

## Executive Summary

The U.S. Department of Agriculture has been responsible for ensuring sanitation and process controls in meat plants since 1906. This report estimates that the cost of performing those tasks amounted to about 0.5 percent of costs: 0.2 cents per pound for poultry and 0.6 cents per pound for beef. However, the cost of not performing sanitation and process controls may have been higher, in that plants that failed to maintain required sanitation and process controls were more likely than others to go out of business. Additionally, this report projects the costs of the Pathogen Reduction Hazard Analysis (PR/HACCP) rule of 1996. This most recent effort to assure wholesome meat and poultry products mandates the use of a HACCP food safety process control program by all meat and poultry slaughter and processing plants and established maximum thresholds for the presence of pathogens in meat products. This regulation is estimated to raise a plant's costs of production by about 1.1 percent: 0.4 cents per pound for poultry and 1.2 cents per pound for beef.

The U.S. Department of Agriculture (USDA) began inspecting exported pork bellies for trichinae and live cattle, hogs, and sheep as well as discretionary meat items for diseases and defects in 1890. The Federal Meat Inspection Act of 1906 required USDA to ensure that slaughter and processing plants performed an appropriate amount of sanitation. Regulations based on the Wholesome Meat and the Wholesome Poultry Products Acts of 1967 and 1968 raised the bar on sanitation standards by compelling plants to adhere to 15 types of sanitation and process control standards.

Concern over the presence of harmful pathogens in meat and poultry increased among some experts during the 1960s and 1970s when the National Academy of Sciences published a report in 1969 on the presence of *Salmonella* in poultry. Subsequently, the American Public Health Association filed and then lost a 1972 Supreme Court case that petitioned the court to declare *Salmonella* an adulterant. In 1977, the consulting firm Booz-Allen expressed concern in a report to USDA about the presence of *Salmonella* and other harmful pathogens in meat and poultry.

USDA's Food Safety and Inspection Service (FSIS) developed voluntary and mandatory quality control programs in the late 1970s and formalized them in regulations in the early 1980s. Plants that participated in these programs identified and monitored control points and took over much of FSIS's responsibility for ensuring the performance of the Sanitation and Process Control Program (SPCPs) in exchange for greater regulatory flexibility and reduced inspector overtime costs. However, only about 5 percent of all plants ever adopted a voluntary Total Quality Control program, the most comprehensive quality control program introduced by FSIS.

Public fears over the wholesomeness of meat and poultry products accelerated during the 1980s with an outbreak of *E. coli* 0157:H7 poisonings in McDonalds restaurants in 1982, 49 deaths attributed to *Listeria monocytogenes* and 2,200 cases of *Salmonella* poisoning in Chicago during the later 1980s, and 4 children's deaths from an outbreak of *E. coli* 0157:H7 at Jack-in-the-Box restaurants in Washington and other Northwestern States in 1992 and 1993. In response, FSIS promulgated regulations requiring safe handling of ready-to-cook and ready-to-eat meat and poultry, declared *E. coli* 0157:H7 an adulterant in ground beef and began testing products for it, and issued the Pathogen Reduction Hazard Analysis and Critical Control Point (PR/HACCP) rule.

The use of a HACCP food safety process control program was the central feature of the PR/HACCP rule. Other components included mandatory testing for *E. coli* and *Salmonella* to verify that meat and poultry processes are under control as well as mandatory sanitation and process control standards. A HACCP program comprises the following elements: (1) an assessment of all hazards, (2) identification of critical points necessary for maintaining food safety, (3) the setting of critical limits for each critical control point (CCP), (4) development of procedures to monitor each CCP, (5) determination of corrective actions, (6) implementation of a recordkeeping system, and (7) establishment of verification procedures.

Meat and poultry process control programs help ensure the food safety quality of a firm's production, can yield a longer shelf life, and encourage repeat purchases, but can also raise costs.

To see how much costs may have changed, we estimated a cost function with process control effort as one of the arguments in an approach similar to Antle's. Results show that performance of sanitation and process control tasks on average increased plant costs in six of the eight industries. A 50-percent improvement in sanitation and process control performance, i.e., reduction in SPCPs, caused plant costs to rise an average of 1.2 percent. Hog slaughter and processed poultry plants had the highest cost increases, and processed meat had the lowest. Cattle slaughter showed a minuscule drop in costs, while cured/cooked pork had a 1.5-percent decline in costs. Note, that Antle pointed out in 2000 that this estimate likely understates food safety quality control costs because plants likely perform other tasks to enhance food safety.

We also found that costs dropped as sanitation and process control performance dropped, and plant size rose in all eight industries, but significantly so only in processed poultry, suggesting modest diseconomies of scale in sanitation and process controls. This means that increased performance of sanitation and process control tasks increases costs more in larger plants than in smaller ones. However, this small increase in costs for larger plants does not offset the sizeable returns to scale (lower costs) arising from increased plant size alone. These findings are important in that an increase in the number of sanitation and process control tasks would likely benefit neither small nor large plants.

Even though it is costly to perform sanitation and process control tasks, plants continued to do them. Our findings (chapter 5) may explain why. These results suggest that large slaughter plants and all meat processors in the 90th percentile of unperformed/poorly performed sanitation and process control tasks (about twice the mean number of unperformed/poorly performed sanitation and process control practices) have an increased likelihood of exiting the industry. Only small slaughter plants could reduce their likelihood of exiting an industry by poorly performing sanitation and process control tasks.

After finding empirically that performance of sanitation and process control practices correlates with HACCP tasks, we estimated the costs of HACCP regulation. We found that imposition of HACCP would increase industry variation in process control performance. For example, plants with about twice the mean level of poorly performed HACCP tasks (about the 90th percentile of quality control effort) would have an average of \$500,000 in lower process control costs than plants at the industry mean performance level. These savings suggest that incentives to reduce process control effort

may be stronger under HACCP and may require an increase in enforcement actions to maintain regulatory compliance.

We estimated that HACCP plans and their implementation would raise meat and poultry prices by about 1.1 percent, i.e., 0.4 cents per pound for poultry and 1.2 cents per pound for beef. The 1.1-percent increase in meat and poultry costs that we project may sound small and is to the consumer, but to the producer it is quite large. Meat and poultry plants have little direct control over meat input prices; yet, meat and poultry inputs amount to anywhere from about 80 percent (cattle slaughter) to 50 percent (sausages) of all costs. Thus, for meat and poultry plants, the cost of the PR/HACCP rule ranges from between 2.2 and 5.5 percent of controllable costs, i.e., nonmeat costs.

These estimates of the costs of HACCP to the industry are more than seven times larger than the original FSIS-estimated costs of the PR/HACCP rule. Even so, the estimated costs reported here are less than one-half the drop in health care costs associated with reductions in foodborne illnesses that accrue to the U.S. economy due to implementation of the PR/HACCP rule. This estimate is based on an assumed 20-percent reduction in foodborne illnesses due to PR/HACCP and a Landefeld and Seskin value of a statistical life, the most conservative health care cost savings estimate provided by USDA's Economic Research Service.