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Report to Congressional Requesters

May 1994

FOOD SAFETY

Risk-Based Inspections and Microbial Monitoring Needed for Meat and Poultry

GAO/RCED-94-110

GAO

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Resources, Community, and
Economic Development Division

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May 19, 1994

The Honorable Charles W. Stenholm
Chairman, Subcommittee on Department
Operations and Nutrition
Committee on Agriculture
House of Representatives

The Honorable Harold L. Volkmer
Chairman
The Honorable Steve Gunderson
Ranking Minority Member
Subcommittee on Livestock
Committee on Agriculture
House of Representatives

Harmful microorganisms in food, such as some types of E. coli and salmonella, cause millions of illnesses each year and cost government, industry, and consumers billions of dollars. Microbial contamination is widely recognized as today's most serious public health risk associated with meat and poultry. The Food Safety and Inspection Service (FSIS), within the U.S. Department of Agriculture (USDA), spent about $558 million and 10,750 staff years in fiscal year 1993 to inspect meat and poultry, relying primarily on visual methods that may ensure a clean-looking plant environment and meat and poultry products free of visible adulteration but cannot detect microbial contamination. FSIS has recognized the need to modernize its inspection system since at least 1985, when the National Academy of Sciences recommended that FSIS intensify its efforts to control and eliminate contamination from microorganisms that cause disease in humans.[1]

Concerned about the effectiveness of FSIS' meat and poultry inspection system, you asked us to evaluate whether (1) the system makes the most effective use of its resources to ensure food safety, (2) meat and poultry plants have programs to test for microorganisms, and (3) a quality control concept known as Hazard Analysis and Critical Control Point is an effective approach for ensuring food safety. As appendix I shows, since 1969 we and other organizations have issued numerous reports and testimony describing the limitations of the current inspection system. In particular, during the last few years, we have emphasized the need to build

[1]Meat and Poultry Inspection: The Scientific Basis of the Nation's Program, National Research Council, National Academy of Sciences (1985).

a scientific, risk-based meat and poultry inspection system to better protect the public from foodborne illnesses. This report includes detailed information, not previously available, that we developed on FSIS' use of inspection resources and the extent of microbial testing in selected meat and poultry plants.

Results in Brief

FSIS' meat and poultry inspection system does not efficiently and effectively use its resources to protect the public from the most serious health risks associated with meat and poultry—microbial contamination. The system—originally designed around the turn of the century to protect against health threats from diseased animals—is hampered by inflexible legal requirements and relies on outdated, labor-intensive inspection methods. Under current law, federal inspectors must examine each carcass slaughtered—nearly 7 billion birds and livestock annually—and visit each of the approximately 5,900 processing plants at least once during each operating shift. During these inspections, FSIS inspectors rely on their senses (smell, touch, and feel) to make judgments about disease conditions, contamination, and sanitation. However, these inspections, which consumed about two-thirds of FSIS' 10,750 staff year budget in fiscal year 1993, cannot detect microbial contamination.

While FSIS does not routinely test for microbial contaminants or require industry to conduct such tests, some plants do so to ensure the safety and quality of their products. Of 157 plants we contacted, 76 conducted periodic microbial testing to monitor the level of microorganisms on equipment and products and in the plant environment.[2] On the basis of the results of their monitoring, 74 of the 76 plants have made changes to their facilities and/or operations to improve product safety and quality. However, because each plant developed its own testing program, with little or no assistance from FSIS, the programs varied considerably in their sampling methodology and criteria for evaluating test results. As a result, the plants' microbial monitoring programs vary in their effectiveness because some plants could be testing the wrong things or using criteria for evaluating microbial test results that are too lenient. Furthermore, while most of the larger plants we contacted have testing programs, only a few of the smaller ones do because the programs are considered costly, and FSIS does not provide assistance or guidance on how to develop and implement such programs.

[2]Although the 157 plants were selected to obtain a cross section of all federally inspected meat and poultry plants, they cannot be used to make statements about the entire meat and poultry industry because they were judgmentally selected.

A Hazard Analysis and Critical Control Point (HACCP) system is generally recognized as the best currently available approach for ensuring safe foods because it focuses on preventing contamination rather than detecting contamination once it has occurred. FSIS plans to issue a proposed regulation in 1994 requiring that each meat and poultry plant develop and implement a Hazard Analysis and Critical Control Point system, but it has not yet determined (1) whether microbial testing will be required as part of such a system or (2) who should do it—the plants or FSIS inspectors. If such testing is done, regardless of who does it, FSIS will need to develop guidelines for evaluating the results of such tests.

Background

At the turn of the century, Upton Sinclair's The Jungle raised a public outcry about contagious animal diseases, unsanitary conditions, deceptive practices, and lax government inspection at meat packing plants. The Congress responded to this outcry by passing the Federal Meat Inspection Act in 1907. This act and a subsequent poultry act require federal inspection of meat and poultry products to ensure that they are safe, wholesome, and correctly labeled and packaged.

To achieve these objectives, the acts require that during slaughter operations, each individual animal carcass be examined by an on-line FSIS inspector. During this "post mortem" inspection, largely unchanged for 87 years, inspectors make judgments about disease conditions, abnormalities, and contamination in carcasses on the basis of what they see, feel, and smell—a process known as organoleptic inspection. (See app. II for a detailed description of these inspection procedures.)

Meat and poultry from government-inspected carcasses can be inspected again during further processing. (Processing operations can include simple cutting and grinding operations, complex canning procedures, or preparation of ready-to-eat products.) Under the meat and poultry inspection acts, FSIS is to inspect all processed products in order to ensure that they are wholesome, not adulterated, and properly labeled. FSIS has long implemented these statutory responsibilities through daily inspections, under which all meat and poultry processing plants are visited by an inspector at least once during each operating shift. That is, plants with one shift are visited at least once daily by an FSIS inspector, and plants with two shifts are visited at least twice daily. Also, plants that operate overtime generally receive an additional separate inspection visit. During each plant visit, a processing inspector may spend from 15 minutes to

several hours performing various inspection duties, based primarily on organoleptic methods.

Nevertheless, the safety of meat and poultry remains a concern. Because many cases of foodborne illness go undiagnosed or unreported, the actual extent of the problem is unknown with estimates varying widely from 6.5 million to more than 80 million cases annually. Moreover, according to the Centers for Disease Control, meat and poultry products have been recognized as an important source of foodborne disease. In economic terms, USDA estimates that the annual cost of foodborne illness in the United States ranges from $5.2 billion to $6.1 billion, with more than one-half of the costs, or $3.9 billion to $4.3 billion, of the illnesses attributable to meat and poultry products.

FSIS Is Unable to Use Its Resources Effectively

Because of inflexible statutory inspection requirements and labor-intensive inspection procedures that are of limited value in detecting microbial pathogens, FSIS is not able to target its resources on the principal health risk associated with meat and poultry—microbial contamination.[3] Moreover, the usefulness of FSIS' current approach is likely to diminish further because FSIS' current resources cannot keep pace with industry growth. We estimate that FSIS allocated about two-thirds of its 10,750 staff year budget in fiscal year 1993 to comply with statutory requirements—about 47 percent to examine every carcass and about 20 percent to inspect each processing plant at least once daily. (See app. III for details on FSIS' resource use.)

Mandated Slaughter Inspections Use Substantial Resources but Provide Questionable Benefits

FSIS annually allocates over 5,000 staff years, or 47 percent of its total staff year budget, to meet the legal requirement that it examine every carcass. In 1992, FSIS inspectors, using organoleptic methods, examined 126 million cattle, swine, sheep, horse, and lamb carcasses and 6.8 billion poultry carcasses.

The impact on FSIS' resources of inspecting every carcass is best illustrated by the number of on-line inspectors needed to inspect the 6.8 billion birds slaughtered in 1992. At the fastest line speeds, an inspector has about 2 seconds to visually examine the inside and outside surfaces of each bird

[3]In Food Safety: Building a Scientific, Risk-Based Meat and Poultry Inspection System (GAO/T-RCED-93-22, Mar. 16, 1993), we testified that statutory mandates restrict FSIS' flexibility to respond to changes in risk, organoleptic inspections are not capable of detecting microbial pathogens, and labor-intensive inspection procedures drain resources from the development of a risk-based system.

and feel the eviscerated internal organs. About 2,100 full-time inspectors are needed to carry out these inspections—1,830 regularly assigned inspectors and 260 relief inspectors.[4]

Inspection needs are likely to increase. While meat production has been relatively constant since 1981, poultry production has increased by 4 percent a year. This rate of growth is expected to continue for at least the next several years, increasing poultry production by 1.5 billion birds to 8.3 billion birds in 1997. Another 460 inspectors will be required by 1997 to keep pace with the increased production. But it is uncertain where these additional resources will come from. In line with federal initiatives to control spending, FSIS' staff resources have remained relatively constant since 1981, and FSIS has said that it currently needs about 300 more inspectors to meet even today's requirements.

While FSIS could reduce its resource requirements by giving inspectors less time to examine each carcass, some experts already have questioned the effectiveness of an inspector who examines 12,000 or more birds a day under current line speeds. On the other hand, the inspectors' union and consumer groups believe that inspectors would be more effective if slaughter lines were slowed and inspectors were given more time to inspect each carcass. However, such an approach could significantly increase FSIS' resource requirements. For example, a modest increase of 1 second in the inspection time for poultry, from 2 seconds to 3 seconds per carcass, would increase the number of inspectors needed by 50 percent, requiring FSIS to hire another 1,030 inspectors just to meet current production levels.

Moreover, experts have increasingly questioned the public health benefits of the organoleptic inspection that FSIS relies on. According to a 1985 National Academy of Sciences report, while organoleptic inspection serves its original purpose of protecting consumers from grossly visible lesions or diseases, it cannot identify microbial pathogens—today's principal health risk. Similarly, an October 1993 conference of the World Congress on Meat and Poultry Inspection, an international association of government regulators from meat trading countries, concluded that post-mortem organoleptic inspection must be changed because (1) it wastes resources and cannot detect microbial pathogens, (2) the animal diseases for which it was originally designed have been eradicated in many countries, and

[4]These figures are GAO's calculations based on FSIS' data. Relief inspectors are needed because inspectors must be present at each inspection station during slaughter operations. Therefore, FSIS uses relief inspectors to cover the inspection stations when regularly assigned inspectors are on break or leave or are away for training.

(3) it results in unnecessary cross-contamination because the hands-on inspection techniques used virtually ensure that contamination is spread from one carcass to another.

In our March 1993 testimony, we concluded that while careful organoleptic examination of some animals, such as old dairy cows, may still be needed, the benefit of such inspections for the young, market animals that account for the vast majority of slaughtered animals is less certain.

Processing Plant Inspections Are Inefficient and Not Based on Risk

FSIS annually allocates about 2,200 staff years, or 20 percent of its total staff years, to inspect about 5,900 meat and poultry processing plants at least once during each operating shift and again during overtime operations, under current law. On average, more than 1,300 of these 5,900 plants require a second or third FSIS inspection each day because the plants run second shifts and/or overtime operations.

This inflexible daily inspection requirement is labor-intensive and costly because FSIS inspectors must visit thousands of plants daily regardless of the potential health risk involved. Because most processing plants are small, producing less than 1 million pounds of product a year, and do not require a full-time inspector, a "patrol" assignment is established in which one inspector is responsible for several plants. Most of FSIS' 1,400 patrol assignments comprise three to six plants and thus require considerable travel time and transportation cost. FSIS estimates that each patrol inspector spends, on average, about 80 minutes per day traveling between plants. This equals about 240 staff years, or 11 percent of the total processing staff years, and costs FSIS about $8.1 million annually based on an average yearly salary of $33,800 for a processing inspector. In addition, about $11 million is spent annually to reimburse inspectors for use of their cars and for other travel expenses associated with patrol assignments.

To redirect FSIS' inspections toward firms and food processes that pose the greatest risk, the Congress passed the Processed Products Inspection Improvement Act of 1986, which amended the requirements on inspection frequency for meat processing plants. For a 6-year period, the act authorized FSIS to use its own discretion to determine the frequency of inspection. However, except for three limited pilot tests, FSIS did not implement its discretionary authority, which lapsed on November 10, 1992.

In 1977 and again in 1992, we reported that inspection resources could be used more efficiently and effectively if FSIS tailored the frequency and intensity of inspection to the potential risks associated with individual processing plants.[5] We concluded that discretionary inspection could lead to safer products and help reduce costs because scarce federal inspection resources would be redirected from low-risk operations to areas that may need greater coverage because they present a higher risk potential. In our 1992 report, we asked the Congress to consider extending FSIS' discretionary authority for processing plants.

Some Plants Independently Test for Microbial Contaminants

FSIS does not routinely test for microbial contamination nor does it require industry to do so. Consequently, FSIS does not keep a list of meat and poultry plants with microbial testing programs. Therefore, to obtain information on industry's microbial testing programs (also referred to as "microtesting" in this report), we contacted 157 meat and poultry plants judgmentally selected from various regions of the country. We worked with FSIS staff to select a group of plants representative of all federally inspected meat and poultry plants. These included large and small slaughter and processing plants. When possible, we obtained documentation of the plants' testing programs or reviewed the plants' documents when such information was considered proprietary by plant officials and therefore not releasable. Nevertheless, since the plants were judgmentally selected, the results of our work are limited to the information collected from the 157 plants that we contacted and cannot be used to make statements about any of the other federally inspected plants or group of plants.

Of the 157 meat and poultry plants we contacted, 76 have implemented testing programs to monitor the level of microorganisms on equipment and products and in the plant environment, including 74 that have used the test results to make changes to their processing procedures or facilities. Plant officials said that these changes were aimed at improving the safety and quality of their meat and poultry products. For example, one plant found through microbial testing that it had listeria—a pathogenic bacteria—in its product. With the help of a commercial laboratory, the source of the problem was traced to a slicer that was contaminating the product. The plant replaced the slicer and changed cleaning procedures, eliminating the listeria problem. (App. IV describes the plants' microbial testing programs

[5]Food Safety and Quality: Uniform, Risk-Based Inspection System Needed to Ensure Safe Food Supply (GAO/RCED-92-152, June 26, 1992) and A Better Way for the Department of Agriculture to Inspect Meat and Poultry Processing Plants (GAO/RCED-78-11, Dec. 9, 1977).

and provides examples of the changes the plants have made because of these programs.)

Larger plants—those producing more than 1 million pounds of meat and poultry per year—were more likely to have testing programs than smaller plants. Of the 97 larger plants that we contacted, 61 had testing programs, compared with 15 of the 60 smaller plants that we contacted. Plants without testing programs generally cited cost as the main obstacle to adopting such programs. In addition to program development costs, the operating costs for plants with microtesting programs ranged from a low of $600 per year to a high of $750,000 per year.

Plants encounter these costs, in part, because they cannot turn to FSIS for assistance in program design and operations. Although FSIS has a Division of Microbiology located in Washington, D.C., FSIS' assistance to plants is generally limited to guidelines for processing plants seeking authorization to substitute microbial testing programs for cleaning the plant between shifts (mid-shift cleanup), which is the current requirement. For example, FSIS regional officials told us that they have received many calls from plants inquiring about microbial testing programs. These officials said that they refer these plants to industry associations because FSIS is not set up to provide such assistance. While industry associations can provide valuable assistance to plants establishing or operating microbial testing programs, the extent of such assistance varies among associations and not all meat and poultry plants belong to an industry association.

To fill this void, plants seek assistance from commercial laboratories or design their programs in-house. Therefore, the sampling methodologies, type of tests performed, and test evaluation criteria vary from plant to plant. For example, plant microbial testing programs range from weekly sampling to determine the general bacteria levels on equipment surfaces to daily sampling of equipment surfaces and products to determine general bacteria levels as well as to identify the presence of specific pathogens, such as listeria and salmonella.

Plants also used different standards to evaluate the results of microbial tests. For example, the strictest standards for general bacteria levels allowed on equipment surfaces before operations begin ranged from 0 to 500 colonies per square inch. Similarly, the level of staphylococcus bacteria allowed on raw meat and poultry ranged from 0 to 500 colonies per gram. While plant officials were reluctant to endorse specific standards, they believed that guidance from FSIS would be beneficial.

Officials in 48 of the 76 plants with microbial testing programs said that FSIS should provide guidelines for evaluating test results. While FSIS has a general guide of no more than 100 colonies per square inch for evaluating preoperational test results from equipment, such information is not disseminated to all meat and poultry plants. FSIS generally just provides this information to plants seeking to substitute microbial testing programs for mid-shift cleanup because FSIS is reluctant to promulgate an industrywide guide until further research is conducted.

Furthermore, FSIS does not build upon the information developed by the plants through microbial tests so that it can be informed and be able to provide assistance when called upon. For example, FSIS did not collect, analyze, or disseminate microbial testing information developed by the 18 plants in which it had inspection tasks requiring periodic review of the plants' testing programs. For the other 58 plants with testing programs, FSIS did not officially monitor the programs in 43 plants, and information was not available to determine if FSIS monitored the microbial testing programs in 15 plants.

Our findings on the wide variation in plant microtesting programs and the lack of FSIS' assistance are consistent with those reported in June 1992 by a Science Review Panel, established by the Secretary of Agriculture to evaluate beef slaughter inspection methods.[6] Among its major findings, the panel, which included veterinarians, microbiologists, and other scientists, reported that in the plants it visited, it found a great diversity in the microbiological sampling and testing methodologies being used. The panel concluded that FSIS should undertake the leadership role in the development of more uniform methodologies and programs that will permit proper comparisons of data and provide feedback for corrective actions. More specifically, the panel reported that FSIS, in concert with industry, should evaluate the effectiveness of proposed programs, develop new and standardized methodologies when needed, design and develop scientific data bases, and monitor the success of new programs and technologies.

Without FSIS' support, plants are less likely to learn from each other's experiences. As a result, plants spend time and resources identifying and correcting problems already resolved by others. For example, four plants we contacted found independently, through microbial testing that one type of conveyor belt could not be sanitized and therefore was likely to harbor

[6]Report of Comparative Review of USDA Streamlined Inspection System for Cattle and Traditional Inspection Methods, Andrulis Research Corporation (June 1992).

microorganisms. Each plant went through a laborious process of determining the source of its high microbial counts—experimenting with different sanitizers and evaluating employee's hygiene and work habits—before determining that it needed to switch to a different type of conveyor belt. Moreover, other plants that use this type of conveyor belt had not been informed of the problems it presents.

HACCP Is a Generally Accepted Approach for Ensuring Food Safety, but Role of Microbial Testing Is Uncertain

A Hazard Analysis and Critical Control Point system is generally considered to be the best approach currently available for ensuring safe foods because it focuses on preventing contamination rather than detecting contamination once it has occurred. To strengthen regulation of the industry and help ensure safer meat and poultry, the Secretary of Agriculture announced in May 1993 that each meat and poultry plant would be required to develop and implement a HACCP system. While FSIS plans to publish its proposed HACCP requirements in 1994, its plans to date do not specifically require microbial testing to monitor plants' HACCP systems to ensure that they are working effectively. Furthermore, FSIS has no plans to develop guidelines for evaluating the results of microbial tests and determining when remedial actions are needed.

HACCP Is Considered the Best Approach for Ensuring the Safety of Meat and Poultry

To prevent food safety problems before they occur, the HACCP approach focuses on (1) identifying hazards and assessing risks associated with each phase of food production,[7] (2) determining the critical points where the identified hazards can be controlled, and (3) establishing procedures to monitor these critical control points.

For example, during the slaughtering of cattle, hide removal is considered a critical control point. If the hide, which is not cleaned before slaughter, is not properly removed, it could contaminate the carcass. Under a HACCP system, a plant quality control employee could observe the hide removal process on a regular basis, such as every hour, to determine that it was performed in accordance with established procedures. If the proper procedures were not being followed, the line would be immediately stopped and corrective actions would be implemented. The determinations made during the observations would be documented and retained for future review by FSIS.

[7]Hazards include any biological, chemical, or physical property that may cause an unacceptable consumer health risk.

The scientific community has endorsed HACCP as an effective approach for ensuring food safety. For example, during the 1980s, several scientific panels convened by the National Academy of Sciences recommended wider use of HACCP in food regulation, particularly for the meat and poultry inspection program.[8] In addition, the National Advisory Committee on Microbiological Criteria for Food has endorsed HACCP as an effective and rational approach for ensuring food safety.[9]

Role of Microbial Testing in FSIS' Proposed HACCP Approach Is Uncertain

Although the HACCP concept has wide support, consumer groups, the inspectors' union, and other parties have raised various concerns about how FSIS intends to implement HACCP in the meat and poultry industry. These concerns include whether FSIS would (1) relinquish too much responsibility for food safety to industry, (2) not require FSIS' approval of plants' HACCP systems, (3) lack adequate authority to access relevant plant records, (4) provide adequate HACCP training to its inspectors, and (5) lack the authority to impose sanctions and penalties on plants failing to comply with HACCP requirements. Another concern that we have is whether a mandatory HACCP system will include adequate microbial testing to ensure that microbial hazards are controlled. FSIS' documents on HACCP provide no details on whether such testing will be required.

The HACCP concept uses a two-step process to ensure its effectiveness—evaluation of the individual critical control points and an overall evaluation (called "verification") of the entire system. Individual critical control points must be evaluated on a real-time basis; that is, evaluation results must be immediately available so that corrective action can be taken as soon as possible. Real-time evaluation tools include physical observation and testing for chemical residues. Microbial testing does not provide real-time results because under today's technology, results are not available for at least 24 hours, although FSIS has been encouraging the development of quicker testing methodologies.[10]

[8]Meat and Poultry Inspection: The Scientific Basis of the Nation's Program (1985) and Poultry Inspection: The Basis for a Risk-Assessment Approach (1987), National Academy of Sciences.

[9]This committee, whose members include food safety and public health experts from government, industry, and academia, was established in 1987 to provide the U.S. Department of Agriculture and the Departments of Health and Human Services, Commerce, and Defense with advice and recommendations on the development of microbiological criteria that could be used to assess the safety and wholesomeness of food.

[10]USDA's Agricultural Research Service is evaluating a rapid test that determines general bacterial levels on meat within minutes.

The HACCP concept also requires verification that a plant's overall processing system is working, not just the individual control points. This verification need not be done on a real-time basis but can rely on, among other methods, testing samples of products taken at various times throughout production. Microbial testing can provide this overall verification, allowing judgments to be made on product safety and alerting the plants to deficiencies in processing, distribution, storage, or marketing.

FSIS recognizes the benefits of microbial testing but has not yet determined if such testing will be required as an integral part of plants' HACCP systems. FSIS officials said that they are continuing to evaluate the need for microbial testing, including who should do it—the plant or FSIS inspectors.

As would be expected, plants with microtesting programs that were included in our survey were more in favor of making microtesting mandatory than plants without such programs. For example, of the 76 plants that had microtesting programs, 53 said that such testing should be mandatory, 16 said that it should remain voluntary, and 7 expressed no opinion. Of the 81 plants that did not do microtesting, 54 said that such testing should remain voluntary, 15 said that it should be mandatory but generally believed the government should do it, and 12 expressed no opinion.

If microbial testing is required, regardless of who does it, guidelines will have to be developed to help plants or FSIS inspectors determine when microbial test results should require remedial action. Without guidelines, plants or FSIS inspectors will have to rely on their own judgments on when to take action, which would vary widely, as indicated above.

Conclusions

The federal inspection system is neither efficient nor effective in protecting the public from the most serious health risks caused by microbial contamination. Resources that could be more effectively used in a risk-based system are drained away by labor-intensive inspection procedures and inflexible inspection frequencies. For example, FSIS continues to rely primarily on organoleptic inspection procedures that are not capable of detecting harmful bacteria. In addition, under current law, federal inspectors must examine each carcass slaughtered and visit each processing plant at least daily. To better protect the public from foodborne illnesses, FSIS must move to a modern, scientific, risk-based inspection system. Such a system would allow FSIS to target its resources towards the higher-risk meat and poultry products by increasing inspection of such

products, developing methods or tools that would help inspectors detect microbial contamination, and/or increasing the testing of such products.

The plants that have initiated microbial testing programs have used the test results to identify problem areas and made numerous changes that were designed to improve the safety of their products. However, FSIS, the federal agency responsible for overseeing the meat and poultry industry and ensuring the safety of meat and poultry, has not supported this effort by designing generic programs and/or disseminating information gained from individual testing programs. As a result, the investment required of plants interested in improving their processes by implementing microbial testing programs could be significant and thereby discourage such testing, particularly in small plants.

The HACCP approach is generally considered the most effective approach currently available for preventing microbial contamination. FSIS, however, has not yet determined whether microbial testing will be an essential component of HACCP requirements. Without specifying testing requirements and criteria, FSIS cannot ensure that each plant's HACCP system will effectively monitor microbial contamination.

Recommendation

To improve the safety of meat and poultry, we recommend that the Secretary of Agriculture direct the Administrator, FSIS, to develop a mandatory HACCP system that includes specific requirements for microbial testing and guidelines for determining when microbial test results warrant action by the plant. As part of this effort, the Administrator should assist meat and poultry plants in the development of their microbial testing programs by, among other things, disseminating information on the programs already in operation.

Recommendation to the Congress

We recommend that the Congress revise the meat and poultry acts to provide FSIS with the flexibility and discretion to target its inspection resources to the most serious food safety risks.

Agency Comments and Our Evaluation

We received written comments from the U.S. Department of Agriculture (USDA) on a draft of this report. (See app. V.) USDA agreed that (1) microbiological hazards are the major threat to public health identified with the consumption of meat and poultry, (2) the current inspection system must be shifted to a system based on science and risk, (3) greater

flexibility in adjusting resources to target the most serious food safety risks may be important, and (4) HACCP holds promise for preventing contamination. USDA also provided a description of various initiatives undertaken during the past year to improve the existing inspection system, including a proposed animal identification and traceback program; nationwide, microbial baseline studies to determine the presence and levels of pathogens on meat and poultry; a final rule mandating labels on raw meat and poultry describing safe handling techniques; and strengthened oversight and regulatory enforcement.

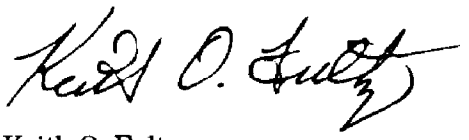
In February 1994 testimony before a Senate agriculture subcommittee, we provided our assessment of these same initiatives.[10] We concluded that although USDA's efforts had produced some constructive changes, USDA had not dealt with the inspection system's inherent weaknesses nor fundamentally changed the system's reliance on sensory inspection methods. USDA still has not mandated routine microbial testing by industry or government inspectors nor sought legislative changes to allow it to target its resources to the most serious food safety risks.

We performed our review between April 1993 and January 1994, in accordance with generally accepted government auditing standards. We conducted our work primarily at FSIS headquarters in Washington, D.C., and its Western Regional Office in Alameda, California. We also contacted 157 meat and poultry plants to determine if they had microtesting programs. The plants contacted were judgmentally selected to provide the broadest coverage (that is, large and small slaughter and processing plants in various sections of the country) with the resources available. Because the selection process was judgmental, the information obtained only applies to the 157 plants that we contacted and cannot be used to make statements about the universe of meat and poultry plants. (Further details on our objectives, scope, and methodology are provided in app. VI.)

As arranged with your offices, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days after the date of this letter. At that time, we will send copies of this report to interested congressional committees and the Secretary of Agriculture. We will also make copies available to others upon request.

[10]Meat Safety: Inspection System's Ability to Detect Harmful Bacteria Remains Limited (GAO/T-RCED-94-123, Feb. 10, 1994).

This work was performed under the direction of John W. Harman, Director, Food and Agriculture Issues, who can be reached on (202) 512-5138. Major contributors to this report are listed in appendix VII.



Keith O. Fultz
Assistant Comptroller General

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Abbreviations

CDC	Centers for Disease Control
FSIS	Food Safety and Inspection Service
GAO	General Accounting Office
HACCP	Hazard Analysis and Critical Control Point
USDA	U.S. Department of Agriculture

General Accounting Office and Other Reports Since 1969 on the Federal Meat and Poultry Inspection System

GAO Reports

Meat Safety: Inspection System's Ability to Detect Harmful Bacteria Remains Limited (GAO/T-RCED-94-123, Feb. 10, 1994).

Food Safety: A Unified, Risk-Based System Needed to Enhance Food Safety (GAO/T-RCED-94-71, Nov. 4, 1993).

Food Safety: Building a Scientific, Risk-Based Meat and Poultry Inspection System (GAO/T-RCED-93-22, Mar. 16, 1993).

Food Safety: Inspection of Domestic and Imported Meat Should Be Risk-Based (GAO/T-RCED-93-10, Feb. 18. 1993).

Food Safety and Quality: Uniform, Risk-based Inspection System Needed to Ensure Safe Food Supply (GAO/RCED-92-152, June 26, 1992).

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Selected Aspects of the Administration of the Meat and Poultry Inspection Program (CED-76-140, Aug. 25, 1976).

Consumer Protection Would Be Increased by Improving the Administration of Intrastate Meat Plant Inspection Programs (B-163450, Nov. 2, 1973).

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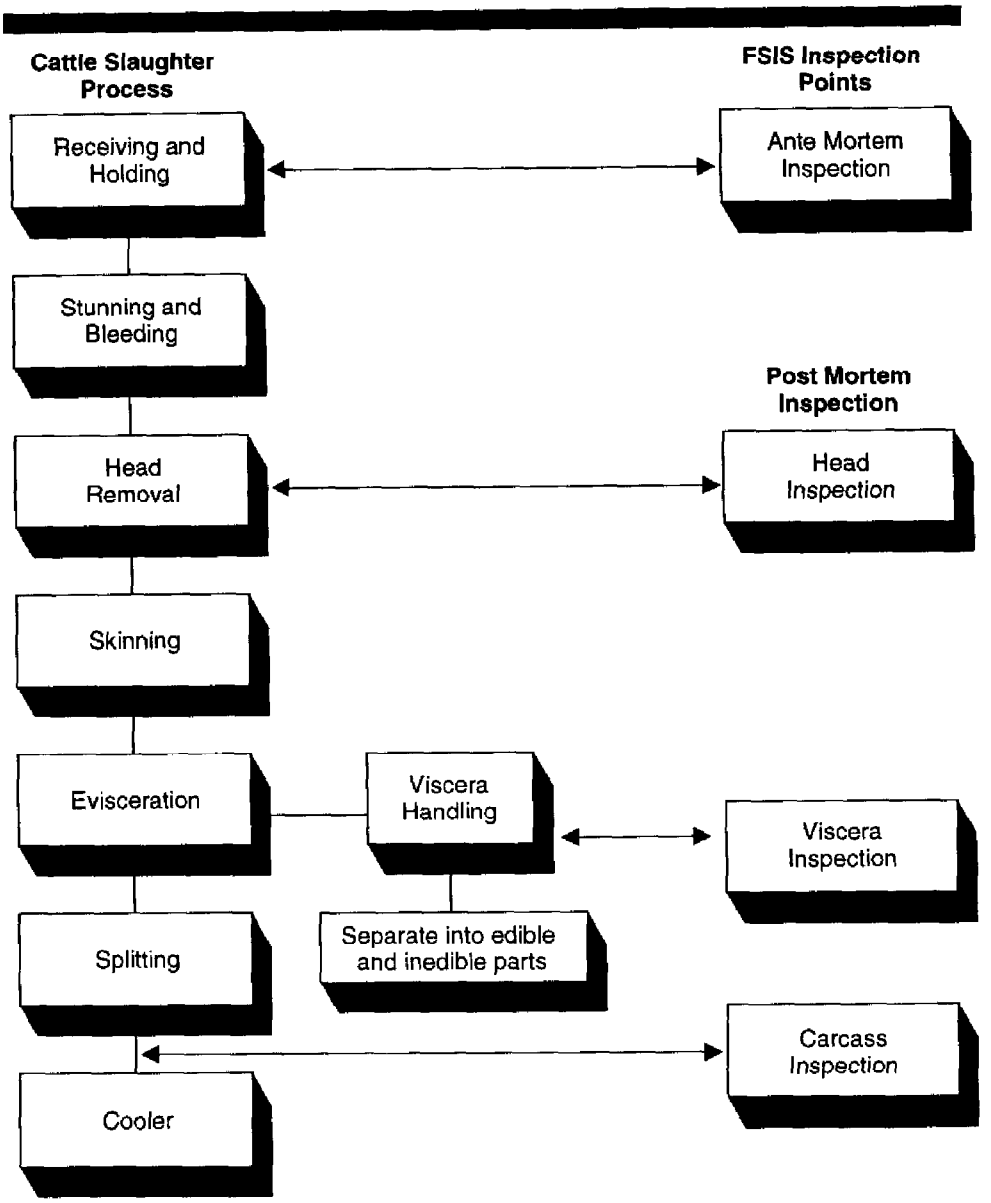
Carcass-By-Carcass Inspection

This appendix describes the Food Safety and Inspection Service's (FSIS) inspection procedures conducted prior to (ante mortem) and following slaughter (post mortem) of animals. The federal meat and poultry inspection acts mandate that FSIS inspectors examine each carcass as it moves through the plant. (The requirement to inspect each individual carcass is often referred to as carcass-by-carcass or bird-by-bird inspection.) Current inspection procedures, largely unchanged for 87 years, rely on organoleptic techniques by which inspectors use their sight, smell, and touch to determine whether animals and carcasses are diseased or contaminated and unfit for human consumption. Figures II.1 through II.8 illustrate cattle and poultry slaughter processes and corresponding points at which FSIS conducts inspection. We observed these slaughter processes and corresponding inspection points on our visits to meat and poultry plants. In addition, we had FSIS inspection operation officials review this appendix for accuracy, and their suggestions have been included, where appropriate.

Figure II.1: the Cattle Slaughter Process and Corresponding FSIS Inspection Points

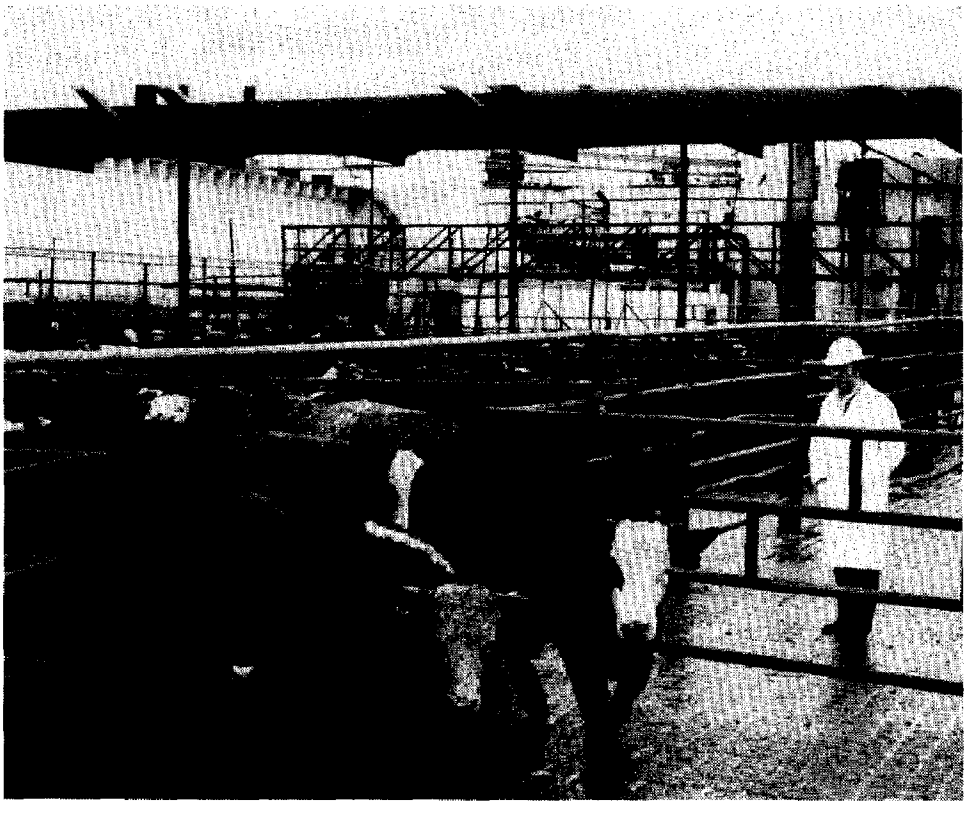


Cattle Ante Mortem Inspection

Ante mortem inspection is intended to prevent animals that are obviously unfit for human consumption because of abnormalities or diseases, such as central nervous system disorders, from entering the slaughter process. FSIS' ante mortem inspection for cattle includes (1) observing the animals at rest and in motion and (2) examining animals identified as abnormal or

diseased to determine their disposition. Figure II.2 shows an inspector viewing cattle in a holding pen.

Figure II.2: Ante Mortem Inspection of Cattle

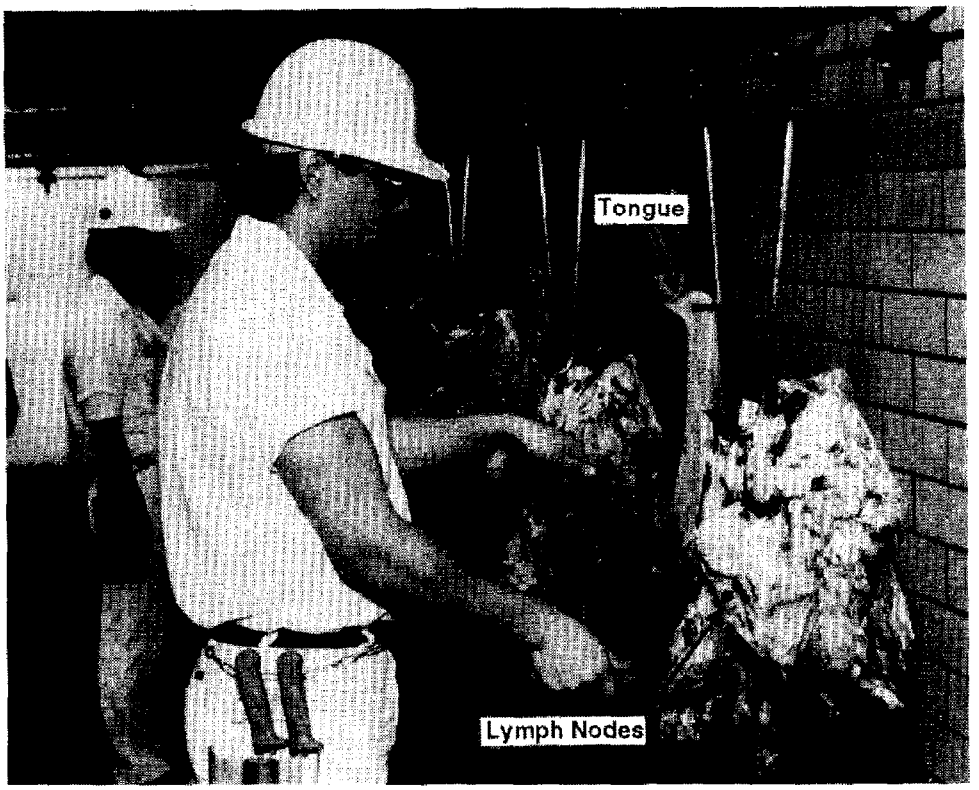


Source: USDA.

Cattle Post Mortem Inspection

The post mortem inspection is designed to identify any carcasses or parts that are diseased or abnormal, thus rendering them unwholesome or adulterated. For example, visual pathological conditions and contamination, such as stomach or intestinal abnormalities, would be reason to remove a carcass or portion thereof from further production. FSIS has established three distinct points during the slaughter process for inspection of cattle carcasses—head, viscera, and final eviscerated carcass. Figures II.3 through II.5 illustrate each inspection point.

Figure II.3: Head Examination During Post Mortem Inspection



Source: USDA.

In head inspections, the inspector examines and cuts the eight lymph nodes located in the head and the cheek muscles and observes and palpates, that is, feels, the tongue.

Figure II.4: Viscera Examination of the Heart, Liver, and Digestive Tract

Source: USDA.

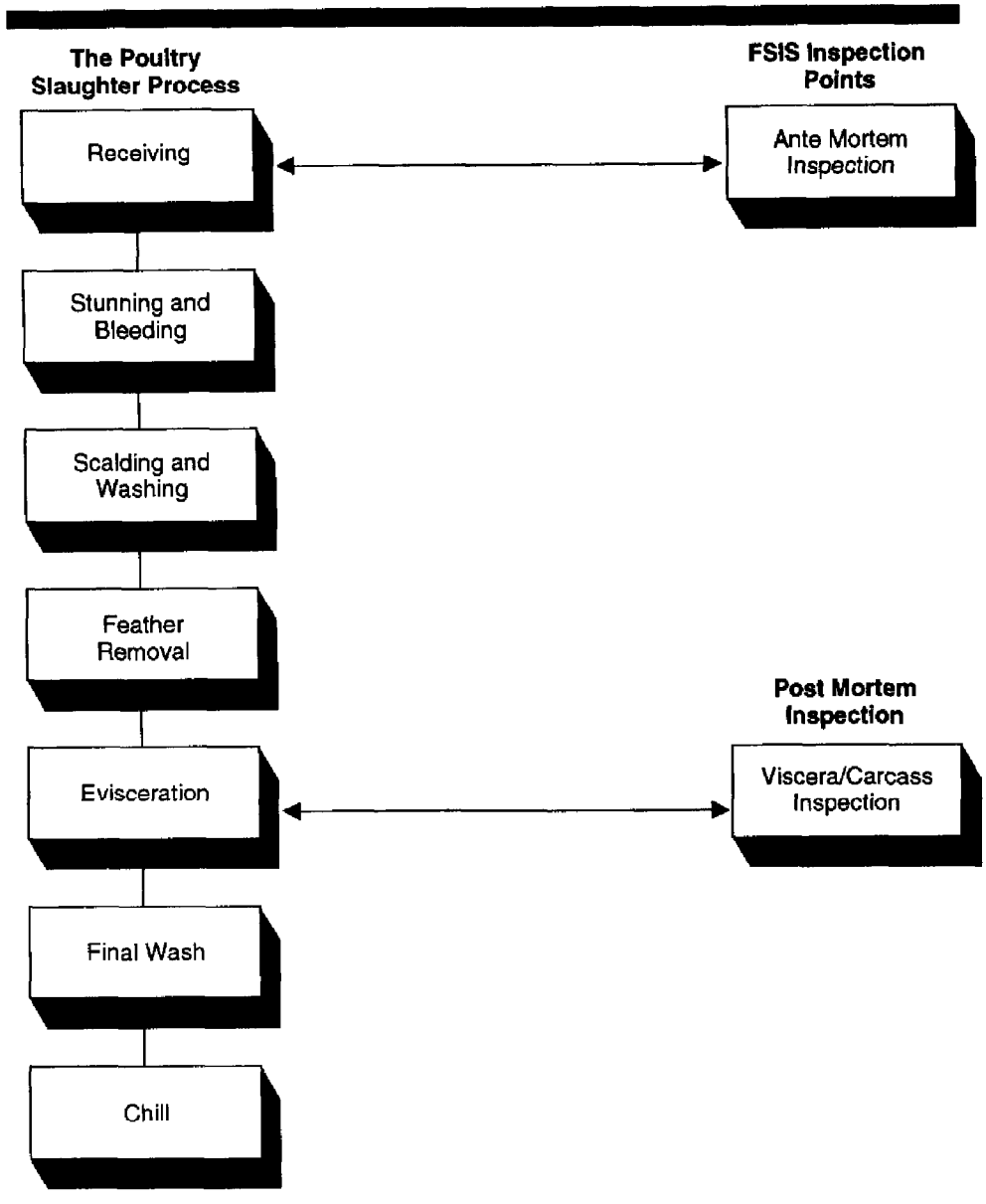
The inspector observes the carcass for contamination and the viscera (internal organs) for obvious abnormalities. The inspector then cuts and observes the heart and the bronchial and hepatic lymph nodes and observes the cranial and caudal mesenteric lymph nodes. The inspector palpates the surfaces of the lungs and liver and the junction between two of the four stomachs.

Figure II.5: Carcass Examination During Post Mortem Inspection

Source: USDA.

The inspector examines the entire eviscerated carcass. This inspection occurs after the carcass is split in half but before the carcass halves are washed. The inspector observes the carcass exterior, interior, and cut surfaces of the muscles and bones and observes and palpates the kidneys and the diaphragm.

Figure II.6: the Poultry Slaughter Process and Corresponding FSIS Inspection Points



Poultry Ante Mortem Inspection

The purpose of ante mortem inspection for poultry is the same as that for red meat animals—to prevent animals that are obviously unfit for human consumption because of abnormalities or diseases from entering the slaughter process. However, for poultry FSIS inspectors generally perform ante mortem inspection on a lot-basis while the birds remain caged, as

shown in figure II.7. As plant employees remove the birds from the cages, they will also identify and withhold from slaughter any dead and abnormal appearing poultry. Later, a veterinarian examines any abnormal or diseased birds. Dead birds are condemned and kept separate from poultry intended for human consumption.

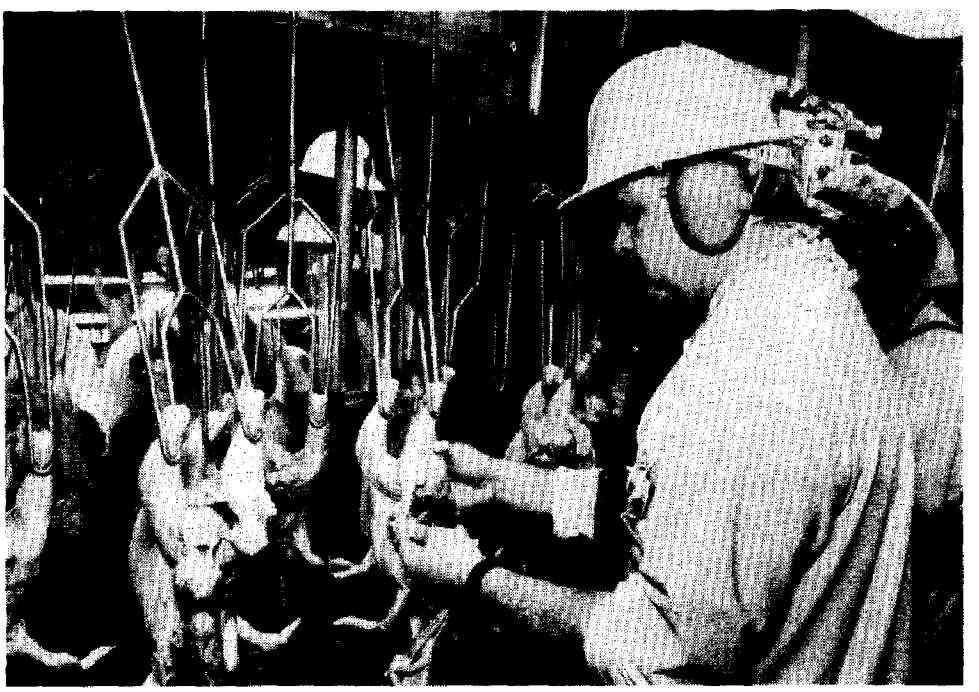
Figure II.7: Ante Mortem Inspection of Poultry

Source: USDA.

Poultry Post Mortem Inspection

The plant is responsible for proper presentation of the carcass to the inspector. The viscera must be removed from the body cavity with care to avoid fecal or other contamination. The inspector then observes the inside of the body cavity, including internal organs, tissues, and body walls. The inspector will next examine the suspended visceral organs, including the spleen, heart, and liver. The inspector observes the carcass for skin tumors, bruises, or other process defects as the bird approaches and again as the bird departs from the inspector's view. Figure II.8 shows an inspector examining the internal organs of a bird.

Figure II.8: Post Mortem Inspection of Poultry



Source: USDA.

FSIS Inspection Resources

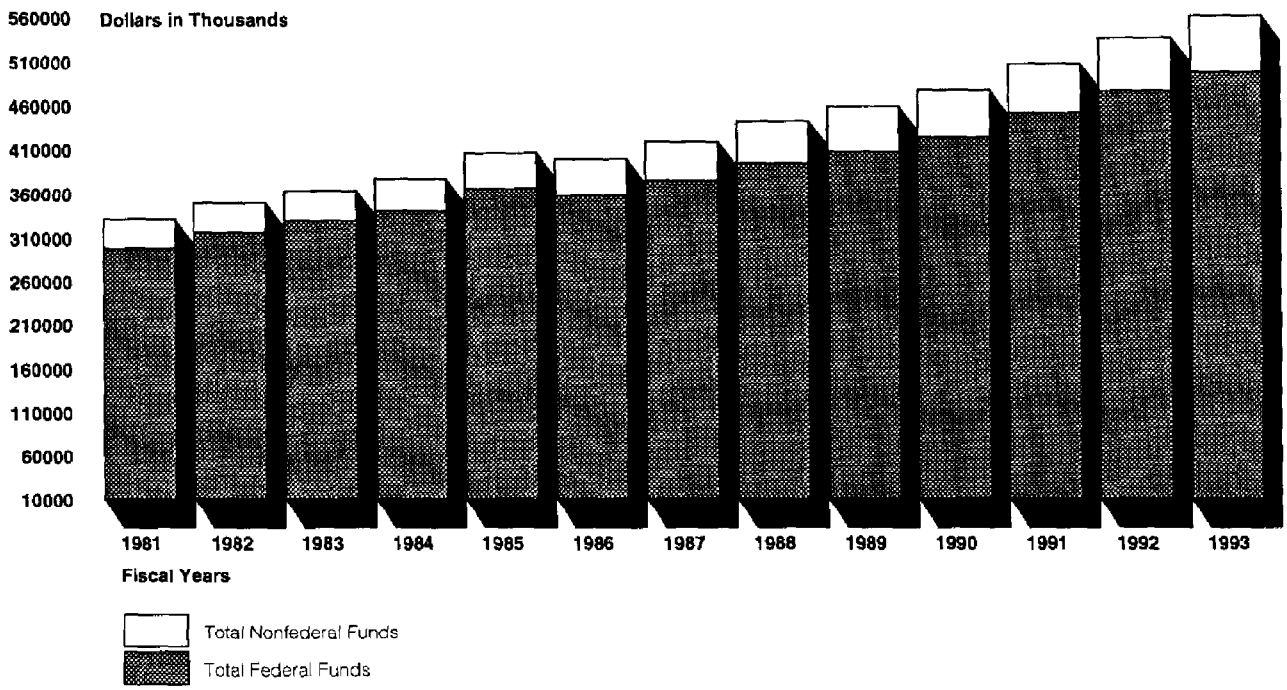
This appendix provides information on how FSIS allocates and uses its resources to operate the meat and poultry inspection system mandated by legislation. Overall, our analysis of FSIS' budget, personnel, and staffing data showed the following highlights.

- Since 1981, FSIS' budget, adjusted for inflation, as well as its staff resources have remained relatively constant.
- Two-thirds of FSIS' 10,750 total agency staff years in 1993 are dedicated to meeting inspection requirements based on legislation. (About 47 percent is allocated for carcass-by-carcass inspection and another 20 percent is allocated to daily inspection of processing plants.)
- Absent hiring more inspectors or increasing inspection line speeds, the growth in poultry production will continue to stress FSIS' resource use.

FSIS Budget Remains Constant When Adjusted for Inflation

Since fiscal year 1981, FSIS' budget has grown from a total of $331 million (federal and nonfederal funds) to an estimated $558 million for fiscal year 1993. (See fig. III.1.) However, when adjusted for inflation, the budget has fluctuated only slightly between $519 million in fiscal year 1981 to $558 million for fiscal year 1993. (See fig. III.2.) We begin our analysis in 1981 because (1) FSIS was created in June 1981 and (2) according to FSIS officials, the agency functions have remained essentially unchanged since then.

Figure III.1: FSIS Budget 1981 Through 1993

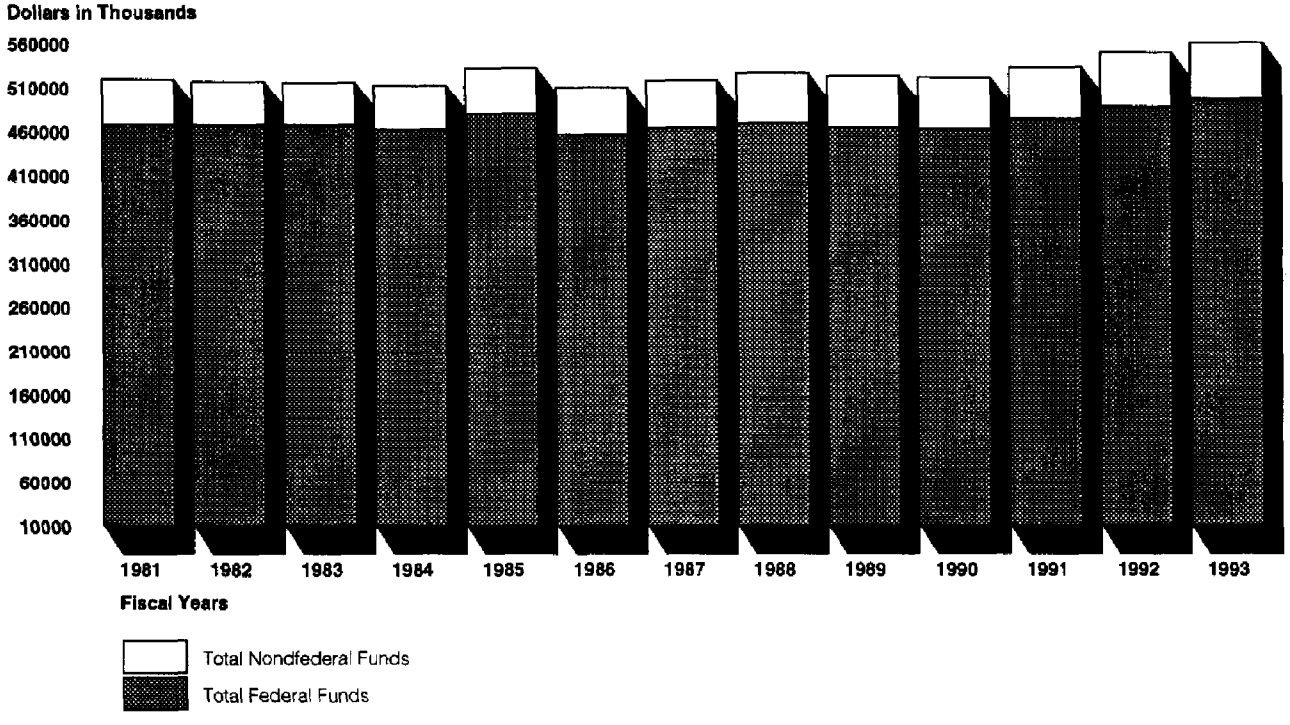


Nonfederal funds include reimbursements from meat and poultry plants to FSIS for overtime, holiday, and voluntary inspections.

The fiscal year 1993 budget includes a supplemental appropriation of $4 million, which was granted to FSIS for the last 6 months of fiscal year 1993 to hire an additional 160 inspectors.

Source: 1983 through 1994 USDA Budgets. The 1994 budget contains data on 1993 appropriations.

Figure III.2: FSIS 1981 Through 1993 Budget in Constant 1993 Dollars



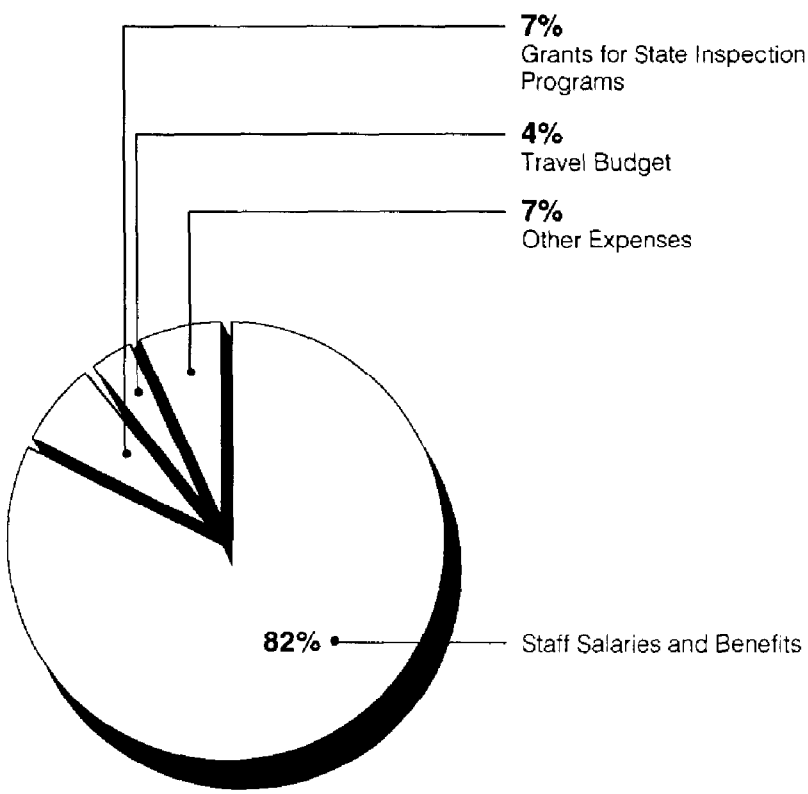
Source: 1983 through 1994 USDA Budgets. The 1994 budget contains data on 1993 appropriations.

Most of FSIS' Budget Allocated to Staffing Costs

For fiscal year 1993, FSIS officials estimated that staffing costs account for 82 percent of the agency's total budget and travel costs account for 4 percent. (See fig. III.3.) This allocation shows that FSIS is a labor-intensive agency. FSIS budget increases primarily cover annual inflationary and salary increases. FSIS officials told us that because the agency is so labor-intensive, it has few discretionary funds. For example, the agency's travel budget is primarily for inspectors' local travel between plants to perform their inspection tasks. FSIS estimated that one-half of the remaining 14 percent of the agency's federal funds would be allocated to items such as supplies, equipment, printing, communications, and utilities. FSIS is required to direct the remaining 7 percent of the agency's total budget to required cost-sharing—50 percent—for those states that have their own inspection programs. FSIS officials said that these funds are not

available for use in FSIS' federal programs. FSIS provides oversight and annual reviews to state inspection programs to ensure that these programs maintain equality with the federal inspection program.

Figure III.3: Estimated Percent of FSIS Budget Allocated to Salaries and Other Expenses—Fiscal Year 1993



Note: Other Expenses include items such as supplies, equipment, printing, communications, and utilities.

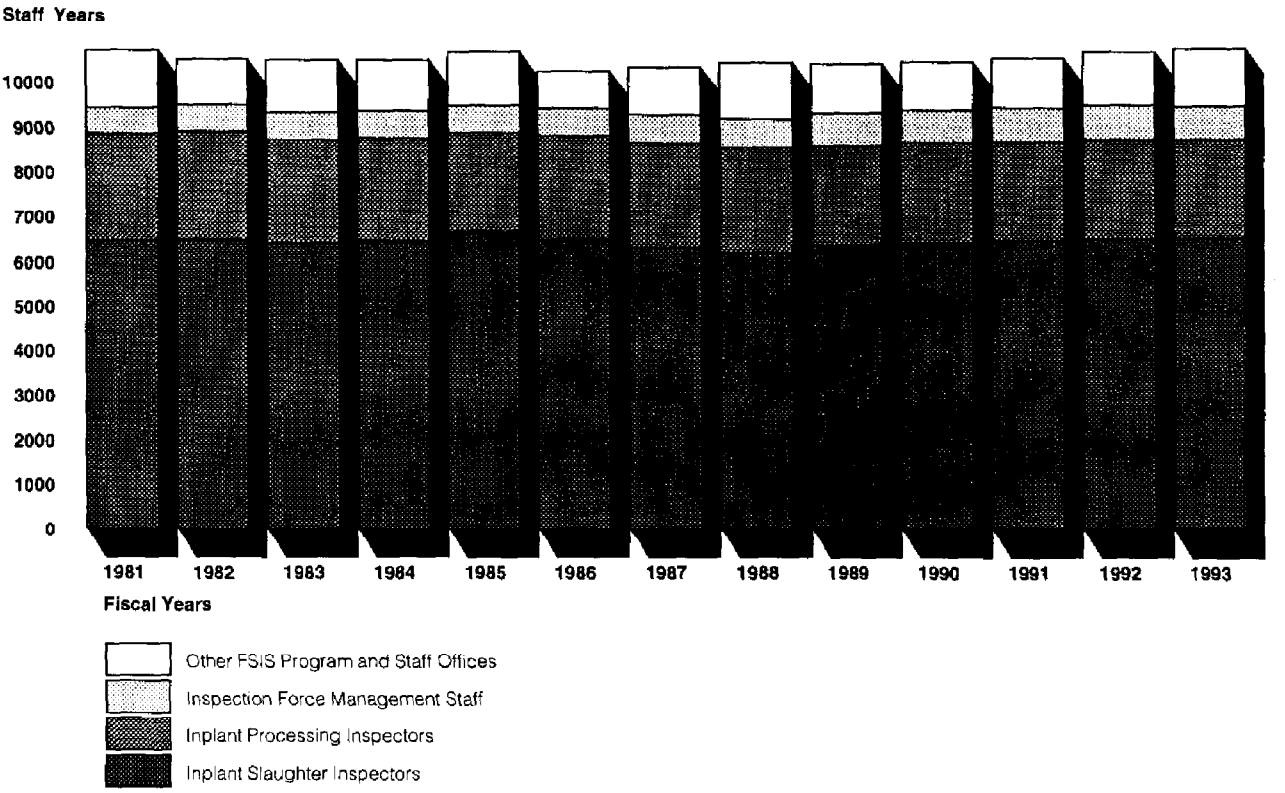
Source: 1994 USDA Budget, containing data on 1993 appropriations.

FSIS Total Agency and Inspector Staff Years Remain Constant

As reflected in FSIS' budget, total agency staff years have remained relatively constant, fluctuating slightly between 10,705 staff years in fiscal year 1981 to an estimated 10,754 staff years in 1993. Staff years for in-plant slaughter and processing inspectors have also fluctuated only slightly during this period from 8,857 inspector staff years in 1981 to 8,734 staff years in 1993. Between 1981 and 1993, minor increases in slaughter

inspection staff years have accompanied minor decreases in processing inspection staff years. That is, according to agency officials, as the poultry industry grew and FSIS had to examine growing numbers of slaughtered poultry with limited resources, the agency shifted processing inspectors to slaughter inspection activities. Despite the shift in resources, the proportion of slaughter inspectors to processing inspectors has remained at approximately a 3:1 ratio, respectively, throughout the 13-year span. In addition, according to FSIS officials, fluctuations in FSIS headquarters and field management staff have occurred in conjunction with implementation of food safety initiatives, including a processing management information system and residue monitoring programs. (See fig. III.4.)

Figure III.4: FSIS Total Agency Staff Years 1981 Through 1993



Notes: Inspection Force Management Staff includes 5 regional offices; 26 area offices; and 185 circuit supervisors, where 15 to 35 plants comprise a "circuit," several circuits comprise an "area," and several areas comprise a "region."

Other FSIS program and staff offices conduct management and program support activities, including personnel and budget functions, laboratory analysis, compliance reviews, recalls, and investigations of contaminated products.

Source: GAO calculations based on data from FSIS' Office of Inspection Operations and 1983 through 1993 USDA budgets.

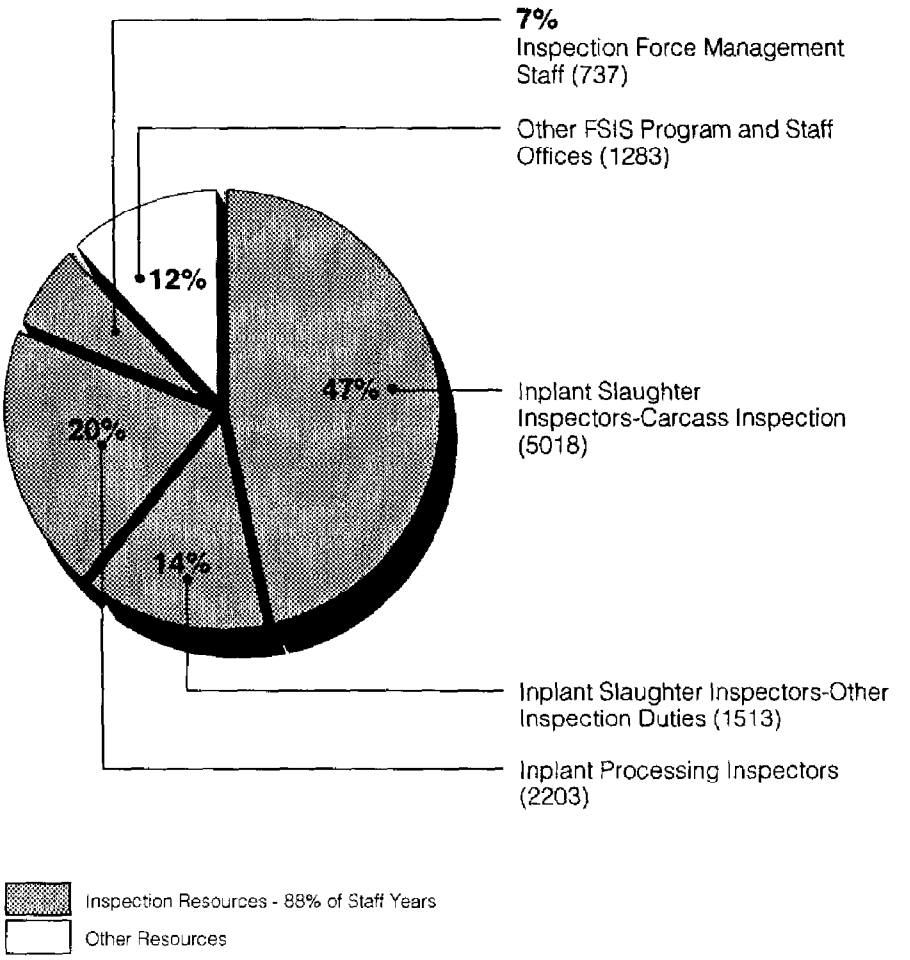
Almost One-Half of FSIS Staff Years Allocated to Carcass-By-Carcass Inspection

Figure III.5 shows how FSIS allocated its staff years in fiscal year 1993. We estimate, based on discussions with agency officials, that FSIS' Inspection Operations Program Office, which houses the agency's domestic inspection resources, consumes 88 percent of the total agency staff years. (See shaded area in fig. 3.5.) Inspection resources include slaughter inspectors conducting carcass-by-carcass inspection, slaughter inspectors conducting other inspection duties, processing inspectors, and the

inspection force management staff. Resources dedicated to carcass-by-carcass inspection account for 47 percent of all FSIS staff years. Carcass-by-carcass inspection requirements dictate that an inspector must always be present at each inspection point on the slaughter line. Therefore, when slaughter inspectors assigned to carcass-by-carcass inspection take breaks, annual or sick leave, or training, FSIS must fill the vacancies that result by using relief inspectors, transferring processing inspectors, or reassigning inspectors conducting other inspection duties in the slaughter plant. Although FSIS has more flexibility in filling vacant processing inspection assignments, it still requires daily inspection of each processing plant. That is, FSIS simply assigns existing processing inspectors additional daily plant visits, in effect, reducing the average amount of time an inspector spends in a processing plant.

We calculated that FSIS dedicates 12 percent of its total staff years to other program and staff offices. These offices are responsible for conducting much of FSIS' management and program support activities, including personnel and budget functions, laboratory analysis, compliance reviews, recalls, and investigations of contaminated products.

Figure III.5: 1993 Estimated FSIS Total Agency Staff Year Allocation, Including Carcass-By-Carcass Inspection



Notes: One staff year is the equivalent of one full-time employee.

Figure III.5 represents permanent full-time, part-time, and temporary staff, as well as any overtime worked.

Carcass-by-carcass inspection is strictly slaughter postmortem inspection tasks.

Other Inspection Duties include ante mortem, supervision, finished product standards, sample collection, residue testing, sanitation, monitoring of condemned products, and other activities.

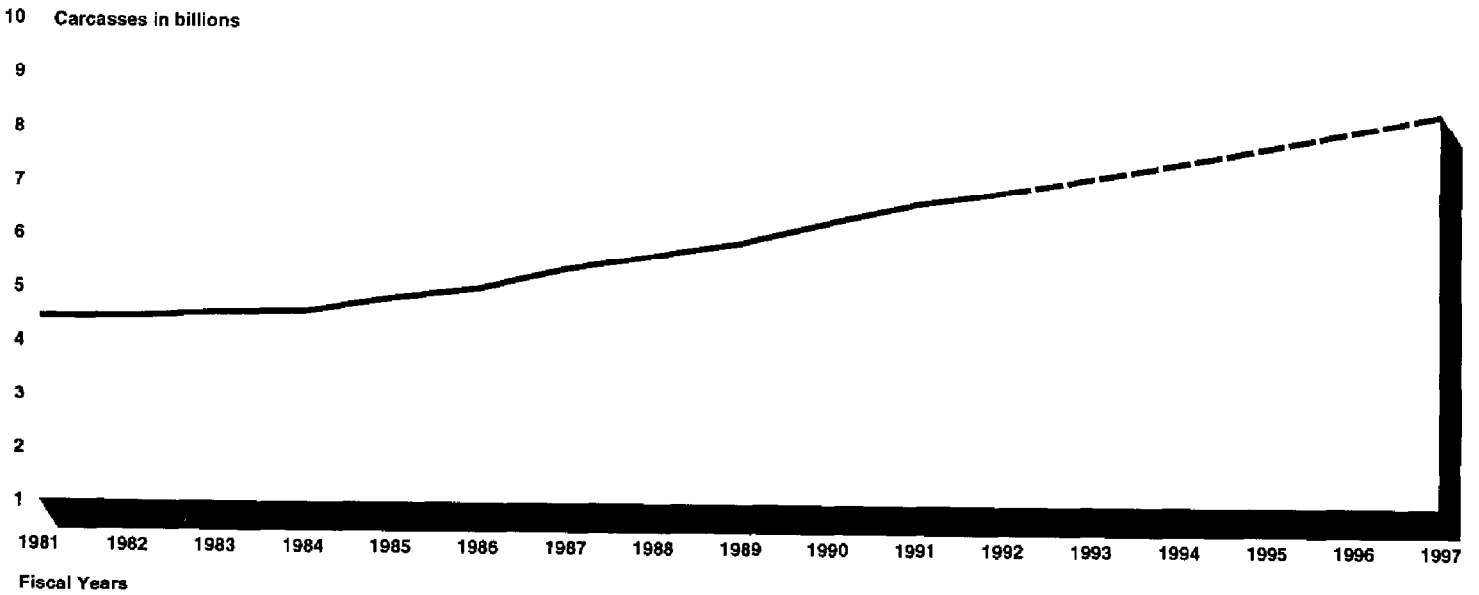
Source: FSIS Office of Personnel and Office of Inspection Operations.

Poultry Industry Growth Increases Demand for FSIS Inspection Resources Under Current Requirements

Although the meat industry has experienced relatively little growth between 1981 and 1992, the poultry industry has grown 54 percent during this period from 4.4 billion slaughtered and federally inspected birds in 1981 to 6.8 billion in 1992. (See fig. III.6.) Because each carcass must be examined, this significant increase in the number of poultry slaughtered taxes FSIS' inspection workforce. For example, under the fastest line speeds currently employed, an inspector has about 2 seconds to visually examine the inside and outside surfaces of each bird and feel the eviscerated internal organs. This equates to 1,800 birds per hour. We calculate that approximately 2,100 full-time inspectors, at a minimum, were needed to examine the 6.8 billion birds slaughtered in fiscal year 1992—about 1,830 regularly assigned inspectors plus another 260 relief inspectors. (FSIS' Resource Management Staff uses a ratio of one relief inspector for every seven regularly assigned inspectors.)

Economists at USDA expect the poultry industry to continue to grow an average of 4 percent per year for the next 5 to 10 years. To maintain inspection time of 2 seconds per bird and handle such growth, FSIS would need to hire an additional 460 inspectors by fiscal year 1997 to inspect the projected 8.3 billion birds slaughtered that year. (About 305 inspectors are needed to examine each 1 billion birds slaughtered. See fig. III.7.) FSIS officials were doubtful that lowering inspection time below 2 seconds per bird would be an effective measure for handling the poultry growth.

Figure III.6: Actual Poultry Federally Inspected 1981 Through 1992 and Projections to 1997

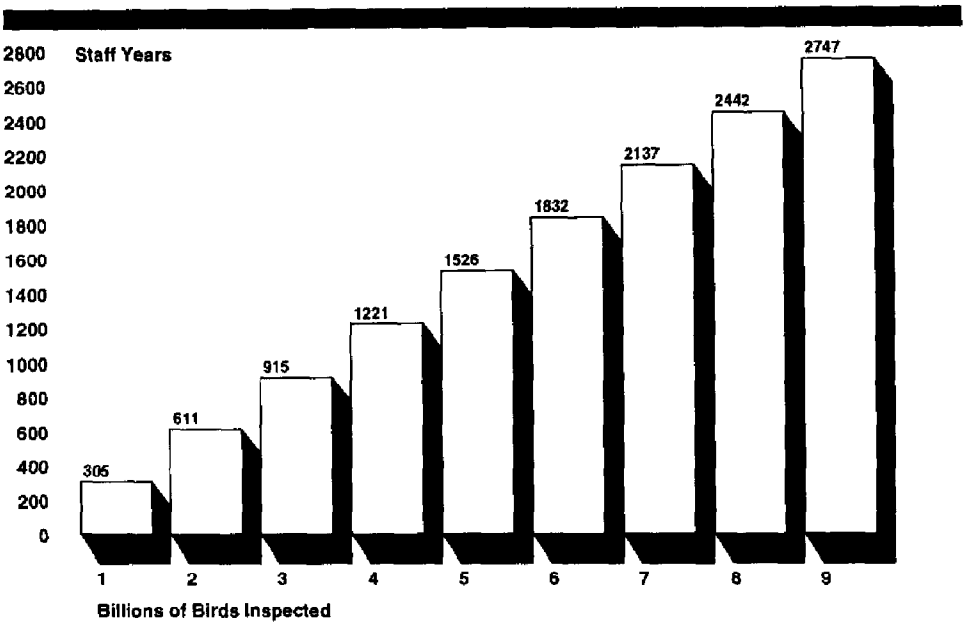


_____ Actual figures.

---- Projected growth based on information provided by the Economic Research Service, USDA, and the National Broiler Council.

Source: 1981 through 1992 FSIS Annual Reports and USDA and National Broiler Council officials.

Figure III.7: Minimum Staff Year Requirements for Carcass-By-Carcass Poultry Inspection at the Fastest Line Speeds

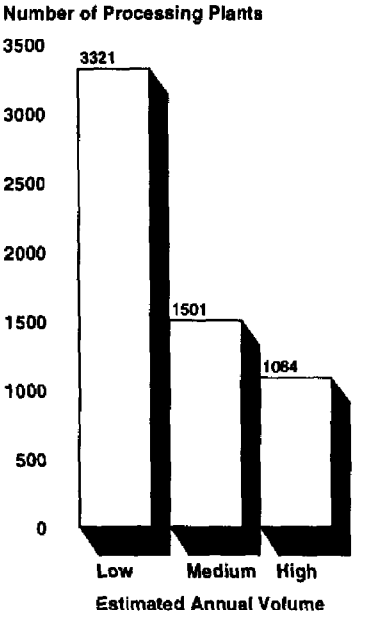


Source: GAO calculations based on FSIS inspection requirements.

Daily Inspection of Numerous Plants Limits FSIS' Ability to Allocate Resources

Daily inspection of processing plants limits FSIS' ability to adjust inspection frequencies to changing public health risks. FSIS' inspection policy requires FSIS to inspect all processing plants daily, or once per shift if a plant operates more than one 8-hour shift. Therefore, all plants, regardless of public health risk, history of compliance with regulatory requirements, or type of processing controls, receive the same frequency and intensity of inspection. FSIS officials told us that 5,906 meat and poultry plants were conducting processing activities as of March 1993. Of these plants, 56 percent, or 3,321, are small or "low" volume operations that produce an estimated 1 million pounds or less of product annually. (See fig. III.8.)

Figure III.8: Size of Meat and Poultry Processing Plants



Notes: Low volume: Processes 1 million pounds per year or less.

Medium volume: Processes between 1 and 10 million pounds per year.

High volume: Processes more than 10 million pounds per year.

Source: PBIS National Database, FSIS, (Jan.-Mar. 1993).

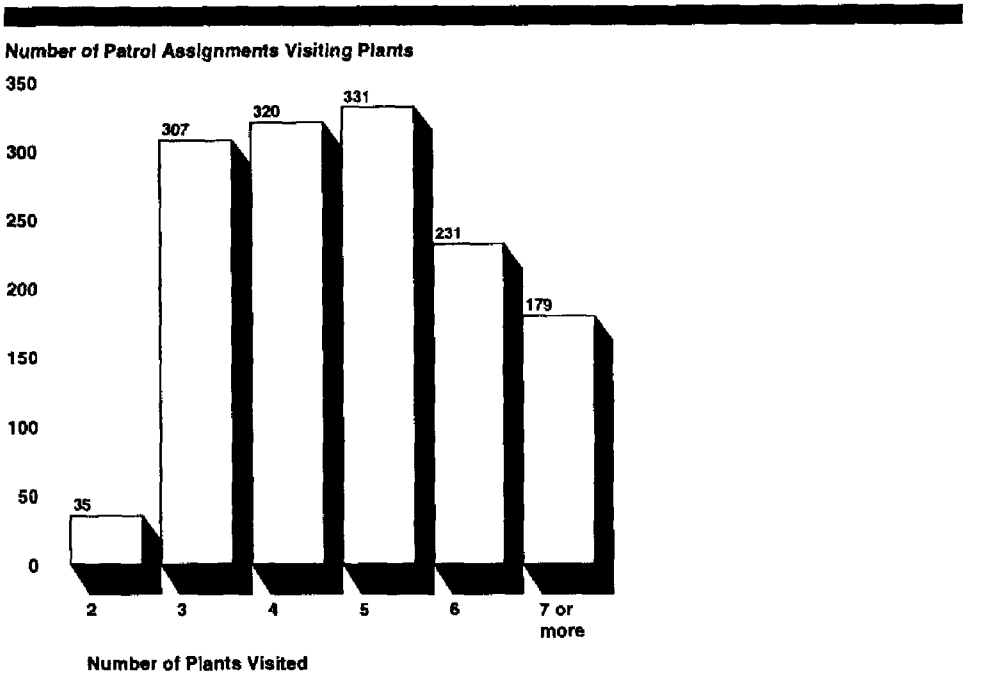
Because all processing plants must be inspected at least daily and small plants do not provide a full days work, many processing inspectors, who operate under "patrol assignments," must spend time traveling between several plants daily. Most of FSIS' 1,400 patrol assignments (both first and second shifts) comprise three to six plants and thus require considerable travel time and transportation cost. (See fig. III.9.)

Processing inspectors conduct various inspection tasks daily. On average, an estimated 11 percent of processing inspectors' time is spent traveling. (See fig. III.10.) This equals about 240 staff years and costs FSIS about $8.1 million annually based on an average yearly salary of $33,800 for a processing inspector. In addition, about $11 million is spent annually to

reimburse inspectors for use of their cars and other travel expenses associated with patrol assignments.

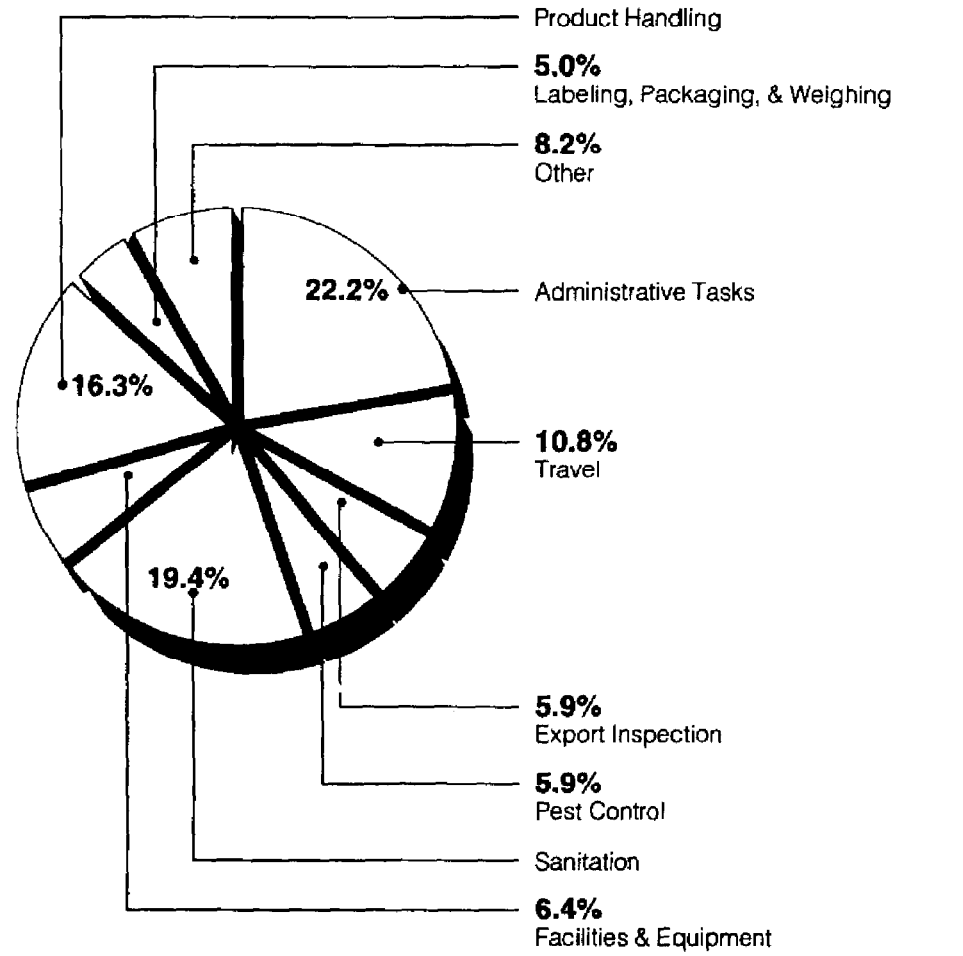
FSIS believes that in order for an inspector to make a judgment that a processing plant's overall sanitation and operations are adequate to ensure a wholesome product, the inspector must maintain a certain presence in the plant over a period of time. FSIS has determined that a minimal presence requires an inspector to visit a plant not only once a day, but during every shift and additionally during overtime hours. FSIS' rationale includes the argument that because employees and product mix are likely to change between shifts, it would be inappropriate to assume that the overall sanitation and operations measured during one shift represented a plant's performance during another shift. On average, about 1,300 of the 5,900 processing plants require a second FSIS inspection each day because the plants run a second shift. In addition, on average, at least 258 plants receive a separate inspection because they conduct overtime operations. (See fig. III.11.)

Figure III.9: Number of Processing Patrol Assignments by Number of Plants Visited



Source: FSIS, Office of Inspection Operations.

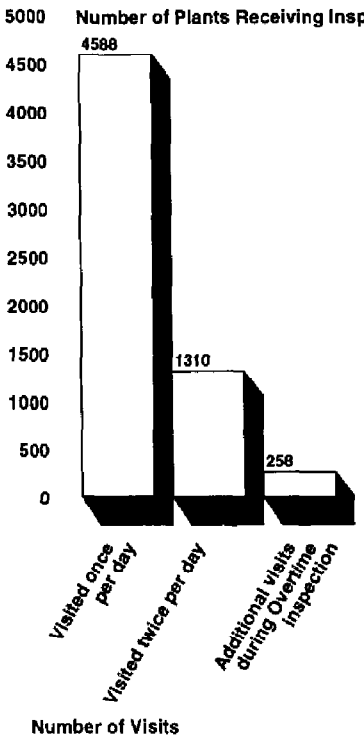
Figure III.10: Percent of Time Spent on Processing Inspection Tasks Between April 1992 and March 1993



Note: Administrative Tasks include paperwork, follow-up on problem areas, and personal time.

Source: Percentages estimated by GAO based on data provided by the Processed Products Inspection Division, FSIS.

Figure III.11: Frequency of Daily Inspection Visits to Meat and Poultry Processing Plants



[a]Although FSIS could not determine actual number of visits conducted during overtime hours, we estimated that, on average, a minimum of 258 visits would occur each day.

Source: FSIS, Office of Inspection Operations.

Some Plants Independently Test for Microbial Contaminants

While FSIS has no microtesting requirements, many of the plants that we contacted conducted tests for microbial contaminants. This appendix provides detailed information on the microtesting conducted by the plants we contacted.

Number of Plants That Conduct Microtesting

Almost one-half of the plants that we contacted conducted microtesting. Processing plants were more likely to conduct microtesting than slaughter plants. For example, 56 percent, or 46, of the 82 processing plants conducted microtesting, compared with 21 percent, or 3, of the 14 slaughter plants. Of the 27 combination plants—plants that performed both slaughter and processing operations—24 conducted microtesting in both their slaughter and processing facilities, the other 3 combination plants conducted tests only in their processing facilities.

Table IV.1: Plants With Microtesting Programs

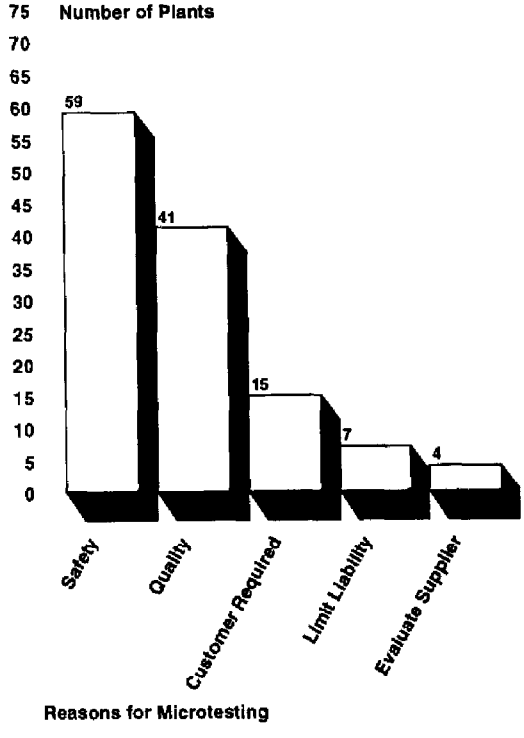
Plants	Number of plants contacted	Number of plants microtesting	Percent of plants microtesting
Slaughter	14	3	21
Processing	82	46	56
Combination	61	27	44
Total	**157**	**76**	**48**

Source: GAO meat and poultry plant survey.

Plant Testing Primarily Aimed at Improving Product Safety

Product safety was the most common reason plants' cited for microtesting. Product quality was a close second. Figure IV.1 shows plants' responses to the question, "Why do you microtest?" Plant officials were not restricted in their responses and often cited more than one reason.

Figure IV.1: Plants' Reasons for Microtesting



Note: Limit liability means that some plants used microtesting as one way to verify the safety and quality of their products should there be a legal dispute with a customer or consumer.

Source: GAO meat and poultry plant survey.

Microtesting Leads to Constructive Changes

Based on high bacterial counts or the presence of pathogens identified through microtesting, 74 of the 76 plants made constructive changes to improve their product safety and quality. These changes can be placed into four general categories: equipment/facility design; sanitation practices; employee awareness; and supplier/product management. The following are specific examples of plant changes made to reduce high microbial counts.

Equipment/Facility Design

Thirty of the plants discovered through their microtesting programs that certain pieces of equipment or the facility itself tended to harbor bacteria. Examples of actual changes made in the design of the equipment or facility include:

- Cutting holes in machines to provide for better access for cleaning.
- Cutting grooves in floor drains to facilitate flow and reduce drain water backup.
- Removing scrapers designed to dislodge excess fat from the conveyor belt because they spread bacteria across the entire conveyor belt.

Sanitation Practices

Sixty-four of the plants identified through microtesting more effective sanitation practices. Examples of improved sanitation practices include:

- Changing cleaning solutions.
- Replacing rather than trying to clean conveyor belts.
- Removing conveyor belts for cleaning rather than cleaning them in place.
- Soaking carcass shrouds in salt and iodine solutions to reduce bacterial growth.

Employee Awareness

Forty plants said that microtesting enabled them to increase employee awareness of and appreciation for good hygiene practices and proper sanitation procedures. Examples of actions taken to improve employee awareness include:

- Focusing employee training on problem areas identified through microtesting.
- Posting additional sanitation signs near identified problem areas.
- Providing disposable sleeves and requiring employees to use them.
- Having the plant microbiologist spend time looking for violations of plant sanitation and employee hygiene practices.

Supplier/Product Management

Forty-four plants used microtesting to improve product safety and quality by better managing their suppliers or production processes. Examples of actions taken to manage suppliers and production processes include:

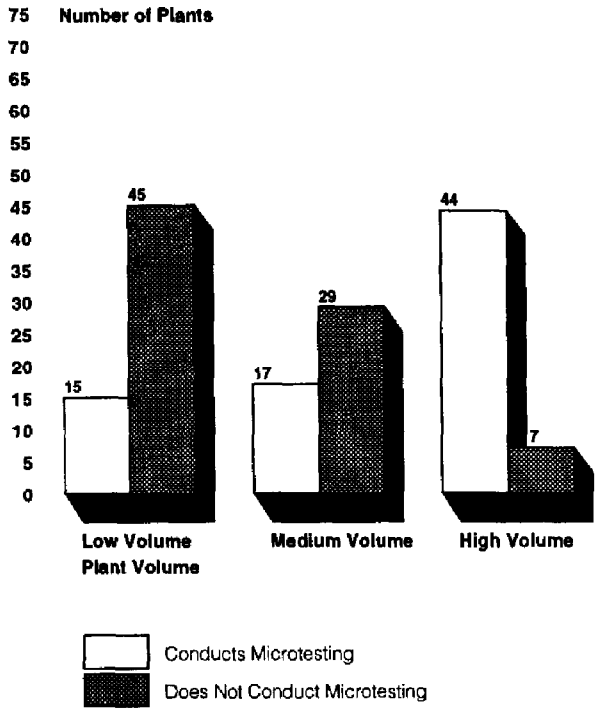
- Advising suppliers of high bacterial counts and requesting that the counts be lowered.
- Assisting suppliers identify and eliminate sources of high bacteria counts.
- Dropping suppliers that continually provided products with excessive bacterial counts.
- Tying-off the intestinal tract and clipping the hide prior to their removal.
- Washing, after each use, the clips used to hang carcass.
- Recalling or placing potentially unsafe products on hold.

- Recooking products that exceeded plant microbial standards.
- Dropping product lines that consistently exceeded plant microbial standards.

Larger Plants More Likely to Conduct Microtesting

The more a plant produced, the more likely it was to conduct microtesting. Figure IV.2 shows the number of low-, medium-, and high-volume plants that conducted microtesting.

Figure IV.2: Larger Plants Are More Likely to Conduct Microbial Tests



Notes: Low volume: Processes 1 million pounds per year or less.

Medium volume: Processes between 1 and 10 million pounds per year.

High volume: Processes more than 10 million pounds per year.

Source: GAO meat and poultry plant survey.

Plant Programs Vary

Plants' microtesting programs varied according to when and where they tested, how often they tested, and the types of tests they conducted.

Testing Frequencies Varied

Plants varied in how often they tested. Some plant programs called for a few equipment or product tests supplemented by additional tests when a bacterial or pathogen problem was suspected, such as when they found a drop in shelf life. Other plants, however, tested much more frequently because microtesting was a key part of their quality control program. Table IV:2 shows the number of tests plants performed throughout the week.

Table IV.2: Frequency of Testing

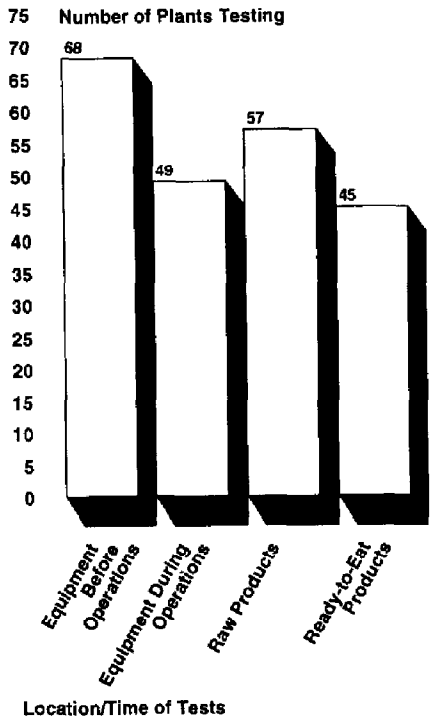
Tests per week	Number of plants testing equipment	Number of plants testing product
1-10	6	7
11-100	40	23
101-500	10	6
Over 500	2	2
Do not test	1	8
Not specified	17	30
Total	**76**	**76**

Source: GAO meat and poultry plant survey.

Types of Tests Conducted Varied

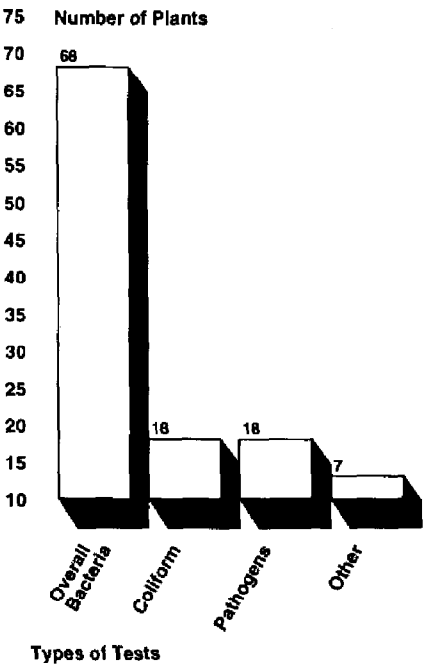
Another variation in program design was what was tested and the types of tests conducted. There are different types of microbial tests, each designed to indicate the presence of microbial organisms. Many plants chose to test for the total bacteria level, which does not identify specific bacteria but shows the cleanliness of equipment surfaces or the general product condition. Other plants tested for specific types of bacteria, particularly bacteria that cause foodborne illnesses. Figure IV.3 shows the number of plants that tested equipment surfaces before and during operations and raw and ready-to-eat product samples. Figures IV.4 through IV.7 show by test type, the number of plants testing equipment surfaces before and during operations and the number of plants testing raw and ready-to-eat products. The data shown in figures IV.4 through IV.7 may differ from the data shown on figure IV.3 because some plants test for general bacterial levels only, some plants test for specific pathogens and not for general bacteria levels, and others test for both general bacteria levels and specific pathogens.

Figure IV.3: Number of Plants Testing Equipment Surfaces and Products



Source: GAO meat and poultry plant survey.

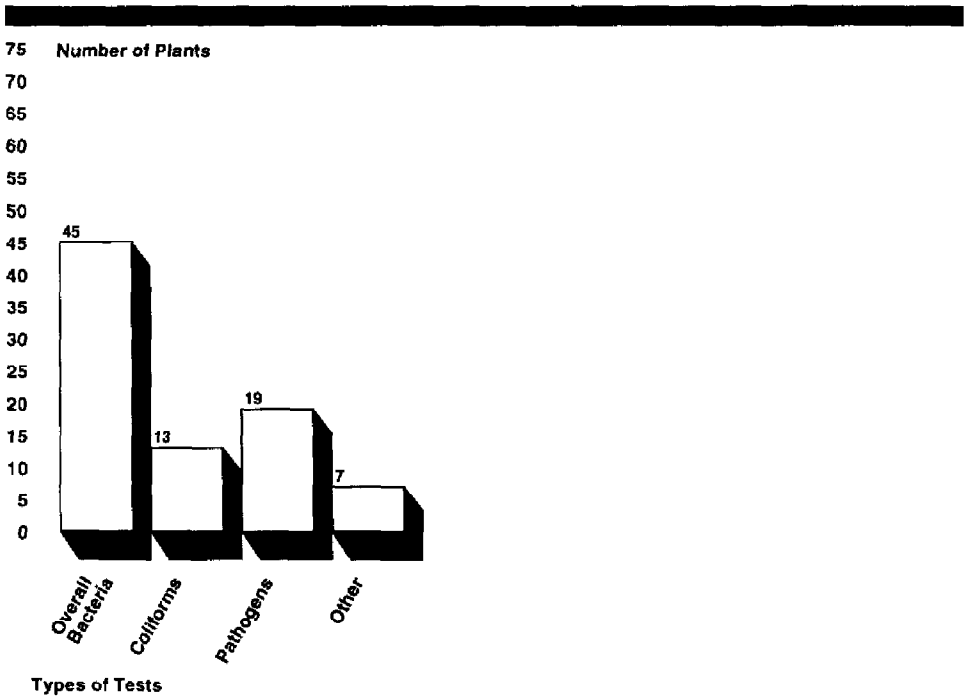
Figure IV.4: Types of Tests Conducted on Equipment Prior to Operations



Note: Examples of pathogen tests include E. coli, salmonella, listeria, and staphylococcus. Examples of other tests include yeast and mold.

Source: GAO meat and poultry plant survey.

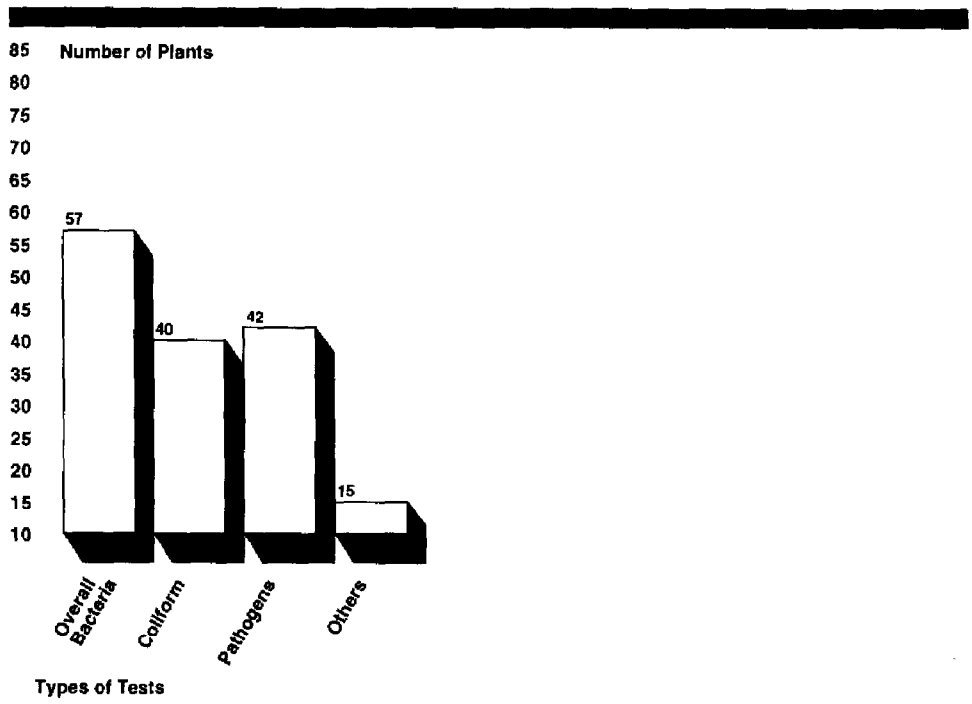
Figure IV.5: Types of Tests Conducted on Equipment During Operations



Note: Examples of pathogen tests include E. coli, salmonella, listeria, and staphylococcus. Examples of other tests include yeast and mold.

Source: GAO meat and poultry plant survey.

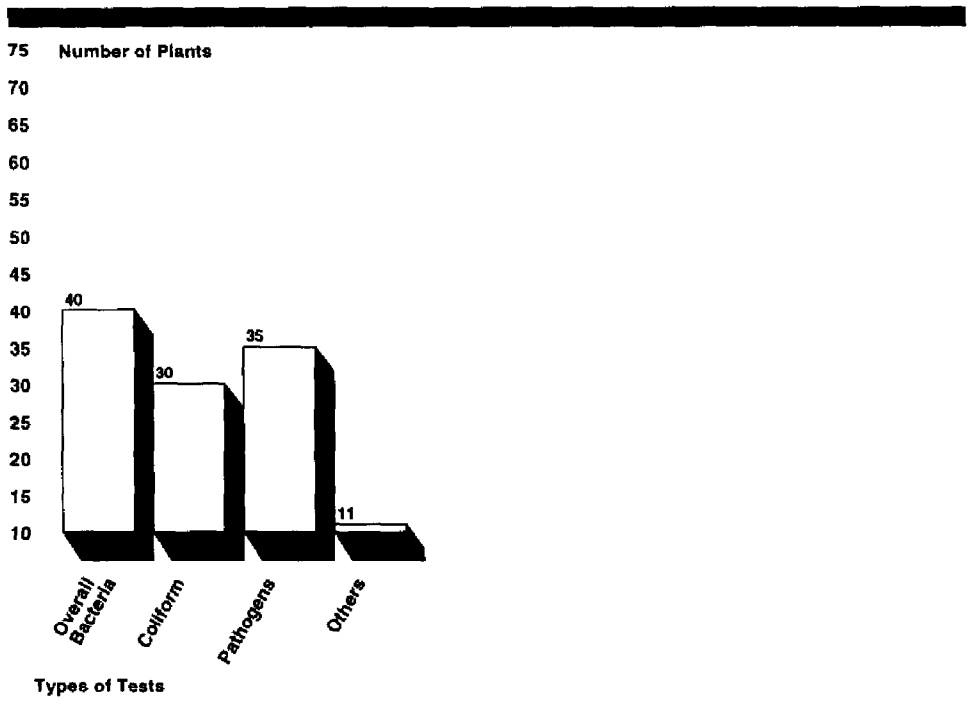
Figure: IV.6: Types of Tests Conducted on Raw Products



Note: Examples of pathogen tests include E. coli, salmonella, listeria, and staphylococcus. Examples of other tests include yeast and mold.

Source: GAO meat and poultry plant survey.

Figure IV.7: Types of Tests Conducted on Ready-To-Eat Products



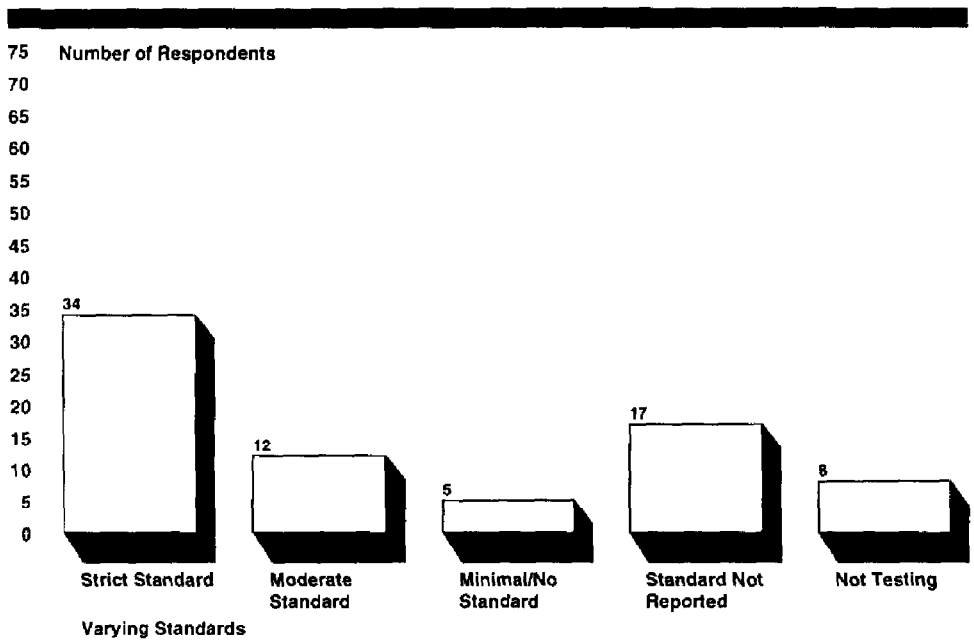
Note: Examples of pathogen tests include E. coli, salmonella, listeria, and staphylococcus. Examples of other tests include yeast and mold.

Source: GAO meat and poultry plant survey.

Evaluation Standards Vary

Plants use different standards to evaluate their test results. What was an acceptable level of bacteria for one plant, was unacceptable at another plant. To illustrate this point, figures IV.8 through IV.11 show the variation in plants' test evaluation standards.

Figure IV.8: Standard Plate Count Criteria Applied to Equipment Tests Made Prior to Operations



Notes: Strict Standard: 0-500 colonies per square inch.

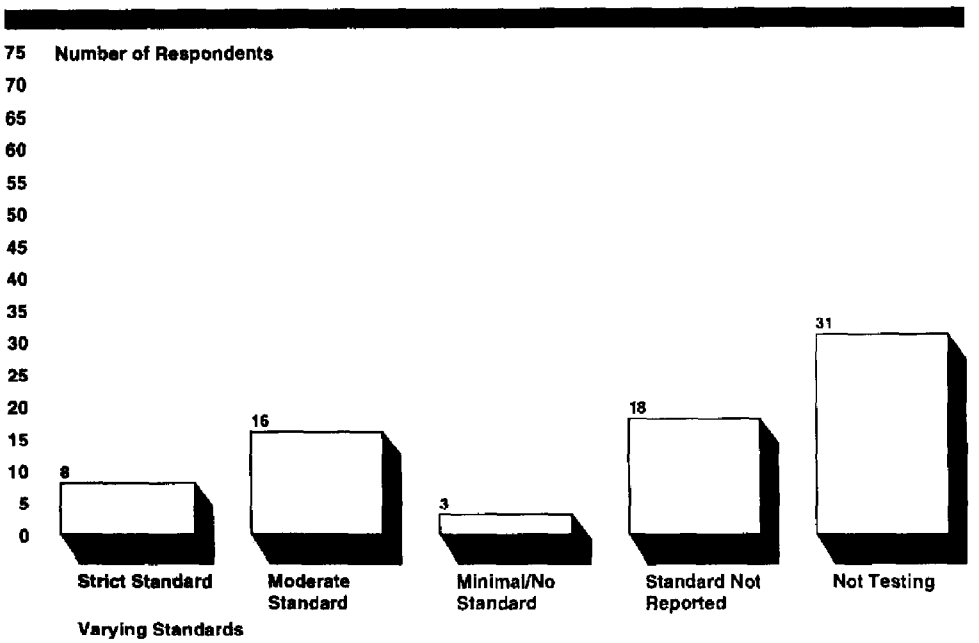
Moderate Standard: 501-100,000 colonies per square inch.

Minimal/No Standard: Over 100,000 colonies per square inch.

Not testing: Plants not testing for bacteria during operations.

Source: GAO meat and poultry plant survey.

Figure IV.9: Standard Plate Count Criteria Applied to Equipment Tests Made During Operations



Notes: Strict Standard: 0-500 colonies per square inch.

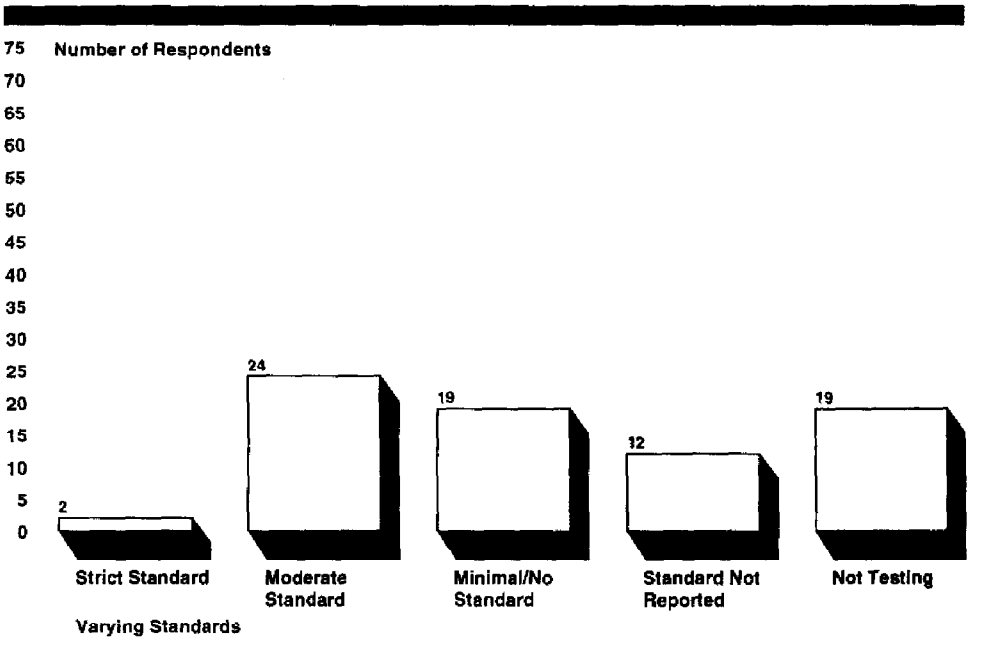
Moderate Standard: 501-100,000 colonies per square inch.

Minimal/No Standard: Over 100,000 colonies per square inch.

Not testing: Plants not testing for bacteria during operations.

Source: GAO meat and poultry plant survey.

Figure IV.10: Standard Plate Count Criteria Applied to Tests of Raw Products



Notes: Strict Standard: 0-500 colonies per square inch.

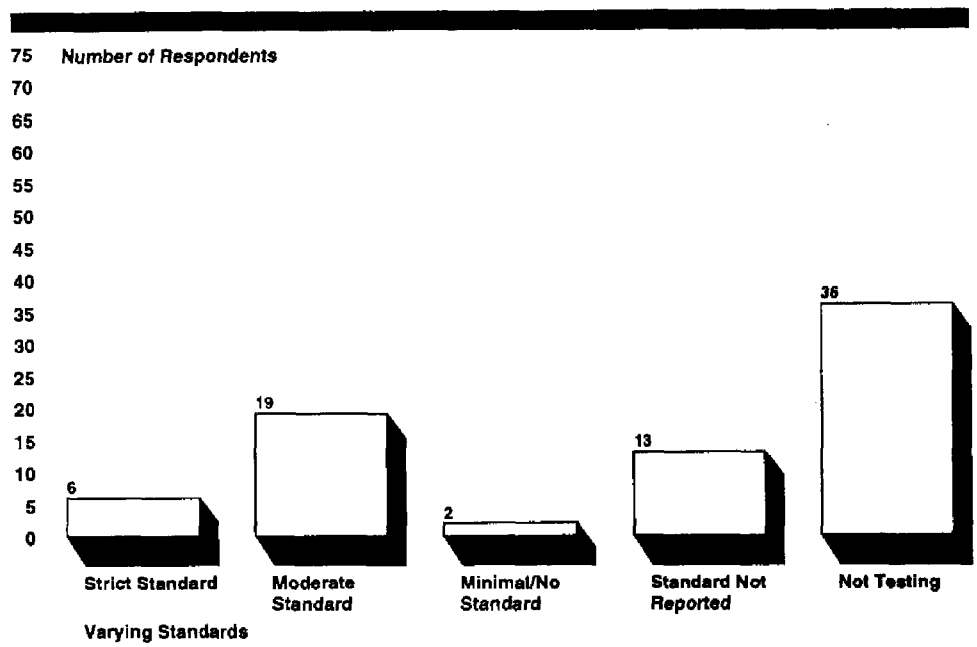
Moderate Standard: 501-100,000 colonies per square inch.

Minimal/No Standard: Over 100,000 colonies per square inch.

Not testing: Plants not testing for bacteria during operations.

Source: GAO meat and poultry plant survey.

Figure IV.11: Standard Plate Count Criteria Applied to Tests of Ready-To-Eat Products



Notes: Strict Standard: 0-500 colonies per square inch.

Moderate Standard: 501-100,000 colonies per square inch.

Minimal/No Standard: Over 100,000 colonies per square inch.

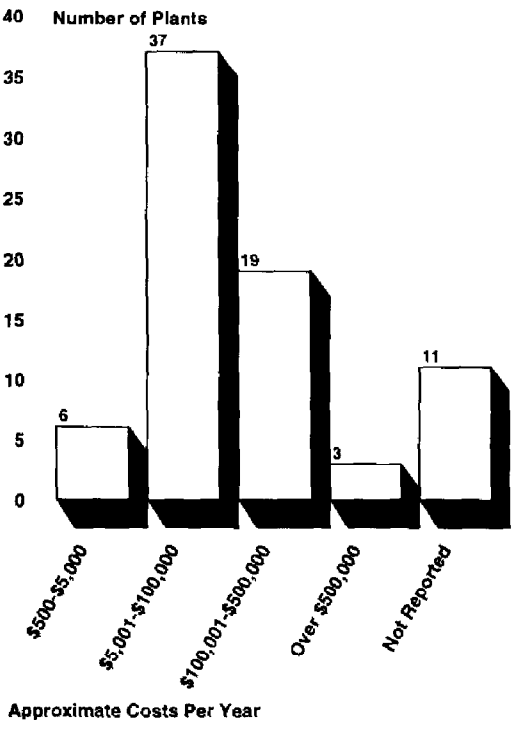
Not testing: Plants not testing for bacteria during operations.

Source: GAO meat and poultry plant survey.

Program Costs Vary

Plants' microtesting programs varied in their annual costs. Figure IV.12 shows a breakout of plants according to how much they spent each year.

Figure IV.12: Approximate Annual Costs of Plants' Microtesting Programs



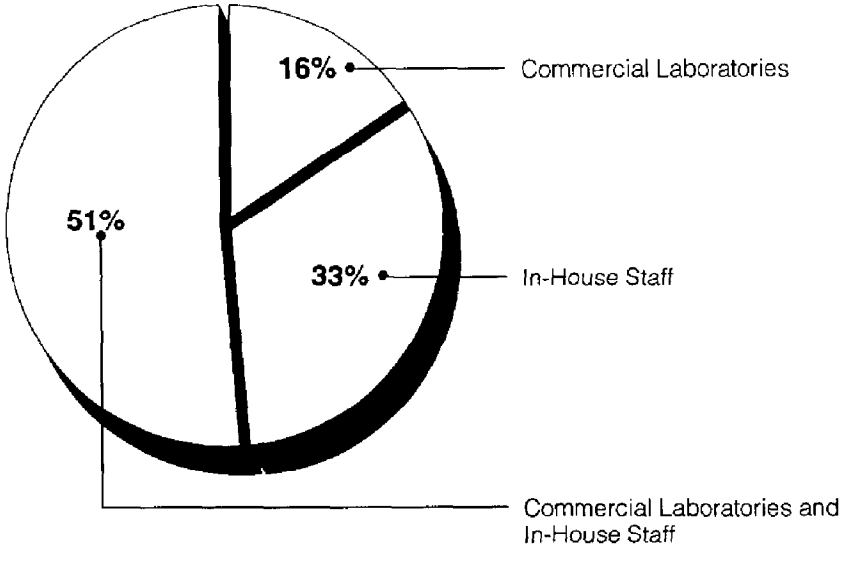
Note: Not reported: Program costs were either not readily available or considered proprietary.

Source: GAO meat and poultry plant survey.

Plants Seek Outside Assistance

FSIS provided plants little assistance in developing and/or operating microtesting programs so plants sought such assistance elsewhere or relied on in-house staff expertise. Figure IV.13 shows the percentage of plants that sought outside assistance, relied on in-house expertise, or used both outside assistance and in-house expertise.

Figure IV.13: Sources Used for the Design and Operation of Plant Microtesting Programs

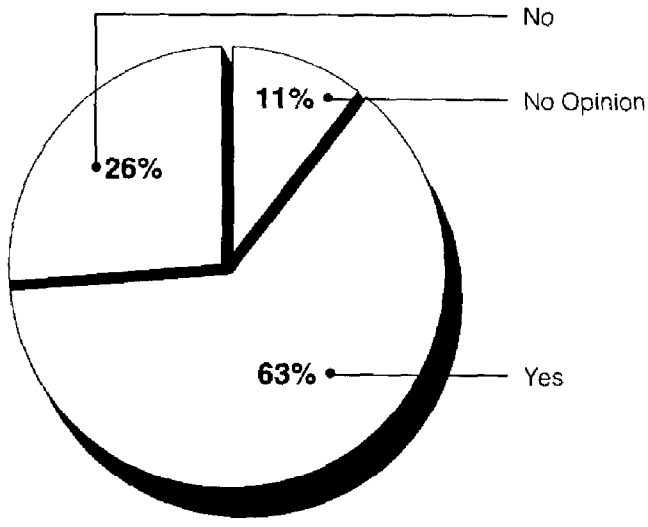


Source: GAO meat and poultry plant survey.

Need for FSIS Assistance

Almost two-thirds of the plants with microtesting programs believed that FSIS should provide more assistance. Figure IV.14 shows plants' views on whether FSIS should provide more guidance to plants operating microtesting programs and assistance to plants wanting to establish microtesting programs.

Figure IV.14: Should FSIS Provide Plants Guidelines and Assistance on Microtesting?



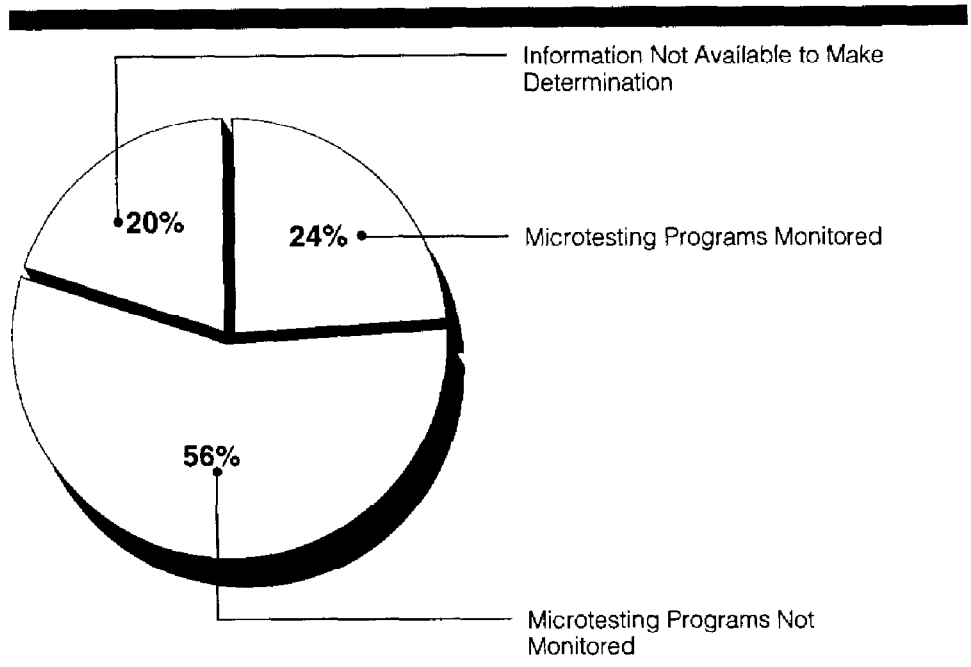
Note: These percentages represent the views of the 76 plants GAO contacted that had microtesting programs.

Source: GAO meat and poultry plant survey.

FSIS Not Aware of Plants' Microbial Testing Results

FSIS does not routinely monitor plant microtesting programs and thus is not in the position to disseminate information on problems identified and/or improvements made because of microbial testing. Figure IV.15 shows that FSIS routinely monitored about one-fourth of the plants microtesting procedures or test results.

Figure IV.15: Plant Microtesting Programs Monitored by FSIS



Source: GAO analysis of FSIS records.

Comments From the U.S. Department of Agriculture

DEPARTMENT OF AGRICULTURE
OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20250

April 8, 1994

Mr. Keith O. Fultz
Assistant Comptroller General
U.S. General Accounting Office
Washington, DC 20548

Dear Mr. Fultz:

Thank you for the opportunity to comment on your draft report entitled, "FOOD SAFETY: Risk-Based Inspections and Microbial Monitoring Needed for Meat and Poultry." I believe that Congress and the public have every right to expect the safest food products possible. Over the past year, the Food Safety and Inspection Service (FSIS) has made several major improvements in the current program and has strengthened it in other areas. These include the Pathogen Reduction Program, more uniform enforcement by inplant inspection personnel, unannounced reviews, improvements in consumer education, and legislative proposals. I believe you will see that our new approach to food inspection sends a strong message: we must protect the public health and there can and will be no compromises.

In recent years and, most recently, due to the deaths and illnesses from the foodborne pathogen E. coli 0157:H7, the call for safe food has intensified. It is painfully clear that, today, microbiological hazards are the major threat to public health identified with consumption of meat and poultry. In quick response to the outbreak of 1993, we accelerated our program to reduce microbial contamination from farm to table, and we have been moving aggressively to implement various components of the program. I would like to highlight the steps taken and being planned in our fight against pathogens.

Measures Underway to Enhance Microbiological Safety

Since January 1993, the U.S. Department of Agriculture (USDA) has worked to design and put in place a far-reaching pathogen reduction program that addresses many steps in the production, distribution, and preparation of meat and poultry products. Our pathogen reduction program emphasizes food safety from farm to table to improve public health protection. The Department is designing model, on-farm programs for reducing or preventing human pathogens in live animals, a role defined as "preharvest food safety." FSIS and the Animal and Plant Health Inspection Service have worked on new legislation to allow the USDA to require animal identification and traceback. The legislative package is under review. FSIS is currently writing new rules to strengthen requirements that meat and poultry plants maintain records that will help identify and trace back product.

Another important step was to launch nationwide, microbial baseline studies to determine the presence and levels of pathogens on meat and poultry. The profiles will give FSIS yardsticks against which to measure progress to reduce risks associated with microbial contaminants. The first survey on steer and heifer slaughter plants is complete and results show that E. coli 0157:H7 was recovered from 0.2 percent, or four of 2,081 sample carcasses.

A similar study is ongoing on cows and bulls, a major source of ground beef. A microbial baseline study for poultry began in February 1994, and will be followed by a swine survey. Microbial monitoring at critical control points in beef slaughter and ground beef processing operations to evaluate process controls to minimize bacterial contamination is also being conducted.

The Clean Meat Program is another effort in our pathogen reduction program. In February 1993, FSIS issued instructions to all inplant personnel that they were to ensure that all visible fecal, ingesta, and milk contamination is removed from beef carcasses as part of the inplant slaughter inspection procedures. This stricter enforcement of the "zero tolerance" policy went into effect immediately, and work on the uniformity of enforcement continued throughout last year. On March 9, 1994, the Secretary announced a proposal to improve poultry inspection which will include microbial improvements and stricter enforcement of the prohibition of all visible fecal matter on raw product. The Secretary's Enhanced Raw Poultry Safety Program is another step to further incorporate science and new technology in the meat and poultry system.

In a Federal Register Notice of October 21, 1993, FSIS described the circumstances under which it would evaluate unsolicited test kits and specified the performance criteria which it considered necessary for in-plant rapid methods. In a Commerce Business Daily (CBD) solicitation of November 19, 1993, the Agency identified the technologies which it considered most promising in terms of their potential to advance the technology and requested that companies working with these technologies advise the Agency if they believed their work could be useful. Also, in a series of Requests for Proposals, appearing in the CBD beginning March 24, 1994, FSIS is seeking competitive bids for work in these areas.

Because a critical element in the defense against foodborne illness is to handle food properly, USDA has mandated safe handling instructions on every package of fresh and partially cooked meat. A final rule for a safe handling label on raw meat and poultry, published in the Federal Register on March 28, 1994, mandates that all raw or partially cooked ground meat and poultry must have the label in 60 days of publication of the rule, and all other not-ready-to-eat meat and poultry products must have

the label by July 6, 1994. A large percentage of industry groups are already voluntarily placing safe handling labels on their products.

In addition, USDA, the Food and Drug Administration and the Centers for Disease Control (CDC) are working together with state and local officials to increase awareness of proper sanitation and food handling practices among food preparers. FSIS on January 10, 1994, placed a person at CDC in Atlanta to provide liaison with that agency's epidemiologists and medical professionals to enhance the public health activities of the FSIS. Other intensified efforts include: video news releases on the new safe handling label; working with meat and supermarket associations on point-of-purchase materials to explain the new label; and preparing materials to educate consumers on safe handling of hamburger meat. We also believe the safe handling label will educate food handlers.

We have strengthened inspection oversight with more frequent and more intense, unannounced and specially targeted reviews by a newly established Review and Assessment (R&A) office. The unit conducts reviews and assessments of our programs, investigates reports of deficiencies in meat and poultry plants, and maintains a complaint tracking system. R&A has established a priority goal to conduct 1,000 plant reviews--to date, approximately 300 of the 1,000 have been completed. These unannounced reviews, coupled with inspection enforcement, have increased considerably the number of meat and poultry plants under the Progressive Enforcement Action program. We are sending a clear message that our inspectors will continue to aggressively work to hold plants to the highest standards.

FSIS also hired 200 new inspectors to ensure proper coverage in plants and has asked for 200 additional inspector positions in the 1995 budget. The legislative package being reviewed by the Department includes proposals for new laws to assess civil penalties to violators of meat and poultry laws. The Agency's recent regulation prescribing strict procedures for preparing and handling cooked meat patties in Federal plants is another example of tougher food safety requirements.

Comments on GAO's Conclusions and Recommendations

The Department has clearly indicated that the current inspection system must be shifted to a system based on science and risk. The Track I and Track II initiatives announced by the Department are intended to do just that. Recognizing the need to make improvements in the existing system while planning for the system of the future, a number of activities have been undertaken in Track I to tighten enforcement of existing sanitation and product

safety requirements. At the same time, activities have been initiated in Track II to move as rapidly as possible to the science and risk-based system of the future.

To the extent that current law restricts movement toward a science and risk-based inspection system, changes may be needed that will allow the Department to take advantage of the full range of research, animal health, inspection and laboratory methods, enforcement techniques, and educational methods available now or in the future. Greater flexibility in adjusting resources to target the most serious food safety risks may also be important.

The Hazard Analysis Critical Control Point (HACCP) system holds promise in preventing contamination and controlling key points in production, distribution, and preparation of meat and poultry. USDA has fully endorsed industry development of HACCP programs that will reach from farm to table. We have also indicated our intent to move beyond current voluntary approaches to mandate HACCP through regulations.

Sincerely,

Patricia Jensen
Acting Assistant Secretary
Marketing and Inspection Services

Objectives, Scope, and Methodology

Concerned about the effectiveness of FSIS' meat and poultry inspection system, the Chairman, Subcommittee on Department Operations and Nutrition, and the Ranking Minority Member, Subcommittee on Livestock, House Committee on Agriculture, asked us to evaluate whether (1) the system makes the most effective use of its resources to ensure food safety, (2) meat and poultry plants have programs to test for microorganisms, and (3) a quality control concept known as Hazard Analysis and Critical Control Point (HACCP) is an effective approach for ensuring food safety.

To assess whether FSIS makes the most effective use of its resources to ensure that the food supply is safe, we interviewed FSIS officials and obtained data on FSIS resource allocation and slaughter volume between fiscal years 1981, the year FSIS was created, and 1993. We (1) reviewed scientific publications, including reports by the National Academy of Sciences and Centers for Disease Control (CDC), which explained the principal public health risks associated with meat and poultry products and (2) evaluated how FSIS's resources are allocated to various inspection tasks intended to protect the public from these risks. In addition, we interviewed CDC officials to determine the extent and causes of foodborne illnesses associated with meat and poultry products.

We also reviewed legislation pertaining to meat and poultry inspection, USDA and FSIS budgets, and FSIS documents to determine federal inspection requirements in domestic meat and poultry plants and how FSIS has allocated personnel and funds to fulfill these requirements. We obtained USDA and private sector officials' views on the future growth of the meat and poultry industry and how such growth would impact FSIS' ability to meet its mandated inspection requirements. Where complete data on use of resources were unavailable, we computed estimates by using methodologies suggested by FSIS officials.

To determine the extent of industry microbial testing programs, we interviewed officials at FSIS headquarters in Washington, D.C., and FSIS North Central, Northeastern, Southwestern, and Western Regional Offices in Des Moines, Iowa; Philadelphia, Pennsylvania; Dallas, Texas; and Alameda, California, respectively. We also reviewed FSIS inspection plans and reports. In addition, we contacted 157 judgmentally selected meat and poultry plants. The plants were selected to both ensure geographic coverage and coverage of plant operations—that is, slaughter and processing operations. FSIS officials assisted us in identifying the FSIS regions and circuits (a group of plants under an individual FSIS supervisor) from which we selected the plants to contact. From each circuit we

selected all the slaughter and combination slaughter/processing plants and randomly selected from the remainder of the circuit the number of large and small processing plants that could be contacted in the time allowed for field visits. However, because the plants contacted were judgmentally selected, the results obtained cannot be used to make statements about the total universe of meat and poultry plants. The information obtained about plant microtesting programs only applies to the 157 plants we contacted in California, Kansas, Maryland, Pennsylvania, Virginia, and Wisconsin.

We obtained explanatory documentation of plant programs, test results, and changes made, when possible. Although some plants viewed this information as proprietary and thus were not willing to provide copies of such information, they generally showed us program documents that supported the general scope and results of their microtesting programs.

To determine whether HACCP is an effective quality control system for ensuring food safety, we interviewed USDA, Food and Drug Administration, and industry officials and reviewed documentation on past and present uses of this system. We also interviewed various industry, federal, and advocacy organization members to obtain their views on FSIS' current inspection system and whether the need for a new system existed.

We performed our review between April 1993 and January 1994, in accordance with generally accepted government auditing standards.

Major Contributors to This Report

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