December 2003



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Introduction

The ERS food safety research program is very directly motivated by the regulatory issues confronting the Food Safety mission area and the Food Safety and Inspection Service (FSIS)

- The first food safety research contributions from ERS were innovative estimates of the annual costs of foodborne illness due to medical costs, productivity losses, and premature deaths. These estimates have been used in official analyses of regulatory proposals and changes. For example, in 1994, ERS worked with FSIS to provide a cost/benefit analysis of the proposed Pathogen Reduction/Hazard Analysis and Critical Control Point (PR/HACCP) rule.
- The cost-of-foodborne-illness estimates continue to provide an empirical foundation for the importance of USDA's food safety programs and policies. ERS currently estimates the cost of foodborne illness caused by several major pathogens, including *E. coli* O157:H7, *Salmonella*, *Campylobacter*, and *Listeria monocytogenes*, to be more than \$7 billion annually. In Spring 2003, the Foodborne Illness Cost Calculator was made publicly available on the ERS website.
- New ERS research reveals how meat and poultry plants have adapted to the implementation of the PR/HACCP rule, and how market incentives are working along with Federal regulations to spur innovations in food safety technologies and investments in new technologies by meat and poultry plants. Understanding the role of market incentives allows the public sector's role to be carefully and efficiently targeted.

The ERS program builds on a quarter century of research on the economics of food safety

- 1980: ERS completes cost/benefit analysis of food safety inspection
 - 1987: ERS testifies on costs of foodborne illness for Senate agriculture committee
 - 1990: Establishment of a Food Safety research section
 - 1994: Establishment of Food Safety Branch
 - 1997: Establishment of Diet, Safety, and Health Economics Branch
 - 1998: Establishment of the Food Safety Extramural Research Program
 - 2001: Launch of five food safety "briefing rooms" on the ERS website (www.ers.usda.gov)
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- 2003: Launch of the Cost of Foodborne Illness Calculator on the ERS website (www.ers.usda.gov/data/foodborneillness).

The ERS food safety research program links with food safety research at domestic and foreign universities

- Cooperative research agreements with Harvard University, North Carolina A&T, Resources for the Future, Ohio State University, University of Illinois, University of Wyoming, and Washington State University
- Support for, and interaction with, the Collaborative Center for Economics of Infectious Diseases (UK)
- Participation in and leadership of the Food Safety and Nutrition section of the American Agricultural Economics Association (AAEA) and the Social and Agricultural Sciences sections of the American Association for the Advancement of Science (AAAS).

The ERS research program is focused on policy needs

- Cooperative research and staff analysis in support of FSIS
- Analytical support for USDA's Office of Risk Assessment and Cost-Benefit Analysis (ORACBA)
- Representation on USDA's new Risk Assessment Committee
- Participation in an interagency committee on standards for peer review of cost-benefit analyses
- Collaboration with the Centers for Disease Control and Prevention (CDC), FSIS, and the Food and Drug Administration (FDA) on analysis of FoodNet surveillance data

ERS Research Principles

A successful research program

- Embraces the interests of all clients—USDA, other Federal agencies, Congress, industry, consumer and public interest groups, university researchers, and extension specialists
- Seeks input from clients when developing research priorities
- Involves collaboration with scientists from other disciplines when appropriate
- Depends on rigorous internal and external review of research results
- Delivers timely and objective results that inform public and private decisions
- Distributes research findings widely, using various formats and media

Research Program Priorities

Food safety research priorities reflect today's needs and tomorrow's issues

- Developing state-of-the-art survey methodologies for measuring consumer demand and willingness to pay for food safety
- Empirically estimating industry costs of adapting to the PR/HACCP rule and assessing implications for use of improved food safety technologies and pathogen reduction
- Studying economic incentives for the development, commercialization, and adoption of food safety innovations
- Understanding the role of information, labeling, and traceability in enhancing the market for food safety
- Exploring conceptual and empirical linkages between food safety and international trade
- Analyzing the economic efficiencies of performance-based standards for food safety

Overview of ERS-FSIS Program Interaction

The ERS program helps meet FSIS program and policy needs

ERS supports FSIS's short-term needs through its responsiveness to customized requests for analysis and information ("staff analysis"). ERS and FSIS also have established a memorandum of understanding to strengthen economic analysis and consultation in support of FSIS's regulatory program in food safety and consumer protection.

Major Examples of Program Support and Policy Analysis

- Analysis in support of PR/HACCP rule (1995-97)
 - Frequent staff analyses in support of FSIS rulemaking
 - User fees study for FSIS (1998)
 - Development of methodologies to assign values to premature death from unsafe food (1998)
 - Participation in the *E. coli* O157:H7 risk assessment for ground beef (ERS led slaughterhouse team module) (1999-2000)
 - Analysis of structural change in the meat and poultry slaughter and processing industries (1999-2000)
 - Analysis of the distribution of benefits and costs across society for the PR/HACCP rule (2000)
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- Analysis of nutrition labeling benefits for FSIS (2000)
- Analysis of the benefits of the “*Listeria* in ready-to-eat foods” regulation (2001)
- Funding and implementation of a baseline survey of meat and poultry plants to assess costs of food safety investments due to PR/HACCP (2001-03)
- Consultation with FSIS on the establishment of a recurring survey of meat and poultry plants building on the ERS baseline survey (2002)
- Briefings for FSIS managers on meat and poultry plant survey results (2003)
- Briefing for USDA officials and staff on traceability in the U.S. food system (of special interest to Codex Alimentarius (Codex) staff) (2003)
- Workshop to review status of collaborative research on economics of food safety performance standards (2003)
- Assist with analysis of current and potential interventions to control *E. coli* O157, including implications for plants of different sizes/types (in progress)
- Analysis of factors affecting a plant’s ability to meet *Salmonella* performance standards (in progress)

ERS Publications of Interest to the Food Safety Mission Area

Food Safety and Trade: Regulations, Risks, and Reconciliation, by Jean C. Buzby and Lorraine Mitchell. Amber Waves, November 2003.

International Trade and Food Safety: Economic Theory and Case Studies, Jean C. Buzby, Editor. AER-828, November 2003.

Calculating the Cost of Foodborne Illness: A New Tool to Value Food Safety Risks, by Elise Golan. Amber Waves, April 2003.

Managing for Safer Food: The Economics of Sanitation and Process Controls in Meat and Poultry Plants, by Michael Ollinger and Valerie Mueller. AER-817, April 2003.

Weighing Incentives for Food Safety in Meat and Poultry, by Michael Ollinger and Nicole Ballenger, Amber Waves, April 2003.

Consumer Food Safety Behavior: A Case Study in Hamburger Cooking and Ordering, by Katherine Ralston, C. Philip Brent, Yolanda Starke, Toija Riggins, and C.T. Jordan Lin. AER-804, May 2002.

Children and Microbial Foodborne Illness, by Jean C. Buzby. *FoodReview*, May 2001.

"Effects of Food-Safety Perceptions on Food Demand and Global Trade," by Jean C. Buzby. In *Changing Structure of Global Food Consumption and Trade*, Anita Regmi, editor. ERS WRS No. 01-1, May 2001.

Product Liability and Microbial Foodborne Illness, by Jean Buzby, Paul Frenzen, and Barbara Rasco. AER-799, April 2001.

Valuing the Health Benefits of Food Safety: A Proceedings, ed. by Fred Kuchler. MP-1570, April 2001.

"An Interdisciplinary Approach to Developing a Probabilistic Risk Analysis Model: Applications to a Beef Slaughterhouse," by Tanya Roberts, Clare Narrod, Scott Malcolm, and Mohammad Modarres. In *Interdisciplinary Food Safety Research*, ed. by Neal Hooker and Elsa Murano, CRC Press: Boca Raton, FL, 2001, pp. 1-23.

"Product Liability and Food Safety: The Resolution of Food Poisoning Lawsuits," by Jean C. Buzby, Paul D. Frenzen, and Barbara Rasco. In *Interdisciplinary Food Safety Research*, ed. by Neal Hooker and Elsa Murano, CRC Press: Boca Raton, FL, 2001, pp. 121-137.

Food Safety Efforts Accelerate in the 1990s, by Steve Crutchfield and Tanya Roberts. FoodReview, December 2000.

Tracing the Costs and Benefits of Improvements in Food Safety: The Case of the Hazard Analysis and Critical Control Point Program for Meat and Poultry, by Elise Golan, Stephen Vogel, Paul Frenzen, and Katherine Ralston. AER-791, October 2000.

Structural Change in U.S. Chicken and Turkey Slaughter, by Michael Ollinger, James MacDonald, and Milton Madison. AER-797, September 2000.

Consumer Acceptance of Irradiated Meat and Poultry Products, by Paul Frenzen, Alex Majchrowicz, Jean Buzby, Beth Imhoff, and the FoodNet Working Group. AIB-757, August 2000.

Assigning Values to Life: Comparing Methods for Valuing Health Risk, by Fred Kuchler and Elise Golan. AER-784, November 1999.

"Probabilistic Risk Assessment and Slaughterhouse Practices: Generic E. Coli Contamination in Beef Destined for Hamburger," by Tanya Roberts, Scott Malcom, and Clare Narrod. In *Probabilistic Safety Assessment: 1999 Conference Proceedings*, American Nuclear Society, Inc.: La Grange Park, Illinois, August 1999, pp. 809-815.

Consolidation in U.S. Meatpacking, by James MacDonald, Michael Ollinger, Kenneth Nelson, and Charles Handy. AER-785, March 1999.

User Fee Financing of USDA's Meat and Poultry Inspection, by James MacDonald, Fred Kuchler, Jean Buzby, Fitzroy Lee, and Lorna Aldrich. AER-775, March 1999.

An Economic Assessment of Food Safety Regulations: The New Approach to Meat and Poultry Inspection, by Stephen Crutchfield, Jean Buzby, Tanya Roberts, Michael Ollinger, and C.T. Jordan Lin. AER-755, July 1997.

Estimated Annual Costs of Campylobacter-Associated Guillain-Barré Syndrome, by Jean Buzby, Tanya Roberts, and Ban Mishu Allos. AER-756, July 1997.

The Benefits of Safer Drinking Water: The Value of Nitrate Reduction, by Stephen Crutchfield, Joseph Cooper, and Daniel Hellerstein. AER-752, June 1997.

Bacterial Foodborne Disease: Medical Costs and Productivity Losses, by Jean Buzby, Tanya Roberts, C.T. Jordan Lin, and James MacDonald. AER-741, August 1996.

Pesticide Residues: Reducing Dietary Risks, by Fred Kuchler, Katherine Ralston, Laurian Unnevehr, and Ram Chandran. AER-728, January 1996.

Tracking Foodborne Pathogens from Farm to Table: Data Needs to Evaluate Control Options MP-1532, December 1995.

Current ERS Projects of Interest to the Food Safety Mission Area

Consumer Awareness of Irradiated Food Products

ERS developed questions about consumer awareness of irradiated food products for the 2002-03 FoodNet Population Survey in collaboration with the CDC/FoodNet project. The survey was conducted by telephone in the nine FoodNet sites. The questions asked whether consumers had seen or bought irradiated beef or chicken, and the most important reason for deciding not to buy irradiated beef. The results of the survey are being analyzed in collaboration with CDC/FoodNet.

Consumer Response to Food Safety Information

In *Consumer Food Safety Behavior* (AER-804), ERS found that food safety education and information influenced hamburger cooking and eating behavior, and reduced the risk of *E. coli* O157:H7 infection and its associated medical costs and productivity losses. Under a fiscal year 2002 cooperative agreement with ERS, researchers at North Carolina A&T analyzed a food safety survey of consumers in five Southeastern States. A conference paper presented in Summer 2003 reported that African-Americans had higher safe food handling scores, even though they were not more aware of labels than other groups, suggesting that ethnic differences in food handling may come from other sources.

Cost of *Salmonella* Control in Broilers: Experiences of Sweden and Denmark and Implications for the United States

Sweden has successfully controlled *Salmonella* in its production of broilers for 20 years. Recently, Denmark has achieved very low levels of *Salmonella* in its production of broilers. This project, conducted in collaboration with the Agricultural Research Service (ARS), examines the practices and technologies used in these countries, from farm to fork, to assure control over *Salmonella*. The researchers have visited producers, government officials, and researchers in Denmark and Sweden and are in the process of modeling and estimating the costs of control. The research team plans to develop several scenarios for the United States, based on the practices in Sweden and Denmark, and to estimate the economic benefits and costs for each scenario.

Economic Costs of Human Illness from Foodborne Pathogens

ERS has had an important role in estimating the economic costs of foodborne illness, currently estimated at \$7.5 billion due to five known microbial pathogens. Projects are ongoing to improve and update these estimates as new knowledge becomes available and estimation techniques improve. Currently the project is examining mortality due to unknown foodborne agents, which have been estimated by CDC to cause 3,400 deaths per year.

Food Safety and International Trade

This project develops an economic framework for understanding conceptual and empirical linkages between food safety and international trade, explores global trends in food safety regulation and food safety-trade policies, and analyzes food safety and trade conflicts and their resolutions in various commodity sectors. The project has produced an ERS report, *International Trade and Food Safety: Economic Theory and Case Studies*. In a new component of the research, conducted in collaboration with the University of Illinois, FDA detention data is being used to test hypotheses about whether food safety problems arise more frequently for new market entrants and countries with lower levels of economic development.

Industry Economic Incentives for Food Safety Innovations

This project uses theory and case studies to identify and analyze the private incentives for improving the safety of food in the United States. Case studies include innovations the industry has developed and is using to produce safer beef, including new equipment, new testing, and new management systems. Interviews with firms were used to determine the most significant factors contributing to the innovation and to identify the nature and magnitude of the economic incentives. The collaborative and contractual relationships among firms in the meat, equipment, microbial testing, and restaurant industries is found to be key. The role of regulatory guidance and approval is analyzed for their impact on economic incentives to invest in and develop the innovations. An ERS report and accompanying *Amber Waves* article are scheduled for an April 2004 release.

Performance Standards for Food Safety: An Economic Analysis

A central issue for the U.S. food safety system is the appropriate role for performance versus process standards in enhancing food safety. Performance standards require that a product meet a certain level of safety, but do not specify the production method. Economists typically argue that performance standards are preferable to process standards because they encourage efficiency and innovation and, as a result, should play a larger role in the nation's food safety system. The object of this research area is to investigate the economic theory behind economists' endorsement of performance standards, the practical issues that may complicate the application of performance standards for food safety, and the costs and benefits of alternative approaches to designing food safety standards.

The Costs of PR/HACCP Regulation and Use of Food Safety Technologies

This project has resulted in the collection of nationally representative data on the costs of PR/HACCP regulation and the use of food safety technologies (through a cooperative agreement with Washington State University). The data will be used to estimate the marginal costs of various components of PR/HACCP and to assess the linkage of PR/HACCP-motivated costs to the use of various food safety technologies. The food safety technology data will be used to examine technology effectiveness (e.g., by linking the data to *Salmonella* performance data) and to create a food safety technology baseline and index. The index may then be linked to food safety performance data to study how changes in technology lead to changes in food safety performance. An ERS report documenting the survey results is scheduled for an April 2004 release, and the survey instrument and summary responses are now available on the ERS website.

The Foodborne Illness Cost Calculator: An Interactive Tool

The Foodborne Illness Cost Calculator details the assumptions behind the ERS cost estimates for the five primary foodborne pathogens and describes how ERS analysts estimate medical costs, productivity costs, and cost of premature death for each pathogen. Users can choose among a variety of alternative assumptions, including assumptions used by FDA and EPA in their foodborne illness cost estimates, to create their own cost estimates for each pathogen. The goal of the Foodborne Illness Cost Calculator is to make the calculations behind Federal cost-benefit and regulatory impact analyses more transparent and to improve food safety policy. The Calculator for *Salmonella* was put on the web in April 2003; work on *Campylobacter* is underway.

Valuation Methods for Reducing Foodborne Risks

This project applies state-of-the-art valuation methodologies to measure the benefits of improving food safety. Two surveys, currently awaiting Office of Management and Budget (OMB) clearance, will be administered to panels of consumers through the Internet. One survey is a contingent valuation survey focusing on responses to different information about foodborne illness risk levels, severity, duration, and mortality rates. The second survey uses a market-based method, measuring how consumers change food intake in response to risk information. The changes in consumption patterns and food expenditures of consumers receiving risk information will be used to derive the willingness to pay for reductions in foodborne illness risk.

Traceability in the U.S. Food Supply: Economic Theory and Industry Studies

Recently, policymakers have begun weighing the usefulness of mandatory traceability to address issues ranging from food safety and bioterrorism to consumer right to know, as well as to inform consumers about food attributes including country of origin, animal welfare, and biotech content. Industry interviews, backed by industry level market studies, are used to establish a description of the extent and type of traceability maintained by private sector firms. This information reveals that financial incentives are leading firms to develop a significant capacity to trace. Efficient traceability systems vary across industries and over time as firms balance costs and benefits to determine the efficient breadth, depth, and precision of their traceability systems. The findings indicate that mandatory traceability—possibly a one-size-fits-all regulation—can be costly as firms already trace many food attributes. Further, other policies are better targeted toward augmenting product differentiation or traceback for food safety.

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