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Resources, Community, and  
Economic Development Division

B-270846

February 29, 1996

The Honorable Pat Roberts  
Chairman  
The Honorable E (Kika) de la Garza  
Ranking Minority Member  
Committee on Agriculture  
House of Representatives

The Honorable Steve Gunderson  
Chairman, Subcommittee on Livestock,  
Dairy, and Poultry  
Committee on Agriculture  
House of Representatives

In an effort to improve food safety, the U.S. Department of Agriculture (USDA) proposed a regulation in February 1995 that would require all meat and poultry plants to adopt new production control procedures,<sup>1</sup> called Hazard Analysis and Critical Control Point (HACCP) systems. Implementing these procedures, which are designed to prevent harmful bacteria from entering the production process, should result in safer meat and poultry products. According to USDA's Food Safety and Inspection Service (FSIS), the 20-year cost to meat and poultry plants to comply with the proposed regulation is about \$2.3 billion. In addition, over the same period, FSIS expects that implementing the new HACCP regulation will reduce the incidence of foodborne illnesses and death, thereby producing potential societal benefits of \$6.4 billion to \$23.9 billion.<sup>2</sup> FSIS is revising

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<sup>1</sup>Proposed rule, Docket No. 93-016P, "Pathogen Reduction, Hazard Analysis and Critical Control Point (HACCP) Systems," Federal Register (Feb. 3, 1995).

<sup>2</sup>In performing the cost-benefit assessment, FSIS used data from the Centers for Disease Control and Prevention and USDA's Economic Research Service. The costs and benefits are the present values estimated

the proposed HACCP regulation in response to about 8,000 comments it received and plans to issue a final regulation in early 1996.

In May 1995, you asked that we determine (1) whether FSIS' analysis provides reasonable projections of the costs and benefits of implementing HACCP systems, (2) how the costs of implementation will be distributed by size of plant and by sector (species slaughtered--cattle, hogs, and poultry), and (3) how the cost of implementation will be distributed among producers, plants, and consumers. In subsequent discussions with your office, we also agreed to provide information on the number of animals a meat or poultry plant would need to slaughter to incur implementation costs of 1, 2, or 3 cents per pound. These data are presented in enclosure I.

In summary, FSIS' analysis provides reasonable projections of the costs and benefits of implementing HACCP systems. That is, FSIS followed a generally conservative approach in assessing the costs and benefits by tending to overestimate the costs and underestimate the benefits. Although additional data would make FSIS' projections more precise, the benefits would continue to outweigh the costs because the benefits are so much greater. Corroborating this likely result, two other studies, using different analytical assumptions and approaches, reached similar conclusions.

The costs of implementing the proposed HACCP regulation vary by plant size and by species slaughtered. Smaller slaughtering plants will spend more per pound than larger plants. For example, the added cost per pound to a small cattle-slaughtering plant is about 2.1 cents,<sup>3</sup> on average, while the added cost to the largest cattle-slaughtering plants is about one one-hundredth of a cent (\$0.0001). By sector, cattle-slaughtering plants will incur about 35 percent of the total implementation costs, hog-slaughtering plants about 51 percent, and poultry-slaughtering plants about 14 percent. The differences in costs occur largely because of the antimicrobial

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in 1994 dollars for 20 years.

<sup>3</sup>We used FSIS' criteria of dollar sales to determine plant size (less than \$2.5 million in annual sales for small slaughtering plants). However, unlike FSIS, we used only the value of meat and poultry products, not of the plant's total sales, in determining which size category best described a slaughtering plant. We believe that this approach represents a fairer means of determining whether a plant has the resources to bear the cost of implementing the HACCP proposal.

treatments required for each animal slaughtered. Antimicrobial treatments cost more for meat animals than for poultry and are expected to cost the hog-slaughtering sector more than the cattle-slaughtering sector. We could not estimate the implementation costs for individual processing plants because not enough data are available on the types and numbers of different processes being used in the plants to determine the HACCP costs.

We could not definitively apportion the cost increase of the proposed HACCP regulation among producers, plants, or consumers. Industry experts we spoke with are unsure how HACCP costs would be distributed. Furthermore, the increase would be too small to be detected among the normal seasonal price variations at the retail, wholesale, or farm level. If it is assumed that all costs would ultimately be absorbed by consumers, as one study suggested would happen in the longer term, the total per-person spending for meat and poultry products would increase by less than 50 cents a year.

## BACKGROUND

FSIS is responsible for ensuring the safety of all meat and poultry products sold in the United States. Nationwide, about 9,200 plants slaughter and process meat and poultry products. FSIS directly inspects approximately 6,200 plants that trade in interstate commerce, while state employees inspect about 3,000 plants in the 27 states that maintain their own inspection programs. These plants can trade their products only within their respective states. FSIS monitors the state inspection programs, which must have standards equal to FSIS', and reimburses the states for about half the costs of their programs.<sup>4</sup>

Currently, FSIS carries out its meat and poultry inspection responsibilities largely through organoleptic inspection--using sight, smell, and touch--to determine the wholesomeness of products. This carcass-by-carcass inspection dates back to the turn of the century and is not designed to detect microbial contamination, which is considered the most serious meat and poultry hazard.

FSIS is proposing to modify its inspection approach. Under this proposed

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<sup>4</sup>For additional information about the state inspection programs, see Meat and Poultry Inspection: Impact of USDA's Food Safety Proposal on State Agencies and Small Plants (GAO/RCED-95-228, June 30, 1995).

approach, FSIS inspectors will continue their carcass-by-carcass and bird-by-bird inspections at slaughtering plants and daily inspections of food-processing plants. In addition, however, FSIS will be responsible for overseeing plants' implementation of HACCP systems. FSIS is still deciding how its inspectors will carry out both the old and new responsibilities.

In contrast to the current inspection approach, which attempts to detect and eliminate contamination after it occurs, HACCP systems use quality control procedures designed to identify opportunities for preventing microbial contamination in food production and take steps to prevent it. A HACCP system consists of seven principles that plants must incorporate into their operations: analyzing hazards, identifying critical control points, establishing critical limits, monitoring, taking corrective actions, keeping records, and verifying that the HACCP system is operating as designed.

Members of the scientific community--such as the National Academy of Sciences and the Food and Drug Administration--and the meat and poultry industry have endorsed the use of HACCP systems as an effective approach for improving food safety. HACCP systems have been proven to decrease microbial contamination in certain food products, such as low-acid canned foods.

As part of the process FSIS used to develop its HACCP proposal, it analyzed the costs that the industry would incur to implement the proposal and the benefits that would accrue to the nation's health. Its analysis showed that the industry's costs would be about \$2.3 billion over the first 20 years. FSIS estimates that implementing the HACCP proposal will cost the industry an average of about two-tenths of a cent (\$0.002) per pound of meat and poultry produced. In FSIS' analysis, these costs would be offset by the potential societal benefits of \$6.4 billion to \$23.9 billion resulting from reductions in the incidence of foodborne illnesses.

To comply with the proposed HACCP regulation, plants must adopt several near-term initiatives within 90 days after the regulation is final and keep these initiatives in place until they implement a HACCP system. FSIS has estimated the total cost of implementing these near-term initiatives at \$315.7 million. This cost is composed of the following components. All plants must adopt standard operating procedures for sanitation, which FSIS estimates at \$86.6 million. In addition, slaughtering plants must implement antimicrobial washes for carcasses at an estimated cost of \$51.7 million; time and temperature controls, such as prompt and continuous

chilling of products, at about \$45.5 million; and microbial testing, at about \$131.9 million. Other types of plants will have to implement some of these near-term initiatives, depending on the plants' processes. For example, plants producing fully cooked products will be required to implement temperature controls. FSIS expects that the near-term initiatives, for the most part, will be incorporated into the plants' overall HACCP systems.

FSIS' COST AND BENEFIT  
PROJECTIONS ARE REASONABLE

FSIS' projections of the costs and benefits of implementing its HACCP regulation, which show that benefits outweigh costs, are reasonable. To develop these projections, FSIS followed a generally conservative approach in estimating costs and benefits; that is, it tended to overstate costs and understate benefits. Since the data available to FSIS to conduct its cost-benefit analysis have certain shortcomings, projections of costs and benefits are not exact. Additional data, especially on the likely effects of implementation on the incidence of foodborne illnesses, would allow FSIS to make more precise estimates. However, we believe that even with more accurate projections, the benefits would still outweigh the costs because the difference between the projected benefits and projected costs is so large. Corroborating this likely result, two other studies using different analytical assumptions and approaches reached similar conclusions.<sup>5</sup>

FSIS' Cost Projections

Because it did not have the comprehensive information needed to determine the actual costs for implementing the proposed HACCP regulation, FSIS developed a methodology to estimate these costs. This methodology was reasonable overall and generated a result that, if anything, errs on the high side. In our view, it produced estimates for some cost components that are in line with the probable cost of implementing the regulation. In other respects, the methodology probably overstated the implementation costs.

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<sup>5</sup>Reforming Meat and Poultry Inspection: Impacts of Policy Options, Institute for Food Science and Engineering, Center for Food Safety, Texas A&M University System (College Station, Texas: Apr. 1995); Comments on Docket No. 93-016P by the Center for Science in the Public Interest, July 5, 1995.

FSIS' cost estimates for implementing two components of the HACCP proposal--microbial testing and variable costs for state-inspected plants--are in line with current experience.<sup>6</sup> For example, at about \$30 per microbial test for Salmonella, FSIS' estimate is comparable to the average cost for this test at laboratories across the nation. Microbial testing is the major cost component of a HACCP system. In addition, FSIS estimated that small, state-inspected plants average about 1.5 processes and calculated their variable costs accordingly.<sup>7</sup> This estimate is in line with the number of processes independently estimated by the president of the National Association of State Meat and Food Inspection Directors, the organization that represents small state meat and poultry plants.

In other respects, however, FSIS probably overestimated costs. For example, FSIS assumed that all plants would incur costs to develop and implement HACCP programs from scratch. FSIS also included the full costs of performing the required microbial testing and of training plant staff to analyze the test results. In reality, many plants already have HACCP programs in place, have trained staff, and are performing microbial testing. These plants will not experience such start-up costs. In May 1994, we reported that almost half of the 157 meat and poultry plants that we contacted had microbial testing programs in place. Many of these programs included far more extensive testing than the one test per process per day that the proposed regulation would require. For example, we found that 40 plants were conducting between 11 and 100 tests per week. Therefore, when FSIS' proposed regulation is implemented, these plants' HACCP programs may require little or no modification and the plants may not incur any additional costs.

FSIS also did not take into account the possibility that, in the longer term, (1) the costs of training staff might decrease as industry's experience with HACCP systems grows or (2) the costs of microbial testing could decline with greater competition or the development of faster and cheaper screening tests. In fact, FSIS is working on developing such tests.

Furthermore, implementation costs are likely to be lower than FSIS

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<sup>6</sup>Costs vary by the number and type of process carried out. FSIS has identified five slaughter and nine processing processes.

<sup>7</sup>Actual data on the number of processes performed by each federally inspected plant are available in FSIS' databases; however, that information is not compiled for state-inspected plants.

projected when changes to the proposed regulation are taken into account. In commenting on the proposed regulation, the meat and poultry industry expressed concern about the costs and prescriptive nature of the proposed HACCP regulation. In response, FSIS issued draft papers and held public meetings at which agency officials indicated that probable changes to the final regulation are likely to reduce the prescriptive nature of the regulation and lower the implementation costs. Among the changes expected to lower costs are reductions in the proposed frequency of the required testing for smaller plants and the substitution of a less expensive required microbial test as an indicator of possible contamination.<sup>8</sup> Consequently, industry's costs may be lower than FSIS estimated. In addition, FSIS expects to eliminate some prescriptive requirements, such as the one for antimicrobial treatments.

#### FSIS' Benefit Projections

FSIS concluded that the potential benefits associated with reducing meat- and poultry-related foodborne illnesses range from \$6.4 billion to \$23.9 billion. These benefits result from implementing an industrywide HACCP approach, not any single component of a HACCP system. With currently available information, it is not possible to attribute portions of the overall benefits to (1) individual components of the system or (2) implementation at individual plants. Although some plants have already put HACCP systems into place, these plants cannot by themselves ensure the safety of the meat and poultry supply because the potential for cross-contamination by meat products from different plants remains. For example, the ground beef in the 1993 West Coast outbreak that caused 700 illnesses and 4 deaths was made from beef slaughtered at many different plants.

FSIS' analysis of the benefits to be achieved under the proposed HACCP regulation has some limitations; on balance, however, we believe that the projections are reasonable. On the one hand, FSIS projected a greater reduction in illnesses than may occur. FSIS projected a maximum benefit that would occur if 90 percent of the meat- and poultry-related illnesses from four major pathogens would be eliminated under a fully implemented

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<sup>8</sup>Currently, the proposed regulation calls for one test for Salmonella per slaughter or raw ground process per day. The revised regulation is likely to require a generic E. coli test instead. Both tests provide a general indication of the amount of product that contains pathogens, but the E. coli test is less expensive.

HACCP system. FSIS made this assumption in the absence of any data on the extent to which HACCP systems can reduce the incidence of foodborne illness. By using this estimate, FSIS may have overstated the benefits. However, even if FSIS' low-range benefits estimate of \$6.4 billion were reduced by 50 percent, the value of the benefits would still exceed FSIS' cost estimate. FSIS officials told us that they chose 90 percent because it represents the goal for the HACCP proposal.

The data on the incidence of foodborne illnesses that FSIS used to project benefits have known limitations. Many experts, including officials from the Centers for Disease Control and Prevention (CDC), have acknowledged the data's weaknesses. Specifically, the data represent projections of the current level of foodborne illness rather than actual data on illnesses; also, they are based on data from the mid-1980s because more current data are not available.<sup>9</sup> Despite these weaknesses, CDC's data represent the best available information on the subject and are widely used by USDA's Economic Research Service and the Council for Agricultural Science and Technology in conducting related analyses.

Other aspects of FSIS' analysis tend to understate the potential benefits to society. Specifically, the method FSIS used to estimate benefits (known as the cost-of-illness technique) does not consider consumers' willingness to pay to avoid deadly illnesses, thereby underestimating the benefits to society, according to some economists.<sup>10</sup> Instead, the method that FSIS

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<sup>9</sup>In 1995, recognizing the limitations of CDC's data, FSIS, the Food and Drug Administration, and CDC jointly funded a more comprehensive effort, in cooperation with state health departments, to monitor the major bacterial pathogens that cause foodborne illness. FSIS and the Food and Drug Administration allocated a total of \$878,000 to CDC to fund the project for the first year. Because the agencies will collect data from only five locations across the country, the data will still be limited. Furthermore, to determine trends, the agencies will need to collect data for 3 to 5 years.

<sup>10</sup>Some economists believe that an alternative method--the willingness-to-pay method--would more accurately estimate benefits to society. This method attempts to measure the amount that people are willing to pay to avoid deadly diseases. While the willingness-to-pay method would likely result in higher estimates than the cost-of-illness method, this method may also understate benefits because it may not include the economic value of avoiding nonfatal illnesses.

used totals up the estimated medical costs and the estimated productivity losses caused by such illnesses. The method has the advantage of being based on average medical expenditures but does not consider consumers' willingness to pay to avoid deadly illnesses.

Additionally, FSIS' benefits estimates are based on reducing meat- and poultry-related illnesses caused by the four pathogens of greatest concern-- Campylobacter jejuni/coli, E. coli 0157:H7, Listeria monocytogenes, and Salmonella. The estimates do not include reductions in illnesses that may result as other meat- and poultry-related pathogens are reduced. For example, strains of E. coli other than 0157:H7 are also known to cause illness and would likely be reduced by HACCP implementation; however, illnesses traced to 0157:H7 are the only E. coli illnesses included in FSIS' benefits estimates.

Finally, FSIS did not calculate or assign any value to the benefits that industry might derive from implementing HACCP programs. Meat and poultry industry officials that we contacted for our 1994 report cited improved food safety and product quality as their reasons for performing microbial testing in their plants. Among the benefits that accrue from reducing microbial contamination through HACCP programs are a longer shelf life gained by controlling the bacteria that cause spoilage; fewer products recalled because of contamination by pathogenic bacteria such as Salmonella and Listeria; fewer sales lost through adverse publicity from foodborne outbreaks; and potentially lower liability costs. The experience of the western restaurant chain that incurred a widespread outbreak from contaminated hamburger meat in 1993 shows how profits can be affected. According to the 1995 study by Texas A&M University on meat and poultry inspection policy, this restaurant chain lost about \$160 million in the 18 months following the outbreak.

Although FSIS is considering changes to the proposed HACCP regulation, it does not expect these changes to affect the level of projected benefits. These changes would reduce the prescriptive character of the proposed regulation and call for less costly and less frequent testing. The regulation will still require plants to implement HACCP systems.

#### Other Studies' Analyses of Costs and Benefits

The April 1995 study by Texas A&M University and the Center for Science in the Public Interest's (CSPI) formal comments on the proposed HACCP regulation submitted in July 1995, have also developed estimates of the

costs and benefits of implementing HACCP systems.<sup>11</sup> They provide useful insights into the costs and benefits of implementing HACCP systems and each reached a conclusion similar to FSIS'.

Texas A&M researchers examined several policy options for reforming meat and poultry inspection. One of these options is similar to FSIS' proposed HACCP regulation. Although this study used different assumptions about costs and benefits, it also concluded that a HACCP system similar to that proposed by FSIS could be cost-effective. According to Texas A&M's study, the estimated annual costs (\$853 million) fell within the range of estimated benefits (from \$360 million to \$960 million).

Differences in cost and benefit assumptions between Texas A&M's study and FSIS' analysis make direct comparisons between the two difficult. On the cost side, Texas A&M's study assumes more microbial testing and more extensive and costlier training than FSIS' analysis. On the benefits side, both studies used the same data on the incidence of foodborne illness as the basis for their estimates of benefits, but they assumed that different percentages of illness would be avoided: Texas A&M assumed 20 percent, while FSIS assumed 90 percent. Even with this radically different assumption, Texas A&M arrived at a positive conclusion about HACCP systems' cost-effectiveness.

CSPI's study estimated the costs and benefits of implementing FSIS' proposed HACCP regulation. This study concluded that FSIS had overstated costs by 20 percent and understated benefits by at least 100 percent. This study's cost calculations differed from FSIS' primarily because CSPI believes that the cost of tests and HACCP consulting services will decrease as the industry becomes more experienced with HACCP systems. In calculating benefits, CSPI's study used a different method, which resulted in higher benefits estimates; it also states that FSIS' analysis did not adequately account for the growth of income and productivity.

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<sup>11</sup>The Center for Food Safety at the Institute of Food Science and Engineering, Texas A&M University, sponsored Texas A&M's study. CSPI is a public advocacy group that examines food-related issues.

HACCP COSTS VARY BY PLANT SIZE AND BY SECTOR

The cost of implementing the proposed HACCP regulation varies by plant size and by sector, but the principal impact of the proposal is on small plants--those with less than \$2.5 million in annual sales.<sup>12</sup> The average cost to all slaughtering plants of implementing the HACCP proposal is less than 1 cent per pound. However, implementation will cost smaller slaughtering plants more per pound of product slaughtered. For example, the added cost per pound to small cattle-slaughtering plants is about 2.1 cents, on average, while the added cost to the largest cattle-slaughtering plants is about one one-hundredth of a cent (\$0.0001). The cost also varies among small slaughtering plants. For example, the added cost to a plant slaughtering fewer than 52 cattle per year (fewer than 1 per week) is about 25 cents per pound. In contrast, the added cost to a small plant slaughtering more than 1,000 cattle per year (about 20 per week) is about 1 cent per pound. For a few very small plants, the added costs could be as high as \$3.44 per pound.

By sector, of the total estimated \$194 million cost to implement the HACCP proposal over the first 5 years, cattle-slaughtering plants will incur about \$68 million, or 35 percent; hog-slaughtering plants will incur about \$100 million, or about 51 percent; and poultry-slaughtering plants will incur about \$27 million, or 14 percent. While most costs for HACCP implementation are calculated on a per-plant basis and are roughly the same for comparable plants, the cost of antimicrobial treatment required for each animal slaughtered differs. Antimicrobial treatments cost more for meat animals than for poultry. Although the estimated cost of the antimicrobial treatment for cattle and hogs is the same--8 cents per carcass--the treatment is expected to cost the hog-slaughtering sector more than the cattle-slaughtering sector because more hogs are slaughtered each year. In 1994, about 90 million hogs were slaughtered, compared to over 34 million cattle. In contrast, the cost of each antimicrobial treatment for poultry is less--about nine one-thousandth of a cent (\$0.00009) per bird. In 1994, 7.5 billion birds were slaughtered. Enclosure I presents detailed information on the range of costs by size of operation and number of

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<sup>12</sup>Our report entitled Meat and Poultry Inspection: Impact of USDA's Food Safety Proposal on State Agencies and Small Plants (GAO/RCED-95-228, June 30, 1995) discusses the effect of the proposed HACCP regulation on small plants in greater detail.

animals slaughtered for cattle, hog, poultry, and combination (mixed species) plants.

For processing plants, the data are too limited to reasonably estimate the costs of implementing HACCP systems nationwide. However, Illinois provided us with detailed data that give some insight into the impact of these costs on small plants. For example, on the basis of these data, we estimate that the operations at Illinois' processing plants range from one to five different processes--from easy (raw ground) to difficult (canned meats) and combinations of the different types. The cost to implement the HACCP proposal for this range of plant operations over 5 years varies from about \$41,800 to about \$113,200 per plant. Depending on the volume and type of product produced, the average cost per pound of implementing the HACCP proposal over the first 5 years ranges from 1 cent per pound to about 61 cents per pound.

#### DETERMINING WHO WOULD BEAR HACCP COSTS IS DIFFICULT

We could not apportion the costs of implementing the HACCP proposal among producers, plants, and consumers. Economic Research Service and knowledgeable academic economists we spoke with do not know how HACCP costs will be distributed among producers, plants, and consumers. Texas A&M's study suggested that, in the short term (while the livestock supply is fixed, limiting producers' ability to respond to price changes), 70 percent of the costs will be passed back to producers and 30 percent on to consumers. In the longer term, however, once producers have adjusted their supplies, the study suggested that consumers will bear all the costs. Furthermore, the increased costs would be too small to be detected: The estimated per-pound cost to plants of implementing the HACCP proposal--about two-tenths of a cent on average (\$0.002)--falls well within the normal range of seasonal price changes for these products at the retail, wholesale, or farm level. In addition, the estimated cost to industry of implementing the HACCP proposal--\$2.3 billion for the first 20 years--is also small when compared to the size of the consumer market for food products. For example, in 1994, consumers spent about \$600 billion on food of all types, including many individual products or meals that contained some meat or poultry.

Because it was not possible to allocate HACCP costs among producers, plants, and consumers, we looked at the effect on consumers' expenditures if consumers absorbed the plants' entire cost of HACCP implementation. In this case, the cost of HACCP systems to consumers would be less than

50 cents a year. For example, for beef, pork, and chicken products, if consumption remained at 1994 levels, the implementation of HACCP systems would cost consumers \$0.41 annually, or less than two-tenths of 1 percent of consumers' spending on such purchases. Table 1, based on 1994 consumption data, shows the estimated costs to consumers of implementing HACCP systems for beef, pork, and chicken.

Table 1: Estimated Average Annual Increase in Consumers' Expenditures if HACCP Systems Had Been in Effect for Beef, Pork, and Chicken in 1994

Type of product	Per capita consumption (in pounds)	Average retail price per pound	Average consumer expenditure	Estimated HACCP expenditure <sup>a</sup>
Beef	64	\$2.65	\$169.60	\$0.18
Pork	50	1.98	99.00	0.12
Chicken	50	1.45	72.50	0.11
Total	164		\$341.10	\$0.41

<sup>a</sup>To obtain these expenditures, we converted retail pounds (per-capita consumption) to the equivalent slaughtered carcass weights using standard industry conversion factors (i.e., 1.4 for beef, 1.2 for pork, and 1.1 for chicken). We then multiplied the result by \$0.002 per pound, USDA's estimate of the per-pound cost of implementing the HACCP proposal.

### AGENCY COMMENTS

We provided copies of a draft of this report to FSIS for its review and comment. We met with two Associate Administrators of FSIS and other relevant FSIS program officials. These officials generally agreed with the information discussed and provided some clarifying comments that we have incorporated into the report where appropriate.

### SCOPE AND METHODOLOGY

In performing our review, we met with agency, industry, and other knowledgeable officials; attended public meetings on the proposed HACCP regulation; and used our past work and reports and other generally available economic data.

Furthermore, in developing information for this report, we obtained the database of federally inspected plants provided by FSIS,<sup>13</sup> built a database from the 27 states that perform their own inspections, and combined both into a single database representing all meat and poultry plants in the country. We separated the plants by species (cattle, hogs, and poultry) into small, medium, and large categories, using the annual sales values that FSIS used in its proposed regulation to designate size categories: Small plants had less than \$2.5 million in annual sales, medium-sized plants had \$2.5 million to \$50 million in annual sales, and large plants had sales of more than \$50 million per year. However, we calculated annual sales values differently than FSIS did in its proposal. FSIS used each establishment's annual reported sales--including all products sold by the plant--to categorize the plants as small, medium-sized, and large. Instead, we used only the value of the meat and poultry products sold by each plant during the year. For that calculation, we used the USDA-reported average sales value and average dressed carcass weight by species to arrive at the number of pounds produced by each category and the dollar value of the sales for each plant. Using the size categories, we determined the average cost per pound for the February 1995 HACCP proposal over the first 5 years of implementation. We also calculated the number of animals slaughtered that would equate to HACCP costs of 1, 2, 3, and more cents per pound that would be applicable to each facility.

We assumed that each plant, whether small, medium-sized, or large, would require modifications to its refrigeration system--at a minimum cost of about \$6,000 in the first year of implementing the near-term initiatives. In addition, we assumed that the state-inspected plants were similar to the federally inspected plants.

We conducted our work from July 1995 through February 1996 in accordance with generally accepted government auditing standards.

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<sup>13</sup>We did not verify the accuracy of the federal database nor the data on state inspections.

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Copies of this report are available on request.

If you or your staff have any questions about this report, I can be reached at (202) 512-5138.

  
for Robert A. Robinson  
Director, Food and  
Agriculture Issues

Enclosure

**DISTRIBUTION OF COSTS FOR IMPLEMENTING  
HACCP SYSTEMS AT SLAUGHTERING PLANTS**

This enclosure presents information on the average cost per pound for different species by plant size under the proposed regulation for Hazard Analysis and Critical Control Point (HACCP) systems. Small plants sell less than \$2.5 million in meat and poultry products each year, medium-sized plants sell \$2.5 million to \$50 million annually, and large plants sell more than \$50 million annually. Table I.1 presents information for cattle-slaughtering plants.

**Table I.1: Distribution of HACCP Costs for Cattle-Slaughtering Plants**

Plant size	Number of plants	Average cents/pound
Large	73	1/100
Medium	70	1/10
Small	114	2.1
Total	257	

As table I.2 shows, cattle-slaughtering plants will have to slaughter about 1,900 cattle annually for the HACCP proposal to cost a penny a pound. As the annual number of head slaughtered decreases, the associated HACCP costs per pound will increase.

**Table I.2: Distribution of HACCP Costs by Number of Cattle Slaughtered for Small Plants**

Average cost/pound	Number of cattle
<0.5 cent/pound	More than 4,650
1.0 cent/pound	1,900
2.0 cents/pound	950
3.0 cents/pound	650
≥4.0 cents/pound	Fewer than 450

Table I.3 shows the average cost per pound of the HACCP proposal for hog-slaughtering plants by size of operation.

Table I.3: Distribution of HACCP Costs for Hog-Slaughtering Plants

Plant size	Number of plants	Average cents/pound
Large	38	2/100
Medium	60	1/10
Small	127	1.8
Total	225	

As table I.4 shows, hog-slaughtering plants will have to slaughter about 8,000 hogs annually for the HACCP proposal to cost a penny a pound. As the annual number of head slaughtered decreases, the associated HACCP costs per pound will increase.

Table I.4: Distribution of HACCP Costs by Number of Hogs Slaughtered for Small Plants

Average cost/pound	Number of hogs
<0.5 cent/pound	More than 16,500
1.0 cent/pound	8,000
2.0 cents/pound	3,800
3.0 cents/pound	2,500
>4.0 cents/pound	Fewer than 1,850

Table I.5 shows the average cost per pound of implementing the HACCP proposal for combination cattle- and hog-slaughtering plants by size of operation.

Table I.5: Distribution of HACCP Costs for Combination Cattle- and Hog-Slaughtering Plants

Plant size	Number of plants	Average cents/pound
Large	2	2.6/100
Medium	91	<2/10
Small	1,606	3.1
Total	1,699	

Table I.6 shows the average cost per pound of implementing the HACCP proposal for poultry-slaughtering plants by size of operation.

Table I.6: Distribution of HACCP Costs for Poultry-Slaughtering Plants

Plant size	Number of plants	Average cents/pound
Large	124	1.2/100
Medium	115	4/100
Small	94	1.7
Total	333	

As shown in table I.7, poultry-slaughtering plants will have to slaughter about 425,000 birds annually for the HACCP proposal to cost a penny a pound. As the annual number of head slaughtered decreases, the associated HACCP costs per pound will increase.

Table I.7: Distribution of HACCP Costs by Number of Birds Slaughtered for Small Plants

Average cost/pound	Number of birds
<0.5 cent/pound	More than 895,000
1.0 cent/pound	425,000
2.0 cents/pound	210,000
3.0 cents/pound	141,000
≥4.0 cents/pound	Fewer than 105,000

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