



www.ers.usda.gov

Food Safety Innovation in the United States

Evidence from the Meat Industry

Elise Golan, Tanya Roberts, Elisabete Salay, Julie Caswell, Michael Ollinger, and Danna Moore

Abstract

Recent industry innovations improving the safety of the Nation's meat supply range from new pathogen tests, high-tech equipment, and supply chain management systems, to new surveillance networks. Despite these and other improvements, the market incentives that motivate private firms to invest in innovation seem to be fairly weak. Results from an ERS survey of U.S. meat and poultry slaughter and processing plants and two case studies of innovation in the U.S. beef industry reveal that the industry has developed a number of mechanisms to overcome that weakness and to stimulate investment in food safety innovation. Industry experience suggests that government policy can increase food safety innovation by reducing informational asymmetries and strengthening the ability of innovating firms to appropriate the benefits of their investments.

Keywords: Food safety, innovation, meat, asymmetric information, Beef Steam Pasteurization System, Bacterial Pathogen Sampling and Testing Program

About the authors

Elise Golan, Tanya Roberts, and Michael Ollinger are economists at the Economic Research Service, USDA. Elisabete Salay is the Director of the Interdisciplinary Center for Food Research (NEPA) and Associate Professor at the Food Engineering Faculty (FEA) of the State University of Campinas (UNICAMP), Brazil. Julie Caswell is a professor in the Dept. of Resource Economics, University of Massachusetts. Danna Moore is Assistant Director, Social and Economic Sciences Research Center, University of Washington.

Acknowledgments

The economic analysis of the case studies required the active cooperation of the innovators. We heartily thank Timothy Biela, Mike Brodziak, Jerome Leising, Randall Phebus, David Theno, and R. Craig Wilson for their willingness to explain details and answer a very long questionnaire. We would also like to thank Gary Becker, Neal Hooker, Janet Perry, and Matt Rendleman for thoughtful reviews of the entire paper; and Dana Rayl West and Thomas McDonald for expert editing and Wynnice Pointer-Napper for the document layout. Professor Salay's participation in the study was supported by a fellowship from the Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP), Brazil.

| Summaryiv |
|---|
| Economic Theory and Empirical Evidence from the Meat Industry |
| Introduction |
| Part I. Theory: The Economics of Food Safety Innovation |
| Food Safety Innovation Boosts Social Welfare |
| Appropriability, Market Demand, and Technological Opportunity |
| Are Key to Innovation |
| Changes in Appropriability, Demand, and Technological Opportunity |
| Vary the Costs and Benefits of Innovation and Imitation |
| Market Failure Distorts the Incentives for Food Safety Innovation |
| and Imitation |
| |
| Part II. Empirical Investigation: A Closer Look at Food Safety |
| Drivers in the Meat Industry9 |
| Food Safety Investments in the Meat and Poultry Industries: |
| Survey Results |
| ERS Survey Reveals Variation in Food Safety Investment |
| Plant Size Influences Amount and Type of Food Safety Activity |
| Appropriability Influences Food Safety Investment |
| Appropriability Mechanisms Encouraged Early Adoption of |
| HACCP-Like Programs |
| ERS Survey Indicates that Buyer Specifications are Key to |
| Spurring Safety Innovation |
| A Case Study of the Equipment Market and the Invention of the |
| Beef Carcass Steam Pasteurization System |
| History of BSPS Invention: Collaboration and Risk Sharing |
| The Innovating Collaborators Appropriated a Variety of Benefits |
| The BSPS-SC: Three Years to Technological Innovation and |
| Market Acceptance |
| Appendix A: Time Line for Beef Steam Pasteurization |
| System Innovation |
| Innovation for Microbial Pathogen Control in the Supply Chain for |
| Hamburger Patties |
| |
| Texas American Foodservice |
| Development of New Sampling and Testing Protocols: Innovation Through Collaboration |
| Texas American Leads the Wayand Appropriates the Benefits |
| An Emerging Market for Food Safety Opens the Door to |
| Food Safety Innovation |
| Appendix B: Time Line for the Texas American Foodservice |
| Corporation Innovation |
| _ |
| Part III. Market and Regulatory Incentives for Food |
| Safety Innovation |
| Market Incentives for Food Safety Innovation: Lessons from |
| the Meat Industry |
| Designing Regulatory Incentives for Food Safety Innovation |
| References |

List of Tables

| A-1—Economic literature suggests three main drivers of innovation and imitation |
|--|
| A-2—Four firm concentration ratios, value of shipments basis |
| A-3—Percent of animals slaughtered in large plants |
| A-4—Large plants' share of industry value of shipments |
| A-5—Annual animal inputs per plant by plant size for cattle slaughter plants |
| A-6—Product output share by plant size for cattle slaughter plants |
| B-1—Large cattle-slaughter plants have higher food safety ratings than small plants, mainly because of more capital intensive activities |
| B-2—Food safety ratings for cattle slaughter plants with buyer specifications are considerably higher than for other plants |
| B-3—Food safety ratings for cattle slaughter plants that serve export markets are higher than for non-exporters |
| B-4—Food safety rating of hog slaughter plants that sell products under their own brand are about the same as other plants |
| B-5—Food safety ratings for three appropriability mechanisms for cooked-meat processing plants without slaughter operations |
| B-6—Percent of plants with HACCP-like programs prior to promulgation of the PR/HACCP rule by various appropriability mechanisms |
| C-1—History of U.S. steam pasteurization experiments on meat and poultry |
| C-2—Reduction in pathogens as a function of steam application time in SPS |
| C-3—General characteristics of Frigoscandia Equipment, 2001 |
| D-1—General characteristics of Texas American Foodservice Corporation, 2001 |