

Summary

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.

Large restaurant chains have created a market for food safety. By far the dominant drivers of food safety innovation in the meat industry are the stringent requirements on product safety and quality demanded by large fast food restaurants. By demanding safer products from their suppliers, these restaurants have successfully created markets for food safety. The success of these markets rests on the ability of these large buyers of meat to enforce standards through testing and process audits—and to reward suppliers who meet safety standards. Through contracts with these large buyers, meat processors are able to appropriate the benefits of their investments in food safety.

Branding helps firms appropriate benefits from food safety innovation. Branding also plays an important role in helping firms appropriate the benefits of safety investments. The major, name-brand fast food restaurants are able to appropriate some of the benefits of their investments in food safety because of their reputations for safe food. However, name-brand recognition is a double-edged sword: it allows consumers (and regulators) to identify and reward firms that produce high-quality, safe products, but it also increases their chances of identifying firms that are guilty of safety lapses. Branding reduces the chances of remaining anonymous in case of a foodborne outbreak, thereby further strengthening the incentives to invest in food safety.

International trade stimulates demand for safety and provides technological spillovers. International trade has played an important role in stimulating the demand for food safety, much the same way as large fast food restaurants. By demanding high safety standards in testing product for safety, and then paying premiums or guaranteeing sales for safe producers, foreign buyers fuel the growth of markets for food safety and stimulate safety innovation.

First movers appropriate the benefits of innovation and encourage diffusion. The first company to adopt a new technology can often appropriate the benefits of innovation. The Texas American Foodservice Corporation (Texas American), for example, did not patent its newly developed Bacterial Pathogen Sampling and Testing Program or seek any other sort of protection for the innovation. Its first mover advantage was sufficient to forestall pressure from competitors and to allow it to appropriate the benefits of the innovation. Not only did Texas American not seek protection for the innovation, it actually sought to disseminate the technology, arguing that anything that helps reduce the possibility of outbreaks associated with hamburgers is good for business. Another reason that firms may have an interest in sharing new technologies with their competitors and with government regulators is to influence the standard of care for the

industry. Setting a standard of care that is difficult to meet can help set a barrier to entry that benefits the first adopters.

Collaboration facilitates innovation and dissemination. The observation that the performance of the industry as a whole affects the reputation and profitability of all firms in the industry provides incentives for firms to collaborate to improve overall industry performance. In the two case studies presented here, the innovative process was dependent on collaboration. In each case, the technical and managerial expertise of the collaborators combined to facilitate the development of the innovation and ensure that it would be effective in a commercial setting. In addition to technical and managerial benefits, collaboration also provides important risk-sharing benefits.

Market conditions push large firms to innovate. The ERS survey indicates that large slaughter plants had much higher food safety technology ratings than smaller ones, suggesting that economies of scale, i.e., lower per unit costs for large plants over small ones, plays a major role in whether plants adopt capital-intensive food safety technologies. However, economies of scale do not sufficiently explain all differences. Two characteristics peculiar to the beef industry and food safety also play a role. First, large and small slaughter plants face different markets. Large plants tend to supply large, homogeneous markets with relatively elastic demand, while smaller plants tend to serve smaller markets with less elastic demand. To protect their markets, large plants may have more incentive than small firms to adopt food safety innovations. Another reason large firms may invest more in food safety than small firms do is that lapses in food safety have the potential to be more costly for large firms because they may involve larger amounts of product.

Foodborne disease outbreaks spur the demand for safety and innovation. The 1993 outbreak of *E. coli* O157:H7 was a seminal food safety event in the United States. This outbreak led to increased consumer awareness of food safety issues and triggered a spike in demand for food safety that is still being felt in the industry. For many consumers, news about foodborne illness outbreaks is their only information about food safety. As a result, the market is susceptible to large fluctuations after foodborne illness outbreaks, as consumers reassess their buying decisions.

Technological validation by third parties is as important as technological opportunity in driving innovation. The Steam Pasteurization System case study highlights an important observation about technological innovation for food safety: the design and fabrication of the technology may be secondary to technological validation in determining the ultimate success of an innovation. Not only is it difficult to measure pathogen control and technological efficacy, but even the best technology can be undermined by deficiencies in the overall safety system. The actual efficacy of the technology may vary greatly from plant to plant, depending on the characteristics of each plant's safety system. As a result, innovators may have a difficult time certifying or otherwise guaranteeing the efficacy of the technology for controlling pathogen contamination.

The drivers of food safety innovation highlighted by the ERS survey and the case studies suggest four areas where government policy may be well targeted for stimulating food safety innovation:

- Strengthening appropriability (the ability to control and exploit the benefits from innovation) through safety information,
- Strengthening appropriability through increasing the costs of food safety failure and the benefits of success,
- Providing flexibility in the choice of food safety technology, and
- Investing in the scientific infrastructure and supporting research on safety testing.

In general, government policy targeted at overcoming asymmetric information problems in markets for food safety will go a long way toward establishing incentives for efficient investment in food safety innovation.

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