

Conclusions

This report uses data from the first national survey of meat and poultry plants on the costs of the PR/HACCP rule and the use of food safety technologies to address issues central to the food safety control efforts made by meat and poultry plants and FSIS. It provides estimates of the expenditures made by the industry both to comply with the PR/HACCP rule and for their own privately motivated food safety investment decisions. It also gives a snapshot of the types of food safety technologies and practices used by the industry. Finally, it provides strong evidence that market mechanisms encourage the use of more sophisticated food safety technologies and an expanded array of food safety practices. The complete survey and the associated summary data can be seen in on the ERS website at: www.ers.usda.gov/data/haccpsurvey/.

The survey provides a substantial amount of data related to PR/HACCP that will be explored more extensively in future studies. These studies will turn to investigation of the perceived benefits of PR/HACCP as well as the long-run costs of PR/HACCP rather than the shortrun costs described here. We will also examine the impact of plant characteristics and food safety equipment and processing practices on plant quality control performance and consider the technological paths plants use to provide food safety.

The Influence of the PR/HACCP Rule

Estimates based on the ERS survey suggest that meat and poultry plants incurred \$570 million in fixed costs and \$380 million in annual variable costs to comply with the PR/HACCP rule; those cost estimates are much higher than the cost estimate of \$1 billion to \$1.2 billion spread over 20 years made by FSIS prior to enactment of the regulation. Depending on the useful life of the fixed assets, the cost estimate based on survey data is close to the \$623 million in annual fixed and variable costs projected by ERS with an alternative methodology in a previous publication (see Ollinger and Mueller, 2003).²¹ Results are also consistent with results from a much smaller survey (Boland et al., 2001) and estimates by Antle (2000). Notwithstanding the higher than anticipated costs of these estimates, projected benefits still exceed industry costs. Crutchfield et al. (1997) provide an estimate of \$1.9 billion in annual health savings when using the most conservative valuation technique and assuming 20-percent effectiveness at reducing foodborne illnesses caused by meat and poultry.

A major reason why our cost estimate is much greater than that made by FSIS is that FSIS considered only the administrative costs associated with record-keeping and planning, the direct cost of testing, and a small estimate of capital outlays whereas this report includes these costs, the costs of hiring the workers necessary for remaining in regulatory compliance, and the capital outlays necessary to bring each plant up to the standards necessary for compliance with regulatory standards. This broader definition of the costs of the PR/HACCP rule is necessary because regulatory costs should include all costs that a plant incurs to perform tasks that it would not do in the absence of regulation.

ERS survey data suggest that the PR/HACCP rule has raised beef and poultry slaughter plant costs by about one-third of 1 cent per pound. However,

²¹Given the nature of the fixed costs, a reasonable economic life of the fixed assets might be 3 to 5 years. If a 3-year life occurred, then the previously estimated costs and costs obtained from this survey are nearly identical.

these are average prices per pound of beef and not the average cost incurred by each plant. Small plants, which tend to produce more specialized products, had much higher average costs than the giant plants, which produce mainly commodity products, such as boxed beef. Since plants must recover their costs, this means that prices for commodity products will rise very little, while prices for more specialized products, like cut-to-order beef, may rise as much as 2 or 3 cents per pound.²² In terms of industry structure, small plants that produce specialty products probably will not be affected that much by PR/HACCP because they have some pricing flexibility, but small plants producing commodity products may face stiffer cost pressures, causing some to exit the industry. From a policy perspective, these plant exits and higher costs are acceptable if the expenditures for food safety are needed to better control pathogens.

Taken at the surface, it appears that compliance costs as a percent of the total cost of production are lower for beef and pork than for poultry since beef costs about twice as much to produce as poultry, as shown by Antle, 2000. However, since many of the beef and pork products must also be further processed but poultry does not, one should add raw and cooked meat processing costs to the slaughter costs. After making this adjustment, survey data suggest that beef and pork costs would rise by about three-fourths of 1 cent per pound—about twice as much as poultry, but about the same as a percentage of costs.

There are some other indirect costs and benefits associated with the PR/HACCP rule. We cannot say whether, on balance, these other factors increase or decrease costs. ERS survey results suggest that product shelf life increased at about 25 percent of all meat and poultry plants. However, plants also suffered additional costs due to declines in production yields and increases in production downtime.

The cost of the PR/HACCP rule is a substantial sum, but it is still much less than the cost of irradiating meat and poultry, which kills all harmful pathogens and is one way to ensure pathogen-free meat or poultry. For example, irradiated ground beef costs 10 cents to 30 cents more—a 5-percent to 10-percent price premium—at Wegmans Food Markets in Pennsylvania by the *Lancaster Farming* newspaper in October 2002.²³

The ERS survey also provided information about the components of the PR/HACCP rule perceived to be most beneficial for pathogen reduction and the aspects considered to be most costly. More plants in all industries except poultry slaughter, regardless of size, believed that the SSOPs had the greatest impact on pathogen reduction, yet very few plants perceived them to be the most costly. A large number of plants also said that HACCP plans and their use had a substantial impact on process control, but a much larger number felt that the use of a HACCP plan was the most costly aspect of the PR/HACCP rule. Many plants also felt that the zero fecal matter/*E. coli* standard is one of the most important aspects of the PR/HACCP rule for pathogen control and a similar number of plants felt that it is the most costly. On balance, these data suggest that plant operators believe more stringent SSOPs are the most cost-effective way to achieve pathogen reduction and HACCP plans are the least cost-effective. HACCP recordkeeping requirements appear to be particularly troublesome for operators. (See box.)

²²Actual price increases seen by consumers depend on a number of factors. First, retailers may choose to either mark prices up more or less than its cost increase. Second, long-term demand for the product can change, altering consumers' willingness to pay a higher price. Third, price increases in one product encourage buyers to consider the purchase of alternatives, resulting in greater product price pressure.

²³The irradiation process does heat treat the meat or poultry product, so, technically, ground irradiated meat is not the same as ground unirradiated meat. Price premiums also depend on tradeoffs between taste and safety. Many consumers prefer the taste of unirradiated meat to irradiated meat and may actually demand a price premium for unirradiated meat. Under these conditions, retailers may not even choose to sell irradiated products because the extra processing makes the meat or poultry more costly to produce. Note also that producers of irradiated products still have to comply with the PR/HACCP rule.

Comments Provide Operator Insights into How To Shape the PR/HACCP Regulation

A number of the survey respondents (43) expressed their views about the PR/HACCP rule in written comments. In general, these comments and data reported in this report show a general acceptance of three components of the PR/HACCP rule—SSOPs, zero tolerance for fecal matter/generic *E. coli* testing, and the *Salmonella* standard. Only the requirement that all plants maintain and implement a HACCP plan drew a substantial number of negative written comments. A disproportionately larger number of plants commented that the plan requirement was the most costly aspect of the PR/HACCP rule, compared with the number of plants that answered that the requirement was the most beneficial part of the rule.

A large majority of the written comments said that the HACCP plans and tasks were necessary. Indeed, about 25 percent said that a HACCP program improved their process control performance and only about 10 percent said HACCP provided no benefits or the tasks themselves were too costly. The chief complaint was about the additional paperwork burden (both record-keeping and HACCP plan development) and inspector inconsistencies. About 60 percent of the responses said that the paperwork costs outweighed the benefits of the HACCP tasks and about 25 percent said that inspector inconsistencies of enforcement led to much higher costs.

It is quite natural to expect the processing-plant operators who are most negatively affected by the HACCP/PR rule to express complaints, but small-plant operators may have a point. A large number of plants inspected by FSIS have fewer than 10 employees, and the plants produce numerous products in small batches. Under these small-batch/multiproduct operating conditions, plants have frequent product changeovers and short production runs that may never reach a steady-state condition. Yet, process control programs such as a HACCP plan monitor production flows, implying that fewer and fewer benefits are realized for shorter and shorter production runs. Moreover, even as the benefits of HACCP programs diminish for multiproduct plants, the costs rise because, for each product, separate HACCP plans may have to be written, records may have to be maintained, and it may be necessary to monitor different points and follow different procedures. Thus, the smallest plants, which often have very complex product mixes, face very high costs; yet, may have staffs of two or three workers and low revenues, making the record-keeping costs per dollar quite high.

Formalized HACCP plans may also be less necessary in small plants. Top management is much better able to directly monitor quality in a small plant than in a large one because top management is often performing manual product processing tasks, performing cleaning and sanitation, and directly handling the product. In larger plants, by contrast, recordkeeping traditionally has been and continues to be essential for maintaining food safety process control since this is the only means a top manager has to monitor food safety. The perverse result is that costs of developing and implementing HACCP plans are higher in small plants; yet, these plants have the most direct control over production by top management.

Survey responses suggest that operators are supportive of performance standards. Yet, testing is much more costly for smaller plants than for larger ones because many larger plants have their own laboratories with a specialized workforce and do testing as part of a daily routine. Thus, government support

may be necessary if extensive testing for *Listeria monocytogenes*, *E. coli* O157:H7, or other pathogens becomes mandatory. The alternative would be disproportionately higher costs for smaller plants relative to larger ones.

Despite the costs of the PR/HACCP rule, some plants invested still larger sums in food safety, presumably because their customers demanded it. Buyer and export market requirements and product branding are among the market mechanisms that encourage producers to enhance food safety process controls. This report shows that plants subject to market mechanisms, particularly buyer and export market requirements, used a more sophisticated food safety quality control system than other plants, while at the same time incurring compliance costs similar to those incurred by other plants.

Food Safety Technology and Practices

Plant size and product markets played a major role in the types of equipment and processing practices employed by meat and poultry plants. To measure the differences, we created five indexes of food safety plant technology for each of the five technology categories: equipment, testing, dehydrating, sanitation, and plant operations.

Index values, which ranged from 0 to 1, varied substantially across plants. Large plants typically relied on sophisticated equipment and testing while smaller plants tended to focus more on SSOPs and plant operations. Plant size also played a role in the types of changes plants felt best controlled pathogens. Larger plants tended to place much more emphasis on the purchase of new equipment and changes to facilities while smaller plants tended to focus more on the frequency of cleaning and product flows. This makes a lot of sense. More than one-half of all plant managers believed that equipment and plant facilities changes were most costly. Since this requires a fixed investment and since larger plants have the capacity to make full use of it while smaller plants may not, large plants could realize much lower per-unit costs.

A central theme of this report is that market mechanisms encourage food safety investments.²⁴ Retail and restaurant customers of meat and poultry plant products and government inspectors receiving exported meat products are in a better position than consumers to ascertain the food safety of the products that they receive because they can conduct microbiological testing and impose production standards on their suppliers. Cost information from the ERS survey supports the market effect hypothesis. Plants subject to stricter market mechanisms had much higher food safety index values than other plants for equipment and testing and higher but less robust differences in SSOPs and plant operations.

The role played by markets in imposing strict food safety standards on meat and poultry producers has important public policy implications. It suggests that information about plant food safety performance provided by FSIS, such as plant quality control performance ratings, could be used by meat and poultry buyers in their purchasing decisions, and may encourage greater diligence in performing food-safety-related tasks and elicit greater investment in food safety technologies.

²⁴The level of investment required through market mechanisms may or may not be the socially optimal level. Since the optimal level cannot be precisely determined, buyers could demand a level of food safety that costs more than the benefits in improved health. On the other hand, buyers could demand less food safety than optimal, suggesting that underinvestment exists. Regardless of whether buyers demand a level of food safety that is greater, less than, or equal to the social optimal level, it appears certain that the buyers acting through market mechanisms demand greater food safety than that offered under PR/HACCP.