

June 2015

Meat Industry Survey in Support of Public Health Risk-Based Inspection

Contract No. AG-3A94-B-13-0003

Order No. AG-3A94-K-13-0053

Final Report

Prepared for

Gary Noyes

USDA, FSIS/OPPD
Patriot Plaza III, Office 8-124C
355 E. St. SW
Washington, DC 20024

Prepared by

Catherine Viator

Sheri C. Cates

Shawn A. Karns

Peter Siegel

Jenna E. Brophy

Ariana Napier

Mary K. Muth

RTI International
3040 E. Cornwallis Road
Research Triangle Park, NC 27709

RTI Project Number 0214016.001.002.001

RTI Project Number
0214016.001.002.001

Meat Industry Survey in Support of Public Health Risk-Based Inspection

Contract No. AG-3A94-B-13-0003

Order No. AG-3A94-K-13-0053

Draft Report

June 2015

Prepared for

Gary Noyes

USDA, FSIS/OPPD
Patriot Plaza III, Office 8-124C
355 E. St. SW
Washington, DC 20024

Prepared by

Catherine Viator

Sheri C. Cates

Shawn A. Karns

Peter Siegel

Jenna E. Brophy

Ariana Napier

Mary K. Muth

RTI International
3040 E. Cornwallis Road
Research Triangle Park, NC 27709

Contents

Section	Page
1 Introduction	1-1
2 Sample Design	2-1
2.1 Sampling Frame.....	2-1
2.2 Stratification.....	2-2
2.3 Sample Size and Precision	2-3
2.4 Systematic Sampling	2-4
3 Survey Design and Administration	3-1
3.1 Survey Instrument Design	3-1
3.2 Questionnaire Review	3-3
3.2.1 Pretest Interviews	3-3
3.2.2 Reviews by Government Agencies and Trade Associations	3-4
3.3 Survey Administration Procedures	3-4
4 Analysis Procedures	4-1
4.1 Survey Response and Eligibility Rates	4-1
4.2 Nonresponse Bias Analysis.....	4-3
4.3 Weighting Procedures	4-5
4.3.1 Initial Sampling Weights.....	4-5
4.3.2 Adjustment for Unknown Eligibility.....	4-5
4.3.3 Nonresponse Adjustment.....	4-6
4.4 Data Analysis Procedures	4-7

4.4.1	Data Entry, Coding, and Cleaning	4-7
4.4.3	Data Analysis.....	4-8
5	Survey Results	5-1
6	Comparative Analysis of 2005 and 2015 Survey Results	6-1
7	Conclusions	7-1
7.1	Key Findings.....	7-1
7.2	Lessons Learned	7-2
Appendixes		
A	Survey Instrument	A-1
B	FSIS Prenotice Letter, Informational Brochure, and Thank You/Reminder Postcard.....	B-1

Figure

Number	Page
3-1. Data Collection Procedures for the Meat Slaughter and Processing Industry Survey	3-5

Tables

Number	Page
2-1. Sampling Frame Counts for the 2005 and 2015 Meat Slaughter and Processing Surveys and Comparative Analysis	2-2
2-2. Universe Size for Federally Inspected Meat Slaughter and Processing Establishments	2-3
2-3. Sample Design for Federally Inspected Meat Slaughter and Processing Establishments	2-4
2-4. Survey Universe and Sample for Federally Inspected Very Small Meat Slaughter and Processing Establishments, by Region and Type of Species Slaughtered ^a	2-5
3-1. Types of Information Collected in the Survey	3-2
4-1. Meat Slaughter and Processing Survey Eligibility and Response Rates	4-2
4-2. Comparison of Respondents and Nonrespondents: Meat Slaughter and Processing Establishments	4-4
5-1. Weighted Responses for Section 1: Slaughter and Fabrication	5-6
5-2. Weighted Responses for Section 2: Further Processing	5-9
5-3. Weighted Responses for Section 3: Microbiological Testing Practices	5-13
5-4. Weighted Responses for Section 4: Packaging and Labeling	5-17
5-5. Weighted Responses for Section 5: Employee Training	5-19
5-6. Weighted Responses for Section 6: Establishment Characteristics	5-22
5-7. Frequency of Label Updates by Type of Label	5-28
5-8. Weighted Responses by Size for Section 1: Slaughter and Fabrication	5-33
5-9. Weighted Responses by Size for Section 2: Further Processing	5-38
5-10. Weighted Responses by Size for Section 3: Microbiological Testing Practices	5-42

5-11.	Weighted Responses by Size for Section 4: Packaging and Labeling	5-46
5-12.	Weighted Responses by Size for Section 5: Employee Training	5-50
5-13.	Weighted Responses by Size for Section 6: Establishment Characteristics	5-56
6-1.	Comparison of Weighted Responses for Section 1: Slaughter and Fabrication, 2005 and 2015	6-2
6-2.	Comparison of Weighted Responses for Section 2: Further Processing, 2005 and 2015	6-5
6-3.	Comparison of Weighted Responses for Section 3: Microbiological Testing Practices, 2005 and 2015	6-6
6-4.	Comparison of Weighted Responses for Section 5: Employee Training, 2005 and 2015	6-7
6-5.	Comparison of Weighted Responses for Section 6: Establishment Characteristics, 2005 and 2015	6-8

1

Introduction

FSIS requires up-to-date information on industry practices to conduct timely and reliable RIAs. The recurring industry surveys provide FSIS with timely data on practices used in the meat, poultry, and egg industries to control pathogens and promote food safety. This report describes the survey procedures and results for meat slaughter and processing establishments.

The Food Safety and Inspection Service (FSIS) is responsible for ensuring that domestic and imported meat, poultry, and egg products are safe, wholesome, unadulterated, and properly labeled and packaged. As FSIS works to improve the efficiency and effectiveness of its information and inspection systems, accurate and updated industry information is necessary for conducting a wide range of analyses. These analyses include, but are not limited to, regulatory impact analyses (RIAs) of its proposals and the economic impacts of its proposed actions on small business establishments, as required by the Office of Management and Budget (OMB). Although some establishment information is available through existing FSIS systems or can be obtained directly from frontline supervisors or inspectors-in-charge, other data must be obtained through voluntary industry surveys. To meet FSIS's data needs in support of public health risk-based inspection, FSIS contracted with RTI International to conduct surveys of the meat, poultry, and egg industries.

Beginning in 2001, RTI designed the surveys and prepared the OMB clearance package in collaboration with FSIS. Under separate contracts, the following surveys have been completed:

- Egg Packing and Egg Products Industries—2003
- Meat and Poultry Slaughter and Processing—2004–2005¹
- Meat and Poultry Processing Only—2005

¹ The survey was conducted from September 2004–January 2005. Because the survey ended in 2005 and the final report was published in 2005, it is referred to as the “2005 survey” in this report.

- Egg Products—2013

In the last decade, significant technological advancements have given establishments greater flexibility in their slaughter and processing procedures. Because establishments have recently adopted many of these advancements, the currently available information was inaccurate and incomplete. FSIS, therefore, needed a second round of the surveys to produce accurate RIAs reflecting current industry practices for proposed regulatory actions. Estimates of economic burden on small businesses of FSIS's planned rulemaking will be more accurate using the new data. Additionally, this round of the surveys, when compared with the previous round, permits FSIS to evaluate trends in industry practices and identify areas of concern.

In 2010, FSIS contracted with RTI to develop the questionnaires for this round of the surveys, conduct a pretest of the questionnaires, and refine the questionnaires based on the pretest (contract no. AG-3A94-B-08-0006). RTI also prepared an Information Collection Request (ICR) for submission to OMB for approval of the data collection for the four surveys. In 2012, FSIS issued the current contract with RTI to tailor the ICR previously developed to be specific to the meat slaughter and processing industry and to administer the survey. FSIS received OMB approval to conduct the Survey of Meat Slaughter and Processing Establishments in August 2014. RTI conducted the survey using a multimodal approach, allowing respondents to choose whether they wanted to complete a paper or Web survey, and making a series of reminder contacts to nonrespondents to encourage participation. This report describes the survey procedures and presents the results of the meat slaughter and processing survey.

The remainder of this report is organized as follows:

- Section 2 describes the sample design.
- Section 3 describes the design and administration of the survey.
- Section 4 describes the nonresponse bias analysis and weighting and data analysis procedures.

- Section 5 presents tabulated survey results in aggregate and by Hazard Analysis and Critical Control Point (HACCP) size.
- Section 6 presents a comparative analysis of the results from the 2005 and 2015 surveys.
- Section 7 concludes the report.

In addition, the appendices provide the following:

- Appendix A – Survey instrument
- Appendix B – FSIS prenotice letter, informational brochure, and thank you/reminder postcard

2

Sample Design

This section describes the sample design for the meat slaughter and processing establishment survey. We present details on the sampling frame, stratification procedures, sample size and precision, and our systematic sampling methods.

2.1 SAMPLING FRAME

FSIS's PHIS was used to develop the sampling frame of federally inspected meat slaughter and processing establishments. These establishments conduct slaughter activities and may or may not conduct processing activities.

The survey population was federally inspected meat slaughter and processing establishments. We used FSIS's Public Health Inspection System (PHIS) as the starting point for developing the sampling frame. PHIS is a comprehensive database of active meat, poultry, and egg products establishments under the jurisdiction of FSIS. It contains information on volume, annual revenue, number of employees, inspection activities, and contact information.

In consultation with FSIS, we decided to exclude certain types of establishments from the sampling frame so that the sampling frame was representative of the vast majority of establishments inspected by FSIS. Consistent with the approach used for the 2005 survey, we excluded:

- Establishments operating for objectives that are not strictly commercial (N = 36).¹
- Establishments located in a U.S. territory (N = 8) (because of the potential for language barriers in completing the survey).

We conducted a comparative analysis of the sampling frames for the current survey and the 2005 survey (see Table 2-1). Of

¹We searched the name of the establishment and excluded establishments that are universities, religious organizations, prisons, Native American organizations, and state and federal government facilities.

the 711 establishments in the sampling frame for the 2015 survey, 522 establishments were also in the sampling frame for the 2005 survey (189 of the establishments were not included in the sampling frame for the 2005 survey). Most of the differences are among very small establishments where there is more likely to be entry into and exit from the industry compared with small and large establishments. Additionally, it is not surprising that there are differences between the two frames because the procedures used to develop the frame for the 2005 survey were different. In 2005, we conducted concurrent surveys of the meat and poultry slaughter/processing industries and therefore, to minimize burden, we classified establishments that slaughter/process both meat and poultry into one category based on slaughter volume so that an establishment would not be required to complete more than one survey.

Table 2-1. Sampling Frame Counts for the 2005 and 2015 Meat Slaughter and Processing Surveys and Comparative Analysis

	Very Small	Small	Large	All
<i>Frame Count</i>				
2015	500	151	60	711
2005	517	214	66	797
<i>Comparative Analysis</i>				
Both 2015 and 2005	328	135	59	522
2015 only	172	16	1	189
2005 only	180	83	12	275

Large establishments have 500 or more employees, small establishments have 10 or more employees but fewer than 500, and very small establishments have fewer than 10 employees or less than \$2.5 million in annual sales.

2.2 STRATIFICATION

We stratified the sample by HACCP size² to provide results by size. Information on HACCP size was obtained from PHIS.

²Large establishments have 500 or more employees, small establishments have 10 or more employees but fewer than 500, and very small establishments have fewer than 10 employees or less than \$2.5 million in annual sales.

Table 2-2 provides the final universe size (i.e., population) for federally inspected meat slaughter and processing establishments by HACCP size.

Table 2-2. Universe Size for Federally Inspected Meat Slaughter and Processing Establishments

HACCP Size	Number of Establishments
Very Small	500
Small	151
Large	60
Total	711

2.3 SAMPLE SIZE AND PRECISION

An indication of the expected precision of sample survey estimates is the width of the 95% confidence intervals (CIs) calculated for statistics of interest. Decisions about desirable sample precision involve a trade-off between the need for accurate data and the costs of obtaining it. Larger sample sizes yield greater precision, but larger sample sizes also increase the cost of data collection.

In consultation with FSIS, we decided on a precision of $\pm 5\%$. That is, a CI would be no larger than 10% and would be centered around the estimated prevalence. Thus, the sample design specifies a sample size that is expected to yield precision of $\pm 5\%$ or better for estimates of all proportions, assuming we met our target eligibility and response rates.

We adjusted the required sample sizes upward for anticipated eligibility and response rates. The eligibility rate accounts for establishments that do not slaughter livestock or that are no longer in business. We assumed the same eligibility rates realized during the 2005 survey: 91% for very small establishments, 89% for small establishments, and 98% for large establishments. As specified in the ICR Supporting Statement submitted to the OMB, the target response rates were 66% for very small establishments, 77% for small establishments, and 82% for large establishments (the same response rates realized during the 2005 survey).

Because the sample size would require surveying all or nearly all establishments, we took a census of small and large meat slaughter establishments. We selected a sample of 436 very small meat slaughter establishments. We divided this sample into two subsamples: 403 establishments that were initially released for data collection and 33 establishments that were held in reserve. When we realized during data collection that the eligibility rate for very small establishments was lower than expected, we released the reserve sample of 33 establishments.

Table 2-3 summarizes the respondent universe, sample size, anticipated number of eligible establishments, and sample yield (i.e., anticipated number of respondents) by type and size of establishment. Our sample design was expected to yield 413 completed surveys with federally inspected meat slaughter and processing establishments.

Table 2-3. Sample Design for Federally Inspected Meat Slaughter and Processing Establishments

	Very Small	Small	Large	All
Universe	500	151	60	711
Sample size	436	151	60	647
Assumed eligibles	397	134	59	590
Expected sample yield	262	103	48	413

2.4 SYSTEMATIC SAMPLING

We used systematic sampling to select the sample for very small meat establishments.³ The purpose of systematic sampling (instead of random sampling) is to ensure that the selected sample adequately represents the entire respondent universe or population. Systematic sampling forces the sample to include establishments with varying characteristics, such as location and type of species slaughtered. With simple random sampling, the sample could be biased, because of coincidence, by including too many or too few of particular categories of

³Systematic sampling was not used for the other strata because we took a census.

establishments, causing the sample to misrepresent the respondent universe.

To systematically select the sample for very small meat establishments, we used information on geographic location and type of species slaughtered. We defined four geographic regions based on the Census regions: Northeast, Midwest, South, and West. We defined two types of species slaughtered using information from FSIS on slaughter volume: beef and pork. Establishments that slaughter both beef and pork were classified as “both” for the systematic sampling.

Prior to selecting the sample, we sorted the file by type of species slaughtered then geographic region. Once sorted, sample points were selected by choosing every 1.147 (500/436) establishment in the sorted list until the entire sample was drawn. Table 2-4 shows the number and percentage of very small establishments in the survey universe and resulting sample.

Table 2-4. Survey Universe and Sample for Federally Inspected Very Small Meat Slaughter and Processing Establishments, by Region and Type of Species Slaughtered^a

Species Slaughtered	Region									
	Northeast		Midwest		South		West		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
<i>Survey Universe</i>										
Beef	12	2.4	14	2.8	18	3.6	15	3.0	59	11.8
Pork	7	1.4	8	1.6	19	3.8	7	1.4	41	8.2
Both Beef and Pork	110	22.0	115	23.0	110	22.0	65	13.0	400	80.0
Total	129	25.8	137	27.4	147	29.4	87	17.4	500	100.0
<i>Survey Sample</i>										
Beef	10	2.3	12	2.8	16	3.7	13	3.0	51	11.7
Pork	6	1.4	7	1.6	17	3.9	6	1.4	36	8.3
Both Beef and Pork	96	22.0	100	22.9	96	22.0	57	13.1	349	80.0
Total	112	25.7	119	27.3	129	29.6	76	17.4	436	100.0

^aThe sample was selected using systematic sampling.

3

Survey Design and Administration

This section describes the design of the survey instrument and our questionnaire review procedures, and provides an overview of the survey administration procedures.

3.1 SURVEY INSTRUMENT DESIGN

The purpose of the survey was to obtain information on practices and technologies used to control pathogens and promote food safety.

The purpose of the survey was to obtain information on practices and technologies used to control pathogens and promote food safety. FSIS needs this information to guide regulatory policy making and to conduct required RIAs. Additionally, the survey findings can be used to compare current practices and technologies with findings from the 2005 survey.

As described in Section 1, RTI initially developed the survey instrument for meat slaughter and processing establishments in conjunction with surveys for egg packers, egg products processors, poultry slaughter establishments, and meat and poultry processing-only establishments in 2001. In 2010, FSIS contracted with RTI to develop the questionnaires for another round of industry surveys, conduct a pretest of the questionnaires, and prepare the OMB approval package. Under this contract, RTI worked with FSIS to further refine the survey for meat slaughter and processing establishments to reflect current technologies, practices, and issues of importance to FSIS. RTI met with stakeholders at FSIS to identify new research questions and data needs for upcoming analyses. Using FSIS research questions and FSIS's data needs as a guideline, we developed appropriate survey questions and response items to address each new data need. For example,

we added a question about pre-harvest practices and a new section on packaging and labeling practices. Table 3-1 lists the types of information collected in the survey, and Appendix A provides the final survey instrument.

As a result of the 2010 pretest findings that indicated the industry would be receptive to a Web-based survey, the revised 2014 survey was self-administered by plant managers either via a hardcopy paper-and-pencil or a Web-based survey (based on their stated preference). From previous experience, we have found that it is difficult for establishments to complete similar surveys over the telephone because of the need to refer to records or consult with other individuals at the establishment; thus, a telephone survey was not appropriate.

Table 3-1. Types of Information Collected in the Survey

Section 1: Slaughter and Fabrication	<ul style="list-style-type: none"> ▪ Pre-harvest management practices ▪ Procedures for dehiding carcasses ▪ Technologies used during slaughter and fabrication ▪ Practices used during slaughter and fabrication ▪ Livestock slaughter line speed ▪ Production volumes by HACCP code
Section 2: Further Processing	<ul style="list-style-type: none"> ▪ Types of further processed products produced ▪ Practices used in further processing operations ▪ Technologies used in further processing operations for raw or partially cooked products ▪ Technologies used in further processing operations for ready-to-eat (RTE) products
Section 3: Microbiological Testing Practices	<ul style="list-style-type: none"> ▪ Methods of microbiological testing ▪ Actions taken when raw product tests positive for <i>Salmonella</i> and Shiga toxin-producing <i>E. coli</i> (STEC)
Section 4: Packaging and Labeling	<ul style="list-style-type: none"> ▪ Modified atmosphere packaging systems ▪ Type of labeling and branding ▪ Method of printing labels ▪ Special statements or claims

(continued)

Table 3-1. Types of Information Collected in the Survey (continued)

Section 5: Employee Training	<ul style="list-style-type: none"> ▪ New hire food safety training ▪ On-going food safety training ▪ Number of employees trained ▪ Type of employee training received ▪ FSIS training resources used
Section 6: Establishment Characteristics	<ul style="list-style-type: none"> ▪ Age of production space ▪ Audits of food safety and humane handling procedures ▪ Customer-required certifications ▪ Frequency of cleaning slaughter and fabrication areas ▪ Number of employees ▪ Management of quality control/quality assurance (QC/QA) activities ▪ Percentage of live animal imports ▪ Percentage of product exported ▪ Traceability practices used ▪ Food recall and crisis management practices used ▪ Sales revenue ▪ Investment in upgrades and expansions

3.2 QUESTIONNAIRE REVIEW

Several third-party individuals and organizations reviewed the survey instrument for relevance and applicability, including industry personnel, other government organizations, and industry trade association representatives, as described below.

3.2.1 Pretest Interviews

To test survey instruments developed in 2010 under a prior contract, RTI conducted telephone interviews with establishment personnel from three meat slaughter and processing establishments, representing different HACCP sizes and types of species slaughtered. The pretest findings and suggested revisions to the survey instruments were summarized and delivered to FSIS (Viator and Cates, 2010).

To obtain an estimate of respondent burden as required by OMB, we sent the instrument to four meat slaughter and

processing establishments.¹ Each of these establishments provided an estimate of the time required to complete the survey instrument. Based on time estimates provided, we estimated the survey burden to be 60 minutes per response.

3.2.2 Reviews by Government Agencies and Trade Associations

Under the previous contract in 2010 (contract no. AG-3A94-B-08-0006), representatives from the U.S. Department of Agriculture's Economic Research Service reviewed the draft questionnaire and offered feedback on questionnaire content, question format, and additional survey questions, such as information needed to assess the economic impact of product recalls. In the current contract, RTI also invited representatives from four relevant meat industry trade associations to review the draft questionnaire and data collection procedures. The trade associations included:

- American Association of Meat Processors (AAMP)
- American Meat Institute (AMI)²
- North American Meat Association (NAMA)
- Southwest Meat Association

Trade association representatives offered useful and substantive feedback on the questionnaire, including relevance of questions and the use of appropriate terminology. In consultation with FSIS, RTI revised the questionnaire based on all feedback provided by reviewers.

3.3 SURVEY ADMINISTRATION PROCEDURES

Data collection occurred just over 16 weeks, from October 22, 2014, to February 14, 2015.³ Figure 3-1 illustrates the steps in the data collection process.

We implemented a variety of procedures aimed at maximizing the response rate to the survey. Once the survey effort received OMB approval, we communicated with representatives from AAMP, AMI, NAMA, and the Southwest Meat Association to

¹OMB requires at least three respondents to estimate the time burden, but RTI obtained estimates from four establishments.

²The American Meat Institute (AMI) and the North American Meat Association (NAMA) have since merged to form the North American Meat Institute (NAMI).

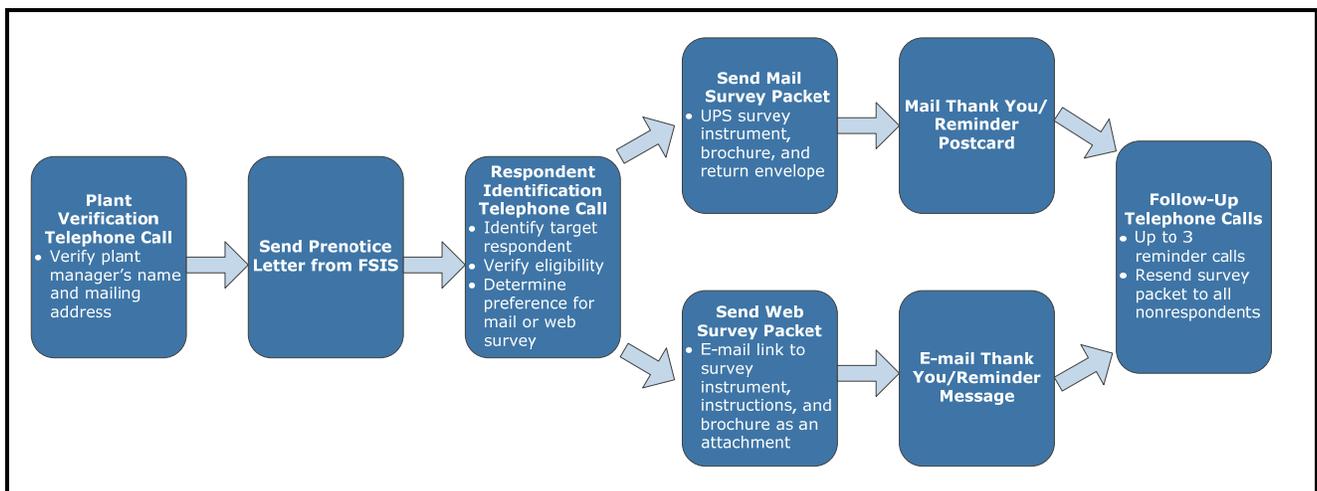
³No contacts were made with establishments during the holiday weeks of Thanksgiving or Christmas.

request assistance in promoting the survey to their membership. Trade association representatives included introductory information and reminders to complete the survey in weekly and monthly newsletters, on telephone calls, and in other communications with their membership. In addition, FSIS promoted the survey in the FSIS Constituent Update before and during the data collection period.

During the data collection period, we maintained a toll-free survey telephone help line and a designated email address for participants with questions or requiring assistance with completing the questionnaire. The survey help line and email account were staffed by members of the RTI project team knowledgeable about the survey and the meat slaughter industry.

As an incentive to complete the survey, all respondents were offered a summary report of the survey results, allowing them to compare their practices with others in their industry.

Figure 3-1. Data Collection Procedures for the Meat Slaughter and Processing Industry Survey



Contact with inspection personnel. FSIS emailed each district manager information about the survey. District managers were asked to notify inspectors-in-charge of the upcoming survey so that they could verify the legitimacy of the survey to establishment management, if necessary.

Plant verification telephone call. Experienced telephone interviewers at RTI's Research Operations Center called each sampled establishment to obtain the plant manager's name and mailing address.

FSIS prenotice letter. RTI mailed the FSIS prenotice letter and a study brochure (see Appendix B) to plant managers at sampled establishments. If a plant manager was not identified during the initial telephone call, the letters were mailed to the attention of the "plant manager." The FSIS letter was printed on FSIS letterhead and signed by the FSIS Administrator. The FSIS letter explained the purpose of the survey, the importance of participation, and RTI's pledge of confidentiality. The letter also informed plant managers that they would receive a copy of the survey results. The study brochure—a full-color, trifold brochure—highlighted the purpose of the study and provided contact information for FSIS and RTI.

Respondent identification telephone call. Approximately 10 days after mailing the prenotice letter, RTI's telephone interviewers called plant managers to verify plant eligibility (i.e., during the past year the plant conducted slaughter activities of beef, veal, pork, lamb, or goat for commercial purposes), identify the target respondent (if not the plant manager), gain cooperation, and determine preferred survey mode (hardcopy paper-and-pencil or Web-based online survey). Plant managers who refused to participate were mailed a hardcopy survey and re-contacted during the follow-up telephone call phase.

Survey packet mailing. We mailed the survey packet via United Parcel Service (UPS) to plant managers who requested a hardcopy survey. Plant managers who preferred to complete the survey online were sent an email with a link to the Web-based survey.

The hardcopy survey packet included an RTI cover letter, another copy of the FSIS prenotice letter and study brochure, the survey booklet, and a metered (prepaid) envelope for returning the completed survey to RTI.

Emails sent to plant managers contained a link to the survey and the same survey materials as the hardcopy version, the FSIS prenotice letter, RTI cover letter, and study brochure.

The Web-based survey was administered through a software program called the Hatteras System, which is an ASP.NET-based system. Both the questionnaire and the survey data were stored in a Microsoft SQL Server database. For security purposes, a two-tiered security approach was used for accessing the survey and transmitting the data. The first layer of security, Secure Socket Layer (SSL), ensured that only encrypted data flowed over the Internet. In the second layer of security, each user received an ID and password, which allowed the user to return later to complete partially completed surveys.

Postcard mailing. Approximately 1 week after mailing and emailing the survey packets, RTI sent sampled establishments a personalized postcard (see Appendix B). The postcard served as a thank you for those who returned the completed survey and as a reminder for those who had not. Postcards were sent via United States Postal Service and via email for those completing the Web-based survey.

Follow-up telephone calls. Approximately 2 weeks after the postcard mailing, RTI's telephone interviewers began follow-up calls to nonrespondents to remind them to complete and return the survey. Follow-up calls were made three times during the data collection period. During the follow-up calls, interviewers offered to send a replacement survey (via UPS or email), if needed.

Establishments that continued to refuse participation in the survey were either eliminated from re-contact (for hard or hostile refusals) or re-contacted during the next telephone follow-up (for soft and gatekeeper refusals).

Remailing of survey packet. Approximately 7 weeks after the survey packets were originally sent, we remailed the survey packet via UPS and email to all nonrespondents. All nonresponders, regardless of their preferred mode for completing the survey, were sent a hardcopy survey via UPS. Plant managers who preferred to complete the survey online also received another email with the link to the survey and their plant login ID and password. The cover letter included the data collection end date for returning the completed survey. Telephone interviewers made the final follow-up reminder telephone calls approximately 1 week after this remailing.

At each round of telephone calls (initial, respondent identification, and three follow-up reminder calls), at least five call attempts were made. Sampled establishments that we were unable to contact by telephone were sent the survey materials (FSIS prenotice letter, survey packet, and reminder postcard) via UPS to the attention of the "plant manager."

4

Analysis Procedures

This section presents the survey response and eligibility rates, describes the nonresponse bias analysis and weighting procedures, and discusses the data analysis procedures.

4.1 SURVEY RESPONSE AND ELIGIBILITY RATES

We received 376 completed surveys (66% response rate). Of these, 35% were completed online and 65% were completed hardcopy.

Table 4-1 shows the final disposition of the sample and the eligibility and response rates by stratum. We received 376 completed surveys. Of these, 131 (35%) were completed online and 245 (65%) were completed as hardcopy surveys.

We assigned each sample point (establishment) a final disposition of *respondent*, *nonrespondent*, or *ineligible*. For 77 establishments, the eligibility status could not be determined because a telephone number was not available for the establishment (no listing was available from directory assistance or the telephone number was not in service), or a telephone number was available, but we were unable to verify eligibility in the respondent identification call.

The ineligible disposition includes establishments that

- do not currently slaughter meat species (cattle, calves, swine, lambs, or goats);
- perform only custom-slaughter activities;
- previously slaughtered meat species but are now out of business; and
- are food banks, prisons, university research facilities, or retail operations only.

Table 4-1. Meat Slaughter and Processing Survey Eligibility and Response Rates

	HACCP Size			
	Very Small	Small	Large	Total
Respondents	227	102	47	376
Nonrespondents	94	21	5	120
Unknown eligibility	50	20	7	77
Ineligibles				
Do not slaughter for commercial purposes, or do not slaughter meat species (beef, pork, veal, lamb, or goat)	63	7	0	70
Out of business	0	1	0	1
Wrong business	2	0	1	3
Total ineligibles	65	8	1	74
Total sample	436	151	60	647
Eligibility rate (%) ^a	83%	94%	98%	87%
Unweighted response rate (%) ^b	61%	71%	80%	66%
Weighted response rate (%) ^c	63%	72%	80%	66%

^aEligibility rate = (Respondents + Nonrespondents)/(Respondents + Nonrespondents + Ineligibles).

^bResponse rate = Respondents/(Respondents + Nonrespondents + Unknown Eligibility).

^cCalculated using the survey weights adjusted for unknown eligibility.

Respondents are those establishments that completed the questionnaire. Nonrespondents are those establishments that were eligible for the survey but did not participate. Establishments with unknown eligibility are also considered nonrespondents for the unweighted response rate calculation.

The eligibility rate—the proportion of the total sample that was eligible for the survey—is calculated as follows:

$$\text{Eligibility Rate} = \frac{\text{Respondents} + \text{Nonrespondents}}{\text{Respondents} + \text{Nonrespondents} + \text{Ineligibles}} \quad (4.1)$$

The target overall eligibility rate was 91%; however, the actual eligibility rate was 87%. The eligibility rates varied by establishment size, with large establishments having a 98% eligibility rate, small establishments at 94%, and very small establishments at 83%. Because of the low eligibility rate for very small establishments, we released an additional sample.

The actual eligibility rate was lower than anticipated because of the large number of custom-only establishments.

The response rate for the survey—the proportion of eligible establishments that completed the questionnaire—is calculated as follows:

$$\text{Response Rate} = \frac{\text{Respondents}}{\text{Respondents} + \text{Nonrespondents} + \text{Unknown Eligibility}} \quad (4.2)$$

We computed unweighted and weighted response rates. The weighted response rates were calculated using the survey weights adjusted for unknown eligibility (see Section 4.3). The weighted response rates provide a measure of the percentage of establishments on the sampling frame (i.e., the population) that are represented by the responding establishments.

The overall weighted response rate for all establishments was 66%. Response rates were higher for small and large establishments compared to very small establishments.

We did not achieve the target number of completed surveys (376 vs. 413) because the eligibility rates and response rates were lower than anticipated. We were very close to achieving the target number of completed surveys for small (102 vs. 103) and large (47 vs. 48) establishments. We believe that conducting data collection during the winter holiday period contributed to response rates that were lower than expected. This time period is the “busy season” for many slaughter and processing establishments, as they are filling holiday orders and their staff are on vacation.

4.2 NONRESPONSE BIAS ANALYSIS

Nonresponse may cause bias in survey estimates if establishments choosing not to respond would have provided answers to questions that differ systematically from answers provided by establishments that choose to respond. Using weighting class adjustments in developing the survey weights (as described in Section 4.3) can help reduce nonresponse bias to the extent that weighting classes are homogeneous (i.e., within a class, establishments have similar characteristics).

We examined the characteristics of respondents and nonrespondents to determine if there were any statistically significant differences. The characteristics used in the nonresponse bias analysis included region, HACCP size, and

species slaughtered because these characteristics are known for both nonrespondents and respondents. The analysis was conducted using the survey weights adjusted for unknown eligibility (see Section 4.3). A chi-square test was used to evaluate whether or not the distribution of each variable was different for respondents and nonrespondents.

Table 4-2. Comparison of Respondents and Nonrespondents: Meat Slaughter and Processing Establishments

	Respondents		Nonrespondents ^a		Chi-square-test p-value
	n	Weighted %	n	Weighted %	
Region					0.0296*
Northeast	75	20.3	43	22.0	
Midwest	144	37.8	52	26.1	
South	104	27.9	65	33.1	
West	53	14.0	37	18.8	
Total	376	100.0	197	100.0	
HACCP Size					0.0091*
Very small	227	63.6	144	75.1	
Small	102	24.9	41	19.2	
Large	47	11.5	12	5.7	
Total	376	100.0	197.0	100.0	
Species Slaughtered					0.8449
Cattle	86	21.8	47	23.4	
Swine	71	18.0	34	16.5	
Cattle and swine	219	60.2	116	60.1	
Total	376	100.0	197	100.0	

*Differences are statistically significant at the 0.05 level.

^aIncludes nonrespondents and establishments with unknown eligibility.

Table 4-2 compares the characteristics of respondents and nonrespondents. Regarding species slaughtered, the difference in the distribution between respondents and nonrespondents was not statistically significant. However, for HACCP size and region, differences in the distribution of respondents and nonrespondents were statistically significant. Compared to nonrespondents, a larger percentage of respondents were small or large establishments, and a smaller percentage of respondents were very small establishments. Regarding region, a larger percentage of respondents were from the Midwest census region compared to nonrespondents.

As described in the next section, based on the findings from the nonresponse bias analysis, we used HACCP size and region as weighting classes for the nonresponse adjustment.

4.3 WEIGHTING PROCEDURES

We generated all statistical estimates for the survey by applying appropriate survey weights to the respondent record data. We computed survey weights in three steps:

1. We computed initial sampling weights by stratum.¹
2. We adjusted the initial sampling weights for unknown eligibility.
3. We used weighting class adjustments to adjust the weights for nonresponse to the survey.

We describe each step in our weighting procedures below.

4.3.1 Initial Sampling Weights

We first assigned each establishment in the sample (i.e., sample point) an initial sampling weight. The initial sampling weight is equal to the inverse of the selection probability where the selection probability is equal to the sample size (n) divided by the population (N). Thus, we calculated the initial sampling weight for each stratum as follows:

$$W_0 = \frac{\text{Population Size}(N)}{\text{Sample Size}(n)}. \quad (4.3)$$

For the small and large strata, the initial sampling weight is equal to one because we took a census. For each stratum, the sum of the initial sampling weights across all sampled establishments is equal to the population.

4.3.2 Adjustment for Unknown Eligibility

We calculated adjustment factors within each stratum to adjust for sample points for which the eligibility status was unknown. For establishments with unknown eligibility, the adjustment factor was calculated as follows:

$$F_1 = \frac{\text{Sum of Weights } (W_0) \text{ for Known Eligibles in Stratum}}{\text{Sum of Weights } (W_0) \text{ for Known Eligibles and Ineligibles in Stratum}} \quad (4.4)$$

¹The sample design includes three strata for HACCP size.

For establishments with known eligibility, the adjustment factor is equal to one (i.e., $F_1 = 1$).

The adjusted weight for each establishment in a stratum is equal to

$$W_1 = W_0 \cdot F_1. \quad (4.5)$$

4.3.3 Nonresponse Adjustment

Nonresponse adjustments ensure that, within each weighting class, respondent weights sum to the population counts of eligible establishments. These adjustments, implemented with the computation and application of adjustment factors in each weighting class, can help reduce nonresponse bias to the extent that weighting classes are homogeneous.

Given the sample size, the data available for nonrespondents, and the findings from Table 4-2 that compared the characteristics of respondents and nonrespondents, we used HACCP size and region to form the weighting classes. Due to small sample sizes, we could not use region as a weighting class for large establishments, and we combined the Northeast, South, and West regions for small establishments.

We calculated adjustment factors (F_2) within each weighting class as follows:

$$F_2 = \frac{\text{Sum of Weights } (W_1) \text{ for Eligibles in Class}}{\text{Sum of Weights } (W_1) \text{ for Respondents in Class}} \cdot \quad (4.6)$$

The adjusted weight for each responding establishment in a weighting class is equal to

$$W_2 = W_1 \cdot F_2. \quad (4.7)$$

The adjusted weight varies by size and region. This causes the survey design effect to be 1.031.² The design effect is small and should have little effect on the standard errors.

We weighted all results using the final adjusted weights (W_2). For each stratum, the sum of the final adjusted weights across all respondents to the survey is equal to the population of eligible establishments.

²The survey design effect is the sample variance for the study divided by the variance of a simple random sample (with no stratification).

4.4 DATA ANALYSIS PROCEDURES

Prior to tabulating the survey data, we conducted data editing and coding and data cleaning. We describe these procedures and our data analysis procedures below.

4.4.1 Data Entry, Coding, and Cleaning

The hardcopy questionnaires were keyed into the online survey by trained data entry staff at RTI. All data were double-keyed (i.e., 100% verification) for quality control purposes.

Prior to tabulating survey responses, we systematically examined the survey dataset (including the keyed hardcopy responses and the online survey responses completed by the respondents) to isolate and address data inconsistencies, reporting errors, or otherwise erroneous data. Specific data-cleaning procedures are described below.

The most common error made by respondents was not selecting a response option for each question (i.e., item nonresponse). This error was most often made when completing questions in a table format (questions 1.6, 3.5, and 5.5 had the highest item nonresponse). Item nonresponse was recorded as a missing value in the dataset. If the respondent selected at least one response in the table, then the “nonresponse” items were changed to “no”. For the questions that asked respondents to “Circle all that apply,” the Web software sets all unchecked responses to “no” if at least one response is checked on the question.

Several questions required the respondent to enter a text response (e.g., Question 1.1 asked the respondent to specify if they selected the Other response). For questions with open-ended text responses, we manually reviewed the responses and, when possible, recoded to the correct response category. In some cases, we created new response options if multiple respondents provided the same response. These are noted as “write in” responses in the results tables.

Questions 4.2 and 6.1 required respondents to enter numeric responses that sum to 100%. Some respondents entered values that did not sum to 100%. Respondents’ answers were recoded as missing values if the sum of their responses was less than 80% or greater than 120% (exclusions are noted in the results tables) so that they were excluded from the analysis. If the sum of the responses was between 80% and

120%, then we normalized the responses to 100% using the initial response distribution and included the responses in the analysis.

For Question 1.6, production volumes, some respondents entered one pound as their annual production volume. These responses were set to missing values and not included in the analysis.

Some respondents were inconsistent in their responses regarding their production of processed products. If a respondent indicated that they do not produce processed product in Question 2.1, but then indicated in Question 3.2 that they tested processed product, we resolved the inconsistency by recoding their response for Question 3.2. Similarly, if they entered production volumes for processed products in Question 1.6 but said that they do not process in Question 2.1, we changed their response to Question 2.1. We also reviewed other inconsistencies on a case-by-case basis and made additional adjustments to the survey responses as appropriate.

4.4.3 Data Analysis

All analyses were conducted using SAS[®], a statistical analysis software tool (SAS, 1999), using the final survey weights. We computed proportions for questions in which respondents could select one or more responses from a list of responses.

Respondents who did not answer the question (i.e., missing values) were not included in the calculation of proportions. The number and percentage of nonrespondents are provided in the results tables. We computed means for questions that required a numeric response from respondents.

Section 5 of this report provides tables with the survey results for meat slaughter and processing establishments (n = 376). We provide tables with tabulations for each question for all respondents and separate tables with cross-tabulations by HACCP size.

For the cross-tabulations, we provide the 95% CIs for the very small establishments.³ An indication of the precision of survey estimates is the widths of the 95% CIs. For example, if we report that the 95% CI for the percentage of very small meat

³ CIs cannot be computed for small and large establishments because we took a census of those strata.

establishments that use a particular technology is (50%, 60%), this means that the probability that the true population value lies between 50% and 60% is 0.95. This means there remains a probability of 0.05 that the true population value lies outside the (50%, 60%) CI. The CIs are constructed using a logit transformation so that their endpoints lie between 0 and 1. CIs are not provided for small and large establishments because we conducted a census of those strata; therefore, calculation of CIs is not appropriate. However, we can test whether the responses for very small plants are statistically significantly different from those for small or large plants by determining whether the mean values for small or large plants fall within the CI for very small plants. These statistical differences are noted in Tables 5-7 through 5-12 with the ^ symbol.

In reporting results, we suppressed the data for some questions to preserve confidentiality of responses and to avoid the possibility of revealing the identity of establishments that responded. For questions deemed sensitive in nature (e.g., Questions 1.6 and 6.18), we suppressed data that had fewer than five responses. For all other questions, we suppressed data that had fewer than three responses. Suppressions are noted in the results tables with an asterisk (*).

Section 6 provides tables that compare the overall weighted results from this survey (n = 376) to the overall weighted results from the 2005 survey (n = 384). We selected the questions that had similar wording in both surveys to compare. In addition, we only compared results for questions in which the same populations would have responded in both surveys (i.e., skip patterns were not present). Similar to the overall analysis, we masked the data for some questions to preserve confidentiality of responses by collapsing or suppressing data with few responses or by suppressing entire questions.

5

Survey Results

Tables 5-1 through 5-6 provide weighted tabulations of the survey questions for meat slaughter and processing establishments (n = 376). The survey results are representative of the population of meat slaughter and processing establishments as defined in Section 2. Some regulated establishments were excluded from the sampling frame (e.g., establishments that slaughter only equine or establishments that are university facilities) so that the sampling frame was representative of the vast majority of commercial FSIS-inspected establishments.

We computed proportions for questions in which respondents could select one or more responses from a list of responses. The number of respondents (n) for each response is provided in the tables. We computed means for questions that required a numeric response from respondents. The number of respondents (n) used in mean calculations is provided in the tables.

Tables 5-7 through 5-13 provide weighted cross-tabulations for all questions by HACCP size. In addition to the estimated proportions, we provide the 95% CIs for the point estimates for very small establishments¹.

A summary of the survey findings, based on the overall results presented in Tables 5-1 through 5-6, is provided below:

¹ We did not estimate CIs for small or large establishments because we took a census, and estimating CIs for a census is not possible.

Slaughter and Fabrication

- There is limited use of the pre-harvest management practices asked about in the survey. Forty percent of all meat establishments use clean and dry bedding for confined operations and holding pens as part of their pre-harvest management practices to control for pathogens of concern such as STEC. Hide washing (26%) was the second most practiced operation. [Question 1.1]
- The majority (84%) of meat establishments use a skinning knife when de-hiding carcasses. [Question 1.2]
- Two-thirds of all meat establishments use organic acid rinse (66%) and over half use tempered carcass rinse/wash (53%) during slaughter and fabrication operations. The other technologies asked about in the survey are not widely used. [Question 1.3]
- The majority of meat establishments use chemical sanitizers or hot water for food contact surfaces and tools used in the slaughter area (93%) and have written policies and procedures that require humane handling of animals (87%). [Question 1.4]
- The mean livestock slaughter line speed is 107 head per hour for beef, 425 head per hour for swine, and 4 head per hour for establishments that slaughter both beef and swine. The overall minimum line speed is 1 and the maximum is 2,765. [Question 1.5]
- The majority of meat slaughter and processing establishments produce raw, intact product (84%) and raw, non-intact (ground) product (75%). About one-third of establishments produce heat treated, but not fully cooked—not shelf stable product. The remaining HACCP product categories are produced by less than one-third of establishments. [Question 1.6]

Further Processing

- Over 70% of meat establishments grind raw meat or further process meat products. [Question 2.1]
- Almost 90% of establishments produce raw or partially cooked products for consumers; more than half (51%) produce not shelf stable RTE products for consumers. About one-third of establishments produce shelf stable RTE products (32%) or products shipped for further processing to another establishment (34%). [Question 2.2]

- Almost all establishments use chemical sanitizers or hot water for sanitizing hand tools such as knives used in further processing areas (98%), about three-fourths of establishments treat drains with sanitizers for pathogen control (77%), and about two-thirds of establishments rotate sanitizing chemicals used in the further processing area per manufacturer’s label or per scientific advice (64%). [Question 2.3]
- Only about half of the establishments use the technologies asked about in the survey in their further processing operations. Forty-five percent do not use any of these technologies in their raw or partially cooked product areas, and forty-six percent do not use any of them in their RTE processing areas. [Questions 2.4 and 2.5]

Microbiological Testing Practices

- Sixty-one percent of establishments only use an independent, commercial laboratory to conduct microbiological testing, fifteen percent use a company laboratory or both company and commercial laboratories, and twenty-four percent don’t conduct any testing in addition to that required by FSIS regulation. [Question 3.1]
- Establishments most often tested carcasses before fabrication (76%), raw meat after fabrication (71%), product contact surfaces (55%), and environmental (non-product contact) surfaces (40%). Fewer establishments tested raw or partially cooked products (22%), RTE products (approximately 16%), hides (14%), and lymph nodes (5%). [Question 3.2]
- *E. coli* O157:H7 was the pathogen most commonly tested by establishments during slaughter (60%) and fabrication (72%). [Questions 3.3 and 3.4]
- When test results indicate that sampled raw product is presumptive positive for *Salmonella*, establishments are most likely to conduct further testing to confirm positive (29%) and destroy product (22%). For Shiga toxin-producing *E. coli* (O157:H7 or non-O157 STEC), the percentage of establishments that conduct further testing to confirm the positive increases to 45% and the percentage of establishments that destroy product increases to 41%. [Question 3.5]

Packaging and Labeling

- The majority (82%) of meat establishments use vacuum packaging for product packed using modified atmosphere packaging. [Question 4.1]
- Thirty-seven percent of product is packaged and branded products for consumers, 38% is packaged and branded for food service, 20% is bulk product labeled for further processing, and 3% is packaged for custom slaughter. [Question 4.2]
- Forty percent of establishments update their labels once a year or more often, seventeen percent update their labels every 2 to 3 years, twenty-two percent update their labels less frequently than every 3 years, and twenty-three percent reported that they do not update their labels. [Question 4.3]
- Nearly 70% of establishments print product labels or packaging using digital printing that is done by the establishment or parent company and almost half (47%) use an outside company using printing plates. [Question 4.4]
- For products that are produced and packaged for retail sale, 32% of establishments do not include special statements or claims. [Question 4.5]

Employee Training

- Establishments are most likely to provide informal, unscheduled on-the-job food safety training (78% of establishments), scheduled on-the-job food safety training conducted by establishment personnel (48%), and written food safety training materials (47%) to newly hired, permanent production employees. [Question 5.1]
- Management employees were trained most frequently in humane handling (85%), records and documentation (81%), and Sanitation Standard Operating Procedures (SSOPs, 79%). Production employees were trained most frequently in humane handling (89%), SSOPs (83%), and sanitary dressing (81%). [Question 5.5]
- Sixty-five percent of establishments used FSIS notices and directives, fifty-four percent used compliance guidelines, and thirty-nine percent used the FSIS Web site as training resources. [Question 5.6]
- Approximately two-thirds of establishments use FSIS compliance guidelines during the validation and verification of HACCP systems and during the

development of SSOPs. Approximately half of establishments use them upon receipt of a noncompliance record (NR), before or during a food safety assessment, and during the training of employees. [Question 5.7]

Establishment Characteristics

- Sixty-five percent of establishments are audited by independent, third-party auditors. Practices most commonly audited include humane handling (60%), HACCP (59%), SSOPs (58%), and Good Manufacturing Practices (GMPs, 56%). [Questions 6.2 and 6.3]
- Over half (53%) of establishments do not have customers that require certifications. Thirty percent have customer-specified requirements for certification, nineteen percent are required to have Global Food Safety Initiative (GFSI) certification, and twelve percent have organic certification. [Question 6.5]
- More than half of establishments (53%) employ 1 to 5 full-time employees for their QC/QA department, which includes food safety. [Question 6.12]
- The majority of establishments do not import live animals for slaughter (89%) or export product outside of the United States (78%). [Questions 6.14 and 6.15]
- Over half of establishments can identify and track their products using a traceable code, by production lot, backward to specific animal suppliers (55%) and forward to specific customers (57%). [Question 6.16]
- Some establishments employ food recall and crisis management practices, such as having a written crisis management program (43%), conducting mock recalls forward to specific customers (39%), and conducting mock recalls backwards to suppliers (27%). [Question 6.17]

Table 5-1. Weighted Responses for Section 1: Slaughter and Fabrication

Question	n	%
1.1 ^a Which of the following pre-harvest management practices do this establishment's suppliers apply as part of their food safety system to control for pathogens of concern such as <i>Salmonella</i> and Shiga toxin-producing <i>E. coli</i> (STEC)?		
1. Drinking water treatments for purification, including chlorination, ozonation, and electrolyzed water	59	15.6
2. Antibiotics as a feed additive	20	5.0
3. Probiotics as a feed additive	22	5.4
4. Vaccination for <i>Salmonella</i> or Shiga toxin-producing <i>E. coli</i> (STEC)	7	1.8
5. Bacteriophages used on farms	8	1.8
6. Colicin producing <i>E. coli</i> strains as a feed additive	*	*
7. Clean and dry bedding for confined operations and holding pens	146	40.6
8. Hide washing before slaughter	97	26.2
9. Other	13	3.3
10. None of the above	63	17.4
11. Don't know	82	22.7
Total	364	
No response	12	
Question	n	%
1.2 ^a How does this establishment dehide carcasses?		
1. This establishment does not dehide carcasses	43	10.5
2. Skinning knife	302	83.9
3. Air knife	99	24.6
4. Mechanical side puller	35	7.6
5. Mechanical down puller	86	21.9
6. Mechanical up puller	66	15.7
7. Other	6	1.5
Total	369	
No response	7	

(continued)

^a Respondents could select more than one response.

^b Respondent could enter as head per hour or head per day. For reporting purposes, we converted all responses into a per hour figure, assuming one day equals 8 hours of production time.

*Results are suppressed because of the small number of respondents.

Table 5-1. Weighted Responses for Section 1: Slaughter and Fabrication (continued)

Question	n	%
1.3 ^a Which of the technologies listed below are currently used by this establishment during slaughter and fabrication operations?		
1. Bioluminescent testing system for preoperative sanitation checks ("ATP tests")	69	15.5
2. Conveyor belts made from materials designed to prevent bacterial growth (for example, coated with silver ions)	14	3.0
3. Steam pasteurization systems (for example, the Frigoscandia)	23	5.1
4. Steam vacuum units	58	12.7
5. Organic acid rinse	247	65.9
6. Tempered carcass rinse/wash	203	53.2
7. Positive air pressure from clean side to dirty side	63	14.1
8. Foreign material detection (for example, metal detection equipment, x-rays, visual inspection systems)	112	26.8
9. Equipment for removal of spinal cord prior to carcass splitting	45	11.6
10. Air injection separation of cuts	26	5.5
11. None of the above	33	9.4
Total	371	
No response	5	
Question	n	%
1.4 ^a Which of the practices listed below are currently used by this establishment during slaughter and fabrication operations?		
1. Requires and documents that its animal producers use production practices to control pathogens (for example, clean, dry bedding)	62	15.1
2. Requires and documents that its animal producers use production practices to control chemical residues (for example, drugs or growth hormones)	143	36.2
3. Rotates sanitizing chemicals it uses in the slaughter area per manufacturer's label or per scientific advice	154	38.7
4. Uses chemical sanitizers or hot water for food contact surfaces and tools used in the slaughter area	347	93.3
5. Has written policies and procedures to control the use of hazardous chemicals	247	65.0
6. Has written policies and procedures that require humane handling of animals	324	86.6
7. Applies antimicrobial agents to raw products	201	53.2
8. Removes major lymph nodes	122	32.6
9. None of the above	2	0.5
Total	370	
No response	6	

(continued)

^a Respondents could select more than one response.^b Respondent could enter as head per hour or head per day. For reporting purposes, we converted all responses into a per hour figure, assuming one day equals 8 hours of production time.

*Results are suppressed because of the small number of respondents.

Table 5-1. Weighted Responses for Section 1: Slaughter and Fabrication (continued)

Question	Head per Hour ^b			
	n	Mean	Min	Max
1.5 What is the average livestock slaughter line speed? If multiple lines, highest line speed is shown.				
All meat species combined	372	94	1	2,765
Beef only	86	107		
Swine only	68	425		
Both beef and swine	218	4		
No response	4			

Question	Establishment Produces Product		Annual Production (pounds)				
	n	%	n	Mean	Min	Max	
	1.6 ^a For each HACCP product category listed below provide an estimate of the total pounds produced by this establishment during the past year.						
a. Raw, intact (raw not ground)	314	84.1	226	57,388,527	30	1,030,000,000	
b. Raw, non-intact (raw ground)	274	75.2	199	8,000,767	75	472,542,900	
c. Thermally processed, commercially sterile	*	*	*	*	*	*	*
d. Not heat treated, shelf stable	21	5.7	10	16,292	300	50,000	
e. Heat treated, shelf stable	68	18.3	51	1,793,621	200	75,000,000	
f. Fully cooked, not shelf stable	97	26.5	73	4,336,380	250	167,000,000	
g. Product with secondary inhibitors not shelf stable	18	5.1	15	18,910	300	117,808	
h. Heat treated, but not fully cooked— not shelf stable	116	32.2	81	2,712,459	225	100,000,000	
No response	5						

^a Respondents could select more than one response.

^b Respondent could enter as head per hour or head per day. For reporting purposes, we converted all responses into a per hour figure, assuming one day equals 8 hours of production time.

*Results are suppressed because of the small number of respondents.

Table 5-2. Weighted Responses for Section 2: Further Processing^a

Question	n	%
2.1 Does this establishment currently grind raw meat or further process (for example, cook, cure, or smoke) meat products?		
1. Yes	268	72.5
2. No	105	27.5
Total	373	100.0
No response	3	
Question	n	%
2.2 ^{b,c} What types of further processed food products does this establishment produce?		
1. Shelf stable ready-to-eat (RTE) products for consumers	66	32.0
2. Not shelf stable ready-to-eat (RTE) products for consumers	104	51.0
3. Raw or partially cooked products for consumers	183	87.4
4. Products that are shipped for further processing to another establishment	78	34.4
Total	209	
No response	62	

(continued)

^a There is high item nonresponse for this section. If a respondent answered No to Question 2.1, but wrote in a production volume for processed products in Question 1.6, we changed their answer to Question 2.1 to Yes. However, because they answered No to Question 2.1, they skipped the remaining questions in Section 2.

^b Respondents could select more than one response.

^c Excludes respondents who do not currently grind raw meat or further process meat products.

^d This response was excluded when calculating the proportion.

Table 5-2. Weighted Responses for Section 2: Further Processing^a (continued)

Question	n	%
2.3 ^{b,c} Which of the following practices does this establishment currently use in its further processing operations?		
1. Stipulates practices for controlling pathogens in purchasing specifications for raw meat	105	48.0
2. Stipulates practices for controlling chemical residues (for example, drugs or growth hormones) in purchasing specifications for raw meat	75	33.6
3. Treats drains with sanitizers for pathogen control	165	76.5
4. Uses chemical sanitizers or hot water for sanitizing hand tools such as knives used in further processing areas	210	97.5
5. Rotates sanitizing chemicals it uses in the further processing area per manufacturer's label or per scientific advice	141	63.6
6. Treats food contact equipment and surfaces to remove biomatter during operations	74	34.5
7. Uses antimicrobial treatments for food contact equipment during operations	64	29.1
8. Applies antimicrobial agents to RTE product	35	16.7
9. None of the above	2	0.9
Total	216	
No response	55	

(continued)

^a There is high item nonresponse for this section. If a respondent answered No to Question 2.1, but wrote in a production volume for processed products in Question 1.6, we changed their answer to Question 2.1 to Yes. However, because they answered No to Question 2.1, they skipped the remaining questions in Section 2.

^b Respondents could select more than one response.

^c Excludes respondents who do not currently grind raw meat or further process meat products.

^d This response was excluded when calculating the proportion.

Table 5-2. Weighted Responses for Section 2: Further Processing^a (continued)

Question	n	%
2.4 ^{a,b} Which of the following technologies does this establishment currently use in its further processing operations for raw or partially cooked products?		
1. ^d This establishment does not produce raw or partially cooked products	31	
2. Bioluminescent testing system for preoperative sanitation checks ("ATP tests")	42	17.3
3. Conveyor belts made of materials designed to prevent bacterial growth (for example, coated with silver ions)	8	3.2
4. Foreign material detection (for example, metal detection equipment, x-rays, visual inspection systems)	74	31.2
5. Irradiation equipment	*	*
6. High pressure processing	5	2.2
7. Infrared technology	*	*
8. Other types of pasteurization processes (for example, steam and hot water treatments, ultraviolet light, microwave processing)	20	9.6
9. None of the above	90	45.0
Total	212	
No response	59	

(continued)

^a There is high item nonresponse for this section. If a respondent answered No to Question 2.1, but wrote in a production volume for processed products in Question 1.6, we changed their answer to Question 2.1 to Yes. However, because they answered No to Question 2.1, they skipped the remaining questions in Section 2.

^b Respondents could select more than one response.

^c Excludes respondents who do not currently grind raw meat or further process meat products.

^d This response was excluded when calculating the proportion.

*Results are suppressed because of the small number of respondents.

Table 5-2. Weighted Responses for Section 2: Further Processing^a (continued)

Question	n	%
2.5 ^{b,c} Which of the following technologies does this establishment currently use in its further processing operations for RTE products?		
1. ^c This establishment does not produce RTE products	65	
2. Bioluminescent testing system for preoperative sanitation checks ("ATP tests")	14	6.3
3. Conveyor belts made of materials designed to prevent bacterial growth	3	1.3
4. Foreign material detection (for example, metal detection equipment, x-rays, visual inspection systems)	36	17.2
5. Irradiation equipment	*	*
6. High pressure processing	3	1.2
7. Infrared technology	0	0.0
8. Post-packaging pasteurization	*	*
9. Other types of pasteurization processes	10	5.2
10. None of the above	92	46.3
Total	207	
No response	64	

^a There is high item nonresponse for this section. If a respondent answered No to Question 2.1, but wrote in a production volume for processed products in Question 1.6, we changed their answer to Question 2.1 to Yes. However, because they answered No to Question 2.1, they skipped the remaining questions in Section 2.

^b Respondents could select more than one response.

^c Excludes respondents who do not currently grind raw meat or further process meat products.

^d This response was excluded when calculating the proportion.

*Results are suppressed because of the small number of respondents.

Table 5-3. Weighted Responses for Section 3: Microbiological Testing Practices

Question	n	%
3.1 In addition to the generic <i>E. coli</i> testing of carcasses and <i>Listeria</i> testing of ready-to-eat (RTE) products required by FSIS regulation, does this establishment conduct microbiological testing?		
1. Yes, using a company-owned lab	23	5.2
2. Yes, using an independent commercial lab	220	60.8
3. Yes, using both company and commercial labs	46	10.2
4. No	86	23.9
Total	375	100.0
No response	1	
Question	n	%
3.2 ^{a,b} During the past year, this establishment tested which of the following?		
1. Hides before slaughter	46	13.9
2. Carcasses before fabrication	221	76.3
3. Raw meat after fabrication	206	71.6
4. Lymph nodes	16	4.9
5. Shelf stable ready-to-eat (RTE) products	42	15.0
6. Not shelf stable ready-to-eat (RTE) products	50	17.3
7. Raw or partially cooked products	69	22.4
8. Product contact surfaces	167	55.5
9. Environmental (non-product contact) surfaces	124	40.1
10. Other	2	0.8
Total	285	
No response	5	

(continued)

^a Respondents could select more than one response.^b Excludes respondents who do not conduct microbiological testing.

Table 5-3. Weighted Responses for Section 3: Microbiological Testing Practices (continued)

Question	n	%
3.3 ^{a,b} During the past year, what microbial indicators and pathogens were tested for by this establishment during slaughter?		
1. Aerobic plate count (APC)	106	32.0
2. Total plate count (TPC)	67	20.5
3. Total coliforms	95	30.1
4. <i>E. coli</i> O157:H7	167	59.8
5. Non-O157 STEC	90	29.7
6. Virulence genes (stx, eae, uidA, spi)	5	1.5
7. <i>Enterobacteriaceae</i>	35	9.8
8. Yeasts and molds	12	3.4
9. <i>Bacillus cereus</i>	3	0.8
10. <i>Salmonella</i>	82	27.1
11. <i>Staphylococcus aureus</i>	10	3.0
12. <i>Trichinella</i>	5	1.5
13. <i>Toxoplasma gondii</i>	0	0.0
14. <i>Clostridium perfringens</i>	6	1.8
15. <i>Listeria</i> species	38	13.1
16. Other	2	0.8
17. None of the above	45	16.5
Total	289	
No response	1	

(continued)

^a Respondents could select more than one response.

^b Excludes respondents who do not conduct microbiological testing.

Table 5-3. Weighted Responses for Section 3: Microbiological Testing Practices (continued)

Question	n	%
3.4 ^{a,b} During the past year, what microbial indicators and pathogens were tested for by this establishment during fabrication?		
1. Aerobic plate count (APC)	88	27.2
2. Total plate count (TPC)	72	22.7
3. Total coliforms	84	26.4
4. <i>E. coli</i> O157:H7	200	72.4
5. Non-O157 STEC	98	33.5
6. Virulence genes (stx, eae, uidA, spi)	4	1.2
7. Enterobacteriaceae	22	6.4
8. Yeasts and molds	18	5.1
9. <i>Bacillus cereus</i>	3	0.9
10. <i>Salmonella</i>	93	31.7
11. <i>Staphylococcus aureus</i>	14	4.3
12. <i>Trichinella</i>	4	1.4
13. <i>Toxoplasma gondii</i>	0	0.0
14. <i>Listeria</i> species	59	20.8
15. <i>Clostridium perfringens</i>	12	4.1
16. Other	3	0.9
17. None of the above	41	14.6
Total	283	
No response	7	

(continued)

^a Respondents could select more than one response.^b Excludes respondents who do not conduct microbiological testing.

Table 5-3. Weighted Responses for Section 3: Microbiological Testing Practices (continued)

Question	Salmonella		Shiga Toxin-Producing <i>E. coli</i> (O157:H7 or non-O157 STEC)	
	n	%	n	%
3.5 ^{a,b} What actions does this establishment take when test results indicated that sampled raw product is presumptive positive for <i>Salmonella</i> and Shiga toxin-producing <i>E. coli</i> (O157:H7 or non-O157 STEC)?				
1. Conduct further testing to confirm positive	99	29.0%	152	45.4%
2. Conduct further testing to determine serotype	30	8.8%	59	17.1%
3. Divert product to cooking (at this plant)	39	11.1%	81	23.3%
4. Destroy product	72	22.3%	136	40.9%
5. Re-work product	14	4.2%		
6. Sell product into commerce where it will receive a lethality step	32	8.2%		
7. Sell product to a processing establishment	20	5.0%		
8. Other	4	1.2%	15	3.9%
9. Establishment does not test for this pathogen	71	20.7%	45	12.8%
10. Never experienced a positive test result (write-in)	8	2.5%	7	2.2%
Total	338			
No response	38			

^a Respondents could select more than one response.

^b Excludes respondents who do not conduct microbiological testing.

Table 5-4. Weighted Responses for Section 4: Packaging and Labeling

Question		n	%		
4.1 ^a	Does this establishment use any of the following types of modified atmosphere packaging systems?				
	1. Vacuum packaging	303		81.8	
	2. Mixtures of gases	41		9.0	
	3. None of the above	66		17.8	
	Total	371			
	No response	5			
Question		n	Mean	Min	Max
4.2	Calculated as a percentage of total production, how were this establishment's meat products packaged and branded during the past year?				
	a. Consumer packaging with name brand label (also known as national or regional brand name)	322	12.8	0	100
	b. Consumer packaging with store or private label brand	322	24.6	0	100
	c. Foodservice packaging labeled with establishment's own company brand name	322	32.3	0	100
	d. Foodservice packaging labeled with another company's brand name (for example, restaurant brand)	322	6.0	0	95
	e. Bulk product labeled for further processing	322	20.4	0	100
	f. Other	322	0.7	0	100
	g. Packaged for custom slaughter customers	322	3.2	0	95
	Total	322	100.0		
	No response	54			
Question		n	%		
4.3	On average, how often does this establishment update its label?				
	1. At least twice a year	47		12.3	
	2. About once a year	93		27.3	
	3. About every 2 years	30		8.0	
	4. About every 3 years	29		8.5	
	5. Less frequently than every 3 years	73		21.5	
	6. Does not update label	74		22.5	
	Total	346		100.0	
	No response	30			

(continued)

^a Respondents could select more than one response.^b This response was excluded when calculating the proportion.

Table 5-4. Weighted Responses for Section 4: Packaging and Labeling (continued)

Question	n	%
4.4 ^a What method does this establishment use to print labels or packaging for its products?		
1. By an outside company using printing plates	175	46.7
2. By an outside company using digital printing	92	24.9
3. By the establishment or parent company using digital printing	247	67.3
4. Other	14	3.9
Total	361	
No response	15	
Question	n	%
4.5 On the products that are produced and packaged for retail sale at this establishment, what proportion of labels includes one or more special statements or claims?		
1. ^b This plant does not package products for retail sale	66	
2. None	113	38.9
3. 1-25%	117	37.9
4. 26-50%	15	4.9
5. 51-75%	20	5.8
6. 76-100%	39	12.5
Total	304	100.0
No response	6	

^a Respondents could select more than one response.

^b This response was excluded when calculating the proportion.

Table 5-5. Weighted Responses for Section 5: Employee Training

Question	n	%		
5.1 ^a What food safety training is provided for newly hired, full time permanent production employees of this establishment?				
1. Written food safety training materials are given to new hires	186	46.8		
2. Informal, unscheduled on-the-job food safety training	292	77.7		
3. Scheduled on-the-job food safety training conducted by establishment personnel	188	47.9		
4. Formal food safety course conducted by establishment personnel	90	21.3		
5. Formal food safety course administered on a computer at the establishment	54	12.0		
6. Formal food safety course conducted by professional trainers	35	9.0		
7. None of above	16	4.8		
Total	374			
No response	2			
Question	n	%		
5.2 ^a What food safety training is provided for temporary and part-time production employees of this establishment?				
1. Written food safety training materials are given to temporary hires	140	35.9		
2. Informal, unscheduled on-the-job food safety training	260	71.2		
3. Scheduled on-the-job food safety training conducted by establishment personnel	140	36.6		
4. Formal food safety course conducted by establishment personnel	66	16.2		
5. Formal food safety course administered on a computer at the establishment	31	6.9		
6. Formal food safety course conducted by professional trainers	16	4.1		
7. None of above	56	15.0		
Total	366			
No response	10			
Question	n	Mean	Min	Max
5.3 How many employees were trained in the past year?				
a. Newly, hired full time permanent production employees	353	129.5	0	4,300
b. Temporary and newly hired part-time production employees	288	8.3	0	350
No response	9			

(continued)

^a Respondents could select more than one response.

Table 5-5. Weighted Responses for Section 5: Employee Training (continued)

Question	n	%
5.4 ^a What continuing food safety training is provided for production employees of this establishment?		
1. Written refresher materials are given to employees	101	24.7
2. Continuing informal on-the-job food safety training	306	81.7
3. Scheduled on-the-job refresher food safety training conducted by establishment personnel	143	35.0
4. Formal, periodic refresher course work conducted by establishment personnel	105	24.5
5. Formal, periodic refresher course work conducted by professional trainers	22	5.5
6. None of the above	25	7.4
Total	373	
No response	3	

Question	Management Employees		Production Employees	
	n	%	n	%
5.5 ^a During the past year, what types of training did permanent employees of this establishment receive?				
a. HACCP	269	74.6%	201	54.0%
b. Sanitation Standard Operating Procedures (SSOPs)	282	78.8%	295	82.3%
c. Humane handling	302	84.6%	320	89.7%
d. Recall procedures	241	67.2%	81	22.3%
e. Quality control	255	70.6%	209	57.6%
f. Records and documentation	287	80.8%	205	57.7%
g. Lock out/tag out (LOTO)	245	67.2%	202	54.5%
h. Food defense	259	72.2%	161	43.6%
i. Sampling procedures	233	65.8%	121	32.8%
j. Sanitary dressing	260	72.5%	290	81.0%
k. Good Manufacturing Practices (GMPs)	276	76.8%	279	77.8%
l. Allergens	199	56.0%	142	39.0%
No response	21			

(continued)

^a Respondents could select more than one response.

Table 5-5. Weighted Responses for Section 5: Employee Training (continued)

Question	n	%
5.6 ^a During the past year, what FSIS resources did this establishment use for training?		
1. None	67	17.8
2. FSIS Web site	148	38.2
3. CDs/DVDs produced by FSIS	76	20.4
4. FSIS-sponsored workshops/webinars	30	7.4
5. FSIS notices and directives	243	64.7
6. Compliance guidelines	207	54.4
7. Other FSIS resources	13	3.5
Total	373	
No response	3	
Question	n	%
5.7 ^a When does your establishment use FSIS compliance guidance documents?		
1. During the validation of HACCP systems	231	62.8
2. During the verification of HACCP systems	247	67.5
3. During the development of Sanitation Standard Operating Procedures (SSOPs)	243	66.1
4. Upon receipt of a noncompliance record (NR)	207	55.5
5. Before/during a food safety assessment (FSA)	191	50.4
6. During the training of employees	175	47.7
7. Other	32	7.9
Total	365	
No response	11	

^a Respondents could select more than one response.

Table 5-6. Weighted Responses for Section 6: Establishment Characteristics

	Question	n	Mean	Min	Max
6.1	What is the approximate percentage of the square footage of the production space of this establishment that is under 5 years old, 5 years to just under 20 years old, or 20 years old or more?				
a.	Under 5 years old	342	12.4	0	100
b.	5 years to just under 20 years old	342	24.6	0	100
c.	20 years old or more	342	63.0	0	100
	Total	342	100.0		
	Question	n	%		
6.2 ^a	Who conducts independent, third-party audits of this establishment's food safety procedures?				
1.	This establishment's food safety procedures are not audited by independent, third-party auditors			119	34.9
2.	Independent, third-party auditors that are hired by this establishment or by corporate headquarters			124	30.0
3.	Independent, third-party auditors that are hired by customers of this establishment			82	20.1
4.	Customers of this establishment (for example, food service, military)			65	14.7
5.	None of the above			90	26.4
	Total			363	
	No response			13	
	Question	n	%		
6.3 ^a	When independent, third-party audits are conducted, which practices are audited?				
1.	Microbiological testing			127	47.4
2.	Residue testing			63	23.6
3.	Humane handling			157	60.0
4.	Sanitary dressing			131	49.4
5.	Fabrication			127	47.6
6.	Further processing			94	35.2
7.	HACCP system			155	59.3
8.	Good Manufacturing Practices (GMPs)			148	56.0
9.	Sanitation Standard Operating Procedures (SSOPs)			152	58.1
10.	Food defense			129	48.1
11.	Other			18	6.5
12.	None of the above			75	33.0
	Total			249	
	No response			127	

(continued)

^a Respondents could select more than one response.

^b Excludes respondents who stated no employees work in a quality control/quality assurance (QC/QA) department, including food safety.

Table 5-6. Weighted Responses for Section 6: Establishment Characteristics (continued)

Question	n	%
6.4 ^a Who conducts independent, third-party audits of this establishment's humane handling procedures?		
1. This establishment's humane handling procedures are not audited by independent, third-party auditors	92	26.8
2. Independent, third-party auditors that are hired by this establishment or by corporate headquarters	134	32.7
3. Independent, third-party auditors that are hired by customers of this establishment	92	22.9
4. Customers of this establishment (for example, food service, military)	60	13.7
5. None of the above	100	29.2
Total	365	
No response	11	
Question	n	%
6.5 ^a What certifications are required by customers of this establishment?		
1. None	182	53.1
2. Global Food Safety Initiative (GFSI) (includes ISO 22000, BRC, IFS, Dutch HACCP, and SQF)	82	18.9
3. Customer-specified requirements	119	30.2
4. Organic certification	42	11.7
5. Other	23	6.2
Total	364	
No response	12	
Question	n	%
6.6 ^a Is the slaughter area of this establishment cleaned during each production shift?		
1. No	15	3.5
2. Yes, it is cleaned between species changes	171	48.9
3. Yes, it is cleaned at the end of the shift	304	81.5
4. Yes, it is cleaned mid-shift	110	28.2
Total	373	
No response	3	

(continued)

^a Respondents could select more than one response.^b Excludes respondents who stated no employees work in a quality control/quality assurance (QC/QA) department, including food safety.

Table 5-6. Weighted Responses for Section 6: Establishment Characteristics (continued)

Question	n	%		
6.7 ^a Does this establishment operate a separate clean-up shift for the slaughter area after the production shift is done?				
1. No	76	22.0		
2. Yes, performed by establishment personnel	227	62.7		
3. Yes, performed by contractors	73	16.0		
Total	373	100.0		
No response	3			
Question	n	%		
6.8 ^a Is the fabrication area of this establishment cleaned during each production shift?				
1. No	22	5.2		
2. Yes, it is cleaned between product type changes	137	40.1		
3. Yes, it is cleaned at the end of the shift	305	84.4		
4. Yes, it is cleaned mid-shift	98	25.9		
Total	364			
No response	12			
Question	n	%		
6.9 ^a Does this establishment operate a separate clean-up shift for the fabrication area after the production shift is done?				
1. No	71	20.7		
2. Yes, performed by establishment personnel	219	62.3		
3. Yes, performed by contractors	80	18.4		
Total	365	100.0		
No response	11			
Question	n	Mean	Min	Max
6.10 Approximately how many production employees are employed at this establishment?				
a. Full-time employees	363	202.3	0	4,300
b. Part-time employees	282	2.9	0	50
c. Temporary employees	216	2.1	0	50
No response	10			

(continued)

^a Respondents could select more than one response.

^b Excludes respondents who stated no employees work in a quality control/quality assurance (QC/QA) department, including food safety.

Table 5-6. Weighted Responses for Section 6: Establishment Characteristics (continued)

Question	n	Mean	Min	Max
6.11 Approximately how many laboratory employees are employed by this establishment? This does not include personnel employed by third-party labs that work onsite at the plant.				
a. Full-time employees	352	0.9	0	30
No response	24			
Question	n	%		
6.12 Approximately how many full-time employees at this establishment work in a quality control/quality assurance (QC/QA) department, including food safety?				
1. None		109	32.3	
2. 1 to 5		188	52.8	
3. 6 to 10		17	4.2	
4. 11 or more		50	10.7	
Total		364	100.0	
No response		12		
Question	n	%		
6.13 ^b For the person who manages the QC/QA department, what percentage of their time is devoted to managing QC/QA activities?				
1. 1 to 24 percent		70	28.7	
2. 25 to 49 percent		49	21.6	
3. 50 to 74 percent		38	13.8	
4. 75 to 99 percent		46	16.2	
5. 100 percent		54	19.7	
Total		257	100.0	
No response		10		
Question	n	%		
6.14 To the best of your knowledge, what percentage of live animals slaughtered at this establishment during the past year was imported?				
1. None		320	88.8	
2. 1 to 9 percent		19	4.3	
3. 10 to 24 percent		13	3.0	
4. 25 to 49 percent		12	2.6	
5. 50 to 100 percent		5	1.3	
Total		369	100.0	
No response		7		

(continued)

^a Respondents could select more than one response.^b Excludes respondents who stated no employees work in a quality control/quality assurance (QC/QA) department, including food safety.

Table 5-6. Weighted Responses for Section 6: Establishment Characteristics (continued)

Question	n	%
6.15 What percentage of this establishment's product is exported outside of the United States?		
1. None	271	78.2
2. 1 to 24 percent	79	17.4
3. 25 to 49 percent	14	2.9
4. 50 to 100 percent	7	1.5
Total	371	100.0
No response	5	
Question	n	%
6.16 ^a Which of the following traceability practices does this establishment currently use in its operations?		
1. Identifies and tracks its products using a traceable code, by production lot, backward to specific animal supplier	208	54.6
2. Identifies and tracks its products using a traceable code, by production lot, forward to specific customers	218	57.1
3. None of the above	84	23.9
Total	370	
No response	6	
Question	n	%
6.17 ^a Which of the following food recall and crisis management practices does this establishment currently use in its operations?		
1. Conducts mock recalls of lot codes delivered to specific customers	156	39.1
2. Conducts mock recalls of lot codes backwards to raw material suppliers	109	26.9
3. Documents mock recall exercises and conducts a self-assessment	131	32.3
4. Has a written crisis management program beyond the scope of product recalls	167	43.0
5. Conducts crisis management exercises	64	15.2
6. Has recall insurance	87	21.3
7. Has business continuity plan	89	21.7
8. None of the above	94	27.4
9. Other	2	0.6
Total	364	
No response	12	

(continued)

^a Respondents could select more than one response.

^b Excludes respondents who stated no employees work in a quality control/quality assurance (QC/QA) department, including food safety.

Table 5-6. Weighted Responses for Section 6: Establishment Characteristics (continued)

Question	n	%
6.18 What was the approximate value of total establishment sales revenue during the past year?		
1. Under \$249,999	67	21.1
2. \$250,000 to \$499,999	49	15.0
3. \$500,000 to \$1.49 million	74	23.1
4. \$1.5 million to \$2.49 million	31	9.2
5. \$2.5 million to \$24.9 million	58	15.4
6. \$25 million to \$49.9 million	6	1.5
7. \$50 million to \$99.9 million	14	3.4
8. \$100 million to \$249.9 million	15	3.5
9. \$250 million to \$499.9 million	8	1.8
10. \$500 million or more	28	6.1
Total	350	100.0
No response	26	
Question	n	%
6.19 During the past year, what was the estimated level of investment in upgrades and expansions of plant facilities and equipment as a share of sales?		
1. 0–5%	161	44.0
2. 6–10%	115	33.2
3. 11–15%	31	8.8
4. 16–20%	19	5.3
5. 21% or more	32	8.7
Total	358	100.0
No response	18	
Question	n	%
6.20 During the past year, what portion of the total investment in upgrades and expansions of plant facilities and equipment was related to food safety?		
1. 0–10%	237	66.7
2. 11–25%	67	19.3
3. 26–50%	34	8.7
4. 51% or more	19	5.3
Total	357	100.0
No response	19	

^a Respondents could select more than one response.

^b Excludes respondents who stated no employees work in a quality control/quality assurance (QC/QA) department, including food safety.

At the request of FSIS, we conducted additional analysis to determine the frequency of label updates by type of label (Questions 4.2 and 4.3). The results are shown in Table 5-7.

Table 5-7. Frequency of Label Updates by Type of Label

Question 4-2. Calculated as a percentage of total production, how were this establishment's meat products packaged and branded during the past year?	Question 4-3. On average, how often does this establishment update its label? (Mean)					
	1. At least twice a year (%)	2. About once a year (%)	3. About every 2 years (%)	4. About every 3 years (%)	5. Less frequently than every 3 years (%)	6. Does not update label (%)
a. Name brand (also known as national or regional brand name)	6.6	13.8	22.5	13.4	9.5	14.8
b. Store or private label brand	23.8	22.6	23.8	21.5	32.6	23.0
c. Labeled with establishment's own company brand name	30.8	34.5	23.9	38.6	28.8	37.3
d. Labeled with another company's brand name (for example, restaurant brand)	4.8	7.1	9.8	7.9	5.0	3.3
e. Labeled for further processing	29.4	17.2	20.0	16.0	20.5	20.0
f. Other	0.0	1.0	0.0	0.3	0.4	1.6
g. Packaged for custom slaughter customers	4.6	3.8	0.0	2.4	3.2	0.0
Total	100	100	100	100	100	100

Tables 5-8 through 5-13 present the weighted results of the survey by HACCP size. CIs are provided for very small establishments, but not for small and large establishments because we conducted a census of those establishments. Furthermore, statistical tests of difference for small and large

plants are not necessary because this is a survey of the universe of small and large plants and not a statistical sample of these plants. However, we can test whether the responses for very small plants are statistically significantly different from those for small or large plants by determining whether the mean values for small or large plants fall within the CI for very small plants. These statistical differences are noted with a $\hat{\wedge}$ symbol in the tables. A summary of the survey findings is provided below:

Slaughter and Fabrication

- Very small (92%) and small (69%) establishments indicated using a skinning knife more often than other methods of dehiding carcasses, whereas large establishments used a variety of methods (skinning knife [60%], air knife [60%], mechanical side puller [53%], mechanical down puller [53%], and mechanical up puller [51%]). [Question 1.2]
- Many very small and small establishments use organic acid rinse (61% and 75%) and tempered carcass rinse/wash (49% and 62%). The use of the technologies asked about in the survey are more widespread among large establishments. Large establishments use foreign material detection (98%), organic acid rinses (78%), adenosine triphosphate (ATP) tests for pre-operative sanitation checks (76%), positive air pressure from the clean to the dirty side (69%), and steam vacuum units (67%). [Question 1.3]
- Establishments of all sizes use chemical sanitizers or hot water for food contact surfaces and tools in the slaughter area, ranging from 92% of very small establishments to 100% of large establishments. It is also common for establishments to have written policies that require humane handling of animals, ranging from 83% of very small establishments to 100% of large establishments. [Question 1.4]

Further Processing

- Very small and large establishments were more likely to grind raw meat or further process meat products (78% and 76%) compared to small establishments (56%). [Question 2.1]
- Ninety percent of large establishments produce products that are shipped to another establishment for further processing, while most very small and small establishments produce products sold directly to

consumers (particularly raw or partially cooked products). [Question 2.2]

- Regardless of size, almost all establishments use chemical sanitizers or hot water for sanitizing hand tools in the further processing area, ranging from 93% of small establishments to 99% of very small establishments. However, large establishments are more likely to use antimicrobial treatment for food contact equipment during operations (61%, versus 25% and 26% of very small and small establishments). Similar differences exist for other practices asked about in the survey. [Question 2.3]
- All large establishments use foreign material detection, and over three-fourths use ATP tests for pre-operative sanitation checks in further processing areas for raw or partially cooked products. Few establishments of any size use irradiation equipment, high pressure processing, infrared technology, or post-packaging pasteurization. [Questions 2.4 and 2.5]

Microbiological Testing Practices

- Two-thirds of very small establishments use only an independent commercial laboratory for microbiological testing, whereas 72% of small establishments and 77% of large establishments use only independent commercial laboratories or both company-owned and commercial laboratories. [Question 3.1]
- It is common for establishments of all sizes to test carcasses before fabrication and raw meat after fabrication. Small and large establishments are more likely to test product and non-product contact surfaces than very small establishments. [Question 3.2]
- During slaughter, very small (67%) and small (59%) establishments were more likely to test for *E. coli* O157:H7 than large establishments (28%). It is more common for large establishments to conduct screening tests such as aerobic plate count (APC) and total plate count (TPC; 81% and 47%) versus 13% and 8% at very small establishments. [Question 3.3]
- Across all size categories, about one-third of establishments reported conducting further testing to confirm positive test results when sampled raw product is presumptive positive for *Salmonella*. More very small (45%) and small (54%) establishments conduct further testing to confirm positive test results for STEC. Large establishments are more likely to destroy the product (47%) when it tests positive for STEC. [Question 3.5]

Packaging and Labeling

- Vacuum packaging is the most common type of modified atmosphere packaging system used among all sizes of establishments. Half of all large establishments also use a mixture of gases, compared to only 12% of small and 2% of very small establishments. [Question 4.1]
- Very small establishments label 43% of their product for sale to consumers, compared to 26% of product for small establishments and 23% of product at large establishments. Large establishments label more of their product as bulk product for further processing (42%), compared to only 12% of product at very small establishments. [Question 4.2]
- Large establishments tend to update their product labels more frequently than very small or small establishments, with 41% of large establishments updating their labels at least twice per year (compared to only 8% of very small establishments). [Question 4.3]

Employee Training

- Small (79%) and very small establishments (77%) most often use informal, unscheduled on-the-job food safety training for newly hired, full-time production employees. Large establishments most often use written food safety training materials and scheduled on-the-job training conducted by establishment personnel (85% for both) as well as informal, unscheduled on-the-job training (81%). [Question 5.1]
- Across all establishment sizes, establishments used FSIS notices and directives and compliance guidelines more than any other FSIS resource. About twice as many large establishments (66%) used the FSIS Web site as very small establishments (34%) as a resource. [Question 5.6]
- Establishments of all sizes use FSIS compliance guidelines; however, large establishments are more likely to use them upon receipt of a noncompliance record (NR) or before or during a food safety assessment. [Question 5.7]

Establishment Characteristics

- All large establishments are audited by independent, third-party auditors, compared to 81% of small establishments and 55% of very small establishments. [Question 6.2]

- All large establishments have customers that require certifications, compared to 32% of very small establishments and 68% of small establishments. [Question 6.5]
- Larger establishments are more likely than small and very small establishments to import live animals and export their product outside of the United States. [Questions 6.14 and 6.15]
- Forty-nine percent of very small establishments use traceability practices backward to animal suppliers and forward to customers, compared to sixty-four percent of small establishments, and one hundred percent of large establishments. [Question 6.16]
- More than 90% of large establishments conduct and document mock recalls forward to specific customers and have a written crisis management program, compared to about half of small establishments and less than one-third of very small establishments. Further, 59% of large establishments have recall insurance, compared to only 10% of very small establishments and 37% of small establishments. [Question 6.17]

Table 5-8. Weighted Responses by Size for Section 1: Slaughter and Fabrication

	Very Small				Small		Large	
	n	%	95% CI		n	%	n	%
			Low	High				
1.1 ^a Which of the following pre-harvest management practices do this establishment's suppliers apply as part of their food safety system to control for pathogens of concern such as <i>Salmonella</i> and Shiga toxin-producing <i>E. coli</i> (STEC)?								
1. Drinking water treatments for purification, including chlorination, ozonation, and electrolyzed water	28	12.9	8.4	17.4	18	18.1 [^]	13	29.5 [^]
2. Antibiotics as a feed additive	8	3.6	1.1	6.1	*	*	10	22.7 [^]
3. Probiotics as a feed additive	7	3.1	0.8	5.4	6	6.1 [^]	9	20.5 [^]
4. Vaccination for <i>Salmonella</i> or Shiga toxin-producing <i>E. coli</i> (STEC)	*	*	*	*	*	*	3	6.8
5. Bacteriophages used on farms	*	*	*	*	*	*	5	11.4
6. Colicin producing <i>E. coli</i> strains as a feed additive	0	0.0	--	--	0	0.0	*	*
7. Clean and dry bedding for confined operations and holding pens	92	42.1	35.5	48.7	36	35.9	18	40.9
8. Hide washing before slaughter	48	22.1	16.6	27.7	40	40.4 [^]	9	20.5
9. Other	6	2.5	0.5	4.5	5	5.1 [^]	*	*
10. None of the above	41	18.4	13.3	23.6	14	14.1	8	18.2
11. Don't know	56	25.0	19.3	30.8	21	20.5	5	11.4 [^]
Total	220		8.4	17.4	100		44	
No response	7		1.1	6.1	2		3	

(continued)

Table 5-8. Weighted Responses by Size for Section 1: Slaughter and Fabrication (continued)

	Very Small				Small		Large	
	n	%	95% CI		n	%	n	%
			Low	High				
1.2 ^a How does this establishment dehide carcasses?								
1. ^b This establishment does not dehide carcasses	12	5.5	2.4	8.5	16	15.7 [^]	15	33.3 [^]
2. Skinning knife	206	92.4	88.8	95.9	69	68.7 [^]	27	60.0 [^]
3. Air knife	30	13.7	9.1	18.4	42	41.9 [^]	27	60.0 [^]
4. Mechanical side puller	*	*	*	*	10	10.1	24	53.3
5. Mechanical down puller	35	16.0	11.1	20.9	27	26.7 [^]	24	53.3 [^]
6. Mechanical up puller	14	6.5	3.2	9.8	29	28.4 [^]	23	51.1 [^]
7. Other	*	*	*	*	*	*	3	6.7
Total	223				101		45	
No response	4				1		2	
1.3 ^a Which of the technologies listed below are currently used by this establishment during slaughter and fabrication operations?								
1. Bioluminescent testing system for preoperative sanitation checks ("ATP tests")	7	3.2	0.8	5.6	28	27.3 [^]	34	75.6 [^]
2. Conveyor belts made from materials designed to prevent bacterial growth (for example, coated with silver ions)	0	0.0	--	--	7	6.9	7	15.6
3. Steam pasteurization systems (for example, the Frigoscandia)	*	*	*	*	9	8.9	13	28.9
4. Steam vacuum units	*	*	*	*	27	26.2	30	66.7
5. Organic acid rinse	136	61.1	54.7	67.6	76	74.9 [^]	35	77.8 [^]
6. Tempered carcass rinse/wash	110	48.6	42.0	55.2	64	62.0 [^]	29	64.4 [^]

(continued)

Table 5-8. Weighted Responses by Size for Section 1: Slaughter and Fabrication (continued)

	Very Small				Small		Large	
	n	%	95% CI		n	%	n	%
			Low	High				
7. Positive air pressure from clean side to dirty side	6	2.9	0.6	5.1	26	24.9^	31	68.9^
8. Foreign material detection (for example, metal detection equipment, x-rays, visual inspection systems)	27	12.5	8.0	16.9	41	39.9^	44	97.8^
9. Equipment for removal of spinal cord prior to carcass splitting	21	9.4	5.6	13.3	13	12.8	11	24.4^
10. Air injection separation of cuts	0	0.0	--	--	6	5.8	20	44.4
11. None of the above	25	11.3	7.1	15.4	8	7.8	0	0.0^
Total	224				102		45	
No response	3				0		2	
1.4 ^a Which of the practices listed below are currently used by this establishment during slaughter and fabrication operations?								
1. Requires and documents that its animal producers use production practices to control pathogens (for example, clean, dry bedding)	20	8.8	5.1	12.5	24	23.5^	18	40.0^
2. Requires and documents that its animal producers use production practices to control chemical residues (for example, drugs or growth hormones)	53	24.5	18.7	30.2	49	48.6^	41	91.1^
3. Rotates sanitizing chemicals it uses in the slaughter area per manufacturer's label or per scientific advice	64	28.2	22.3	34.1	53	51.9^	37	82.2^
4. Uses chemical sanitizers or hot water for food contact surfaces and tools used in the slaughter area	206	91.8	88.1	95.5	96	95.0	45	100.0^
5. Has written policies and procedures to control the use of hazardous chemicals	128	57.4	50.9	64.0	75	73.8^	44	97.8^

(continued)

Table 5-8. Weighted Responses by Size for Section 1: Slaughter and Fabrication (continued)

	Very Small				Small		Large	
	n	%	95% CI		n	%	n	%
			Low	High				
6. Has written policies and procedures that require humane handling of animals	186	82.9	77.9	87.9	93	92.0^	45	100.0^
7. Applies antimicrobial agents to raw products	99	45.5	38.9	52.1	65	64.4^	37	82.2^
8. Removes major lymph nodes	70	31.6	25.4	37.7	28	27.4	24	53.3^
9. None of the above	1	0.4	0.0	1.3	1	1.0	0	0.0
Total	224				101		45	
No response	3				1		2	

	Head per Hour							
	n	Mean	95% CI		n	Mean	n	Mean
			Low	High				
1.5 What is the average livestock slaughter line speed? If multiple lines, highest line speed is shown.								
Head per hour								
All meat species combined	225	5	3.8	5.5	101	60^	46	814^
Beef only	21	10			38	45	27	320
Swine only	18	12			31	133	19	1,517
Both beef and swine	186	3			32	9	0	0
No response	2				1		1	

(continued)

Table 5-8. Weighted Responses by Size for Section 1: Slaughter and Fabrication (continued)

	Very Small								Small				Large				
	Establishment Produces Product	95% CI		Annual Production (pounds)		95% CI		Establishment Produces Product	Annual Production (pounds)		Establishment Produces Product	Annual Production (pounds)					
		%	Low	High	n	Mean	Low		High	n		%	n	Mean	n	%	n
1.6 ^a For each HACCP product category listed below provide an estimate of the total pounds produced by this establishment during the past year.																	
a. Raw, intact (raw not ground)	185	82.3	77.3	87.3	136	689,691	-250,289	1,629,670	83	83.0	59	25,613,826 [^]	46	100 [^]	31	487,348,622 [^]	
b. Raw, non-intact (raw ground)	185	82.0	76.9	87.1	137	243,982	66,110	421,853	59	59.1 [^]	44	20,158,467 [^]	30	65.2 [^]	18	61,121,291 [^]	
c. Thermally processed, commercially sterile	0	0.0	--	--	0	0	--	--	0	0.0	0	0	*	*	*	*	
d. Not heat treated, shelf stable	15	6.4	3.2	9.5	8	19,031	3,524	34,538	6	6.2	*	*	0	0 [^]	0		
e. Heat treated, shelf stable	49	20.9	15.6	26.1	37	18,085	2,797	33,374	12	11.9 [^]	9	972,235 [^]	7	15.2 [^]	5	21,779,895 [^]	
f. Fully cooked, not shelf stable	70	30.3	24.3	36.3	54	43,224	20,257	66,192	22	21.7 [^]	15	7,158,885 [^]	5	10.9 [^]	*	*	
g. Product with secondary inhibitors, not shelf stable	15	6.6	3.3	9.8	13	14,470	-5,366	34,306	*	*	*	*	*	*	*	*	
h. Heat treated, but not fully cooked—not shelf stable	90	39.1	32.7	45.6	67	73,782	8,700	138,865	17	16.9 [^]	9	1,544,096 [^]	9	19.6 [^]	5	55,632,092 [^]	
No response	2								2				1				

^a Respondents could select more than one response.

^b This response was excluded when calculating the proportion.

*Results are suppressed because of the small number of respondents.

[^]These results are outside the range of the CI; therefore, it is statistically different from very small establishments at the 5% level from very small establishments.

Note: "--" indicates that the confidence interval could not be estimated because there were no observations (respondents) for that response.

Table 5-9. Weighted Responses by Size for Section 2: Further Processing

	Very Small				Small		Large	
	n	%	95% CI		n	%	n	%
			Low	High				
2.1 Does this establishment currently grind raw meat or further process (for example, cook, cure, or smoke) meat products?								
1. Yes	177	77.8	72.2	83.3	57	55.9^	34	75.6
2. No	49	22.2	16.7	27.8	45	44.1^	11	24.4
Total	226	100.0			102	100.0	45	100.0
No response	1				0		2	
2.2 ^{a,b} What types of further processed food products does this establishment produce?								
1. Shelf stable ready-to-eat (RTE) products for consumers	51	36.2	28.1	44.3	10	24.5^	5	16.1^
2. Not shelf stable ready-to-eat (RTE) products for consumers	80	57.8	49.4	66.2	19	45.3^	5	16.1^
3. Raw or partially cooked products for consumers	118	86.5	80.8	92.2	34	82.9	31	100.0^
4. Products that are shipped for further processing to another establishment	30	22.3	15.2	29.4	20	49.0^	28	90.3^
Total	137				41		31	
No response	41				16		5	

(continued)

Table 5-9. Weighted Responses by Size for Section 2: Further Processing (continued)

	Very Small				Small		Large	
	n	%	95% CI		n	%	n	%
			Low	High				
2.3 ^{a,b} Which of the following practices does this establishment currently use in its further processing operations?								
1. Stipulates practices for controlling pathogens in purchasing specifications for raw meat	64	45.0	36.7	53.2	20	48.1	21	67.7 [^]
2. Stipulates practices for controlling chemical residues (for example, drugs or growth hormones) in purchasing specifications for raw meat	40	28.4	20.9	35.8	15	36.1 [^]	20	64.5 [^]
3. Treats drains with sanitizers for pathogen control	109	76.4	69.4	83.4	32	76.1	24	77.4
4. Uses chemical sanitizers or hot water for sanitizing hand tools such as knives used in further processing areas	141	98.7	97.0	100.0	39	92.8 [^]	30	96.8 [^]
5. Rotates sanitizing chemicals it uses in the further processing area per manufacturer's label or per scientific advice	85	59.0	50.8	67.1	28	66.1	28	90.3 [^]
6. Treats food contact equipment and surfaces to remove biomatter during operations	48	34.3	26.4	42.2	12	28.6	14	45.2 [^]
7. Uses antimicrobial treatments for food contact equipment during operations	34	25.0	17.7	32.3	11	26.1	19	61.3 [^]
8. Applies antimicrobial agents to RTE product	22	16.1	9.9	22.3	8	19.5	5	16.1
9. None of the above	1	0.6	0.0	1.9	1	2.5 [^]	0	0.0
Total	143				42		31	
No response	35				0		5	

(continued)

Table 5-9. Weighted Responses by Size for Section 2: Further Processing (continued)

	Very Small				Small		Large	
	n	%	95% CI		n	%	n	%
			Low	High				
2.4 ^{a,b} Which of the following technologies does this establishment currently use in its further processing operations for raw or partially cooked products?								
1. ^c This establishment does not produce raw or partially cooked products	23	16.0	9.9	22.0	8	19.6	0	0.0 [^]
2. Bioluminescent testing system for preoperative sanitation checks ("ATP tests")	11	9.4	4.1	14.7	7	21.9 [^]	24	77.4 [^]
3. Conveyor belts made of materials designed to prevent bacterial growth (for example, coated with silver ions)	*	*	*	*	3	9.6	4	12.9
4. Foreign material detection (for example, metal detection equipment, x-rays, visual inspection systems)	24	20.4	13.0	27.7	19	57.6 [^]	31	100.0 [^]
5. Irradiation equipment	*	*	*	*	0	0.0	0	0.0
6. High pressure processing	*	*	*	*	*	*	*	*
7. Infrared technology	0	0.0	--	--	*	*	0	0.0
8. Other types of pasteurization processes (for example, steam and hot water treatments, ultraviolet light, microwave processing)	13	11.3	5.4	17.1	5	15.6	*	*
9. None of the above	77	65.4	56.7	74.1	13	39.2 [^]	0	0.0 [^]
Total	117				33		31	
No response	38				16		5	

(continued)

Table 5-9. Weighted Responses by Size for Section 2: Further Processing (continued)

	Very Small				Small		Large	
	n	%	95% CI		n	%	n	%
			Low	High				
2.5 ^{a,b} Which of the following technologies does this establishment currently use in its further processing operations for RTE products?								
1. ^c This establishment does not produce RTE products	28	21.1	14.1	28.1	17	41.1 [^]	20	64.5 [^]
2. Bioluminescent testing system for preoperative sanitation checks ("ATP tests")	7	6.3	1.8	10.9	3	12.3 [^]	4	36.4 [^]
3. Conveyor belts made of materials designed to prevent bacterial growth	*	*	*	*	*	*	*	*
4. Foreign material detection (for example, metal detection equipment, x-rays, visual inspection systems)	20	19.4	11.7	27.1	9	35.8 [^]	7	63.6 [^]
5. Irradiation equipment	*	*	*	*	0	0.0	0	0.0
6. High pressure processing	*	*	*	*	0	0.0	*	*
7. Infrared technology	0	0.0	--	--	0	0.0	0	0.0
8. Post-packaging pasteurization	*	*	*	*	*	*	0	0.0
9. Other types of pasteurization processes	8	7.7	2.5	12.9	*	*	0	0.0
10. None of the above	75	70.3	61.5	79.1	13	51.9 [^]	4	36.4 [^]
Total	106				25		11	
No response	44				0		5	

^a Respondents could select more than one response.

^b Excludes respondents who do not currently grind raw meat or further process meat products

^c This response was excluded when calculating the proportion.

*Results are suppressed because of the small number of respondents.

[^]These results are outside the range of the CI; therefore, it is statistically different from very small establishments at the 5% level from very small establishments.

Note: "--" indicates that the confidence interval could not be estimated because there were no observations (respondents) for that response.

Table 5-10. Weighted Responses by Size for Section 3: Microbiological Testing Practices

	Very Small				Small		Large	
	n	%	95% CI		n	%	n	%
			Low	High				
3.1 In addition to the generic <i>E. coli</i> testing of carcasses and Listeria testing of ready-to-eat (RTE) products required by FSIS regulation, does this establishment conduct microbiological testing?								
1. Yes, using a company-owned lab	4	1.7	0.0	3.4	8	7.7^	11	23.4^
2. Yes, using an independent commercial lab	153	67.8	61.7	73.9	57	56.3^	10	21.3^
3. Yes, using both company and commercial labs	4	1.9	0.0	3.7	16	15.9^	26	55.3^
4. No	66	28.6	22.7	34.5	20	20.0^	0	0.0^
Total	227	100.0			101	100.0	47	100.0
No response	0				1		0	
3.2 ^{a,b} During the past year, this establishment tested which of the following?								
1. Hides before slaughter	5	3.3	0.4	6.3	22	27.1^	19	40.4^
2. Carcasses before fabrication	110	70.1	62.9	77.4	67	83.0^	44	93.6^
3. Raw meat after fabrication	106	67.7	60.3	75.1	63	77.8^	37	78.7^
4. Lymph nodes	3	2.0	0.0	4.2	4	4.8^	9	19.1^
5. Shelf stable ready-to-eat (RTE) products	29	17.9	11.9	23.8	9	11.1^	4	8.5^
6. Not shelf stable ready-to-eat (RTE) products	32	19.4	13.3	25.6	12	14.4	6	12.8^
7. Raw or partially cooked products	24	15.3	9.6	21.0	19	23.5^	26	55.3^
8. Product contact surfaces	67	42.4	34.5	50.2	60	73.7^	40	85.1^
9. Environmental (non-product contact) surfaces	41	25.8	18.9	32.7	48	59.2^	35	74.5^
10. Other	2	1.2	0.0	2.9	0	0.0	0	0.0
Total	157				81		47	
No response	4				1		0	

(continued)

Table 5-10. Weighted Responses by Size for Section 3: Microbiological Testing Practices (continued)

	Very Small				Small		Large	
	n	%	95% CI		n	%	n	%
			Low	High				
3.3 ^{a,b} During the past year, what microbial indicators and pathogens were tested for by this establishment during slaughter?								
1. Aerobic plate count (APC)	21	12.6	7.5	17.7	47	57.1 [^]	38	80.9 [^]
2. Total plate count (TPC)	12	7.6	3.4	11.7	33	40.5 [^]	22	46.8 [^]
3. Total coliforms	27	17.0	11.1	22.9	40	48.7 [^]	28	59.6 [^]
4. <i>E. coli</i> O157:H7	106	66.6	59.3	74.0	48	58.7 [^]	13	27.7 [^]
5. Non-O157 STEC	39	24.1	17.4	30.7	31	37.6 [^]	20	42.6 [^]
6. Virulence genes (stx, eae, uidA, spi)	*	*	*	*	3	3.7	*	*
7. <i>Enterobacteriaceae</i>	*	*	*	*	8	9.7	25	53.2
8. Yeasts and molds	*	*	*	*	5	6.0	6	12.8
9. <i>Bacillus cereus</i>	0	0.0	--	--	3	3.4	0	0.0
10. <i>Salmonella</i>	31	20.0	13.6	26.4	32	38.7 [^]	19	40.4 [^]
11. <i>Staphylococcus aureus</i>	*	*	*	*	*	*	6	12.8
12. <i>Trichinella</i>	*	*	*	*	*	*	*	*
13. <i>Toxoplasma gondii</i>	0	0.0	--	--	0	0.0	0	0.0
14. <i>Clostridium perfringens</i>	*	*	*	*	*	*	*	*
15. <i>Listeria</i> species	20	12.6	7.4	17.9	13	15.8	5	10.6
16. Other	*	*	*	*	0	0.0	0	0.0
17. None of the above	34	20.9	14.6	27.3	11	13.4 [^]	0	0.0 [^]
Total	160				82		47	
No response	1				0		0	

(continued)

Table 5-10. Weighted Responses by Size for Section 3: Microbiological Testing Practices (continued)

	Very Small				Small		Large	
	n	%	95% CI		n	%	n	%
			Low	High				
3.4 ^{a,b} During the past year, what microbial indicators and pathogens were tested for by this establishment during fabrication?								
1. Aerobic plate count (APC)	15	9.5	4.9	14.1	42	52.4 [^]	31	66.0 [^]
2. Total plate count (TPC)	14	9.2	4.6	13.9	33	41.3 [^]	25	53.2 [^]
3. Total coliforms	17	10.9	5.9	15.8	38	47.6 [^]	29	61.7 [^]
4. <i>E.coli</i> O157:H7	122	78.6	72.2	85.1	52	65.4 [^]	26	55.3 [^]
5. Non-O157 STEC	42	27.2	20.1	34.3	33	41.5 [^]	23	48.9 [^]
6. Virulence genes (stx, eae, uidA, spi)	0	0.0	--	--	*	*	*	*
7. <i>Enterobacteriaceae</i>	*	*	*	*	6	7.6	15	31.9
8. Yeasts and molds	*	*	*	*	6	7.3	11	23.4
9. <i>Bacillus cereus</i>	0	0.0	--	--	3	3.6	0	0.0
10. <i>Salmonella</i>	36	24.1	17.2	31.0	34	42.3 [^]	23	48.9 [^]
11. <i>Staphylococcus aureus</i>	*	*	*	*	4	5.0	8	17.0
12. <i>Trichinella</i>	*	*	*	*	*	*	0	0.0
13. <i>Toxoplasma gondii</i>	0	0.0	--	--	0	0.0	0	0.0
14. <i>Listeria</i> species	35	21.9	15.4	28.3	17	21.3	7	14.9 [^]
15. <i>Clostridium perfringens</i>	6	3.9	0.8	6.9	3	3.5	3	6.4
16. Other	*	*	*	*	0	0.0	*	*
17. None of the above	26	16.2	10.4	22.0	10	12.4	5	10.6
Total	156				80		47	
No response	5				2		0	

(continued)

Table 5-10. Weighted Responses by Size for Section 3: Microbiological Testing Practices (continued)

	Very Small								Small				Large			
	Salmonella		95% CI		STEC		95% CI		Salmonella		STEC		Salmonella		STEC	
	n	%	Low	High	n	%	Low	High	n	%	n	%	n	%	n	%
3.5 ^{a,b} What actions does this establishment take when test results indicated that sampled raw product is presumptive positive for <i>Salmonella</i> and Shiga Toxin-producing <i>E. coli</i> (O157:H7 or non-O157 STEC)?																
1. Conduct further testing to confirm positive	55	27.3%	21.0	33.5	90	44.8%	37.9	51.8	30	33.6%^	48	53.9%^	14	30.4%	14	30.4%^
2. Conduct further testing to determine serotype	17	8.3%	4.5	12.1	30	14.8%	9.8	19.7	10	11.3%	22	24.7%^	3	6.5%	7	15.2%
3. Divert product to cooking (at this plant)	23	10.7%	6.5	14.9	48	22.9%	17.1	28.6	11	12.4%	18	20.2%	5	10.9%	15	32.6%^
4. Destroy product	50	25.3%	19.2	31.4	87	43.4%	36.5	50.3	15	16.8%^	27	30.3%^	7	15.2%^	22	47.8%
5. Re-work product	7	3.5%	0.9	6.0					15	8.1%			7	0.0%^		
6. Sell product into commerce where it will receive a lethality step	5	2.7%	0.3	5.1					12.2%^	34.8%						
7. Sell product to a processing establishment	*	*	0.0	2.2					10.3%^	19.6%						
8. Other	3	1.5%	0.0	3.2	3	1.5%	0.0	3.2	0	0.0%	6	6.8%^	1	2.2%	6	13.0%^
9. Establishment does not test for this pathogen	41	20.0%	14.5	25.6	22	11.0%	6.6	915.3	21	23.0%	13	14.2%	9	19.6%	10	21.7%^
10. Never experienced a positive test result (write-in)	8	3.7%	1.2	6.3	7	3.3%	0.9	5.6	0	0.0%^	0	0.0%^	0	0.0%^	0	0.0%^
Total	202								90				46			
No response	25				12				25				12			

^a Respondents could select more than one response.

^b Excludes respondents do not conduct microbiological testing

*Results are suppressed because of the small number of respondents.

^These results are outside the range of the CI; therefore, it is statistically different from very small establishments at the 5% level from very small establishments.

Note: “—” indicates that the confidence interval could not be estimated because there were no observations (respondents) for that response.

Table 5-11. Weighted Responses by Size for Section 4: Packaging and Labeling

	Very Small				Small		Large	
	n	%	95% CI		n	%	n	%
			Low	High				
4.1 ^a Does this establishment use any of the following types of modified atmosphere packaging systems?								
1. Vacuum packaging	183	82.2	77.2	87.3	75	74.5 [^]	45	95.7 [^]
2. Mixtures of gases	4	1.7	0.0	3.3	12	11.8 [^]	25	53.2 [^]
3. None of the above	39	17.4	12.3	22.4	26	25.5 [^]	*	*
Total	223	100.0			101	100.0	47	100.0
No response	4				1		0	

(continued)

Table 5-11. Weighted Responses by Size for Section 4: Packaging and Labeling (continued)

	Very Small						Small				Large			
	n	Mean	Min	Max	95% CI		n	Mean	Min	Max	n	Mean	Min	Max
					Low	High								
4.2 Calculated as a percentage of total production, how were this establishment's meat products packaged and branded during the past year?														
a. Consumer packaging with name brand label (also known as national or regional brand name)	195	12.0	0	100	8.4	15.6	90	13.1	0	100	37	18.2^	0	100
b. Consumer packaging with store or private label brand	195	31.4	0	100	26.0	36.9	90	12.7^	0	100	37	4.4^	0	20
c. Foodservice packaging labeled with establishment's own company brand name	195	34.0	0	100	28.7	39.3	90	28.4^	0	100	37	29.4	0	97
d. Foodservice packaging labeled with another company's brand name (for example, restaurant brand)	195	5.5	0	95	3.4	7.5	90	8.3^	0	85	37	3.6	0	20
e. Bulk product labeled for further processing	195	12.0	0	100	8.0	16.1	90	36.5^	0	100	37	41.8^	0	100
f. Other	195	0.6	0	100	-0.4	1.5	90	0.4	0	35	37	2.7^	0	89
g. Packaged for custom slaughter customers	195	4.4	0	95	2.0	6.9	90	0.7^	0	50	37	0.0^	0	0
Total	195	100.0					90	100.0			37	100		
No response	32						12				10			

(continued)

Table 5-11. Weighted Responses by Size for Section 4: Packaging and Labeling (continued)

	Very Small				Small		Large	
	n	%	95% CI		n	%	n	%
			Low	High				
4.3 On average, how often does this establishment update its label?								
1. At least twice a year	17	8.0	4.3	11.7	12	12.7^	18	40.9^
2. About once a year	58	27.9	21.7	34.0	26	28.3	9	20.5^
3. About every 2 years	12	5.6	2.5	8.7	11	11.6^	7	15.9^
4. About every 3 years	17	8.4	4.5	12.2	5	5.5	7	15.9^
5. Less frequently than every 3 years	47	22.5	16.8	28.2	23	24.7	3	6.8^
6. Does not update label	58	27.6	21.5	33.7	16	17.2^	0	0.0^
Total	209	100.0			93	100.0	44	100.0
No response	18				9		3	
4.4 ^a What method does this establishment use to print labels or packaging for its products?								
1. By an outside company using printing plates	84	39.0	32.4	45.6	56	57.0^	35	74.5^
2. By an outside company using digital printing	45	21.2	15.6	26.7	26	27.2^	21	44.7^
3. By the establishment or parent company using digital printing	138	63.8	57.3	70.2	68	69.0	41	87.2^
4. Other	10	4.5	1.7	7.2	3	3.1	*	*
Total	216				98		47	
No response	11				4		0	

(continued)

Table 5-11. Weighted Responses by Size for Section 4: Packaging and Labeling (continued)

	Very Small				Small		Large	
	n	%	95% CI		n	%	n	%
			Low	High				
4.5 On the products that are produced and packaged for retail sale at this establishment, what proportion of labels includes one or more special statements or claims?								
1. ^b This plant does not package products for retail sale	28	13.0	8.5	17.5	36	36.8 [^]	*	*
2. None	90	45.5	38.5	52.5	15	24.5 [^]	8	18.2 [^]
3. 1–25%	72	36.2	29.5	43.0	26	41.6	19	43.2 [^]
4. 26–50%	8	4.1	1.3	6.9	5	8.3 [^]	*	*
5. 51–75%	6	3.1	0.6	5.5	4	6.4 [^]	10	22.7 [^]
6. 76–100%	22	11.1	6.7	15.5	12	19.2 [^]	5	11.4
Total	198	100.0			62	100.0	44	100.0
No response	1				4		1	

^a Respondents could select more than one response.

^b This response was excluded when calculating the proportion.

*Results are suppressed because of the small number of respondents.

[^]These results are outside the range of the CI; therefore, it is statistically different from very small establishments at the 5% level from very small establishments.

Note: “—” indicates that the confidence interval could not be estimated because there were no observations (respondents) for that response.

Table 5-12. Weighted Responses by Size for Section 5: Employee Training

	Very Small				Small		Large	
	n	%	95% CI		n	%	n	%
			Low	High				
5.1 ^a What food safety training is provided for newly hired, full time permanent production employees of this establishment?								
1. Written food safety training materials are given to new hires	77	34.5	28.2	40.8	69	66.9 [^]	40	85.1 [^]
2. Informal, unscheduled on-the-job food safety training	173	76.7	71.1	82.3	81	79.3	38	80.9
3. Scheduled on-the-job food safety training conducted by establishment personnel	84	37.5	31.1	43.9	64	62.6 [^]	40	85.1 [^]
4. Formal food safety course conducted by establishment personnel	21	9.5	5.6	13.4	39	37.9 [^]	30	63.8 [^]
5. Formal food safety course administered on a computer at the establishment	8	3.3	1.0	5.6	17	16.4 [^]	29	61.7 [^]
6. Formal food safety course conducted by professional trainers	17	7.5	4.0	11.0	10	9.9	8	17.0 [^]
7. None of above	15	6.8	3.5	10.2	*	*	0	0.0 [^]
Total	225				102		47	
No response	2				0		0	

(continued)

Table 5-12. Weighted Responses by Size for Section 5: Employee Training (continued)

	Very Small				Small		Large	
	n	%	95% CI		n	%	n	%
			Low	High				
5.2 ^a What food safety training is provided for temporary and part-time production employees of this establishment?								
1. Written food safety training materials are given to temporary hires	61	27.0	21.1	32.9	49	49.6 [^]	30	68.2 [^]
2. Informal, unscheduled on-the-job food safety training	165	73.3	67.5	79.2	65	66.1 [^]	30	68.2
3. Scheduled on-the-job food safety training conducted by establishment personnel	67	29.9	23.8	36.0	44	45.1 [^]	29	65.9 [^]
4. Formal food safety course conducted by establishment personnel	17	8.0	4.3	11.6	27	27.5 [^]	22	50.0 [^]
5. Formal food safety course administered on a computer at the establishment	3	1.3	0.0	2.7	8	8.1 [^]	20	45.5 [^]
6. Formal food safety course conducted by professional trainers	7	3.1	0.8	5.4	4	4.2	5	11.4 [^]
7. None of above	29	13.2	8.7	17.8	18	18.2 [^]	9	20.5 [^]
Total	224				98		44	
No response	3				4		3	

(continued)

Table 5-12. Weighted Responses by Size for Section 5: Employee Training (continued)

	Very Small						Small				Large			
	n	Mean	Min	Max	95% CI		n	Mean	Min	Max	n	Mean	Min	Max
					Low	High								
5.3 How many employees were trained in the past year?														
a. Newly, hired full time permanent production employees	212	3.9	0	45	3.1	4.8	96	79.9 [^]	0	584	45	1,112.0 [^]	0.0	4,300
b. Temporary and newly hired part-time production employees	176	1.9	0	25	1.4	2.4	74	15.1 [^]	0	226	38	36.6 [^]	0.0	350
No response	5						2				2			

(continued)

Table 5-12. Weighted Responses by Size for Section 5: Employee Training (continued)

	Very Small				Small		Large	
	n	%	95% CI		n	%	n	%
			Low	High				
5.4 ^a What continuing food safety training is provided for production employees of this establishment?								
1. Written refresher materials are given to employees	37	16.3	11.4	21.2	33	32.0 [^]	31	66.0 [^]
2. Continuing informal on-the-job food safety training	183	81.5	76.3	86.6	84	82.0	39	83.0
3. Scheduled on-the-job refresher food safety training conducted by establishment personnel	47	21.2	15.8	26.6	56	54.4 [^]	40	85.1 [^]
4. Formal, periodic refresher course work conducted by establishment personnel	22	9.8	5.9	13.8	41	40.1 [^]	42	89.4 [^]
5. Formal, periodic refresher course work conducted by professional trainers	7	3.3	0.9	5.7	9	8.7 [^]	6	12.8 [^]
6. None of the above	20	9.2	5.3	13.1	5	5.2 [^]	0	0.0 [^]
Total	224				102		47	
No response	3				0		0	

(continued)

Table 5-12. Weighted Responses by Size for Section 5: Employee Training (continued)

	Very Small								Small				Large			
	Management Employees		95% CI		Production Employees		95% CI		Management Employees		Production Employees		Management Employees		Production Employees	
			Low	High			Low	High								
	n	%			n	%	n	%	n	%	n	%	n	%		
5.5 ^a During the past year, what types of training did permanent employees of this establishment receive?																
a. HACCP	145	69.6%	63.4	75.9	94	44.4%	37.6	51.2	78	78.4%^	69	69.4%^	46	97.9%^	38	80.9%^
b. Sanitation Standard Operating Procedures (SSOPs)	157	75.6%	69.7	81.4	166	79.2%	73.7	84.8	80	80.7%	87	87.9%^	45	95.7%^	42	89.4%^
c. Humane handling	171	82.2%	77.0	87.4	183	87.6%	83.1	92.1	84	84.7%	92	92.8%^	47	100.0%^	45	95.7%^
d. Recall procedures	134	64.3%	57.8	70.9	47	22.0%	16.3	27.6	69	69.4%	20	20.3%	38	80.9%^	14	29.8%^
e. Quality control	133	64.2%	57.6	70.7	112	53.4%	46.5	60.2	78	78.7%^	58	58.4%	44	93.6%^	39	83.0%^
f. Records and documentation	164	79.1%	73.6	84.6	126	59.8%	53.0	66.5	82	82.8%	50	50.0%^	41	87.2%^	29	61.7%^
g. Lock out/tag out (LOTO)	123	59.2%	52.4	65.9	96	45.8%	39.0	52.6	77	77.4%^	63	62.9%^	45	95.7%^	43	91.5%^
h. Food defense	142	68.4%	62.0	74.7	79	37.5%	30.9	44.1	73	73.6%	49	49.0%^	44	93.6%^	33	70.2%^
i. Sampling procedures	135	65.2%	58.7	71.7	60	28.5%	22.3	34.6	63	63.7%	31	31.6%	35	74.5%^	30	63.8%^
j. Sanitary dressing	142	68.3%	61.9	74.6	163	78.0%	72.3	83.6	75	76.0%^	85	85.9%^	43	91.5%^	42	89.4%^
k. Good Manufacturing Practices (GMPs)	148	71.4%	65.2	77.5	153	73.6%	67.6	79.6	81	81.7%^	81	81.7%^	47	100.0%^	45	95.7%^
l. Allergens	121	57.8%	51.1	64.6	75	35.8%	29.2	42.4	42	42.3%^	40	40.0%	36	76.6%^	27	57.5%^
No response	18								3				0			

(continued)

Table 5-12. Weighted Responses by Size for Section 5: Employee Training (continued)

	Very Small				Small		Large	
	n	%	95% CI		n	%	n	%
			Low	High				
5.6 ^a During the past year, what FSIS resources did this establishment use for training?								
1. None	41	18.0	12.9	23.0	19	18.4	7	14.9
2. FSIS Web site	74	32.9	26.7	39.1	43	42.0 [^]	31	66.0 [^]
3. CDs/DVDs produced by FSIS	45	20.3	14.9	25.6	22	21.3	9	19.1
4. FSIS-sponsored workshops/webinars	12	5.3	2.3	8.2	8	7.8	10	21.3 [^]
5. FSIS notices and directives	141	62.8	56.4	69.2	63	62.5	39	83.0 [^]
6. Compliance guidelines	109	48.8	42.2	55.4	63	62.6 [^]	35	74.5 [^]
7. Other FSIS resources	8	3.5	1.1	5.9	3	3.0	*	*
Total	225				101		47	
No response	2				1		0	
5.7 ^a When does your establishment use FSIS compliance guidance documents?								
1. During the validation of HACCP systems	136	61.7	55.2	68.2	63	63.6	32	68.1
2. During the verification of HACCP systems	145	66.2	59.9	72.6	71	72.0	31	66.0
3. During the development of Sanitation Standard Operating Procedures (SSOPs)	141	64.2	57.8	70.6	66	67.2	36	76.6 [^]
4. Upon receipt of a noncompliance record (NR)	110	50.3	43.6	57.0	61	61.6 [^]	36	76.6 [^]
5. Before/during a food safety assessment (FSA)	97	43.8	37.2	50.4	58	58.3 [^]	36	76.6 [^]
6. During the training of employees	100	46.0	39.3	52.7	49	49.5	26	55.3 [^]
7. Other	11	5.1	2.2	8.1	5	4.9	16	34.0 [^]
Total	219				99		47	
No response	8				3		0	

^a Respondents could select more than one response.

*Results are suppressed because of the small number of respondents.

[^]These results are outside the range of the CI; therefore, it is statistically different from very small establishments at the 5% level from very small establishments.

Note: “—” indicates that the confidence interval could not be estimated because there were no observations (respondents) for that response.

Table 5-13. Weighted Responses by Size for Section 6: Establishment Characteristics

	Very Small						Small				Large			
	n	Mean	Min	Max	95% CI		n	Mean	Min	Max	n	Mean	Min	Max
					Low	High								
6.1 What is the approximate percentage of the square footage of the production space of this establishment that is under 5 years old, 5 years to just under 20 years old, or 20 years old or more?														
a. Under 5 years old	202	14.4	0	100	10.0	18.8	97	9.7^	0	100	43	5.2^	0	25
b. 5 years to just under 20 years old	202	23.0	0	100	18.2	27.8		28.0^	0	100	43	26.8	0	100
c. 20 years old or more	202	62.6	0	100	56.7	68.4	97	62.3	0	100	43	68.0	0	100
Total		100.0					97	100.0			43	100.0		
No response	25						97				4			

(continued)

Table 5-13. Weighted Responses by Size for Section 6: Establishment Characteristics (continued)

	Very Small				Small		Large	
	n	%	95% CI		n	%	n	%
			Low	High				
6.2 ^a Who conducts independent, third-party audits of this establishment's food safety procedures?								
1. This establishment's food safety procedures are not audited by independent, third-party auditors	100	45.0	38.3	51.6	19	19.2 [^]	0	0.0 [^]
2. Independent, third-party auditors that are hired by this establishment or by corporate headquarters	25	11.7	7.4	16.1	58	58.4 [^]	41	93.2 [^]
3. Independent, third-party auditors that are hired by customers of this establishment	23	10.5	6.4	14.6	26	26.0 [^]	33	75.0 [^]
4. Customers of this establishment (for example, food service, military)	7	3.0	0.8	5.3	22	22.1 [^]	36	81.8 [^]
5. None of the above	72	32.7	26.5	39.0	18	18.3 [^]	0	0.0 [^]
Total	220				99		44	
No response	7				3		3	

(continued)

Table 5-13. Weighted Responses by Size for Section 6: Establishment Characteristics (continued)

	Very Small				Small		Large	
	n	%	95% CI		n	%	n	%
			Low	High				
6.3 ^a When independent, third-party audits are conducted, which practices are audited?								
1. Microbiological testing	32	27.3	19.2	35.4	51	62.3 [^]	44	95.7 [^]
2. Residue testing	15	13.1	6.9	19.3	27	33.2 [^]	21	45.7 [^]
3. Humane handling	50	42.1	33.2	51.0	64	78.1 [^]	43	93.5 [^]
4. Sanitary dressing	36	30.7	22.3	39.0	55	67.0 [^]	40	87.0 [^]
5. Fabrication	33	28.4	20.2	36.6	50	60.9 [^]	44	95.7 [^]
6. Further processing	25	21.5	14.0	29.0	33	40.3 [^]	36	78.3 [^]
7. HACCP system	50	42.3	33.3	51.2	61	74.2 [^]	44	95.7 [^]
8. Good Manufacturing Practices (GMPs)	43	36.6	27.8	45.3	61	74.1 [^]	44	95.7 [^]
9. Sanitation Standard Operating Procedures (SSOPs)	49	41.4	32.5	50.3	60	73.0 [^]	43	93.5 [^]
10. Food defense	34	28.7	20.5	36.9	52	63.1 [^]	43	93.5 [^]
11. Other	5	3.7	0.5	7.0	7	8.7 [^]	6	13.0 [^]
12. None of the above	61	49.7	40.7	58.7	14	16.9 [^]	0	0.0 [^]
Total	121				82		46	
No response	106				20		1	

(continued)

Table 5-13. Weighted Responses by Size for Section 6: Establishment Characteristics (continued)

	Very Small				Small		Large	
	n	%	95% CI		n	%	n	%
			Low	High				
6.4 ^a Who conducts independent, third-party audits of this establishment's humane handling procedures?								
1. This establishment's humane handling procedures are not audited by independent, third-party auditors	73	33.4	27.1	39.7	19	19.1 [^]	0	0.0 [^]
2. Independent, third-party auditors that are hired by this establishment or by corporate headquarters	30	14.3	9.5	19.0	59	58.4 [^]	45	97.8 [^]
3. Independent, third-party auditors that are hired by customers of this establishment	30	13.9	9.3	18.6	30	29.4 [^]	32	69.6 [^]
4. Customers of this establishment (for example, food service, military)	7	3.2	0.9	5.6	17	16.9 [^]	36	78.3 [^]
5. None of the above	87	39.2	32.7	45.7	13	12.8 [^]	0	0.0 [^]
Total	218				101		46	
No response	9				1		1	
6.5 ^a What certifications are required by customers of this establishment?								
1. None	150	68.4	62.1	74.7	32	31.6 [^]	0	0.0 [^]
2. Global Food Safety Initiative (GFSI) (includes ISO 22000, BRC, IFS, Dutch HACCP, and SQF)	10	4.7	1.8	7.7	29	28.5 [^]	43	93.5 [^]
3. Customer-specified requirements	37	17.8	12.6	23.0	48	47.5 [^]	34	73.9 [^]
4. Organic certification	23	10.8	6.6	15.1	18	18.0 [^]	*	*
5. Other	14	6.3	3.1	9.5	6	6.0	3	6.5
Total	217				101		46	
No response	10				1		1	

(continued)

Table 5-13. Weighted Responses by Size for Section 6: Establishment Characteristics (continued)

	Very Small				Small		Large	
	n	%	95% CI		n	%	n	%
			Low	High				
6.6 ^a Is the slaughter area of this establishment cleaned during each production shift?								
1. No	4	1.7	0.0	3.5	6	5.7 [^]	5	10.9 [^]
2. Yes, it is cleaned between species changes	137	60.9	54.4	67.3	34	33.7 [^]	0	0.0 [^]
3. Yes, it is cleaned at the end of the shift	185	82.1	77.0	87.2	81	79.4	38	82.6
4. Yes, it is cleaned mid-shift	48	21.7	16.2	27.2	38	37.5 [^]	24	52.2 [^]
Total	225				102		46	
No response	2				0		1	
6.7 ^a Does this establishment operate a separate clean-up shift for the slaughter area after the production shift is done?								
1. No	66	29.2	23.2	35.2	10	9.9 [^]	0	0.0 [^]
2. Yes, performed by establishment personnel	155	69.0	62.9	75.1	62	60.9 [^]	10	21.7 [^]
3. Yes, performed by contractors	5	2.2	0.3	4.1	31	30.0 [^]	37	80.4 [^]
Total	225				102		46	
No response	2				0		1	

(continued)

Table 5-13. Weighted Responses by Size for Section 6: Establishment Characteristics (continued)

	Very Small				Small		Large	
	n	%	95% CI		n	%	n	%
			Low	High				
6.8 ^a Is the fabrication area of this establishment cleaned during each production shift?								
1. No	5	2.2	0.3	4.1	9	8.7 [^]	8	17.4 [^]
2. Yes, it is cleaned between product type changes	105	48.5	41.8	55.2	31	31.6 [^]	*	*
3. Yes, it is cleaned at the end of the shift	187	86.0	81.3	90.6	83	83.3	35	76.1 [^]
4. Yes, it is cleaned mid-shift	46	21.1	15.6	26.6	31	31.5 [^]	21	45.7 [^]
Total	218				100		46	
No response	9				2		1	
6.9 ^a Does this establishment operate a separate clean-up shift for the fabrication area after the production shift is done?								
1. No	60	27.0	21.1	32.9	11	11.1 [^]	0	0.0 [^]
2. Yes, performed by establishment personnel	152	70.1	64.0	76.2	58	57.6 [^]	9	19.6 [^]
3. Yes, performed by contractors	9	4.2	1.5	6.9	34	33.2 [^]	37	80.4 [^]
Total	218	100.0			101	100.0	46	100.0
No response	9				1		1	

(continued)

Table 5-13. Weighted Responses by Size for Section 6: Establishment Characteristics (continued)

	Very Small						Small				Large			
	n	Mean	Min	Max	95% CI		n	Mean	Min	Max	n	Mean	Min	Max
					Low	High								
6.10 Approximately how many production employees are employed at this establishment?														
a. Full-time employees	217	9.0	0	64	7.9	10.1	101	101.3 [^]	2	695	45	1,815.0 [^]	500	4,300
b. Part-time employees	172	2.3	0	27	1.8	2.7	76	2.7	0	25	34	7.9 [^]	0	50
c. Temporary employees	119	0.9	0	15	0.5	1.4	64	4.3 [^]	0	50	33	3.2 [^]	0	50
No response	7						1				2			
6.11 Approximately how many laboratory employees are employed by this establishment? This does not include personnel employed by third-party labs that work onsite at the plant.														
a. Full-time employees	212	0.2	0	10	0.1	0.4	98	1.1 [^]	0	30	42	5.0 [^]	0	24
No response	15						4				5			

(continued)

Table 5-13. Weighted Responses by Size for Section 6: Establishment Characteristics (continued)

	Very Small				Small		Large	
	n	%	95% CI		n	%	n	%
			Low	High				
6.12 Approximately how many full-time employees at this establishment work in a quality control/quality assurance (QC/QA) department, including food safety?								
1. None	96	43.3	36.7	49.9	13	13.2^	0	0.0^
2. 1 to 5	119	54.5	47.9	61.2	69	68.0^	0	0.0^
3. 6 to 10	4	1.8	0.0	3.5	13	12.9^	0	0.0
4. 11 or more	*	*	*	*	6	5.9	43	100.0
Total	220	100.0			101	100.0	43	100.0
No response	7				1		4	

(continued)

Table 5-13. Weighted Responses by Size for Section 6: Establishment Characteristics (continued)

	Very Small				Small		Large	
	n	%	95% CI		n	%	n	%
			Low	High				
6.13 ^b For the person who manages the QC/QA department, what percentage of their time is devoted to managing QC/QA activities?								
1. 1 to 24 percent	46	36.4	27.9	44.9	22	24.8 [^]	*	*
2. 25 to 49 percent	38	31.7	23.3	40.0	8	9.2 [^]	3	7.0 [^]
3. 50 to 74 percent	14	10.7	5.3	16.0	15	16.5 [^]	9	20.9 [^]
4. 75 to 99 percent	10	7.6	3.0	12.1	24	27.2 [^]	12	27.9 [^]
5. 100 percent	17	13.7	7.6	19.8	20	22.2 [^]	17	39.5 [^]
Total	125	100.0			89	100.0	43	100.0
No response	6				0		4	
6.14 To the best of your knowledge, what percentage of live animals slaughtered at this establishment during the past year was imported?								
1. None	219	97.6	95.6	99.7	73	72.0 [^]	28	65.1 [^]
2. 1 to 9 percent	3	1.3	0.0	2.9	8	7.4 [^]	8	18.6 [^]
3. 10 to 24 percent	*	*	*	*	10	9.7	*	*
4. 25 to 49 percent	0	0.0	--	--	7	6.9	5	11.6
5. 50 to 100 percent	*	*	*	*	4	4.0	0	0.0
Total	224	100.0			102	100.0	43	100.0
No response	3				0		4	
6.15 What percentage of this establishment's product is exported outside of the United States?								
1. None	221	98.4	96.8	100.0	50	49.7 [^]	0	0.0 [^]
2. 1 to 24 percent	4	1.6	0.0	3.2	48	46.3 [^]	27	61.4 [^]
3. 25 to 49 percent	0	0.0	--	--	*	*	13	29.5
4. 50 to 100 percent	0	0.0	--	--	*	*	4	9.1
Total	225	100.0			102	100.0	44	100.0
No response	2				0		3	

(continued)

Table 5-13. Weighted Responses by Size for Section 6: Establishment Characteristics (continued)

	Very Small				Small		Large	
	n	%	95% CI		n	%	n	%
			Low	High				
6.16 ^a Which of the following traceability practices does this establishment currently use in its operations?								
1. Identifies and tracks its products using a traceable code, by production lot, backward to specific animal supplier	104	47.3	40.7	54.0	63	61.5 [^]	41	89.1 [^]
2. Identifies and tracks its products using a traceable code, by production lot, forward to specific customers	106	48.5	41.9	55.2	66	64.4 [^]	46	100.0 [^]
3. None of the above	70	30.8	24.7	36.8	14	14.1 [^]	0	0.0
Total	222				102		46	
No response	5				0		1	
6.17 ^a Which of the following food recall and crisis management practices does this establishment currently use in its operations?								
1. Conducts mock recalls of lot codes delivered to specific customers	48	22.5	16.8	28.1	63	62.1 [^]	45	97.8 [^]
2. Conducts mock recalls of lot codes backwards to raw material suppliers	30	14.2	9.4	19.0	39	38.2 [^]	40	87.0 [^]
3. Documents mock recall exercises and conducts a self-assessment	35	16.6	11.5	21.6	52	51.1 [^]	44	95.7 [^]
4. Has a written crisis management program beyond the scope of product recalls	70	32.1	25.9	38.4	54	53.1 [^]	43	93.5 [^]
5. Conducts crisis management exercises	14	6.5	3.2	9.8	19	18.6 [^]	31	67.4 [^]
6. Has recall insurance	22	10.3	6.1	14.4	38	37.3 [^]	27	58.7 [^]
7. Has business continuity plan	25	11.5	7.2	15.8	31	30.1 [^]	33	71.7 [^]

(continued)

Table 5-13. Weighted Responses by Size for Section 6: Establishment Characteristics (continued)

	Very Small				Small		Large	
	n	%	95% CI		n	%	n	%
			Low	High				
8. None of the above	78	35.4	29.0	41.8	16	16.2 [^]	0	0.0 [^]
9. Other	1	0.6	0.0	1.7	1	1.0	0	0.0
Total	217				101		46	
No response	10				1		1	
6.18 What was the approximate value of total establishment sales revenue during the past year?								
1. Under \$249,999	63	29.2	23.1	35.3	*	*	0	0.0 [^]
2. \$250,000 to \$499,999	45	20.4	15.0	25.7	*	*	*	*
3. \$500,000 to \$1.49 million	67	31.0	24.8	37.3	7	7.6 [^]	0	0.0 [^]
4. \$1.5 million to \$2.49 million	22	10.2	6.1	14.2	8	8.5	*	*
5. \$2.5 million to \$24.9 million	20	9.2	5.3	13.1	36	37.5 [^]	*	*
6. \$25 million to \$49.9 million	0	0.0	--	--	6	6.5	0	0.0
7. \$50 million to \$99.9 million	0	0.0	--	--	13	13.8	*	*
8. \$100 million to \$249.9 million	0	0.0	--	--	10	10.5	5	13.2
9. \$250 million or more	0	0.0	--	--	8	8.1	28	73.7
Total	217	100.0			95	100.0	38	100.0
No response	10				7		9	
6.19 During the past year, what was the estimated level of investment in upgrades and expansions of plant facilities and equipment as a share of sales?								
1. 0-5%	95	42.4	35.8	49.0	44	44.1	22	56.4 [^]
2. 6-10%	77	35.7	29.3	42.2	29	29.5	9	23.1 [^]
3. 11-15%	19	8.9	5.0	12.7	9	9.1	3	7.7
4. 16-20	11	5.0	2.1	8.0	6	6.1	*	*
5. 21% or more	18	7.9	4.4	11.4	11	11.2	3	7.7
Total	220	100.0			99	100.0	39	100.0
No response	7				3		8	

(continued)

Table 5-13. Weighted Responses by Size for Section 6: Establishment Characteristics (continued)

	Very Small				Small		Large	
	n	%	95% CI		n	%	n	%
			Low	High				
6.20 During the past year, what portion of the total investment in upgrades and expansions of plant facilities and equipment was related to food safety?								
1. 0–10%	155	70.2	64.0	76.3	58	58.5 [^]	24	61.5 [^]
2. 11–25%	40	19.2	13.8	24.5	22	22.0	5	12.8 [^]
3. 26–50%	13	5.7	2.6	8.7	14	14.3 [^]	7	17.9 [^]
4. 51% or more	11	5.0	2.1	7.9	5	5.2	3	7.7
Total	219	100.0			99	100.0	39	100.0
No response	8				3		8	

^a Respondents could select more than one response.

^b Excludes respondents who stated no employees work in a quality control/quality assurance (QC/QA) department, including food safety

*Results are suppressed because of the small number of respondents.

[^]These results are outside the range of the CI; therefore, it is statistically different from very small establishments at the 5% level from very small establishments.

Note: “—” indicates that the confidence interval could not be estimated because there were no observations (respondents) for that response.

6

Comparative Analysis of 2005 and 2015 Survey Results

To provide information on changes in food safety technologies and practices that have occurred in the meat slaughter and processing industry over the past 10 years, we compared the results from the 2015 survey with the 2005 survey. The wording for many of the survey questions from the 2005 survey was the same as the wording in the 2015 survey. For those questions that remained the same, we compared overall weighted responses from the two surveys (n = 376 for the 2015 survey and n = 384 for the 2005 survey). Tables 6-1 through 6-5 present the results of the comparative analysis. The question numbers and wording shown in the tables are from the 2015 survey. In instances where the questions are the same for the two surveys but the response items are different, only the response items that are the same for both surveys are shown in the tables, thus the numbering of items is not always consecutive.

Select findings from the comparative analysis include the following:

- The use of ATP tests, organic acid rinses, tempered carcass washes, and foreign metal detection remained almost the same from 2005 to 2015. The use of some technologies appears to have decreased (e.g., conveyor belts); additional analysis is needed to better understand the reasons for these declines [Question 1.3]

- The percentage of establishments that use chemical sanitizers or hot water for food contact surfaces increased from 51% to 93% in the slaughter area, and from 65% to 98% in the further processing area. [Questions 1.4 and 2.3]
- Microbiological testing of carcasses before fabrication and raw meat after fabrication increased over the 10-year time period, from 69% to 76% for carcasses before fabrication and from 50% to 72% for raw meat. [Question 3.2]
- The use of different types of food safety training for new hires and existing employees has increased from 2005 to 2015. Distribution of written materials to new hires increased from 30% in 2005 to 47% in 2015, and to existing employees from 13% in 2005 to 25% in 2015. [Questions 5.1 and 5.4]
- The value of annual sales revenue has remained approximately the same from 2005 to 2015. [Question 6.18]

Table 6-1. Comparison of Weighted Responses for Section 1: Slaughter and Fabrication, 2005 and 2015

	2005		2015	
	n	%	n	%
1.2 ^a How does this establishment dehide carcasses?				
1. This establishment does not dehide carcasses	44	8.2	43	10.5
2. Skinning knife	279	78.4	302	83.9
3. Air knife	105	21.6	99	24.6
4. Mechanical side puller	49	8.7	35	7.6
5. Mechanical down puller	89	20.5	86	21.9
6. Mechanical up puller	78	16.9	66	15.7
Number of respondents	384		369	

(continued)

Table 6-1. Comparison of Weighted Responses for Section 1: Slaughter and Fabrication, 2005 and 2015 (continued)

	2005		2015	
	n	%	n	%
1.3 ^a Which of the technologies listed below are currently used by this establishment during slaughter and fabrication operations?				
1. Bioluminescent testing system for preoperative sanitation checks ("ATP tests")	68	12.7	69	15.5
2. Conveyor belts made from materials designed to prevent bacterial growth (for example, coated with silver ions)	75	15.0	14	3.0
3. Steam pasteurization systems (for example, the Frigoscandia)	56	10.8	23	5.1
4. Steam vacuum units	102	19.2	58	12.7
5. Organic acid rinse	257	65.6	247	65.9
6. Tempered carcass rinse/wash	204	52.2	203	53.2
7. Positive air pressure from clean side to dirty side	107	21.3	63	14.1
8. Foreign material detection (for example, metal detection equipment, x-rays, visual inspection systems)	116	21.8	112	26.8
9. Equipment for removal of spinal cord prior to carcass splitting	54	14.4	45	11.6
11. None of the above	22	6.9	33	9.4
Number of respondents	381		371	
1.4 ^a Which of the practices listed below are currently used by this establishment during slaughter and fabrication operations?				
1. Requires and documents that its animal producers use production practices to control pathogens (for example, clean, dry bedding)	46	11.2	62	15.1
2. Requires and documents that its animal producers use production practices to control chemical residues (for example, drugs or growth hormones)	147	33.1	143	36.2
4. Uses chemical sanitizers or hot water for food contact surfaces and tools used in the slaughter area	198	50.7	347	93.3
5. Has written policies and procedures to control the use of hazardous chemicals	298	74.7	247	65.0
6. Has written policies and procedures that require humane handling of animals	329	84.9	324	86.6
Number of respondents	381		370	

^a Respondents could select more than one response.

*Results are suppressed because of the small number of respondents.

Table 6-1. Comparison of Weighted Responses for Section 1: Slaughter and Fabrication, 2005 and 2015 (continued)

	2005				2015			
	Annual Production (pounds)				Annual Production (pounds)			
	Mean	Min	Max	n	Mean	Min	Max	
1.6 ^a For each HACCP product category listed below provide an estimate of the total pounds produced by this establishment during the past year.								
a. Raw, intact (raw not ground)	247	64,209,547	500	1,980,000,000	226	57,388,527	30	1,030,000,000
b. Raw, non-intact (raw ground)	210	7,260,998	1,000	257,745,000	199	8,000,767	75	472,542,900
c. Thermally processed, commercially sterile	*	*	*	*	*	*	*	*
d. Not heat treated, shelf stable	17	118,702	100	2,848,254	10	16,292	300	50,000
e. Heat treated, shelf stable	51	391,276	50	11,459,424	51	1,793,621	200	75,000,000
f. Fully cooked, not shelf stable	97	3,307,833	200	166,000,000	73	4,336,380	250	167,000,000
g. Product with secondary inhibitors not shelf stable	16	51,746	500	500,000	15	18,910	300	117,808
h. Heat treated, but not fully cooked—not shelf stable	80	2,324,311	100	84,000,000	81	2,712,459	225	100,000,000

^a Respondents could select more than one response.

*Results are suppressed because of the small number of respondents.

Table 6-2. Comparison of Weighted Responses for Section 2: Further Processing, 2005 and 2015

	2005		2015	
	n	%	n	%
2.1 Does this establishment currently grind raw meat or further process (for example, cook, cure, or smoke) meat products?				
1. Yes	278	74.9	268	72.5
2. No	106	25.1	105	27.5
Number of respondents	384	100.0	373	100.0
2.2 ^{a,b} What types of further processed food products does this establishment produce?				
1. Shelf stable ready-to-eat (RTE) products for consumers	108	39.5	66	32.0
3. Raw or partially cooked products for consumers	226	80.7	183	87.4
4. Products that are shipped for further processing to another establishment	98	28.2	78	34.4
Number of respondents	278		209	
2.3 ^{a,b} Which of the following practices does this establishment currently use in its further processing operations?				
1. Stipulates practices for controlling pathogens in purchasing specifications for raw meat	188	71.3	105	48.0
2. Stipulates practices for controlling chemical residues (for example, drugs or growth hormones) in purchasing specifications for raw meat	102	37.8	75	33.6
3. Treats drains with sanitizers for pathogen control	224	79.8	165	76.5
4. Uses chemical sanitizers or hot water for sanitizing hand tools such as knives used in further processing areas	180	64.6	210	97.5
6. Treats food contact equipment and surfaces to remove biomatter during operations	125	45.5	74	34.5
7. Uses antimicrobial treatments for food contact equipment during operations	114	38.8	64	29.1
9. None of the above	*	*	*	*
Number of respondents	274		216	

(continued)

^a Respondents could select more than one response.^b Excludes respondents who do not currently grind raw meat or further process meat products.

*Results are suppressed because of the small number of respondents.

Table 6-3. Comparison of Weighted Responses for Section 3: Microbiological Testing Practices, 2005 and 2015

	2005		2015	
	n	%	n	%
3.1 In addition to the generic <i>E. coli</i> testing of carcasses and <i>Listeria</i> testing of ready-to-eat (RTE) products required by FSIS regulation, does this establishment conduct microbiological testing?				
1. Yes	297	73.5	289	76.1
4. No	87	26.5	86	23.9
Number of respondents	384	100	375	100
3.2 ^{a,b} During the past year, this establishment tested which of the following?				
1. Hides before slaughter	68	20.9	46	13.9
2. Carcasses before fabrication	205	68.9	221	76.3
3. Raw meat after fabrication	155	50.3	206	71.6
Number of respondents	278		285	

^a Respondents could select more than one response.

^b Excludes respondents who do not conduct microbiological testing.

Table 6-4. Comparison of Weighted Responses for Section 5: Employee Training, 2005 and 2015

	2005		2015	
	n	%	n	%
5.1 ^a What food safety training is provided for newly hired, full time permanent production employees of this establishment?				
1. Written food safety training materials are given to new hires	136	29.6	186	46.8
2. Informal, unscheduled on-the-job food safety training	266	72.5	292	77.7
3. Scheduled on-the-job food safety training conducted by establishment personnel	124	27.1	188	47.9
4. Formal food safety course conducted by establishment personnel	67	13.3	90	21.3
6. Formal food safety course conducted by professional trainers	21	4.2	35	9.0
Number of respondents	380		374	
5.4 ^a What continuing food safety training is provided for production employees of this establishment?				
1. Written refresher materials are given to employees	61	12.7	101	24.7
2. Continuing informal on-the-job food safety training	290	77.7	306	81.7
3. Scheduled on-the-job refresher food safety training conducted by establishment personnel	96	20.1	143	35.0
4. Formal, periodic refresher course work conducted by establishment personnel	76	15.2	105	24.5
5. Formal, periodic refresher course work conducted by professional trainers	28	5.7	22	5.5
Number of respondents	377		373	

^a Respondents could select more than one response.

Table 6-5. Comparison of Weighted Responses for Section 6: Establishment Characteristics, 2005 and 2015

	2005		2015	
	n	%	n	%
6.1 What is the approximate percentage of the square footage of the production space of this establishment that is under 5 years old, 5 years to just under 20 years old, or 20 years old or more?				
a. Under 5 years old	344	12.3	342	12.4
b. 5 years to just under 20 years old	344	26.5	342	24.6
c. 20 years old or more	344	61.2	342	63.0
Number of respondents	344		342	
6.10 Approximately how many production employees are employed at this establishment?				
a. Full-time employees	375	195.0	363	202.3
6.13 ^a For the person who manages the QC/QA department, what percentage of their time is devoted to managing QC/QA activities?				
1. 1 to 24 percent	55	27.7	70	28.7
2. 25 to 49 percent	44	21.0	49	21.6
3. 50 to 74 percent	38	14.6	38	13.8
4. 75 to 99 percent	59	19.8	46	16.2
5. 100 percent	49	17.0	54	19.7
Number of respondents	245	100.0	257	100.0
6.14 To the best of your knowledge, what percentage of live animals slaughtered at this establishment during the past year was imported?				
1. None	317	89.2	320	88.8
2. 1 to 9 percent	29	5.2	19	4.3
3. 10 to 24 percent	13	2.4	13	3.0
4. 25 to 49 percent	7	1.3	12	2.6
5. 50 to 100 percent	9	2.0	5	1.3
Number of respondents	375	100.0	369	100.0
6.18 What was the approximate value of total establishment sales revenue during the past year?				
1. Under \$2.5 million	188	65.1	221	68.4
5. \$2.5 million to \$24.9 million	74	16.9	58	15.4
6. \$25 million to \$49.9 million	18	3.5	6	1.5
7. \$50 million to \$99.9 million	18	3.5	14	3.4
8. \$100 million to \$249.9 million	18	3.3	15	3.5
9. \$250 million to \$499.9 million	27	4.8	8	1.8
10. \$500 million or more	16	3.0	28	6.1
Number of respondents	359	100.0	350	100.0

^a Excludes respondents who stated no employees work in a quality control/quality assurance (QC/QA) department, including food safety.

7

Conclusions

RTI conducted the 2015 Meat Slaughter & Processing Industry Survey as a follow-up to a similar survey that was conducted for FSIS in 2005. The purpose of the 2015 survey was to assess changes in industry's use of technologies and food safety practices and to collect information on additional topics of interest to the agency.

The survey was administered using a multimodal approach, allowing respondents to choose whether they wanted to complete a paper or Web survey and contacting the plants using a variety of telephone, mail, and email methods. A total of 376 plants completed the survey (66% response rate).

7.1 KEY FINDINGS

The survey findings suggest some improvements in the meat slaughter and processing industry's use of food safety technologies and practices over the past 10 years. For example, comparing the 2005 and 2015 survey results, the percentage of plants using chemical sanitizers or hot water on food contact surfaces increased from 51% to 93% in the slaughter area, and from 65% to 98% in the further processing area since 2005.

Based on findings from the 2015 survey, 76% of meat slaughter and processing plants conduct microbiological testing in addition to mandatory testing required by FSIS. *E. coli* O157:H7 was the pathogen most commonly tested for by establishments during slaughter (61%) and fabrication (72%). Comparing the 2005 and 2015 surveys, the percentage of plants conducting microbiological testing on raw meat after fabrication has increased by more than 20 percentage points.

Many of the establishments surveyed emphasize traceability and recalls: over half of all establishments can trace their products back to specific animal suppliers (54%) and forward to specific customers (57%). Almost all large establishments and over half of all small establishments conduct mock recalls to specific customers and have a written crisis management program; however, less than one-third of very small establishments conduct these activities.

Nearly all (95%) establishments provide some type of food safety training for new hires. Similarly, the overwhelming majority (93%) of establishments also provide continuing food safety training for permanent production employees. The topic most frequently trained on is humane handling practices, for both management and production employees. The use of different types of food safety training for new hires and existing employees has increased from 2005 to 2015. Distribution of written materials to new hires increased from 30% in 2005 to 47% in 2015, and distribution of written materials to existing employees from 13% in 2005 to 25% in 2015. Most plants (82%) reported that they use FSIS resources such as the FSIS Web site, DVDs, webinars, or workshops for training purposes.

7.2 LESSONS LEARNED

This section summarizes lessons learned while conducting the 2015 survey of meat slaughter and processing plants. We suggest that FSIS consider these recommendations in future surveys of meat, poultry, and egg industries.

During the respondent identification telephone call, we asked two eligibility questions. However, for 77 establishments, we were unable to reach the respondent by phone and thus unable to complete the eligibility questions to determine whether the establishment was eligible for the survey (i.e., currently slaughters meat species). For future surveys, we recommend adding the eligibility questions to the beginning of the questionnaire in the event that eligibility cannot be confirmed by phone. We believe this change would reduce the number of establishments with unknown eligibility and thus yield a higher response rate by providing a more accurate count of ineligibles (which are excluded in the response rate calculation).

For several questions in the survey, there was high item non-response (i.e., the respondent skipped a question). This was

more prevalent in the open-ended questions that asked for numerical responses. We recommend that FSIS limit or reduce the number of open-ended questions with numerical responses to the extent possible or reformat these questions so that respondents select a response from a list of categories (e.g., < x pounds, x – y pounds, y - z pounds, > z pounds) instead of writing in a numerical response.

A number of potential respondents only answered the first five questions of the survey, and then stopped when they reached Question 1.6 that asked for production volumes (these cases were not considered completed surveys). This suggests that these respondents reacted negatively to the production volume question (e.g., considered this to be confidential or proprietary information) and thus terminated the survey. We recommend moving this question to the last section of the survey, to reduce the likelihood that respondents terminate the survey.

Over one-third of respondents completed the survey online; thus we recommend that FSIS continue to offer this as an option in future industry surveys. While this is not a large percentage of respondents, we recommend that respondents be provided this option, since offering multiple modes may help to increase response at no additional cost to FSIS since the same data processing system is used for both modes. We believe that the number of respondents who would elect to complete the survey online will increase over time. At the same time, it is equally important that FSIS continue to offer a hardcopy, mail version for those who do not use computers or have Internet access.

Appendix A: Survey Instrument

Form Approved: OMB No. 0583-0164
Expiration Date: 08/31/2017
See OMB Statement on inside cover

Survey of Meat Slaughter and Processing Establishments

2014

This survey applies only to the plant listed on this label.

Refer to this label as instructed in the survey.

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0583-0164. The time required to complete this information collection is estimated to average 60 minutes per response, including the time for reviewing instructions, searching for existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

Send comments regarding this burden estimate or any other aspects of this collection of information, including suggestions for reducing this burden to:

Gary Noyes
Policy Analysis Staff
Office of Policy and Program Development
Food Safety and Inspection Service, USDA
Phone: (301) 504-3672
E-mail: Gary.Noyes@fsis.usda.gov

If you have questions regarding your rights as a study participant, you may call RTI's Office of Research Protection toll-free at 1-866-214-2043.

Instructions

The U.S. Department of Agriculture, Food Safety and Inspection Service (USDA, FSIS), has contracted with RTI International to conduct a survey of meat slaughter and processing establishments. This survey, a follow-up to a survey that was conducted in 2004, collects information about industry's use of food safety technologies and practices. The purpose of this new survey is to understand changes in industry's use of food safety technologies and practices and to collect accurate, up-to-date information to guide policy making and help FSIS fulfill its regulatory responsibilities with the minimum burden possible to industry.

Participation in this survey is important, and we thank you for your help. This survey research will benefit the meat slaughter and processing industry by improving the agency's understanding of current industry practices. As a respondent to the survey, you will receive a summary report of the survey results.

Please answer all questions as they pertain to the specific establishment named on the mailing label attached to the front of this survey booklet. By "establishment" we mean all of the buildings and facilities used for slaughter and processing operations within the general area of the address shown on the mailing label.

Please consult with other members of your organization if you do not know the answer to a particular question. Please try to answer all of the questions. For questions that ask for numbers or percentages, **your best estimate is acceptable.** For purposes of this survey, certain words have particular meanings. For any word printed in **bold** type in a question, please read the definition provided in the margin near the question.

Participation in this survey is voluntary. **The data you provide will be kept secure to the extent permitted by law. Responses to the survey will not be used as the basis of enforcement action against this establishment. We will provide data to FSIS that does not contain identifying information. The study results will be reported to the public only in aggregated form so that individual establishments or firms cannot be identified.**

Please return the completed survey within 10 business days in the enclosed postage-paid return envelope, or to RTI International, Attn: Data Capture (0214016.001.002.001) at 5265 Capital Blvd, Raleigh, NC 27690-1653.

Questions?

Contact the Survey Helpline

If you have any questions as you complete the survey, please send an email to SurveyFSIS@rti.org or call toll-free at 877-294-1306. We operate the Helpline on weekdays from 9:00 a.m. to 5:00 p.m. EST.

By **pre-harvest** we mean any activity prior to the point of slaughter, including activities at the farm, feedlot, or slaughter plant.

By **probiotics** we mean live microbial feed supplements which beneficially affect the host animal by improving its intestinal microbial balance.

By **bacteriophages** we mean viruses with the ability to infect and kill bacteria. This is administered orally as a spray or as a liquid mixed into feed.

By **colicin producing *E. coli* strains** we mean antibacterial proteins produced by some strains of *E. coli* that are lethal for related strains of *E. coli*.

1 Slaughter and Fabrication

1.1 Which of the following pre-harvest management practices do this establishment's suppliers apply as part of their food safety system to control for pathogens of concern such as *Salmonella* and Shiga Toxin producing *E. coli* (STEC)? **Circle all that apply.**

1. Drinking water treatments for purification, including chlorination, ozonation, and electrolyzed water
2. Antibiotics as a feed additive
3. **Probiotics** as a feed additive
4. Vaccination for *Salmonella* or Shiga toxin-producing *E. coli* (STEC)
5. **Bacteriophages** used on farms
6. **Colicin producing *E. coli* strains** as a feed additive
7. Clean and dry bedding for confined operations and holding pens
8. Hide washing before slaughter
9. Other (specify)

-
-
10. None of the above
 11. Don't know

1.2 How does this establishment dehide carcasses? **Circle all that apply.**

1. This establishment does not dehide carcasses
2. Skinning knife
3. Air knife
4. Mechanical side puller
5. Mechanical down puller
6. Mechanical up puller
7. Other

1.3

Which of the technologies listed below are currently used by this establishment during slaughter and fabrication operations? **Circle all that apply.**

1. Bioluminescent testing system for preoperative sanitation checks ("ATP tests")
2. Conveyor belts made from materials designed to prevent bacterial growth (for example, coated with silver ions)
3. Steam pasteurization systems (for example, the Frigoscandia)
4. Steam vacuum units
5. Organic acid rinse
6. Tempered carcass rinse/wash
7. Positive air pressure from clean side to dirty side
8. Foreign material detection (for example, metal detection equipment, x-rays, visual inspection systems)
9. Equipment for removal of spinal cord prior to carcass splitting
10. Air injection separation of cuts
11. None of the above

1.4

Which of the practices listed below are currently used by this establishment during slaughter and fabrication operations? **Circle all that apply.**

1. Requires and documents that its animal producers use production practices to control pathogens (for example, clean, dry bedding)
2. Requires and documents that its animal producers use production practices to control chemical residues (for example, drugs or growth hormones)
3. Rotates sanitizing chemicals it uses in the slaughter area per manufacturers label or per scientific advice
4. Uses chemical sanitizers or hot water for food contact surfaces and tools used in the slaughter area
5. Has **written policies and procedures** to control the use of **hazardous chemicals**
6. Has written policies and procedures that require humane handling of animals
7. Applies antimicrobial agents to raw products
8. Removes major lymph nodes
9. None of the above

By **written policies and procedures** we mean a document that describes the establishment's standard operating procedures.

By **hazardous chemicals** we mean substances such as pesticides, detergents, sanitizers, or lubricants.

All answers you give in this survey will be kept secure to the extent permitted by law. Your best estimates for product volumes are acceptable.

1.5 What is the average livestock slaughter line speed?
Answer in terms of head per hour or per day. If there are multiple lines at different speeds, enter the highest line speed.

- a. _____ head per hour
- b. _____ head per day

By **past year** we mean the most recently completed calendar or fiscal year (12 months).

1.6 For each HACCP product category listed below, circle "Yes" or No" to indicate whether this establishment produces the product. If "Yes," provide an estimate of the total pounds produced by this establishment during the **past year**. Some establishments may categorize products differently than shown in the table. Refer to this establishment's HACCP plan to determine the HACCP product category for the products produced by this establishment.

HACCP Product Category	Example Products	Does Establishment Produce this Product Category?	Annual Production (pounds)
a. Raw, intact (raw not ground)	Whole cuts and steaks, trimmings, mechanically tenderized cuts	Yes No	
b. Raw, non-intact (raw ground)	Ground beef, ground pork, fresh pork sausage, other raw sausages, preformed raw patties	Yes No	
c. Thermally processed, commercially sterile	Canned beef stew, canned pasta with meat, canned chili, baked beans with ham, canned soups, canned Vienna sausages, canned luncheon meat	Yes No	
d. Not heat treated, shelf stable	Fermented sausages, dry sausages, semi-dry sausages, summer sausage, pepperoni, dry salami, uncooked vinegar pickled product	Yes No	
e. Heat treated, shelf stable	Jerky, snack sticks, popped pork skins, cooked vinegar pickled product	Yes No	
f. Fully cooked, not shelf stable	Roast beef, hot dogs, luncheon meats, beef pot pie, burritos	Yes No	
g. Product with secondary inhibitors not shelf stable	Pastrami, corned beef, cured beef tongue, country-style ham, prosciutto	Yes No	
h. Heat treated, but not fully cooked - not shelf stable	Partially cooked meat patties, smoked sausage, bacon	Yes No	

2 Further Processing

By **further processing** we mean all processing beyond slaughter and fabrication.

By **RTE** we mean a product that is edible without additional preparation by the consumer to achieve food safety, but the product may receive additional preparation for taste or appearance purposes.

2.1 Does this establishment currently grind raw meat or **further process** (for example, cook, cure, or smoke) meat products?

1. Yes
2. No **Go to Question 3.1 on page 6**

2.2 What types of further processed food products does this establishment produce? **Circle all that apply.**

1. Shelf stable ready-to-eat (**RTE**) products for consumers
2. Not shelf stable ready-to-eat (**RTE**) products for consumers
3. Raw or partially cooked products for consumers
4. Products that are shipped for further processing to another establishment

2.3 Which of the following practices does this establishment currently use in its further processing operations? **Circle all that apply.**

1. Stipulates practices for controlling pathogens in purchasing specifications for raw meat
2. Stipulates practices for controlling chemical residues (for example, drugs or growth hormones) in purchasing specifications for raw meat
3. Treats drains with sanitizers for pathogen control
4. Uses chemical sanitizers or hot water for sanitizing hand tools such as knives used in further processing areas
5. Rotates sanitizing chemicals it uses in the further processing area per manufacturers label or per scientific advice
6. Treats food contact equipment and surfaces to remove biomatter *during operations*
7. Uses antimicrobial treatments for food contact equipment *during operations*
8. Applies antimicrobial agents to RTE product
9. None of the above

2.4

Which of the following technologies does this establishment currently use in its further processing operations for raw or partially cooked products? **Circle all that apply.**

1. This establishment does not produce raw or partially cooked products
2. Bioluminescent testing system for preoperative sanitation checks ("ATP tests")
3. Conveyor belts made of materials designed to prevent bacterial growth (for example, coated with silver ions)
4. Foreign material detection (for example, metal detection equipment, x-rays, visual inspection systems)
5. Irradiation equipment
6. High pressure processing
7. Infrared technology
8. Other types of pasteurization processes (for example, steam and hot water treatments, ultraviolet light, microwave processing)
9. None of the above

2.5

Which of the following technologies does this establishment currently use in its further processing operations for RTE products? **Circle all that apply.**

1. This establishment does not produce RTE products
2. Bioluminescent testing system for preoperative sanitation checks ("ATP tests")
3. Conveyor belts made of materials designed to prevent bacterial growth
4. Foreign material detection (for example, metal detection equipment, x-rays, visual inspection systems)
5. Irradiation equipment
6. High pressure processing
7. Infrared technology
8. Post-packaging pasteurization
9. Other types of pasteurization processes
10. None of the above

3 Microbiological Testing Practices

3.1 In addition to the generic *E. coli* testing of carcasses and *Listeria* testing of ready-to-eat (RTE) products required by FSIS regulation, does this establishment conduct microbiological testing?

1. Yes, using a company-owned lab
2. Yes, using an independent commercial lab
3. Yes, using both company and commercial labs
4. No **Go to Question 3.5 on page 8**

FSIS regulation requires establishments to conduct generic *E. coli* testing of carcasses and *Listeria* testing of ready-to-eat (RTE) products. Establishments may conduct other testing of products, equipment, and food contact surfaces that is voluntary. Please answer Questions 3.2–3.5 for voluntary testing that is conducted by this establishment. You may need to consult with other members of your organization or your testing laboratory to answer these questions.

3.2 During the past year, this establishment tested which of the following? **Circle all that apply.**

1. Hides before slaughter
2. Carcasses before fabrication
3. Raw meat after fabrication
4. Lymph nodes
5. Shelf stable ready-to-eat (**RTE**) products
6. Not shelf stable ready-to-eat (**RTE**) products
7. Raw or partially cooked products
8. Product contact surfaces
9. Environmental (non-product contact) surfaces
10. Other (specify)

By **RTE** we mean a product that is edible without additional preparation by the consumer to achieve food safety, but the product may receive additional preparation for taste or appearance purposes.

By **Non-O157 STEC** we mean a strain of shiga toxin-producing *E.coli* that is not O157:H7. Examples include O26, O103, O111, O121, and O145.

3.3 During the past year, what microbial indicators and pathogens were tested for by this establishment *during slaughter*? **Circle all that apply.**

1. Aerobic plate count (APC)
2. Total plate count (TPC)
3. Total coliforms
4. *E. coli* O157:H7
5. **Non-O157 STEC**
6. Virulence genes (stx, eae, uidA, spi)
7. *Enterobacteriaceae*
8. Yeasts and molds
9. *Bacillus cereus*
10. *Salmonella*
11. *Staphylococcus aureus*
12. *Trichinella*
13. *Toxoplasma gondii*
14. *Clostridium perfringens*
15. *Listeria* species
16. Other (specify)

17. None of the above

3.4 During the past year, what microbial indicators and pathogens were tested for by this establishment *during fabrication*? **Circle all that apply.**

1. Aerobic plate count (APC)
2. Total plate count (TPC)
3. Total coliforms
4. *E. coli* O157:H7
5. **Non-O157 STEC**
6. Virulence genes (stx, eae, uidA, spi)
7. *Enterobacteriaceae*
8. Yeasts and molds
9. *Bacillus cereus*
10. *Salmonella*
11. *Staphylococcus aureus*
12. *Trichinella*
13. *Toxoplasma gondii*
14. *Listeria* species
15. *Clostridium perfringens*
16. Other (specify)

17. None of the above

By **fabrication** we mean the production of half- or quarter-carcasses, sub-primals, or primals. This does not include ground product.

3.5 What actions does this establishment take when test results indicated that sampled raw product is presumptive positive for *Salmonella* and Shiga Toxin producing *E. coli* (O157:H7 or non-O157 STEC)? **Please check all that apply for each pathogen.**

	<i>Salmonella</i>	Shiga Toxin producing <i>E. coli</i> (O157:H7 or non-O157 STEC)
1. Conduct further testing to confirm positive		
2. Conduct further testing to determine serotype		
3. Divert product to cooking (at this plant)		
4. Destroy product		
5. Re-work product		
6. Sell product into commerce where it will receive a lethality step		
7. Sell product to a processing establishment		
8. Other (specify)		
9. Establishment does not test for this pathogen		

4 Packaging & Labeling

4.1 Does this establishment use any of the following types of modified atmosphere packaging systems? **Circle all that apply.**

1. Vacuum packaging
2. Mixtures of gases
3. None of the above

Your best estimates are acceptable.

4.2 Calculated as a percentage of total production, how were this establishment's meat products packaged and branded during the past year? **Responses should sum to 100%.**

Type of Packaging and Labeling	Type of Branding	Percentage (%)
Packaged and labeled for consumers	a. Name brand (also known as national or regional brand name)	
	b. Store or private label brand	
Packaged and labeled for foodservice	c. Labeled with establishment's own company brand name	
	d. Labeled with another company's brand name (for example, restaurant brand)	
Bulk product for further processing	e. Labeled for further processing	
Other	f. Specify: _____	
Total		100%

4.3 On average, how often does this establishment update its label?

1. At least twice a year
2. About once a year
3. About every 2 years
4. About every 3 years
5. Less frequently than every 3 years
6. Does not update label

By **digital printing** we mean printing directly from a digital image using a laser or inkjet printer and without the use of printing plates.

4.4

What method does this establishment use to print labels or packaging for its products? **Circle all that apply.**

1. By an outside company using printing plates
2. By an outside company using **digital printing**
3. By the establishment or parent company using digital printing
4. Other (specify)

By **special statement or claim** we mean a written statement on the label that relates to the nutrient content of product and its effect on human health, whether product is organic or natural, how the animal was raised, or instructional and disclaimer statements concerning pathogens (e.g., "for cooking only" or "not tested for *E. coli* O157:H7").

4.5

On the products that are produced and packaged for retail sale at this establishment, what proportion of labels includes one or more **special statements or claims**?

1. This plant does not package products for retail sale
2. None
3. 1 to 25%
4. 26 – 50%
5. 51 – 75%
6. 76 – 100%

5 Employee Training

By **food safety training** we mean training to teach concepts and practices for handling food to control biological, chemical, and physical hazards.

By **newly hired, full time permanent production employees** we mean any full time production employee who has worked at the establishment less than 1 month.

By **formal food safety course** we mean a designed course of study that uses prepared materials and follows a specified outline of content.

By **temporary and part-time production employees** we mean those employees that are hired for temporary periods or part-time to work on the production floor, including seasonal employees.

By **production employees** we mean those employees that work on the production floor, either in supervisory or line positions.

5.1 What **food safety training** is provided for **newly hired, full time permanent production employees** of this establishment? ***Circle all that apply.***

1. Written food safety training materials are given to new hires
2. Informal, unscheduled on-the-job food safety training
3. Scheduled on-the-job food safety training conducted by establishment personnel
4. **Formal food safety course** conducted by establishment personnel
5. Formal food safety course administered on a computer at the establishment
6. Formal food safety course conducted by professional trainers
7. None of the above

5.2 What food safety training is provided for **temporary and part-time production employees** of this establishment? ***Circle all that apply.***

1. Written food safety training materials are given to temporary hires
2. Informal, unscheduled on-the-job food safety training
3. Scheduled on-the-job food safety training conducted by establishment personnel
4. Formal food safety course conducted by establishment personnel
5. Formal food safety course administered on a computer at the establishment
6. Formal food safety course conducted by professional trainers
7. None of the above

5.3 How many employees were trained in the past year?
Enter zero if none.

|_|_|_|_| newly, hired full time permanent
production employees

|_|_|_|_| temporary and newly hired part-time
production employees

By **continuing food safety training** we mean training provided periodically to employees that is designed to refresh or extend the initial food safety training the establishment provides to new hires.

5.4 What **continuing food safety training** is provided for production employees of this establishment? **Circle all that apply.**

1. Written refresher materials are given to employees
2. Continuing informal on-the-job food safety training
3. Scheduled on-the-job refresher food safety training conducted by establishment personnel
4. Formal, periodic refresher course work conducted by establishment personnel
5. Formal, periodic refresher course work conducted by professional trainers
6. None of the above

5.5 During the past year, what types of training did permanent employees of this establishment receive?
For each type of employee, check (✓) each type of training that was received.

By **management employees** we mean employees that supervise other employees, including shift managers and line managers.

Type of Training	Type of Employee	
	Management Employees	Production Employees
a. HACCP		
b. Sanitation Standard Operating Procedures (SSOPs)		
c. Humane handling		
d. Recall procedures		
e. Quality control		
f. Records and documentation		
g. Lock out/tag out (LOTO)		
h. Food defense		
i. Sampling procedures		
j. Sanitary dressing		
k. Good Manufacturing Practices (GMPs)		
l. Allergens		

5.6 During the past year, what FSIS resources did this establishment use for training? ***Circle all that apply.***

1. None
 2. FSIS Web site
 3. CDs/DVDs produced by FSIS
 4. FSIS-sponsored workshops/webinars
 5. FSIS notices and directives
 6. Compliance guidelines
 7. Other FSIS resources (specify)
-
-

By **guidance documents** we mean documents prepared by FSIS to assist establishments with compliance. For example, FSIS has guidance documents that describe how to develop and implement sanitation procedures, how to meet sampling and microbial testing requirements, how to meet validation requirements, etc. They can be found at <http://www.fsis.usda.gov/wps/portal/fsis/topics/regulatory-compliance/compliance-guides-index>

5.7 When does your establishment use FSIS compliance **guidance documents**? ***Circle all that apply.***

1. During the validation of HACCP systems
 2. During the verification of HACCP systems
 3. During the development of Sanitation Standard Operating Procedures (SSOPs)
 4. Upon receipt of a noncompliance record (NR)
 5. Before/during a food safety assessment (FSA)
 6. During the training of employees
 7. Other (specify)
-
-

6 Establishment Characteristics

- 6.1** What is the approximate percentage of the square footage of the production space of this establishment that is under 5 years old, 5 years to just under 20 years old, or 20 years old or more? **Responses should sum to 100 percent.**

Age Category	Percentage of Production Space (%)
a. Under 5 years old	
b. 5 years to just under 20 years old	
c. 20 years old or more	
Total	100%

By **audits** we mean review and verification of the establishment's processes by independent, third-party auditors.

- 6.2** Who conducts independent, third-party **audits** of this establishment's food safety procedures? **Circle all that apply.**
1. This establishment's food safety procedures are not audited by independent, third-party auditors
 2. Independent, third-party auditors that are hired by this establishment or by corporate headquarters
 3. Independent, third-party auditors that are hired by customers of this establishment
 4. Customers of this establishment (for example, food service, military)
 5. None of the above

6.3 When independent, third party audits are conducted, which practices are audited? **Circle all that apply.**

1. Microbiological testing
 2. Residue testing
 3. Humane handling
 4. Sanitary dressing
 5. Fabrication
 6. Further processing
 7. HACCP system
 8. Good Manufacturing Practices (GMPs)
 9. Sanitation Standard Operating Procedures (SSOPs)
 10. Food defense
 11. Other (specify)
-
-

12. None

6.4 Who conducts independent, third-party **audits** of this establishment's humane handling procedures? **Circle all that apply.**

1. This establishment's humane handling procedures are not audited by independent, third-party auditors
2. Independent, third-party auditors that are hired by this establishment or by corporate headquarters
3. Independent, third-party auditors that are hired by customers of this establishment
4. Customers of this establishment (for example, food service, military)
5. None of the above

By **certification** we mean an accredited third party visits an organization, assesses its management and production system, and issues a certificate to show that the organization abides by the principles set out in the standard.

6.5 What **certifications** are required by customers of this establishment? **Circle all that apply.**

1. None
 2. Global Food Safety Initiative (GFSI) (includes ISO 22000, BRC, IFS, Dutch HACCP, and SQF)
 3. Customer-specified requirements
 4. Organic certification
 5. Other (specify)
-
-

By **cleaned** we mean removing soil (including food residue) from equipment, utensils, or other surfaces, usually by suspending the soil in water with the aid of a detergent. Cleaning is different from sanitizing (the reduction of bacterial contaminants to safe levels) and from disinfecting (freeing from infectious microorganisms, typically with the aid of chemicals).

6.6 Is the slaughter area of this establishment **cleaned** during each production shift? **Circle all that apply.**

1. No
2. Yes, it is cleaned between species changes
3. Yes, it is cleaned at the end of the shift
4. Yes, it is cleaned mid-shift

6.7 Does this establishment operate a separate clean-up shift for the slaughter area after the production shift is done? **Circle all that apply.**

1. No
2. Yes, performed by establishment personnel
3. Yes, performed by contractors

6.8 Is the fabrication area of this establishment cleaned during each production shift? **Circle all that apply.**

1. No
2. Yes, it is cleaned between product type changes
3. Yes, it is cleaned at the end of the shift
4. Yes, it is cleaned mid-shift

6.9 Does this establishment operate a separate clean-up shift for the fabrication area after the production shift is done? **Circle all that apply.**

1. No
2. Yes, performed by establishment personnel
3. Yes, performed by contractors

6.10 Approximately how many production employees are employed at this establishment? **Provide an average number over the past year for each type of employee. If none, enter zero.**

- a. Full-time employees |_|_|_|_|_|
- b. **Part-time** employees |_|_|_|_|_|
- c. Temporary employees |_|_|_|_|_|

By **part time** we mean working fewer than 30 hours per week.

6.11 Approximately how many laboratory employees are employed by this establishment? **Provide an average number of full-time employees over the past year. Do not include personnel employed by third-party labs that work onsite at the plant.**

a. Full-time employees |__|__|__|__|

6.12 Approximately how many full-time employees at this establishment work in a quality control/quality assurance (QC/QA) department, including food safety?

1. None **Go to Question 6.14**
2. 1 to 5
3. 6 to 10
4. 11 or more

6.13 For the person who manages the QC/QA department, what percentage of their time is devoted to managing QC/QA activities?

1. 1 to 24 percent
2. 25 to 49 percent
3. 50 to 74 percent
4. 75 to 99 percent
5. 100 percent

By **imported** we mean animals born or raised in another country and then transported to the United States.

6.14 To the best of your knowledge, what percentage of live animals slaughtered at this establishment during the past year was **imported**?

1. None
2. 1 to 9 percent
3. 10 to 24 percent
4. 25 to 49 percent
5. 50 to 100 percent

6.15 What percentage of this establishment's product is exported outside of the United States?

1. None
2. 1 to 24 percent
3. 25 to 49 percent
4. 50 to 74 percent
5. 75 to 100 percent

By **crisis management** we mean the process by which an organization deals with a major unpredictable event such as a voluntary food safety recall of products or a severe weather event.

6.16 Which of the following traceability practices does this establishment currently use in its operations? **Circle all that apply.**

1. Identifies and tracks its products using a traceable code, by production lot, backward to specific animal supplier
2. Identifies and tracks its products using a traceable code, by production lot, forward to specific customers
3. None of the above

6.17 Which of the following food recall and **crisis management** practices does this establishment currently use in its operations? **Circle all that apply.**

1. Conducts mock recalls of lot codes delivered to specific customers
2. Conducts mock recalls of lot codes backwards to raw material suppliers
3. Documents mock recall exercises and conducts a self assessment
4. Has a written crisis management program beyond the scope of product recalls
5. Conducts crisis management exercises
6. Has recall insurance
7. Has business continuity plan
8. None of the above
9. Other (specify)

6.18 What was the approximate value of total establishment sales revenue during the past year?

1. Under \$249,999
2. \$250,000 to \$499,999
3. \$500,000 to \$1.49 million
4. \$1.5 million to \$2.49 million
5. \$2.5 million to \$24.9 million
6. \$25 million to \$49.9 million
7. \$50 million to \$99.9 million
8. \$100 million to \$249.9 million
9. \$250 million to \$499.9 million
10. \$500 million or more

All answers you give in this survey will be kept secure to the extent permitted by law. Your best estimates for sales are acceptable.

By **upgrades** we mean the investment in replacement or updated facilities and equipment.

6.19 During the past year, what was the estimated level of investment in **upgrades** and expansions of plant facilities and equipment as a share of sales?

1. 0-5%
2. 6-10%
3. 11-15%
4. 16-20
5. 21% or more

6.20 During the past year, what portion of the total investment in upgrades and expansions of plant facilities and equipment was related to food safety?

1. 0-10%
2. 11-25%
3. 26-50%
4. 51% or more

Thank you for completing the survey.

Appendix B1: FSIS Letter



Food Safety and
Inspection Service

1400 Independence
Avenue, SW.
Washington, D.C.
20250

«Plant_Manager»
«Company»
«Address»
«City», «State» «ZIP»

Dear «Plant_Manager»:

The Food Safety and Inspection Service (FSIS) is conducting a survey, and we are asking for your help.

The purpose of the survey is to add to our understanding of the current practices and technologies used in the meat slaughter and processing industry to control pathogens and promote food safety. The enclosed brochure provides additional information on the survey. You may recall receiving a similar survey a few years ago. This survey contains similar questions that will be used to assess food safety and technology adoption trends over time.

Your establishment is among the 650 meat slaughter and processing establishments that were randomly selected to participate in the survey. Without your response, the survey results will not properly reflect industry practices. Therefore, your help is crucial. I am requesting that you—or someone that you designate at your establishment—complete the survey.

FSIS has contracted with RTI International to develop and conduct this nationwide survey. A representative from RTI will call you soon to ask for your help, and RTI will then send you the survey to complete at your convenience.

As RTI International has done with other surveys it has conducted for Federal agencies, it will report only unidentified individual responses of this survey to FSIS. RTI will perform data masking techniques so that individual plants cannot be identified. The results of the survey will be reported to the public only in summary form so that individual responses or respondents cannot be identified. Those who respond to the survey will receive a summary report of the survey results.

If you have questions about the survey, please do not hesitate to contact Gary Noyes with FSIS at (301) 504-3672 or at Gary.Noyes@fsis.usda.gov.

FSIS appreciates your help in this important endeavor.

Sincerely,

A handwritten signature in blue ink, appearing to read "Alfred V. Almanza".

Alfred V. Almanza
Administrator

Appendix B2: Brochure



How can I find out more about this survey?

For further information about this survey, please contact one of the following individuals:

Gary Noyes
U.S. Department of Agriculture
Food Safety and Inspection Service
Office of Policy and Program
Development
Phone: (301) 504-3672
E-mail: Gary.Noyes@fsis.usda.gov

Catherine Viator
RTI International
Phone: (919) 597-5127
E-mail: viator@rti.org

Survey of Meat Slaughter and Processing Establishments

 United States Department of Agriculture
Food Safety and Inspection Service

 United States Department of Agriculture
Food Safety and Inspection Service





What is this study about?

This survey, sponsored by USDA's Food Safety and Inspection Service (FSIS), is designed to collect accurate, up-to-date information about current practices and technologies used by meat slaughter establishments to control pathogens in their production processes. The survey also asks about microbiological testing practices, food safety training for employees, and establishment characteristics.

This study is a follow-up to a survey conducted in 2004. The second round of the survey will provide FSIS with the most accurate up-to-date information on food safety practices and technologies and allow FSIS to track adoption of these technologies and practices over time.

FSIS has contracted with RTI International to develop and conduct this nationwide survey. RTI International conducted the previous survey for FSIS, and has experience working with the meat slaughter and processing industry.

Why should I complete this survey?

To assist FSIS in meeting its strategic goal to protect public health by significantly reducing the prevalence of foodborne hazards from meat products, FSIS needs accurate and up-to-date information about current practices and technologies.

Your participation is voluntary, but to ensure that the survey results are statistically representative for the whole industry, we cannot substitute another establishment in your place if you decide not to participate.

It is important that all selected establishments, including those that are very small, complete the survey.

All establishments that respond to the survey will receive a summary report of survey results. By participating in the survey, you will have an opportunity to be one of the first in your industry to review summary information about current pathogen control practices and technologies used in your industry.

How long will it take for me to complete the survey?

The average length of time to complete the survey is 60 minutes.

When should I return my completed survey?

We ask that you complete the survey within 10 business days via the web. If you prefer to fill out the hard copy survey, please return it by mail in the envelope provided within 10 business days.

How was my establishment selected to participate?

Your establishment was selected as part of a sample of all meat slaughter establishments in the United States, using methods to ensure statistically reliable results. Without your response, the survey could fail to produce information that accurately represents the industry, so your participation is very important.

Is the survey confidential?

Individual data collected by RTI International in this study will be kept secure to the extent permissible by law. We will only provide data to FSIS that does not identify individual establishments. RTI is a respected leader in survey research, and we will not jeopardize our reputation by compromising our pledge of confidentiality.

Who is RTI International?

RTI International is a non-profit research firm located in North Carolina's Research Triangle Park. With an established history of conducting scientific research for many government agencies, RTI is a proven leader in statistically valid survey research. RTI will conduct the survey, tabulate data collected, and summarize survey results in a report to FSIS.

Appendix B3: Postcard



Research Operations Center
5265 Capital Boulevard
Raleigh, NC 27616
Data Capture (0214016.001.002.001)



Research Operations Center
5265 Capital Boulevard
Raleigh, NC 27616
Data Capture (0214016.001.002.001)

Dear Survey Participant,

Recently, you received a survey on current practices and technologies used in the meat slaughter industry for controlling pathogens. RTI International is conducting this survey for FSIS. If you have already returned the survey, we would like to thank you. Your assistance is very much appreciated.

If you have not yet returned the survey, please complete the survey and mail it back to us within the next week. The information that you provide will help ensure that FSIS develops regulations that are science-based and efficient and that minimize the potential economic burden on plants such as yours.

If you have any questions, please contact the Survey Helpline toll-free at 1-877-294-1306 or SurveyFSIS@rti.org. Thank you again.

Sincerely,

Catherine Viator
RTI Project Manager