

August 2004

Survey of Egg Packing and Egg Products Processing Plants

Revised Final Report

Prepared for

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1

Introduction

The U.S. Department of Agriculture, Food Safety and Inspection Service (USDA, FSIS) is proposing to amend egg and egg products inspection regulations (9 CFR 590) to require egg packing plants and egg products processing plants to develop and implement Hazard Analysis and Critical Control Point (HACCP) systems and Standard Sanitary Operating Procedures (SSOPs). Only by establishing accurate baseline measures of current practices and technologies used by egg packing plants and egg products processing plants can FSIS conduct appropriate and adequate regulatory impact analyses for the proposed rule, as mandated by Executive Order 12866, the Regulatory Flexibility Act (RFA), and the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA).

In July 2001, FSIS awarded a contract to RTI International (43-3A94-1-5028) to design a survey to collect information about technologies and food safety practices used in the meat, poultry, and egg industries and to prepare the Office of Management and Budget (OMB) clearance package. In June 2002, FSIS awarded RTI a contract (43-3A94-2-5018) to conduct a survey of egg packing and egg products processing plants (Egg Industry Surveys). Upon receiving OMB approval, FSIS provided additional funding to conduct activities to help increase the response rate for the Egg Industry Surveys.

FSIS received OMB approval to conduct the Egg Industry Surveys in August 2003. RTI conducted the Egg Industry Surveys using a multimodal approach. We contacted egg packing and egg products

processing plants by telephone to screen for eligibility and to identify the target respondent for the survey, mailed a self-administered questionnaire to the target respondent, and made a series of telephone calls to nonrespondents to encourage participation. Using this approach, we achieved a 77 percent response rate for the Egg Industry Surveys.

This report describes the survey design and administration procedures and presents the results of the Egg Industry Surveys. Section 2 describes the sample design. Section 3 describes the design and administration of the surveys. Section 4 describes the weighting and analysis procedures. Sections 5 and 6 present tabulated survey results for egg packing plants and egg products processing plants. Section 7 concludes the report with lessons learned, including recommendations for revising the questionnaires for future industry surveys.

2

Sample Design

This section describes the sample design procedures for the Egg Industry Surveys. We selected a sample of egg packing plants using a systematic sampling approach and conducted a census of egg products processing plants.

2.1 SURVEY UNIVERSE AND SAMPLING FRAME

The respondent universe includes the following establishments located in the United States (excluding Puerto Rico):

- ▶ egg packing and grading plants and
- ▶ federally inspected egg products processing plants.

We used the Enhanced Facilities Database (EFD) as the sampling frame for the Egg Industry Surveys. RTI developed and currently maintains the EFD for FSIS. The EFD is a database of federally and state-inspected meat, poultry, egg products, and egg packing establishments and contains information on volume, annual revenue, number of employees, inspection activities, and contact information. The EFD combines data from seven government agency databases with supplementary data from *infoUSA* (www.infousa.com). RTI updates the EFD upon request of FSIS. In the past, the EFD has typically been updated every 2 years to provide recent data for economic impact analyses, evaluation studies, and survey sampling frames. We computed the universe sizes using the September 2003 version of the EFD. According to the EFD, there are 550 active egg packing plants and 76 active egg products processing plants in the United States.

2.2 PRECISION

An indication of the expected precision of sample survey estimates is the widths of 95 percent confidence intervals 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 precision of +/-5 percent. That is, a confidence interval would be no larger than 10 percent and would be centered around the estimated prevalence or percentage. Thus, the sample design for egg packing plants specified a sample size that was expected to yield precision of +/-5 percent or better for estimates of all proportions, assuming we met our target eligibility and response rates. Because the number of egg products processing plants is small, we surveyed all 76 establishments (i.e., conducted a census).

To ensure that we met the sample size requirements, we adjusted the required sample sizes upward for the anticipated eligibility and response rates. The eligibility rate accounts for plants that do not pack or process eggs, or plants that are no longer in business. We assumed an 85 percent eligibility rate for egg packing plants and 100 percent eligibility rate for egg products processing plants. The Agriculture Marketing Service (AMS) inspects egg packing plants, with smaller plants inspected on a quarterly basis. FSIS inspectors are continuously present at egg products processing plants. Thus, we believed the information in the EFD for egg products processing plants would be more accurate, and therefore the eligibility rate would be higher among these plants.

As specified in the Information Collection Request (ICR) Supporting Statement submitted to OMB, the target response rate for both types of egg establishments was 75 percent (FSIS, 2002).

Table 2-1 summarizes the universe, sample size, anticipated number of eligible plants, and sample yield (i.e., anticipated number of respondents) for the two types of egg establishments. Our sample design was expected to yield 227 completed surveys with egg packing plants and 57 completed surveys with egg products processing plants.

Table 2-1. Sample Design for Egg Industry Surveys (Number of Establishments)

	Egg Packing Plants (sample)	Egg Products Processing Plants (census)	Total
Universe	550	76	626
Sample size	356	76	432
Eligibles	303	76	379
Sample yield	227	57	284

2.3 SYSTEMATIC SAMPLING APPROACH

The purpose of systematic sampling is to ensure that the selected sample adequately represents the entire target universe or population. Systematic sampling forces the sample to include plants with varying characteristics, such as location and plant size. With simple random sampling, the sample could be biased, because of coincidence, by including too many or too few of particular categories of plants, causing the sample to misrepresent the target universe.

To systematically select the sample for egg packing plants, we used information on size (i.e., number of plant employees), geographic location, and availability of telephone number. We defined three size categories based on the HACCP plant-size categories:¹ very small (fewer than 10 employees), small (10 or more employees),² and size unknown. We defined four regions based on the Census regions: Midwest, Northeast, South, and West. Because telephone numbers were not available for more than 50 percent of egg packing plants, we classified each plant as to availability of telephone number. This allowed us to control the sampling rate for plants with contact information, which helped to facilitate survey administration.

Prior to selecting the sample, we sorted the file by plant-size category, then region, then availability of telephone number. Once

¹Large plants have 500 or more employees, small plants have 10 or more employees but fewer than 500, and very small plants have fewer than 10 employees or less than \$2.5 million in annual sales.

²Includes two plants with more than 500 employees.

sorted, sample points were selected by choosing every 1.545 (550/356) plant in the sorted list. Table 2-2 shows the number and percentage of plants in the population, and Table 2-3 shows the number and percentage of plants in the sample for egg packing plants.

Table 2-2. Survey Universe for Egg Packing Plants, by Size and Region

Size	Region									
	Midwest		Northeast		South		West		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Very small	25	4.6	16	2.9	14	2.6	24	4.4	79	14.4
Small	48	8.7	39	7.1	56	10.2	42	7.6	185	33.6
Unknown	78	14.2	64	11.6	70	12.7	74	13.4	286	52.0
Total	151	27.5	119	21.6	140	25.5	140	25.4	550	100.0

Table 2-3. Survey Sample for Egg Packing Plants, by Size and Region

Size	Region									
	Midwest		Northeast		South		West		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Very small	16	4.5	11	3.1	9	2.5	15	4.2	51	14.3
Small	31	8.7	25	7.0	37	10.4	27	7.6	120	33.7
Unknown	50	14.0	42	11.8	45	12.6	48	13.5	185	52.0
Total	97	27.2	78	21.9	91	25.6	90	25.3	356	100.0

3

Survey Design and Administration

This section describes the design of the mail survey instruments and our pretest procedures, provides an overview of the survey administration procedures, and presents the survey response rates.

3.1 SURVEY INSTRUMENT DESIGN

RTI developed the survey instruments for the Egg Industry Surveys in conjunction with surveys for meat and poultry slaughter and processing plants. The purpose of the surveys is to obtain information on technological and food safety practices needed to guide regulatory policy making and to conduct required regulatory impact analysis. The Egg Industry Surveys are particularly relevant at this time, because of the proposed HACCP and SSOP regulations for the egg industry. FSIS can use the results of the Egg Industry Surveys to establish baseline measures of current practices and technologies used by egg packing plants and egg products processing plants.

We designed the survey instruments for the Egg Industry Surveys in consultation with various stakeholders at FSIS. Working with these stakeholders we identified their data needs, and then using their data needs as a guideline, we developed appropriate survey questions and response items to address each data need or element. We developed separate survey instruments for egg packing and egg products processing establishments. Table 3-1 identifies the types of information collected in the Egg Industry Surveys for each type of establishment.

Table 3-1. Types of Information Collected in the Egg Industry Surveys

Egg Packing Plants	Egg Products Processing Plants
1. Egg Packing Operations ✓ Source and age of eggs ✓ Storage and refrigeration practices ✓ Written food safety plans	1. Egg Products Processing Operations ✓ Source and age of eggs ✓ Storage and refrigeration practices ✓ Production volumes
2. Sanitation Practices ✓ Sanitation inspections ✓ Equipment cleaning practices	2. Sanitation Practices ✓ HACCP and SSOP plan ✓ Sanitation inspections
3. Employee Training ✓ New hire training ✓ Continuous training ✓ HACCP training	3. Microbiological Testing Practices ✓ Methods and frequency of microbiological testing ✓ Environmental testing
4. Plant Characteristics ✓ Age and size of plant ✓ Number of production shifts and employees ✓ Sales revenue	4. Employee Training ✓ New hire training ✓ Continuous training ✓ HACCP training
	5. Plant Characteristics ✓ Age and size of plant ✓ Number of production shifts and employees ✓ Sales revenue

We designed the survey instruments as a paper-and-pencil self-administered questionnaire. We evaluated other survey modes but determined that a paper-and-pencil questionnaire that is administered by mail, with initial and follow-up contacts by telephone, afforded the greatest potential for successful data collection with this population. Many smaller establishments do not have up-to-date Internet access readily available, so a Web-based survey was not feasible. Also, from previous experience we have found that it is difficult for establishments to complete 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.

3.2 PRETEST PROCEDURES

Our pretest procedures included a review of the instruments using RTI's Question Appraisal System (QAS) and pretest interviews with

plant personnel at egg packing and egg product processing plants. We also obtained feedback on the draft survey instruments and survey protocol from the United Egg Producers (UEP) in a telephone interview.

3.2.1 Question Appraisal System

RTI's QAS is a structured, standardized instrument review methodology that evaluates survey questions in relation to the tasks required of the respondents to understand and respond to the questions and evaluates the structure and effectiveness of the questionnaire form itself. We used RTI's QAS to evaluate each survey instrument with regard to question wording, response wording, and questionnaire formats. Following completion of the QAS review, we revised the survey instruments and conducted pretest interviews as described below.

3.2.2 Pretest Interviews

We conducted a combination of on-site and telephone interviews with plant personnel. Two egg packing plants and two egg product processing plants participated in the pretest. The two very small egg plants that we contacted declined to participate in the pretest. Table 3-2 provides the plant size and interview method for each plant participating in the pretest.

Table 3-2.
Characteristics of
Pretest Participants

Plant Type	Interview Method
Egg Packing	Telephone
Large	On-site
Small	
Egg Products Processing	
Large—liquid, frozen, and dried	On-site
Small—liquid, frozen, and dried	Telephone

The purpose of the pretest interviews was to

- ▶ evaluate whether respondents interpreted the questions as intended and understood the question wording and response items,
- ▶ determine whether respondents had difficulty following the skip patterns in the questionnaire,

- obtain feedback on the draft FSIS pre-notice letter and brochure,
- determine the amount of time it takes to complete the survey, and
- discuss the use of incentives as a motivating factor to respond to the survey.

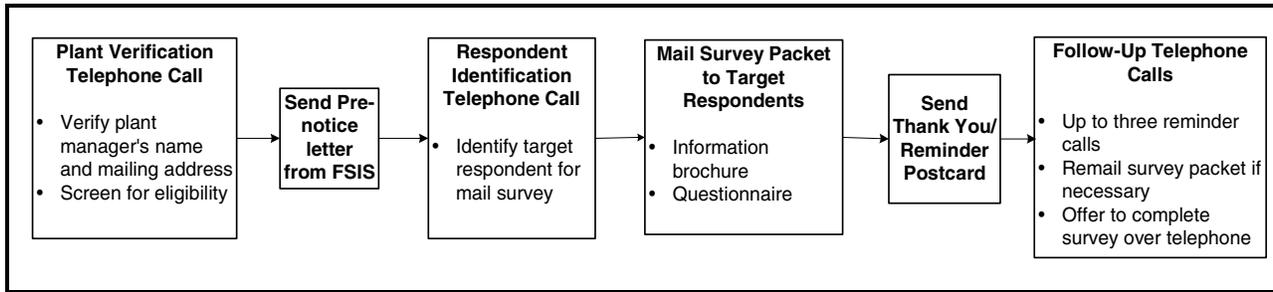
The pretest findings and suggested revisions to the survey instruments are summarized in a separate document (Viator and Kendall, 2002). The pretest participants offered suggestions to improve the survey instruments, primarily with regard to terminology. Based on the pretest, we estimated the survey burden to be 30 minutes or less per respondent. UEP and the pretest respondents agreed that the promise of a summary of survey results would be a motivating factor to complete the survey, and they preferred a summary report to a cash incentive.

Based on the pretest findings and comments from FSIS, we revised the survey instruments. FSIS submitted the ICR Supporting Statement to OMB on November 21, 2002. OMB approved the information collection on August 21, 2003. Appendix A provides copies of the final survey instruments for the Egg Industry Surveys.

3.3 SURVEY ADMINISTRATION PROCEDURES

We implemented a variety of procedures aimed at maximizing the response rate to the surveys. Prior to survey administration, we met with representatives from UEP to discuss their interest in promoting the survey to their membership and possible mechanisms for promoting the survey. UEP announced its support of the Egg Industry Surveys at their annual conference (held October 22-24, 2003) and mailed a letter prior to survey administration (see Appendix B) to their membership encouraging participation in the survey. UEP also placed an announcement about the survey in its newsletter.

We conducted the full-scale data collection over a 15-week period from October 20, 2003, to January 30, 2004. We did not contact participants during the period from December 18 to January 9 because of the holiday season. Figure 3-1 illustrates the steps in the data collection process. We briefly describe each step below.

Figure 3-1. Data Collection Procedures for the Egg Industry Surveys

Contact with inspection personnel. FSIS sent an e-mail to the Inspector-In-Charge (IIC) at all egg products processing plants. Similarly, AMS mailed a letter and a copy of the survey instrument to the inspector at all egg packing plants in the sample. This initial contact informed the inspector that their plant manager would be receiving a survey, so, if necessary, they could verify the legitimacy of the survey to plant management.

Plant verification telephone call. RTI's Telephone and Internet Operations (TIO) unit contacted each sampled establishment to verify the plant manager's name and plant's mailing address. This telephone call also assisted in verifying eligibility of the plant for participation in the survey (i.e., whether the plant currently packs or processes eggs).

FSIS pre-notice letter. We mailed a letter and information brochure (see Appendix C) to plant managers at sampled establishments and to the plant owner if contact information was available from UEP. The letter—on FSIS letterhead and signed by the Administrator of FSIS—explained the purpose of the survey, the importance of participation, and our pledge of confidentiality. The letter also promised respondents that they would receive a copy of the survey results. The information brochure—a two-color, tri-fold brochure—highlighted the purpose of the study and provided contact information for FSIS and RTI.

Respondent identification telephone call. Approximately 1 week after mailing the pre-notice letters, RTI's TIO contacted the plant managers at sampled establishments. The purpose of this telephone call was to identify the target respondent for the survey (if not the plant manager) and to gain their cooperation for the mail survey.

Plants that refused to participate were contacted by a member of the project team, and a refusal conversion was attempted.

Questionnaire Mailing. We mailed the survey packet via Federal Express. The survey packet included a one-page cover letter on RTI letterhead, another copy of the information brochure, a copy of the UEP letter, the appropriate survey booklet, and a metered (pre-paid) envelope for returning the completed questionnaire.

Toll-Free Survey Help Line. During the data collection period, we operated a toll-free survey help line. Respondents could call the survey help line to request assistance when completing the mail survey. The survey help line was staffed by members of the project team knowledgeable about the survey and the egg industry.

Postcard Mailing. Approximately 10 days after mailing the survey packets, we sent sampled establishments a personalized postcard (see Appendix D). The postcard served as a thank you for those who had returned the completed survey and as a reminder for those who had not.

Follow-up Telephone Calls. Approximately 10 days after the postcard mailing, RTI's TIO unit began follow-up telephone calls to nonrespondents to remind them to complete and return the survey. During the follow-up calls, interviewers offered to send a replacement questionnaire and inquired if the respondent would like to complete the survey over the telephone. We made up to three follow-up telephone calls to nonrespondents. Plants that refused to participate in the survey were contacted by a member of the project team, and a refusal conversion was attempted.

Remailing of Survey Packet. Eight weeks after the original mailing (after the holiday season), we remailed the survey packet (via Federal Express) to all nonrespondents for the Egg Packing Survey. We did not re-mail the survey to egg products processing plants because we had already achieved our target response rate. We made the final set of follow-up telephone calls approximately 1 week after the remailing.

The sample included 37 establishments without a telephone number. We sent these establishments an FSIS pre-notice letter, a survey packet, and reminder postcard. Because we were unable to contact these establishments by telephone (to identify a specific

person to send these items), the items were addressed to “plant manager.” We were unable to conduct any type of telephone follow-ups with these cases, although ultimately some of these cases contacted RTI by using the toll-free survey help line.

3.4 SURVEY RESPONSE

Table 3-3 shows the final disposition of the sample and the eligibility and response rates by type of egg establishment. We received 201 completed surveys for egg packing plants and 60 completed surveys for egg products processing plants.

Table 3-3. Final Disposition of Sample and Eligibility and Response Rates, by Establishment Type

	Egg Packing Plants	Egg Products Processing Plants	Total
Completes	201	60	261
Refusals	66	14	80
Ineligibles	89	3	92
Total sample	356	77 ^a	433
Eligibility rate (%)	75%	96%	79%
Response rate (%)	75%	81%	77%

^aThe total number of egg products processors included in the survey increased by one establishment because a new establishment that was not in the EFD was added during data collection. Because we were conducting a census (not a sample) of egg products processors, we could add additional establishments during data collection without adversely affecting the sample design.

We assigned each sample point a disposition of *complete*, *refusal*, or *ineligible*. For two egg products processing plants and for ten egg packing plants, the eligibility status could not be determined because a telephone number was not available for the establishment (no listing available from directory assistance or the telephone was disconnected), or a telephone number was available, but we were unable to reach an individual at the establishment to verify eligibility for the survey. For sample points where the eligibility status was unknown, we estimated the proportion of eligibles among known eligibles and ineligibles, and we used this proportion to distribute the unknowns between eligibles (which are then classified as refusals because they did not complete the survey) and ineligibles. This adjustment was made by type of egg establishment.

The ineligibles disposition includes the following:

- establishments that do not pack or process eggs (e.g., repack eggs only);
- establishments that are food banks, prisons, university research facilities, or retail operations only;
- establishments that previously packed or processed eggs but are now out of business; and
- a percentage of the sample points for which the eligibility status was unknown.

Completes are those sample points that completed the mail survey. Refusals are those sample points that were eligible for the survey but declined to participate (includes a percentage of the sample points for which the eligibility status was unknown).

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

$$\text{Eligibility Rate} = \frac{\text{Refusals} + \text{Completes}}{\text{Total Sample}} \quad (3.1)$$

The eligibility rate for egg packing plants was 75 percent, and the eligibility rate for egg products processing plants was 96 percent. The target eligibility rate was 85 percent for egg packing plants and 100 percent for egg products processing plants. As anticipated, the EFD contains up-to-date and accurate information for egg products processors. However, it appears that many egg packing plants have a registration number with the AMS but do not actually pack eggs for retail sale.

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

$$\text{Response Rate} = \frac{\text{Completes}}{\text{Refusals} + \text{Completes}} \quad (3.2)$$

The response rate for egg packing plants was 75 percent, and the response rate for egg products processing plants was 81 percent. We exceeded our target response rate of 75 percent for egg products processing plants and met our target response rate for egg packing plants.

We exceeded the desired number of completed surveys for egg products processing plants (60 vs. 57). We did not achieve the

desired number of completed surveys for egg packing plants (201 vs. 227) because the eligibility rate was lower than anticipated.

Tables 3-4 and 3-5 show the response rates by size and region for egg packing plants and egg products processing plants, respectively. Nonresponse may cause bias in survey estimates if plants choosing not to respond would have provided answers to questions that differ systematically from answers provided by plants that choose to respond. Using weighting class adjustments in developing the survey weights (as described in Section 4) can help reduce the biases of nonresponse to the extent that weighting classes are homogeneous.

Table 3-4. Response Rates for Egg Packing Plants by Size and Region

Size	Region				Total
	Midwest	Northeast	South	West	
Small	70%	75%	83%	69%	73%
Large	71%	79%	82%	95%	81%
Unknown	69%	65%	70%	84%	72%
Total	70%	71%	75%	84%	75%

Table 3-5. Response Rates for Egg Products Processing Plants by Size and Region

Size	Region				Total
	Midwest	Northeast	South	West	
Small	83%	100%	— ^a	67%	75%
Large	88%	100%	100%	100%	92%
Unknown	62%	67%	100%	— ^a	65%
Total	80%	82%	100%	75%	81%

^aThe population did not include any plants for this size and region

For the Egg Packing Survey, the response rate was significantly higher in the West compared to the Midwest and Northeast regions (difference is statistically significant at the 0.05 level). Table 3-6 compares the characteristics (region and size) of respondents and nonrespondents to the Egg Packing Survey. Compared to other regions, the West region contributed the largest number and percentage of respondents (n = 59; 29 percent) and had the smallest number and percentage of nonrespondents (n = 9; 16 percent). As described in Section 4, we used region as a weighting class for the nonresponse adjustment for the Egg Packing Survey. The number of respondents was insufficient to use both size and region as weighting classes.

For the Egg Products Survey, the response rates varied by size and region as shown in Table 3-4. However, the sample size is too small to compute nonresponse adjustment factors by weighting class.

Table 3-6. Comparison of Respondents and Nonrespondents for Egg Packing Plants

	Respondents		Nonrespondents ^a		t-test p-value
	n	%	n	%	
Region					
Midwest	51	25.4	21	36.2	0.1055
Northeast	45	22.4	15	25.9	0.5824
South	46	22.9	13	22.4	0.9401
West	59	29.4	9	15.5	0.0350 ^b
Total	201	100.0	58	100.0	
Size					
Small	27	13.4	10	17.2	0.4672
Large	75	37.3	17	29.3	0.2636
Unknown	99	49.3	31	53.5	0.5753
Total	201	100.0	58	100.0	

^aWe excluded from the analysis sample points for which the eligibility status was unknown and later classified those sample points as eligible nonrespondents (n = 8).

^bPercentages are significantly different at the 0.05 level.

4

Data Analysis

This section describes weighting adjustments made to account for nonresponse to the survey and procedures used to analyze the survey data.

4.1 WEIGHTING PROCEDURES

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

1. We computed initial sampling weights for each type of egg establishment.
2. We used weighting class adjustments to adjust the initial sampling weights for nonresponse to the mail survey.

We describe each step in our weighting procedures below.

4.1.1 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 type of egg establishment as follows:

$$W_0 = \frac{\text{population size (N)}}{\text{sample size (n)}} \quad (4.1)$$

Because we conducted a census of egg products processing plants, the sampling weight was equal to one. The sampling weight for egg packing plants was equal to 1.545 (550/356). For each type of egg

establishment, the sum of the initial sampling weights across all sampled establishments is equal to the population.

4.1.2 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 class, can help reduce the biases of nonresponse to the extent that weighting classes are homogeneous.

Given the sample size, the data available for nonrespondents, and the findings from Table 3-6 that compared the characteristics of respondents and nonrespondents, we used the four regions used for the systematic sampling as our weighting classes for egg packing establishments.¹ We considered using a combination of size and region, but the resulting number of respondents in some cells would have been too small to properly adjust the weights for nonresponse bias.

Because of the small number of completed surveys for egg products processing plants, we were unable to make the nonresponse adjustment by weighting class. Instead, the same nonresponse adjustment factor was used for all establishments (i.e., one weighting class).

We calculated adjustment factors (F_1) within each weighting class as follows:

$$F_1 = \frac{\text{sum of weights } (W_0) \text{ for eligibles in class}}{\text{sum of weights } (W_0) \text{ for respondents in class}} \quad (4.2)$$

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

$$W_1 = W_0 \cdot F_1 \quad (4.3)$$

The adjusted weight varies by region for egg packing establishments. This causes the survey design effect to be 1.006.

¹To make the nonresponse adjustment, we distributed the 10 sample points for which the eligibility status was not known between eligible nonrespondents (8) and ineligible (2) using the ratio of eligibles to ineligibles (75 percent). The 10 sample points were randomly assigned to the two categories.

This design effect is small and should have little effect on the standard errors.

We weighted all results using the final adjusted weights (W_1). For each type of egg establishment, the sum of the final adjusted weights across all respondents to the mail survey is equal to the population of eligible establishments.

4.2 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.

4.2.1 Data Editing and Coding

RTI's Fulfillment Department Staff edited the questionnaires to resolve any data errors prior to data entry. The most common error made by respondents was selecting multiple responses for questions where only one response was allowed. Some respondents made this error for questions that ask about the frequency of a particular activity (e.g., Question 2.7 in the Egg Products Survey), because the frequency of the activity may depend on certain factors (e.g., which nonproduct contact zone). For these questions, we resolved the error by using the response that represented the "least often" response so that the response for the least frequent activity was recorded in the dataset. For example, if the respondent selected "once per shift" and "once per week," we used the "once per week" response.

Some respondents also made this error for the training questions (Questions 4.1 and 4.2 in the Egg Products Survey and Questions 3.1 and 3.2 in the Egg Packing Survey), because the plant conducts different types of training activities. Because the questions asked for the one "best" response, we resolved the error by using the response that describes the most desirable training option so that the "best" response was recorded in the dataset. For example, if the respondent selected "scheduled on-the-job training" and "formal food safety course" we used the "formal food safety course" response. As discussed in Section 7, we suggest revising the questionnaires for future surveys to minimize response error.

Some respondents wrote “not applicable,” “NA,” or “doesn’t apply” by some questions. In a few cases, respondents wrote “don’t know” by a question. We added response options so that we could distinguish between “not applicable” responses, “don’t know” responses, and missing values (i.e., no response provided) when analyzing the survey data.

Several questions required the respondent to enter a text response (e.g., Question 2.8 in the Egg Packing Survey provides a response option where the respondent can enter other types of sanitizing products used). For questions with open-ended text responses, we manually coded the open-ended text responses and created new response options as appropriate.

The edited and coded questionnaires were keyed into a database using a data entry system developed by RTI. All data were double-keyed (i.e., 100 percent verification) for quality control purposes. Separate datasets were prepared for egg packing plants and egg products processing plants.

4.2.2 Data Cleaning

Prior to tabulating survey responses, we systematically examined the survey datasets to isolate and address data inconsistencies, reporting errors, or otherwise erroneous data. Several questions required respondents to enter numeric responses that sum to 100 percent (e.g., Question 1.2 in the Egg Products Survey asks for the distribution of the age of eggs when received by the facility). Some respondents entered values that did not sum to 100 percent. Respondents’ answers were excluded from the analysis if the sum of their responses was less than 80 percent or greater than 120 percent (exclusions are noted in the survey results table). If the sum of the responses was between 80 and 120 percent, then we normalized the responses to 100 percent using the initial response distribution and included the responses in the analysis.

For the Egg Products Survey, there were differences in the number of respondents reporting production of ready-to-eat (RTE) and ready-to-cook (RTC) products:

	Question 1.11 (All respondents, n = 60)	Questions 3.6 and 3.8 (Respondents that conduct microbiological testing, n = 48)	Questions 3.11 and 3.12 (Respondents that test environmental samples, n = 44)
RTE products	8	14	15
RTC products	21	18	22
Products that are inputs to further processing	49	—	—

We contacted several respondents who provided inconsistent responses to Questions 1.11, 3.6, 3.8, 3.11, and 3.12. We found that in most cases respondents correctly answered Question 1.11 (i.e., only produce products that are inputs to further processing) but went on to complete Questions 3.6, 3.8, 3.11, or 3.12 although they do not produce RTE or RTC products. Thus, we used Question 1.11 as a filter or screening question when analyzing the data for Questions 3.6, 3.8, 3.11, and 3.12. As discussed in Section 7, we suggest revising the questionnaires for future surveys to minimize response error.

Several questions in the Egg Products Survey are in a table format (e.g., Questions 2.1, 3.2, and 3.3). In some cases, several respondents did not complete the table at all (i.e., left the whole table blank). In reporting results for questions in a table format, the number of respondents that did not complete the table at all is provided in a footnote. Any remaining nonresponse is due to respondents not selecting an answer for a row in the table. We contacted several respondents who had partial responses to Questions 2.1 and 3.3 to gain a better understanding of why respondents did not fully complete the tables. For Question 2.1, we found that respondents left the row blank if the plant does not use the process (e.g., the plant does not conduct in-shell pasteurization). For Question 3.3, we found that some respondents left the row blank if the plant does not test for the specific organism, and that some respondents left the row blank because the plant tests product after pasteurization for the specific organism, but the product is an input to further processing by another plant (i.e., *not* RTE or RTC). As discussed in Section 7, we suggest revising the questionnaires for future surveys to help minimize item nonresponse.

Other inconsistencies in the data that we were unable to resolve are noted in footnotes to the results tables in Sections 5 and 6.

4.2.3 Data Analysis

Sections 5 and 6 provide tables with survey results for egg packing plants (n = 201) and egg products processing plants (n = 60), respectively. For each type of egg establishment, we provide results overall and by size of establishment. To report the survey results, we defined size categories for egg packing and egg products processing plants as described below. These size categories are different than the size categories used for the systematic sampling and are based on information provided in the survey. For each type of egg establishment, we defined two size categories (small vs. large) based on the response distribution for the size variable with the constraint of having at least 20 to 30 respondents in each size category.

We used information on number of employees (Question 4.6) to define two size categories for egg packing plants:

- ▶ Small: 39 employees or fewer (n = 166)
- ▶ Large: 40 or more employees (n = 34)

Eight respondents did not answer Question 4.6. For seven of the eight respondents, information on number of employees was available from the EFD and was used to assign respondents to the appropriate category. We excluded the one respondent for which employee data were not available.

We used information on annual production volume (Question 1.10) to define two size categories for egg products processing plants:

- ▶ Small: 50,000,000 pounds or less (n = 39)
- ▶ Large: more than 50,000,000 pounds (n = 20)

Six respondents did not answer Question 1.10. For five of the six respondents, information on production volume was available from the EFD and was used to assign respondents to the appropriate category. We excluded the one respondent for which production data were not available.

Additionally, for egg products processing plants, we ran additional cross-tabs for selected questions. For Question 1.2 (age of eggs when received) and Question 1.6 (number of days eggs are stored

before processing), we provide results by source of eggs. We used the responses to Question 1.1 to define three mutually exclusive categories:

- ▶ Inline: 80 percent or more of annual production is provided by inline layer facilities (n = 14)
- ▶ Open market: 80 percent or more of annual production is provided by open market purchases (n = 29)
- ▶ Offline: all other establishments (n = 13)

The four respondents who did not answer Question 1.1 were excluded from this analysis.

Finally, for egg products processing plants, we conducted analyses weighted by annual production volume for selected questions in Section 1. We used information on production volume (excluding inedible production) from Question 1.10 to compute a weight for production volume and multiplied this weight by the survey weight. The volume-adjusted weight was used for analyses weighted by production volume. We excluded the one respondent for which production data were not available from the survey or EFD.

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

For the overall responses for egg packing plants, we provide the 95 percent confidence intervals (CIs). CIs are not provided for egg products processing plants because we conducted a census. An indication of the precision of survey estimates is the widths of the 95 percent CIs. For example, if we report that the 95 percent CI for the percentage of egg packing plants that conduct a particular process is (50 percent, 60 percent), this means that the probability that the true population value lies between 50 percent and 60 percent is 0.95. This means there remains a probability of 0.05 that the true population value lies outside the (50 percent, 60 percent) CI.

In reporting results by size, we suppress small n's for some questions to preserve confidentiality of responses and to avoid the possibility of revealing the identity of plants selected for the sample

(for Egg Packers Survey). Suppressions are noted in the results tables with an asterisk (*).

5

Survey Results: Egg Packing Plants

Tables 5-1 through 5-4 provide survey results for egg packing plants (n = 201). The results are weighted to adjust for nonresponse. 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. 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. In addition to estimated means and proportions, we provide 95 percent CIs for the point estimates.

Key findings from the Egg Packing Survey, grouped by survey section, include the following:

Egg Packing Operations

- Over 92 percent of packed eggs are from company-owned or contracted layer facilities. The close proximity of these layer facilities explains why 90 percent of eggs are received by packers before they are 4 days old.
- The majority of eggs are transported (67 percent) and stored (53 percent) at temperatures 45°F or below.
- About half of all egg packing plants have a written HACCP plan, quality assurance plan, and sanitation plan.
- 57 percent of egg packing plants have updated, stainless steel, shell egg grading and packing equipment.

Sanitation Practices

- 73 percent of egg packing plants conduct pre-operative sanitation inspections either once daily or once per shift; 60 percent of those keep written records of their inspections.

- 44 percent of egg packing plants routinely do mid-shift clean ups for packing shifts.
- About 80 percent of plants clean their washing, candling, grading, and packing equipment thoroughly each day or each shift, with chlorine as the preferred cleaning product.

Employee Training

- Informal, on-the-job training is the preferred method of teaching new hires and current employees about food safety.
- 39 percent of egg packing plants have employees that have attended formal HACCP training.

Plant Characteristics

- 91 percent of egg packing plants operate one production shift per day.
- The majority of plants operate one clean-up shift (84 percent).
- 63 percent of all plants have a quality control department.
- 50 percent of plants have annual sales revenue less than \$6 million, and about 60 percent are part of a company that owns only one USDA-inspected plant.

Table 5-1. Weighted Responses for Section 1: Egg Packing Operations

	n	Mean	95% CI	
			Low	High
1.1 What percentage of eggs packed by this plant are supplied by inline layer facilities, offline layer facilities, and open market purchases? (<i>Means are percentage of annual production.</i>)				
Inline layer facilities		67.3%	61.4%	73.3%
Offline layer facilities		24.8%	19.4%	30.1%
Open market purchases		7.9%	4.6%	11.1%
Total	199	100.0%	—	—
Not applicable (<i>write in</i>)	1	—	—	—
No response	1	—	—	—
1.2 What is the age of eggs when they are received by the packing facility of this plant? (<i>Means are percentage of annual production.</i>)				
Less than 1 day		64.7%	58.7%	70.8%
1 to 3 days		24.8%	19.9%	29.7%
4 to 6 days		7.5%	5.0%	9.9%
7 to 10 days		2.5%	1.0%	4.0%
11 to 15 days		0.3%	0.0%	0.7%
16 to 20 days		0.1%	0.0%	0.3%
21 days or older		0.0%	0.0%	0.0%
Total	199	100.0%	—	—
Not applicable (<i>write in</i>)	1	—	—	—
No response	1	—	—	—
1.3 What percentage of offline and open market purchase eggs are refrigerated during transportation to this plant? (<i>Means are percentage of all eggs from offline and open market purchase sources.</i>)				
Not refrigerated		15.1%	9.3%	20.9%
45°F or below		66.5%	58.8%	74.1%
46°F to 59°F		16.3%	10.4%	22.2%
60°F or higher		2.2%	0.2%	4.1%
Total	142	100.0%	—	—
Not applicable (<i>write in</i>)	46	—	—	—
No response	12	—	—	—
Not included in analysis ^a	1	—	—	—

(continued)

^aRespondents' answers were excluded from the analysis if the sum of their responses was less than 80 percent or greater than 120 percent.

Table 5-1. Weighted Responses for Section 1: Egg Packing Operations (continued)

		n	Mean	95% CI	
				Low	High
1.4	Once eggs are received at your packing plant, how long are they typically stored before packing? (<i>Means are percentage of annual production.</i>)				
	Less than 1 day		52.4%	45.3%	59.5%
	1 to 3 days		32.0%	26.2%	37.8%
	4 to 6 days		12.9%	9.2%	16.7%
	7 to 10 days		1.9%	0.5%	3.4%
	11 to 15 days		0.4%	0.0%	0.8%
	16 to 20 days		0.3%	0.0%	0.7%
	21 days or longer		0.0%	0.0%	0.0%
	Total	167	100.0%	—	—
	Not applicable (<i>write in</i>)	23	—	—	—
	No response	11	—	—	—
		n	%	95% CI	
				Low	High
1.5	At what temperature are eggs stored at this plant before packing?				
	1. 45°F or below	106	52.9	45.9	59.9
	2. 46°F to 59°F	29	14.4	9.5	19.3
	3. 60°F or higher	21	10.1	6.0	14.3
	Not applicable (<i>write in</i>)	34	16.8	11.6	22.1
	No response	11	5.7	2.4	9.0
	Total	201	100.0	—	—
1.6 ^a	Which of the technologies or equipment listed below are currently in use at this plant?				
	1. Integrated, computerized production system	80	39.8	33.0	46.7
	2. Rapid egg cooling technology	12	5.8	2.6	9.0
	3. Updated, stainless steel, shell egg grading and packing equipment	113	55.6	48.6	62.6
	4. Automatic equipment that detects any defects, such as dirties, checks, and bloods	95	47.7	40.7	54.7
1.7 ^a	Of the choices listed below, what type(s) of written food safety plans does this plant have?				
	1. Written HACCP plan	100	49.6	42.6	56.6
	2. Written quality assurance plan	114	56.7	49.7	63.6
	3. Written sanitation plan	111	55.0	48.0	61.9
	4. Written audit plan	81	39.9	33.1	46.7
	5. This plant does not have a written food safety plan	54	27.2	21.0	33.5

(continued)

^aRespondents could select multiple responses. The results reported are percentage of respondents (n = 201).

Table 5-1. Weighted Responses for Section 1: Egg Packing Operations (continued)

	n	%	95% CI	
			Low	High
1.8 ^a Who conducts independent, non-government, third-party audits of this plant's egg packing operations?				
1. Independent, non-government, third-party auditors that are hired by this plant	34	16.8	11.6	22.0
2. Customers of this plant	64	32.0	25.5	38.5
3. Independent, non-government, third-party auditors that are hired by customers of this plant	40	19.5	14.0	25.1
4. This plant's egg packing operations are not audited by independent, non-government, third-party auditors	101	50.5	43.5	57.5
1.9A Are this plant's egg packing operations certified by an independent, non-government, third-party organization?				
1. Yes	42	20.6	15.0	26.3
2. No	138	68.4	61.9	74.9
3. No response/not applicable (<i>write in</i>)	21	10.9	6.5	15.4
Total	201	100.0	—	—
1.9B ^b [If 1.9A = 1, n = 42] Who certifies this plant's egg packing operations?				
1. ABC Research Corporation	3	7.2	0.0	15.4
2. ASI Food Safety Consultants	3	7.8	0.0	16.6
3. Customers of this plant	12	27.8	13.7	41.9
4. Organic certification organizations	4	9.8	0.3	19.4
5. Silliker Laboratories	5	11.0	1.5	20.6
6. Technical Directions, Inc.	3	7.2	0.0	15.4
7. United Egg Producers (UEP)	5	12.1	1.7	22.5
8. Other organizations	16	37.9	22.5	53.2

^aRespondents could select multiple responses. The results reported are percentage of respondents (n = 201).

^bRespondents could enter multiple responses. The results reported are percentage of respondents who answered "yes" to Q1.9A (n = 42). We recoded the open-ended responses if the same response was provided three or more times.

Table 5-2. Weighted Responses for Section 2: Sanitation Practices

	n	%	95% CI	
			Low	High
2.1 How frequently does this plant conduct pre-operative sanitation inspections?				
1. This plant does not conduct pre-operative sanitation inspections [Skip to Question 2.5]	31	15.5	10.5	20.6
2. Once per production shift, before beginning each production shift	34	17.2	11.9	22.5
3. Once per day, before beginning daily operations	113	55.7	48.7	62.6
4. Less than once per day	4	1.9	0.0	3.8
5. This plant conducts pre-operative sanitation inspections, but with no specific, regular frequency	13	6.6	3.1	10.1
No response/not applicable (<i>write in</i>) [Skip to Question 2.5]	6	3.1	0.6	5.5
Total	201	100.0	—	—
2.2 ^a [If 2.1 = 2, 3, 4, or 5; n = 164] What areas of the plant are inspected routinely during pre-operative sanitation inspections?				
1. Pre-washers, loaders, conveyers, and orienters	147	89.7	85.0	94.4
2. Washer compartments, nozzles, and brushes	154	93.7	89.9	97.5
3. Egg drying equipment	136	82.7	76.8	88.6
4. Egg oiling equipment	81	49.0	41.3	56.8
5. Mass scanning equipment	98	60.3	52.7	67.8
6. Scales	151	92.4	88.4	96.5
7. Egg packing equipment	148	90.6	86.1	95.0
8. Processing rooms	148	90.6	86.1	95.0
9. Coolers and storage areas	152	92.7	88.7	96.7
10. Outside premises	93	56.5	48.8	64.2
11. Refuse handling areas	98	59.7	52.1	67.3
2.3 [If 2.1 = 2, 3, 4, or 5; n = 164] Does this plant maintain written records of its pre-operative sanitation inspections?				
1. Yes	98	59.5	51.8	67.1
2. No	66	40.5	32.9	48.2
Total	164	100.0	—	—

(continued)

^aRespondents could select multiple responses. The results reported are percentage of respondents who answered 2, 3, 4, or 5 for Q2.1 (n = 164).

Table 5-2. Weighted Responses for Section 2: Sanitation Practices (continued)

	n	%	95% CI	
			Low	High
2.4 [If 2.1 = 2, 3, 4, or 5; n = 164] When sanitation problems are found, how quickly are corrective actions begun?				
1. Same production shift, before beginning shift operations	51	30.6	23.5	37.7
2. Same day, before beginning daily operations	90	55.1	47.4	62.8
3. Response depends on severity of sanitation problem (<i>write in</i>)	5	3.1	0.4	5.9
4. Response depends on whether sanitation problem is in a critical area or not (<i>write in</i>)	8	5.0	1.6	8.4
5. Response depends on whether the sanitation problem is in a product contact zone or not (<i>write in</i>)	3	1.9	0.0	4.0
6. Other	7	4.3	1.1	7.4
Total	164	100.0	—	—
2.5 For packing shifts, does this plant routinely do a mid-shift clean-up?				
1. Yes	87	43.4	36.4	50.3
2. No	97	48.1	41.1	55.1
Not applicable (<i>write in</i>)	9	4.4	1.6	7.3
No response	8	4.1	1.3	6.9
Total	201	100.0	—	—
2.6 How frequently is washing and candling equipment at this plant cleaned thoroughly?				
1. Once per production shift, before beginning each production shift	44	22.0	16.2	27.8
2. Once per day, before beginning daily operations	132	65.5	58.9	72.2
3. Less than once per day	5	2.4	0.3	4.5
4. This plant cleans its washing and candling equipment, but with no specific, regular frequency	14	7.0	3.4	10.6
Not applicable (<i>write in</i>)	2	1.0	0.0	2.4
No response	4	2.1	0.0	4.1
Total	201	100.0	—	—
2.7 How frequently is grading and packing equipment at this plant cleaned thoroughly?				
1. Once per production shift, before beginning each production shift	39	19.3	13.8	24.8
2. Once per day, before beginning daily operations	122	60.2	53.4	67.1
3. Less than once per day	9	4.6	1.6	7.5
4. This plant cleans its grading and packing equipment, but with no specific, regular frequency	26	13.3	8.5	18.1
Not applicable (<i>write in</i>)	2	1.0	0.0	2.4
No response	3	1.5	0.0	3.3
Total	201	100.0	—	—

(continued)

Table 5-2. Weighted Responses for Section 2: Sanitation Practices (continued)

	n	%	95% CI	
			Low	High
2.8 ^a What cleaning products does this plant use to clean equipment in the plant?				
1. Quaternary ammonia	50	24.8	18.8	30.8
2. Trisodium phosphate	15	7.4	3.7	11.0
3. Chlorine	144	71.4	65.0	77.7
4. Iodine	3	1.5	0.0	3.2
5. Phosphoric acid	67	33.7	27.1	40.3
6. Acid quaternary compound	22	10.7	6.4	15.0
7. Acetic acid based compound	23	11.3	6.9	15.8
8. Dish washing detergent	82	40.4	33.6	47.3
9. Alkaline based compound (<i>write in</i>)	4	1.9	0.0	3.8
10. Degreaser (<i>write in</i>)	8	4.0	1.3	6.8
11. Potassium hydroxide (<i>write in</i>)	8	4.1	1.3	6.8
12. Sodium based compound (<i>write in</i>)	4	2.0	0.0	4.0
13. Other acid compounds (<i>write in</i>)	4	2.0	0.0	3.9
14. Other	34	16.8	11.6	22.0

^aRespondents could select multiple responses. The results reported are percentage of respondents (n = 201). We recoded the "other" responses if the same response was provided four or more times (see response items 9 through 13).

Table 5-3. Weighted Responses for Section 3: Employee Training

	n	%	95% CI	
			Low	High
3.1 Which response below best describes food safety training for newly hired processing employees of this plant?				
1. Formal food safety course conducted by professional trainers	6	2.8	0.6	5.0
2. Formal food safety course conducted by plant personnel	26	12.7	8.1	17.4
3. Scheduled on-the-job food safety training conducted by plant personnel	49	24.4	18.4	30.4
4. Informal, unscheduled on-the-job food safety training only	87	43.3	36.4	50.2
5. Only written food safety training materials are given to new hires	6	3.1	0.6	5.5
6. No food safety training for new hires	19	9.8	5.6	14.0
No response/not applicable (<i>write in</i>)	8	4.0	1.3	6.8
Total	201	100.0	—	—
3.2 Which response below best describes continuing food safety training for processing employees of this plant?				
1. Formal, periodic refresher course work conducted by professional trainers	7	3.3	0.9	5.7
2. Formal, periodic refresher course work conducted by plant personnel	30	14.6	9.7	19.5
3. Scheduled on-the-job refresher food safety training conducted by plant personnel	47	23.2	17.3	29.1
4. Only written refresher materials are given to employees	2	1.1	0.0	2.5
5. Continuing informal on-the-job food safety training only	78	38.8	32.0	45.6
6. No continuing food safety training for processing employees	33	16.9	11.6	22.2
No response/not applicable (<i>write in</i>)	4	2.1	0.0	4.2
Total	201	100.0	—	—
3.3 Approximately how many employees currently working at this plant have completed formal HACCP training (for example, a 3- to 5-day course)?				
1. None	120	59.7	52.8	66.5
2. 1 to 3 employees	69	34.5	27.8	41.1
3. 4 to 9 employees	8	3.8	1.2	6.5
4. 10 to 20 employees	0	0.0	0.0	0.0
5. More than 20 employees	2	0.9	0.0	2.3
No response	2	1.1	0.0	2.6
Total	201	100.0	—	—

Table 5-4. Weighted Responses for Section 4: Plant Demographics

	n	%	95% CI	
			Low	High
4.1 ^a In what calendar year was this plant built? (<i>If the plant has multiple sections, year is provided for oldest section.</i>)				
1. Before 1960	10	5.2	2.0	8.4
2. 1960–1969	24	11.7	7.2	16.1
3. 1970–1979	46	22.7	16.9	28.6
4. 1980–1989	69	34.6	27.9	41.2
5. 1990–1999	34	16.6	11.4	21.8
6. After 1999	15	7.8	4.0	11.6
No response	3	1.5	0.0	3.2
Total	201	100.0%	—	—
Year (mean response)	198	1980	1977	1983
4.2 ^a What is the approximate total square footage of all facilities that make up this plant? (<i>Includes all facilities, such as production space, warehouses, and office space.</i>)				
1. Under 10,000 sq. ft.	44	21.5	15.8	27.3
2. 10,000–24,999 sq. ft.	65	32.2	25.7	38.8
3. 25,000–49,999 sq. ft.	53	26.6	20.4	32.8
4. 50,000–99,999 sq. ft.	11	5.6	2.3	8.8
4. 100,000 sq. ft. or more	19	9.5	5.4	13.6
No response	9	4.6	1.6	7.6
Total	201	100.0	—	—
Square Footage (mean response)	192	56,211	38,676	73,747
			95% CI	
	n	Mean	Low	High
4.3 Calculated as a percentage of total square footage given in Question 4.2, what is the approximate percentage of the square footage of this plant that is under 5 years old, 5 years to just under 20 years old, or 20 years old or more?				
Under 5 years old		15.6%	10.9%	20.3%
5 years to just under 20 years old		42.6%	36.3%	48.9%
20 years old or more		41.7%	35.3%	48.2%
Total	192	100.0%	—	—
No response	9	—	—	—

(continued)

^aRespondents wrote in a number to answer this question. For reporting purposes, we grouped the responses into the categories shown.

Table 5-4. Weighted Responses for Section 4: Plant Demographics (continued)

		n	%	95% CI	
				Low	High
4.4	How many packing shifts are operated each day at this plant?				
	1. One	184	91.4	87.5	95.4
	2. Two	13	6.7	3.1	10.2
	3. Three	0	0.0	0.0	0.0
	Not applicable (<i>write in</i>)	2	1.0	0.0	2.4
	No response	2	0.9	0.0	2.1
	Total	201	100.0	—	—
4.5	How many clean-up shifts are operated each day at this plant?				
	1. None	20	10.2	5.9	14.5
	2. One	169	83.7	78.4	88.9
	3. Two	6	3.1	0.6	5.6
	4. Three	3	1.5	0.0	3.3
	Not applicable (<i>write in</i>)	1	0.5	0.0	1.6
	No response	2	1.0	0.0	2.3
	Total	201	100.0	—	—
4.6 ^a	Approximately how many people are employed at this plant?				
	1. Fewer than 10	75	36.7	30.0	43.4
	2. Between 10 and 499	118	59.4	52.5	66.2
	3. 500 or more	0	0.0	0.0	0.0
	No response	8	4.0	1.2	6.7
	Total	201	100.0	—	—
	Number of employees (mean response)	193	21.1	18.0	24.1
4.7	Does this plant have a Food Safety Manager?				
	1. Yes	84	41.2	34.3	48.0
	2. No [Skip to Question 4.9]	110	55.3	48.3	62.2
	3. No response [Skip to Question 4.9]	7	3.6	0.9	6.2
	Total	201	100.0	—	—
4.8	[If Q4.7 = 1, n = 84] Approximately what percentage of this plant's Food Safety Manager's time is devoted to managing food safety activities at the plant?				
	1. 1 to 24 percent	57	67.3	57.0	77.7
	2. 25 to 49 percent	17	20.7	11.8	29.7
	3. 50 to 74 percent	2	2.5	0.0	6.0
	4. 75 to 99 percent	3	3.7	0.0	7.9
	5. 100 percent	5	5.7	0.7	10.8
	Total	84	100.0	—	—

(continued)

^aRespondents wrote in a number to answer this question. For reporting purposes, we grouped the responses into the categories shown.

Table 5-4. Weighted Responses for Section 4: Plant Demographics (continued)

	n	%	95% CI	
			Low	High
4.9 ^a Approximately how many employees at this plant work in a quality control department?				
1. None/no quality control department	70	34.9	28.2	41.5
2. One	41	20.2	14.6	25.8
3. 2 to 5	73	36.4	29.7	43.2
4. 6 or more	13	6.4	3.0	9.9
No response	4	2.1	0.0	4.1
Total	201	100.0	—	—
4.10 How many plants are owned by the company that owns this plant?				
1. 1	123	61.1	54.3	67.9
2. 2 to 5	42	20.8	15.1	26.4
3. 6 to 20	22	11.2	6.8	15.7
4. 21 or more	12	6.0	2.7	9.3
No response	2	1.0	0.0	2.3
Total	201	100.0	—	—
4.11 Does this plant participate in the shell egg grading program operated by the Agricultural Marketing Service (AMS)?				
1. Yes	105	51.4	44.4	58.4
2. No	86	43.6	36.6	50.5
No response/don't know/not applicable (<i>write in</i>)	10	5.0	2.0	8.1
Total	201	100.0	—	—
4.12 What was the approximate value of total plant sales revenue for the most recently completed fiscal year?				
1. Less than \$1 million	60	29.3	23.0	35.6
2. \$1 million to \$5.9 million	42	21.2	15.5	27.0
3. \$6 million to \$9.9 million	20	10.0	5.8	14.2
4. \$10 million to \$14.9 million	28	14.0	9.1	18.9
5. \$15 million or more	33	16.6	11.3	21.8
No response/not applicable (<i>write in</i>)	18	8.9	5.0	12.9
Total	201	100.0	—	—

^aRespondents wrote in a number to answer this question. For reporting purposes, we grouped the responses into the categories shown.

Tables 5-5 through 5-8 provide survey results by size of establishment:

- ▶ Small: 39 employees or less (n = 166)
- ▶ Large: 40 or more employees (n = 34)

The cross-tabulation results are weighted to adjust for nonresponse. 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. 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. When sample sizes are small caution should be exercised when making comparisons between small and large plants because the CIs are generally large.

Table 5-5. Weighted Responses by Size for Section 1: Egg Packing Operations

	Small (≤39 employees)		Large (40 or more employees)	
	n	Mean	n	Mean
1.1 What percentage of eggs packed by this plant are supplied by inline layer facilities, offline layer facilities, and open market purchases? (<i>Means are percentage of annual production.</i>)				
Inline layer facilities		66.3%		72.1%
Offline layer facilities		24.8%		25.4%
Open market purchases		8.9%		2.5%
Total	165	100.0%	33	100.0%
Not applicable (<i>write in</i>)	—	—	1	—
No response	1	—	—	—
1.2 What is the age of eggs when they are received by the packing facility of this plant? (<i>Means are percentage of annual production.</i>)				
Less than 1 day		63.7%		69.6%
1 to 3 days		25.9%		19.5%
4 to 6 days		7.7%		6.5%
7 to 10 days		2.4%		3.0%
11 to 15 days		0.2%		0.8%
16 to 20 days		0.0%		0.7%
21 days or older		0.0%		0.0%
Total	165	100.0%	33	100.0%
Not applicable (<i>write in</i>)	—	—	1	—
No response	1	—	—	—
1.3 What percentage of offline and open market purchase eggs are refrigerated during transportation to this plant? (<i>Means are percentage of all eggs from offline and open market purchase sources.</i>)				
Not refrigerated		15.9%		11.7%
45°F or below		68.1%		56.4%
46°F to 59°F		13.5%		31.4%
60°F or higher		2.5%		0.5%
Total	118	100.0%	23	100.0%
Not applicable (<i>write in</i>)	40	—	6	—
No response	7	—	5	—
Not included in analysis ^a	1	—	—	—

(continued)

^aRespondents' answers were excluded from the analysis if the sum of their responses was less than 80 percent or greater than 120 percent.

Table 5-5. Weighted Responses by Size for Section 1: Egg Packing Operations (continued)

	Small (≤39 employees)		Large (40 or more employees)	
	n	Mean	n	Mean
1.4 Once eggs are received at your packing plant, how long are they typically stored before packing? (<i>Means are percentage of annual production.</i>)				
Less than 1 day		50.5%		62.6%
1 to 3 days		34.7%		16.7%
4 to 6 days		12.6%		14.7%
7 to 10 days		1.7%		3.3%
11 to 15 days		0.2%		1.6%
16 to 20 days		0.2%		1.1%
21 days or longer		0.0%		0.0%
Total	142	100.0%	24	100.0%
Not applicable (<i>write in</i>)	19	—	4	—
No response	5	—	6	—
	Small (≤39 employees)		Large (40 or more employees)	
	n	%	n	%
1.5 At what temperature are eggs stored at this plant before packing?				
1. 45°F or below	92	55.8	13	37.1
2. 46°F to 59°F	24	14.4	5	15.2
3. 60°F or higher	17	9.8	4	12.1
Not applicable (<i>write in</i>)	28	16.8	6	17.6
No response	5	3.2	6	17.9
Total	166	100.0	34	100.0
1.6 ^a Which of the technologies or equipment listed below are currently in use at this plant?				
1. Integrated, computerized production system	64	38.5	16	47.7
2. Rapid egg cooling technology	10	5.8	*	6.1
3. Updated, stainless steel, shell egg grading and packing equipment	86	51.2	27	79.0
4. Automatic equipment that detects any defects, such as dirties, checks, and bloods	69	42.1	26	76.5
1.7 ^a Of the choices listed below, what type(s) of written food safety plans does this plant have?				
1. Written HACCP plan	70	42.0	30	88.0
2. Written quality assurance plan	86	51.8	28	82.1
3. Written sanitation plan	81	48.4	30	88.4
4. Written audit plan	56	33.4	25	72.7
5. This plant does not have a written food safety plan	52	31.8	*	2.6

(continued)

^aRespondents could select multiple responses. The results reported are percentage of respondents (n = 166 for small plants and n = 34 for large plants).

*The n is suppressed because of the small number of respondents.

Table 5-5. Weighted Responses by Size for Section 1: Egg Packing Operations (continued)

	Small (≤39 employees)		Large (40 or more employees)	
	n	%	n	%
1.8 ^a Who conducts independent, non-government, third-party audits of this plant's egg packing operations?				
1. Independent, non-government, third-party auditors that are hired by this plant	26	15.4	8	24.2
2. Customers of this plant	49	29.7	15	44.1
3. Independent, non-government, third-party auditors that are hired by customers of this plant	26	15.5	14	39.8
4. This plant's egg packing operations are not audited by independent, non-government, third-party auditors	88	53.1	12	36.2
1.9A Are this plant's egg packing operations certified by an independent, non-government, third-party organization?				
1. Yes	29	17.2	13	37.9
2. No	119	71.4	18	52.9
3. No response/not applicable (<i>write in</i>)	18	11.3	3	9.2
Total	166	100.0	34	100.0
1.9B ^b [If 1.9A = 1] Who certifies this plant's egg packing operations?				
1. Customers of this plant	9	30.6	3	21.5
2. Other organizations	21	72.3	12	92.3

^aRespondents could select multiple responses. The results reported are percentage of respondents (n = 166 for small plants and n = 34 for large plants).

^bRespondents could enter multiple responses. The results reported are percentage of respondents who answered "yes" to Q1.9A (n = 29 for small plants and 13 for large plants). We recoded the open-ended responses into the two categories shown.

Table 5-6. Weighted Responses by Size for Section 2: Sanitation Practices

	Small (≤39 employees)		Large (40 or more employees)	
	n	%	n	%
2.1 How frequently does this plant conduct pre-operative sanitation inspections?				
1. This plant does not conduct pre-operative sanitation inspections [Skip to Question 2.5]	31	18.8	0	0.0
2. Once per production shift, before beginning each production shift	27	16.7	7	20.3
3. Once per day, before beginning daily operations	89	53.0	24	70.6
4. Less than once per day	3	1.7	1	3.1
5. This plant conducts pre-operative sanitation inspections, but with no specific, regular frequency	11	6.7	1	3.2
No response/not applicable (<i>write in</i>) [Skip to Question 2.5]	5	3.1	1	2.9
Total	166	100.0	34	100.0
2.2 ^a [If 2.1 = 2, 3, 4, or 5] What areas of the plant are inspected routinely during pre-operative sanitation inspections?				
1. Pre-washers, loaders, conveyers, and orienters	115	88.5	32	97.3
2. Washer compartments, nozzles, and brushes	120	92.1	33	100.0
3. Egg drying equipment	108	83.0	28	84.4
4. Egg oiling equipment	61	46.7	20	59.7
5. Mass scanning equipment	74	57.5	24	73.0
6. Scales	118	91.1	32	97.3
7. Egg packing equipment	114	88.1	33	100.0
8. Processing rooms	115	88.9	33	100.0
9. Coolers and storage areas	121	93.1	30	90.9
10. Outside premises	79	60.6	14	42.2
11. Refuse handling areas	81	62.4	17	51.4
2.3 [If 2.1 = 2, 3, 4, or 5] Does this plant maintain written records of its pre-operative sanitation inspections?				
1. Yes	71	54.4	27	81.2
2. No	59	45.6	6	18.8
Total	130	100.0	33	100.0

(continued)

^aRespondents could select multiple responses. The results reported are percentage of respondents who answered 2, 3, 4, or 5 for Q2.1 (n = 130 for small plants and 33 for large plants).

Table 5-6. Weighted Responses by Size for Section 2: Sanitation Practices (continued)

	Small (≤39 employees)		Large (40 or more employees)	
	n	%	n	%
2.4 [If 2.1 = 2, 3, 4, or 5] When sanitation problems are found, how quickly are corrective actions begun?				
1. Same production shift, before beginning shift operations	44	33.1	7	21.7
2. Same day, before beginning daily operations	72	55.8	17	51.0
3. Response depends on severity of sanitation problem (<i>write in</i>)	5	4.0	0	0.0
4. Response depends on whether sanitation problem is in a critical area or not (<i>write in</i>)	2	1.6	6	18.2
5. Response depends on whether the sanitation problem is in a product contact zone or not (<i>write in</i>)	1	0.8	2	6.3
6. Other	6	4.7	1	2.7
Total	130	100.0	33	100.0
2.5 For packing shifts, does this plant routinely do a mid-shift clean-up?				
1. Yes	66	39.7	21	62.4
2. No	84	50.5	12	34.7
Not applicable (<i>write in</i>)	8	4.8	1	2.9
No response	8	4.9	0	0.0
Total	166	100.0	34	100.0
2.6 How frequently is washing and candling equipment at this plant cleaned thoroughly?				
1. Once per production shift, before beginning each production shift	39	23.6	5	15.0
2. Once per day, before beginning daily operations	106	63.7	26	76.4
3. Less than once per day	4	2.3	1	3.1
4. This plant cleans its washing and candling equipment, but with no specific, regular frequency	12	7.3	1	2.6
Not applicable (<i>write in</i>)	1	0.6	1	2.9
No response	4	2.5	0	0.0
Total	166	100.0	34	100.0
2.7 How frequently is grading and packing equipment at this plant cleaned thoroughly?				
1. Once per production shift, before beginning each production shift	32	19.1	7	20.7
2. Once per day, before beginning daily operations	96	57.3	26	76.3
3. Less than once per day	9	5.6	0	0.0
4. This plant cleans its grading and packing equipment, but with no specific, regular frequency	25	15.5	0	0.0
Not applicable (<i>write in</i>)	1	0.6	1	2.9
No response	3	1.9	0	0.0
Total	166	100.0	34	100.0

(continued)

Table 5-6. Weighted Responses by Size for Section 2: Sanitation Practices (continued)

	Small (≤39 employees)		Large (40 or more employees)	
	n	%	n	%
2.8 ^a What cleaning products does this plant use to clean equipment in the plant?				
1. Quaternary ammonia	35	21.1	15	43.4
2. Trisodium phosphate	14	8.3	1	2.9
3. Chlorine	117	70.2	26	76.0
4. Iodine	3	1.8	0	0.0
5. Phosphoric acid	49	29.7	17	51.2
6. Acid quaternary compound	18	10.7	4	11.1
7. Acetic acid based compound	19	11.3	4	11.9
8. Dish washing detergent	69	41.2	13	38.1
9. Alkaline based compound (<i>write in</i>)	3	1.7	1	3.1
10. Degreaser (<i>write in</i>)	6	3.6	2	6.1
11. Potassium hydroxide (<i>write in</i>)	4	2.4	4	12.0
12. Sodium based compound (<i>write in</i>)	2	1.3	2	5.8
13. Other acid compounds (<i>write in</i>)	4	2.4	0	0.0
14. Other	29	17.2	5	15.3

^aRespondents could select multiple responses. The results reported are percentage of respondents (n = 166 for small plants and 34 for large plants). We recoded the “other” responses if the same response was provided four or more times (see response items 9 through 13).

Table 5-7. Weighted Responses by Size for Section 3: Employee Training

	Small (≤39 employees)		Large (40 or more employees)	
	n	%	n	%
3.1 Which response below best describes food safety training for newly hired processing employees of this plant?				
1. Formal food safety course conducted by professional trainers	3	1.7	3	8.2
2. Formal food safety course conducted by plant personnel	22	13.0	4	11.6
3. Scheduled on-the-job food safety training conducted by plant personnel	32	19.2	17	50.3
4. Informal, unscheduled on-the-job food safety training only	80	48.3	6	17.3
5. Only written food safety training materials are given to new hires	4	2.4	2	6.3
6. No food safety training for new hires	17	10.5	2	6.3
No response/not applicable (<i>write in</i>)	8	4.9	0	0.0
Total	166	100.0	34	100.0
3.2 Which response below best describes continuing food safety training for processing employees of this plant?				
1. Formal, periodic refresher course work conducted by professional trainers	4	2.3	3	8.2
2. Formal, periodic refresher course work conducted by plant personnel	24	14.0	6	18.3
3. Scheduled on-the-job refresher food safety training conducted by plant personnel	34	20.3	13	38.3
4. Only written refresher materials are given to employees	2	1.3	0	0.0
5. Continuing informal on-the-job food safety training only	69	41.7	8	23.0
6. No continuing food safety training for processing employees	29	17.9	4	12.3
No response/not applicable (<i>write in</i>)	4	2.6	0	0.0
Total	166	100.0	34	100.0

(continued)

Table 5-7. Weighted Responses by Size for Section 3: Employee Training (continued)

	Small (≤39 employees)		Large (40 or more employees)	
	n	%	n	%
3.3 Approximately how many employees currently working at this plant have completed formal HACCP training (for example, a 3- to 5-day course)?				
1. None	105	63.3	14	41.0
2. 1 to 3 employees	55	33.1	14	42.1
3. 4 to 9 employees	4	2.3	4	11.3
4. 10 to 20 employees	0	0.0	0	0.0
5. More than 20 employees	0	0.0	*	5.5
No response	2	1.3	0	0.0
Total	166	100.0	34	100.0

*The n is suppressed because of the small number of respondents.

Table 5-8. Weighted Responses by Size for Section 4: Plant Demographics

	Small (≤39 employees)		Large (40 or more employees)	
	n	%	n	%
4.1 ^a In what calendar year was this plant built? (If the plant has multiple sections, year is provided for oldest section.)				
1. Before 1960	7	4.5	3	8.9
2. 1960–1969	20	11.7	4	11.8
3. 1970–1979	43	25.9	3	8.2
4. 1980–1989	54	32.5	14	42.4
5. 1990–1999	29	17.2	5	14.2
6. After 1999	10	6.4	5	14.6
No response	3	1.8	0	0.0
Total	166	100.0	34	100.0
Year (mean response)	163	1980	34	1981
4.2 ^a What is the approximate total square footage of all facilities that make up this plant? (Includes all facilities, such as production space, warehouses, and office space.)				
1. Under 10,000 sq. ft.	42	24.9	*	2.6
2. 10,000–24,999 sq. ft.	63	38.0	2	5.2
3. 25,000–49,999 sq. ft.	38	22.9	15	45.2
4. 50,000–99,999 sq. ft.	7	4.3	4	12.2
4. 100,000 sq. ft. or more	8	5.0	11	31.6
No response	8	4.9	*	3.2
Total	166	100.0	34	100.0
Square Footage (mean response)	158	31,518	33	175,819
	Small (≤39 employees)		Large (40 or more employees)	
	n	Mean	n	Mean
4.3 Calculated as a percentage of total square footage given in Question 4.2, what is the approximate percentage of the square footage of this plant that is under 5 years old, 5 years to just under 20 years old, or 20 years old or more?				
Under 5 years old		15.2%		18.0%
5 years to just under 20 years old		40.8%		52.8%
20 years old or more		44.0%		29.2%
Total	158	100.0%	33	100.0%
No response	8	—	1	—

(continued)

^aRespondents wrote in a number to answer this question. For reporting purposes, we grouped the responses into the categories shown.

*The n is suppressed because of the small number of respondents.

Table 5-8. Weighted Responses by Size for Section 4: Plant Demographics (continued)

	Small (≤39 employees)		Large (40 or more employees)	
	n	%	n	%
4.4 How many packing shifts are operated each day at this plant?				
1. One	157	94.7	26	75.2
2. Two	6	3.6	7	21.9
3. Three	0	0.0	0	0.0
Not applicable (<i>write in</i>)	1	0.6	1	2.9
No response	2	1.1	0	0.0
Total	166	100.0	34	100.0
4.5 How many clean-up shifts are operated each day at this plant?				
1. None	19	11.7	1	3.2
2. One	136	81.5	32	93.9
3. Two	5	3.2	1	2.9
4. Three	3	1.9	0	0.0
Not applicable (<i>write in</i>)	1	0.6	0	0.0
No response	2	1.2	0	0.0
Total	166	100.0	34	100.0
4.6 ^a Approximately how many people are employed at this plant?				
1. Less than 10	75	44.5	0	0.0
2. Between 10 and 499	88	53.7	30	88.7
3. 500 or more	0	0.0	0	0.0
No response	3	1.8	4	11.3
Total	166	100.0	34	100.0
Number of employees (mean response)	163	14.0	30	59.3
4.7 Does this plant have a Food Safety Manager?				
1. Yes	66	39.1	18	52.6
2. No [Skip to Question 4.9]	94	57.2	15	44.2
3. No response [Skip to Question 4.9]	6	3.7	1	3.2
Total	166	100.0	34	100.0
4.8 [If Q4.7 = 1] Approximately what percentage of this plant's Food Safety Manager's time is devoted to managing food safety activities at the plant?				
1. 1 to 24 percent	46	69.3	11	60.2
2. 25 to 49 percent	12	18.5	5	28.9
3. 50 to 74 percent	2	3.2	0	0.0
4. 75 to 99 percent	2	3.0	1	6.0
5. 100 percent	4	6.0	1	5.0
Total	66	100.0	18	100.0

(continued)

^aRespondents wrote in a number to answer this question. For reporting purposes, we grouped the responses into the categories shown.

Table 5-8. Weighted Responses by Size for Section 4: Plant Demographics (continued)

	Small (≤39 employees)		Large (40 or more employees)	
	n	%	n	%
4.9 ^a Approximately how many employees at this plant work in a quality control department?				
1. None/no quality control department	62	37.6	7	19.6
2. One	37	22.0	4	12.1
3. 2 to 5	54	32.4	19	57.0
4. 6 or more	9	5.5	4	11.3
No response	4	2.5	0	0.0
Total	166	100.0	34	100.0
4.10 How many plants are owned by the company that owns this plant?				
1. 1	116	69.7	6	17.7
2. 2 to 5	29	17.4	13	37.9
3. 6 to 20	11	6.8	11	33.0
4. 21 or more	8	4.9	4	11.4
No response	2	1.2	0	0.0
Total	166	100.0	34	100.0
4.11 Does this plant participate in the shell egg grading program operated by the Agricultural Marketing Service (AMS)?				
1. Yes	85	50.4	20	58.2
2. No	73	44.8	12	35.7
No response/don't know/not applicable (<i>write in</i>)	8	4.8	2	6.1
Total	166	100.0	34	100.0
4.12 What was the approximate value of total plant sales revenue for the most recently completed fiscal year?				
1. Less than \$1 million	58	34.3	*	2.6
2. \$1 million to \$5.9 million	41	25.1	*	3.2
3. \$6 million to \$9.9 million	15	9.1	5	14.7
4. \$10 million to \$14.9 million	14	8.5	14	41.0
5. \$15 million or more	22	13.4	11	32.2
No response/not applicable (<i>write in</i>)	16	9.5	2	6.3
Total	166	100.0	34	100.0

^aRespondents wrote in a number to answer this question. For reporting purposes, we grouped the responses into the categories shown.

*The n is suppressed because of the small number of respondents.

6

Survey Results: Egg Products Processing Plants

Tables 6-1 through 6-5 provide survey results for egg products processing plants (n = 60). The results are weighted to adjust for nonresponse. 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. 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 item is provided in the tables.

Key findings from the Egg Products Processing Survey, grouped by survey section, include the following:

Egg Products Processing Operations

- ▶ The arrangements under which egg products processing plants receive their eggs are about evenly divided among inline facilities, company-owned or contracted facilities (i.e., off-line facilities), and open-market purchases.
- ▶ 70 percent of egg products processing plants use restricted eggs; one-third of these eggs are 7 days or older when received by the plant.
- ▶ Nearly one-half of all egg products processing plants store their eggs at temperatures greater than 45°F and temper eggs to ambient room temperature before breaking.
- ▶ 82 percent of plants produce egg products that are inputs to further processing by another plant.

Sanitation Practices

- ▶ 80 percent of egg products processing plants have a written HACCP plan; of those, two-thirds have designated the pasteurization of liquid eggs as a critical control point.

- Nearly all plants routinely do mid-shift clean-ups, with chlorine as the preferred sanitizer.
- More than 80 percent of plants conduct sanitation inspections of product and nonproduct contact zones daily or more often.

Microbiological Testing Practices

- 80 percent of egg product processing plants conduct microbiological testing in addition to mandatory testing required by FSIS; traditional cultural methods and rapid methods are the most common forms of testing.
- Over 75 percent of plants test for total coliforms and generic *E. coli*; 38 percent test for *Salmonella* Enteritidis and *Listeria monocytogenes*.
- 73 percent of plants conduct environmental sampling, with 40 percent testing for *Listeria* species at least once per week; traditional cultural methods and rapid methods are most often used.

Employee Training

- Over 40 percent of egg products processing plants require formal food safety training for new hires and current employees.
- Over 80 percent of plants have employees that have attended formal HACCP training.

Plant Characteristics

- 42 percent of egg products processing plants operate more than one shift.
- The majority of plants (80 percent) operate one clean-up shift.
- Over 80 percent of plants have a quality control department.
- Two-thirds of plants have annual sales revenue of \$5 million or more and are part of a company that owns other USDA-inspected plants.

Table 6-1. Weighted Responses for Section 1: Egg Products Processing Operations

	n	Mean
1.1 What percentage of eggs processed by this plant are supplied by inline layer facilities, offline layer facilities, and open market purchases? (<i>Means are percentage of annual production.</i>)		
Inline layer facilities		32.1%
Offline layer facilities		38.4%
Open market purchases		29.5%
Total	56	100.0%
Not applicable (<i>write in</i>)	3	—
No response	1	—
1.2 What is the age of eggs—not including restricted eggs—when they are received by the processing facility of this plant? (<i>Means are percentage of annual production using nonrestricted eggs.</i>)		
Less than 1 day		22.0%
1 to 3 days		33.3%
4 to 6 days		25.0%
7 to 10 days		12.3%
11 to 15 days		4.7%
16 to 20 days		1.7%
21 days or older		0.9%
Total	53	100.0%
Not applicable (<i>write in</i>)	5	—
No response	2	—
	n	%
1.3 What share of eggs processed at this plant are restricted eggs?		
1. None	14	23.3
2. Less than 1%	1	1.7
3. 1% to 5%	7	11.7
4. 6% to 10%	4	6.7
5. 11% to 20%	8	13.3
6. 21% or more	22	36.7
No response/not applicable (<i>write in</i>)	4	6.7
Total	60	100.0

(continued)

Table 6-1. Weighted Responses for Section 1: Egg Products Processing Operations (continued)

	n	Mean
1.4 [If Q1.3 = 2, 3, 4, 5, or 6; n = 42] What is the age of restricted eggs when they are received by the processing facility of this plant? (<i>Means are percentage of annual production using restricted eggs.</i>)		
1 to 3 days		33.6%
4 to 6 days		32.8%
7 to 10 days		22.8%
11 to 15 days		6.7%
16 to 20 days		2.9%
21 days or older		1.0%
Don't know		0.1%
Total	42	100.0%
1.5 What percentage of offline and open market purchase eggs are refrigerated during transportation to this plant? (<i>Means are percentage of all eggs received from offline and open market purchase sources.</i>)		
Not refrigerated		14.6%
45°F or below		56.1%
46°F to 59°F		28.9%
60°F or higher		0.4%
Total	49	100.0%
Not applicable (<i>write in</i>)	9	—
No response	2	—
1.6 Considering all sources of eggs processed by this plant, once eggs are received at your processing plant, how long are they stored before processing? (<i>Means are percentage of annual production.</i>)		
Less than 1 day		34.6%
1 to 3 days		44.6%
4 to 6 days		12.5%
7 to 10 days		6.0%
11 to 15 days		1.4%
16 to 20 days		0.6%
21 days or longer		0.3%
Total	55	100.0%
Not applicable (<i>write in</i>)	4	—
No response	1	—

(continued)

Table 6-1. Weighted Responses for Section 1: Egg Products Processing Operations (continued)

	n	%
1.7 At what temperature are eggs stored at this plant before breaking?		
1. 45°F or below	18	30.0
2. 46°F to 59°F	20	33.3
3. 60°F or higher	9	15.0
4. This plant does not break eggs	5	8.3
No response	1	1.7
Not applicable (<i>write in</i>)	7	11.7
Total	60	100.0
1.8 Does this plant temper eggs to ambient room temperature before breaking?		
1. Yes	27	45.0
2. No	23	38.3
3. This plant does not break eggs	5	8.3
No response	1	1.7
Not applicable (<i>write in</i>)	4	6.7
Total	60	100.0
1.9 ^a Which of the technologies, equipment, or practices listed below are currently in use at this plant?		
1. In-shell pasteurization process ^b	1	1.7
2. Advanced pasteurization technology	13	21.7
3. Liquid egg concentrating technology	10	16.7
4. Integrated, computerized processing system	18	30.0
5. Environmentally controlled packaging system	13	21.7

(continued)

^aRespondents could select multiple responses. The results reported are percentage of respondents (n = 60).

^bIn Q2.1, four respondents reported the use of in-shell pasteurization versus one respondent for Q1.9.

Table 6-1. Weighted Responses for Section 1: Egg Products Processing Operations (continued)

	n	Mean ^{a,b}
1.10 For each product category listed below, please write in the total pounds produced by this plant in the most recently completed fiscal year.		
a. Liquid	47	30,005,584
b. Blended and liquid	25	13,760,251
c. Frozen	29	7,305,599
d. Blended and frozen	20	8,423,030
e. Dried	13	6,772,813
f. Blended and dried	8	4,198,049
g. Extended shelf life liquid	5	54,872,000
h. Inedible	45	5,718,531
No response	6	—
	n	%
1.11 ^c What types of food products does this plant produce?		
1. Ready to eat (RTE) products	8	13.3
2. Ready to cook (RTC) products	21	35.0
3. Products that are inputs to further processing by another plant	49	81.7
1.11 ^d What types of food products does this plant produce?		
1. RTE products only	0	0.0
2. RTC products only	8	13.3
3. Products that are inputs to further processing by another plant only	33	55.0
4. RTE and RTC products	0	0.0
5. RTE products and products that are inputs to further processing	3	5.0
6. RTC products and products that are inputs to further processing	8	13.3
7. RTE, RTC, and products that are inputs to further processing	5	8.3
8. No response	3	5.0
Total	60	100.0

(continued)

^aMeans are for respondents that produce the product category (i.e., nonzero responses).

^bWe compared the survey responses with the mean production data from the EFD. The survey estimates and the estimates from the EFD are on the same level of magnitude.

^cRespondents could select multiple responses. The results reported are percentage of respondents (n = 60).

^dFor Q1.11, we also estimated proportions for mutually exclusive categories so that the responses would sum to 100 percent.

Table 6-1. Weighted Responses for Section 1: Egg Products Processing Operations (continued)

	n	%
1.12 ^a Who conducts independent, non-government, third-party audits of this plant's egg processing operations?		
1. Independent, non-government, third-party auditors that are hired by this plant	36	60.0
2. Customers of this plant	47	78.3
3. Independent, non-government, third-party auditors that are hired by customers of this plant	23	38.3
4. This plant's egg processing operations are not audited by independent, non-government, third-party auditors	10	16.7
1.13A Are this plant's egg processing operations certified by an independent, non-government, third-party organization?		
1. Yes	32	53.3
2. No	26	43.3
3. No response	2	3.3
Total	60	100.0
1.13B ^b [IF Q1.13A = 1, n = 32] Who certifies this plant's egg processing operations?		
1. American Institute of Baking	19	59.4
2. ASI Food Safety Consultants	5	15.6
3. Customers of the plant	4	12.5
4. Kosher organizations	7	21.9
5. National Food Processors Association	3	9.4
6. Other organization	5	15.6
1.14 Does this plant have a written HACCP plan?		
1. Yes	48	80.0
2. No	12	20.0
Total	60	100.0

^aRespondents could select multiple responses. The results reported are percentage of respondents (n = 60).

^bRespondents could enter multiple responses. The results reported are percentage of respondents who answered "yes" to Q1.13A (n = 32). We recoded the open-ended responses if the same response was provided three or more times.

Table 6-2. Weighted Responses for Section 2: Sanitation Practices

		Process Is Not Used by this Plant	Process Is Used, But Is Not Designated as a CCP nor Is It Described in a Written Prerequisite Plan at this Plant	Process Is Designated as a CCP in a HACCP Plan for this Plant	Process is Described in a Written Prerequisite Plan at this Plant	No Response/ Not Applicable ^a	Total
		%	%	%	%	%	
2.1	[If Q1.14 = 1, n = 48] For each process listed below, please identify how the process is addressed in the HACCP plan of this plant.						
	Receiving eggs	6.2	27.1	10.4	50.0	6.2	100.0
a.	Receiving nonegg ingredients		20.8	2.1	52.1	10.4	100.0
b.	c. Receiving packaging materials		20.8	2.1	50.0	8.3	100.0
	d. Storing shell eggs	22.9	18.8	10.4	41.7	6.2	100.0
	In-shell pasteurization ^b	14.6 18.8	4.2	4.2	0.0	10.4	100.0
e.	f. Handling of restricted eggs	25.0	31.3	4.2	29.2	10.4	100.0
	Breaking shell eggs	12.5	16.7	22.9	41.7	6.2	100.0
g.	Blending formulation	20.8	14.6	6.2	50.0	8.3	100.0
h.	Pasteurizing liquid eggs ^{§1.3}	20.8	0.0	66.7	4.2	8.3	100.0
i.	Drying egg products	58.3	4.2	10.4	16.7	10.4	100.0
j.	Pasteurizing dried egg whites		0.0	22.9	0.0	10.4	100.0
k.	l. Packaging finished products	16.7	0.0	31.3	43.8	8.3	100.0
	Storing finished products	10.4	8.3	33.3	43.8	4.2	100.0
m.		66.7					(continued)

^aOne respondent did not complete the table (2.1 percent), and one respondent wrote in "not applicable" for Q2.1 (2.1 percent). Any remaining nonresponse is due to respondents not selecting an answer for a row in the table.

^bIn Q1.9, one respondent reported the use of in-shell pasteurization versus four respondents for Q2.1.

Table 6-2. Weighted Responses for Section 2: Sanitation Practices (continued)

	n	%
2.2 ^a [If Q1.14 = 1, n = 48] What records does this plant maintain to verify performance of Prerequisite Plans?		
1. None; no records are kept	0	0.0
2. Quality assurance retention log	41	85.4
3. Calibration log	44	91.7
4. Receiving log	44	91.7
5. Measurement (weight or volume) verification log	36	75.0
6. Employee task performance log	34	70.8
7. Microbial data log	42	87.5
8. Time/temperature log	47	97.9
9. CCP verification log	38	79.2
10. Deviation and corrective action log	37	77.1
2.3 How often are drains sanitized at this plant?		
1. One or more times per shift	10	16.7
2. One or more times per day, but less than one time per shift	21	35.0
3. One or more times per week, but less than one time per day	14	23.3
4. Less than once per week	3	5.0
5. With no routine schedule	7	11.7
6. Drains are not sanitized	5	8.3
Total	60	100.0
2.4 For production shifts, does this plant routinely do a mid-shift clean-up?		
1. Yes	56	93.3
2. No	3	5.0
No response	1	1.7
Total	60	100.0

(continued)

^aRespondents could select multiple responses. The results reported are percentage of respondents who answered “yes” to Q1.14 (n = 48).

Table 6-2. Weighted Responses for Section 2: Sanitation Practices (continued)

	n	%
2.5 ^a What sanitizing products are used at this plant?		
1. Quaternary ammonia	38	63.3
2. Trisodium phosphate	1	1.7
3. Chlorine	56	93.3
4. Iodine	19	31.7
5. Phosphoric acid	24	40.0
6. Acid quaternary compound	15	25.0
7. Acetic acid based compound	11	18.3
8. Dish washing detergent	10	16.7
9. Others	7	11.7
2.6 How frequently does this plant conduct sanitation inspections of product-contact zones?		
1. More than once per shift	30	50.0
2. Once per shift before shift operations begin	7	11.7
3. Once per day before daily operations begin	19	31.7
4. Once per week	2	3.3
5. Once per month	0	0.0
6. Less than once per month	0	0.0
7. No specific or regular frequency	1	1.7
8. This plant does not conduct sanitation inspections of product-contact zones	1	1.7
Total	60	100.00
2.7 How frequently does this plant conduct sanitation inspections of nonproduct contact zones?		
1. More than once per shift	19	31.7
2. Once per shift before shift operations begin	8	13.3
3. Once per day before daily operations begin	22	36.7
4. Once per week	4	6.7
5. Once per month	5	8.3
6. Less than once per month	0	0.0
7. No specific or regular frequency	1	1.7
8. This plant does not conduct sanitation inspections of nonproduct contact zones	1	1.7
Total	60	100.0

^aRespondents could select multiple responses. The results reported are percentage of respondents (n = 60).

Table 6-3. Weighted Responses for Section 3: Microbiological Testing Practices

		n			%		
3.1 Does this plant conduct microbiological testing in addition to the mandatory testing for <i>Salmonella</i> required by FSIS regulation, using either its own lab or an independent commercial lab?							
1.	Yes	48			80.0		
2.	No	9			15.0		
No response		3			5.0		
Total		60			100.0		
3.2 ^a [If Q3.1 = 1, n = 48] Which methods of microbiological testing listed below are used by this plant, by either its own lab or an independent commercial lab for this plant?							
		Not Used by this Plant	Used for Testing Product Before Pasteurization Only	Used for Testing Product After Pasteurization Only	Used for Testing Product Before and After Pasteurization	No Response ^b	Total
		%	%	%	%	%	%
a.	Traditional cultural methods	12.5	18.8	43.8	20.8	4.2	100.0
b.	Rapid methods	10.4	6.2	41.7	20.8	20.8	100.0
c.	Enzyme linked immunoassay (ELISA)	45.8	0.0	29.2	2.1	22.9	100.0
d.	Polymerase chain reaction (PCR)	62.5	2.1	6.2	2.1	27.1	100.0

(continued)

^aIn the survey, respondents could select multiple responses for Q3.2. We added the category “Used for Testing Product Before and After Pasteurization” so that the estimated proportions would sum to 100 percent.

^bTwo respondents (4.2 percent) did not complete the table for Q3.2. Any remaining nonresponse is due to respondents not selecting an answer for a row in the table.

Table 6-3. Weighted Responses for Section 3: Microbiological Testing Practices (continued)

3.3^a [If Q3.1 = 1, n = 48]
 What organisms does this plant test for in (a) pre-pasteurized egg product, (b) RTE product after packaging, or (c) RTC product after packaging?

	Pre-pasteurized Egg Product Only	RTE Product Sampled After Packaging Only	RTC Product Sampled After Packaging Only	RTE and RTC Product	Pre-pasteurized Egg Product and RTE or RTC Product	Not Tested for by this Plant	No Response/ Not Applicable ^b	Total
	%	%	%	%	%	%	%	%
a. Aerobic plate count (APC)	22.9	14.6	10.4	0.0	27.1	10.4	14.6	100.0
b. Total plate count (TPC)	12.5	12.5	22.9	2.1	14.6	25.0	10.4	100.0
c. Total coliforms	14.6	16.7	22.9	2.1	22.9	8.3	12.5	100.0
d. Generic <i>E. coli</i>	10.4	20.8	27.1	6.3	10.4	8.3	16.7	100.0
e. <i>Staphylococcus aureus</i>	2.1	20.8	29.2	6.2	0.0	25.0	16.7	100.0
f. <i>Salmonella</i> species	2.1	12.5	33.3	6.2	8.3	22.9	14.6	100.0
<i>Salmonella</i> Enteritidis	6.2	6.2	18.8	2.1	4.2	41.7	20.8	100.0
<i>Listeria</i> species	4.2	8.3	22.9	2.1	2.1	43.8	16.7	100.0
g. <i>Listeria monocytogenes</i>	2.1	10.4	14.6	6.3	4.2	39.6	22.9	100.0
h. <i>Listeria monocytogenes</i>								
i. j. Yeasts and molds	0.0	18.8	27.1	4.2	8.3	22.9	18.8	100.0

(continued)

^aIn the survey, respondents could select multiple responses for Q3.3. We added the categories "RTE and RTC Product" and "Pre-pasteurized Egg Product and RTE or RTC Product" so that the estimated proportions would sum to 100 percent.

^bThree respondents (6.3 percent) did not complete the table, and one respondent wrote in "not applicable" for Q3.3 (2.1 percent). Any remaining nonresponse is due to respondents not selecting an answer for a row in the table.

Table 6-3. Weighted Responses for Section 3: Microbiological Testing Practices (continued)

3.4 [If Q3.1 = 1, n = 48]

For each organism listed below, how frequently is microbiological testing done on product that is sampled before pasteurization?

	More Than Once per Shift	Once per Shift	Once per Day	Once per Week	More Than Once per Week	More Than Once per Month	Once per Month	Less Than Once per Month	Never	No Response ^a	Total
	%	%	%	%	%	%	%	%	%	%	%
a. Aerobic plate count (APC)	18.8	4.2	12.5	12.5	4.2	2.1	2.1	6.3	25.0	12.5	100.0
b. Total plate count (TPC)	12.5	8.3	6.2	8.3	0.0	0.0	4.2	4.2	47.9	8.3	100.0
c. Total coliforms	20.8	8.3	8.3	8.3	6.2	0.0	6.2	4.2	31.3	6.2	100.0
d. Generic <i>E. coli</i>	14.6	4.2	4.2	8.3	6.3	2.1	4.2	4.2	41.7	10.4	100.0
e. <i>Staphylococcus aureus</i>	0.0	4.2	2.1	6.2	0.0	0.0	2.1	12.5	58.3	14.6	100.0
f. <i>Salmonella</i> species	2.1	6.2	4.2	6.2	0.0	0.0	6.2	6.2	56.3	12.5	100.0
g. <i>Salmonella</i> Enteritidis	2.1	6.2	2.1	0.0	0.0	0.0	0.0	8.3	66.7	14.6	100.0
h. <i>Listeria</i> species	0.0	2.1	0.0	6.2	2.1	0.0	2.1	8.3	64.6	14.6	100.0
i. <i>Listeria monocytogenes</i>	0.0	4.2	0.0	8.3	0.0	2.1	2.1	6.2	62.5	14.6	100.0
j. Yeasts and molds	0.0	6.2	8.3	6.2	2.1	0.0	0.0	8.3	54.2	14.6	100.0

(continued)

^aOne respondent (2.1 percent) did not complete the table for Q3.4. Any remaining nonresponse is due to respondents not selecting an answer for a row in the table.

Table 6-3. Weighted Responses for Section 3: Microbiological Testing Practices (continued)

3.6 [If Q3.1 = 1 and Q1.11 = 1, n = 8]

For each organism listed below, how frequently is microbiological testing done on RTE product that is sampled after pasteurization?

	More Than Once per Shift	Once per Shift	Once per Day	Once per Week	More Than Once per Week	More Than Once per Month	Once per Month	Less Than Once per Month	Never	No Response	Total
	%	%	%	%	%	%	%	%	%	%	%
a. Aerobic plate count (APC)	62.5	12.5	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	100.0
b. Total plate count (TPC)	62.5	0.0	12.5	0.0	0.0	0.0	0.0	0.0	12.5	12.5	100.0
c. Total coliforms	75.0	12.5	12.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Generic <i>E. coli</i>	62.5	25.0	12.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
d. <i>Staphylococcus aureus</i>	62.5	25.0	0.0	0.0	0.0	0.0	0.0	0.0	12.5	0.0	100.0
e. <i>Salmonella</i> species	62.5	25.0	0.0	0.0	0.0	0.0	0.0	0.0	12.5	0.0	100.0
f. <i>Salmonella</i> Enteritidis	25.0	0.0	12.5	0.0	0.0	0.0	0.0	12.5	37.5	12.5	100.0
g. <i>Listeria</i> species	37.5	12.5	0.0	0.0	0.0	0.0	0.0	0.0	37.5	12.5	100.0
h. <i>Listeria monocytogenes</i>	37.5	25.0	12.5	0.0	0.0	0.0	0.0	0.0	12.5	12.5	100.0
i. j. Yeasts and molds	37.5	12.5	12.5	0.0	12.5	0.0	0.0	0.0	25.0	0.0	100.0

(continued)

Table 6-3. Weighted Responses for Section 3: Microbiological Testing Practices (continued)3.8^a [If Q3.1 = 1 and Q1.11 = 2, n = 20]

For each organism listed below, how frequently is microbiological testing done on RTC product that is sampled after it is packaged for your customers?

		More Than Once per Shift	Once per Shift	Once per Day	Once per Week	More Than Once per Week	More Than Once per Month	Once per Month	Less Than Once per Month	Never	No Response	Total
		%	%	%	%	%	%	%	%	%	%	%
	Aerobic plate count (APC)	40.0	5.0	0.0	5.0	0.0	0.0	0.0	0.0	30.0	20.0	100.0
a.	b. Total plate count (TPC)	35.0	5.0	10.0	5.0	0.0	0.0	0.0	0.0	30.0	15.0	100.0
	c. Total coliforms	55.0	5.0	10.0	5.0	0.0	0.0	0.0	0.0	10.0	15.0	100.0
	Generic <i>E. coli</i>	50.0	10.0	5.0	5.0	0.0	0.0	0.0	0.0	10.0	20.0	100.0
d.	<i>Staphylococcus aureus</i>	45.0	10.0	5.0	5.0	5.0	0.0	0.0	5.0	10.0	15.0	100.0
e.	<i>Salmonella</i> species	60.0	10.0	5.0	5.0	0.0	0.0	0.0	0.0	15.0	5.0	100.0
f.	<i>Salmonella</i> Enteritidis	25.0	5.0	10.0	0.0	0.0	0.0	0.0	5.0	45.0	10.0	100.0
g.	h. Yeasts and molds	40.0	10.0	20.0	5.0	0.0	0.0	0.0	0.0	10.0	15.0	100.0

(continued)

^aOne respondent indicated in Q1.11 that they produce RTC product but did not answer Q3.8.

Table 6-3. Weighted Responses for Section 3: Microbiological Testing Practices (continued)

	n	%
3.9A Does this plant test environmental samples?		
1. Yes	44	73.3
No	16	26.7
2. Total	60	100.0
3.9B ^a [If Q3.9A = 1, n = 44] What method does this plant use to test environmental samples?		
1. Traditional cultural methods	29	65.9
Rapid methods	23	52.3
2. Adenosine trisodium phosphate (ATP) bioluminescence	12	27.3
3. Enzyme linked immunoassay (ELISA)	11	25.0
4. 5. Polymerase chain reaction (PCR)	4	9.1
3.10 [If Q3.9A = 1, n = 44] How frequently does this plant's environmental sampling include testing for <i>Listeria</i> species?		
1. More than once per shift	0	0.0
Once per shift	0	0.0
2. Once per day	2	4.5
3. Once per week	13	29.5
4. More than once per week	3	6.8
5. 6. More than once per month	1	2.3
Once per month	6	13.6
7. Less than once per month	9	20.5
8. Never	10	22.7
9. Total	44	100.0

(continued)

^aRespondents could select multiple responses. The results reported are percentage of respondents who answered "yes" to Q3.9A (n = 44).

Table 6-3. Weighted Responses for Section 3: Microbiological Testing Practices (continued)

	More Than Once per Shift	Once per Shift	Once per Day	Once per Week	More Than Once per Week	More Than Once per Month	Once per Month	Less Than Once per Month	Never	No Response	Total
	%	%	%	%	%	%	%	%	%	%	%
3.11 [If Q3.9A = 1 and Q1.11 = 1, n = 8] How frequently is environmental sampling done for each area listed below?											
a. Equipment surfaces that come into direct contact with RTE product	0.0	0.0	25.0	62.5	0.0	0.0	0.0	12.5	0.0	0.0	100.0
b. Equipment surfaces that do not come into direct contact with RTE product	0.0	0.0	12.5	50.0	0.0	12.5	12.5	0.0	12.5	0.0	100.0
c. Walls	0.0	0.0	0.0	25.0	0.0	25.0	12.5	25.0	12.5	0.0	100.0
d. Overhead structures	0.0	0.0	0.0	25.0	0.0	25.0	12.5	25.0	12.5	0.0	100.0
e. Drains	0.0	0.0	0.0	50.0	0.0	12.5	12.5	12.5	12.5	0.0	100.0
3.12 ^a [If Q3.9A = 1 and Q1.11 = 2, n = 18] How frequently is environmental sampling done for each area listed below?											
a. Equipment surfaces that come into direct contact with RTC product	0.0	5.6	16.7	33.3	5.6	0.0	5.6	11.1	16.7	5.6	100.0
b. Equipment surfaces that do not come into direct contact with RTC product	0.0	0.0	5.6	50.0	5.6	5.6	5.6	11.1	11.1	5.6	100.0
c. Walls	0.0	0.0	0.0	33.3	0.0	11.1	5.6	16.7	27.8	5.6	100.0
d. Overhead structures	0.0	0.0	0.0	27.8	0.0	11.1	5.6	22.2	27.8	5.6	100.0
e. Drains	0.0	0.0	0.0	44.4	0.0	11.1	0.0	16.7	22.2	5.6	100.0

^aOne respondent indicated in Q1.11 that they produce RTC product but did not answer Q3.12.

Table 6-4. Weighted Responses for Section 4: Employee Training

	n	%
4.1 Which response below best describes food safety training for newly hired processing employees of this plant?		
1. Formal food safety course conducted by professional trainers	0	0
2. Formal food safety course conducted by plant personnel	25	41.7
3. Scheduled on-the-job food safety training conducted by plant personnel	16	26.7
4. Informal, unscheduled on-the-job food safety training only	15	25.0
5. Only written food safety training materials are given to new hires	2	3.3
6. No food safety training for new hires	1	1.7
No response	1	1.7
Total	60	100.0
4.2 Which response below best describes continuing food safety training for processing employees of this plant?		
1. Formal, periodic refresher course work conducted by professional trainers	1	1.7
2. Formal, periodic refresher course work conducted by plant personnel	25	41.7
3. Scheduled on-the-job refresher food safety training conducted by plant personnel	10	16.7
4. Continuing informal on-the-job food safety training only	21	35.0
5. Only written refresher materials are given to employees	0	0.0
6. No continuing food safety training for processing employees	2	3.3
No response	1	1.7
Total	60	100.0
4.3 Approximately how many employees currently working at this plant have completed formal HACCP training (for example, a 3- to 5-day course)?		
1. None	10	16.7
2. 1 to 3 employees	37	61.7
3. 4 to 9 employees	10	16.7
4. 10 to 20 employees	2	3.3
5. More than 20 employees	1	1.7
Total	60	100.0

Table 6-5. Weighted Responses for Section 5: Plant Demographics

	n	%
5.1 ^a In what calendar year was this plant built? <i>(If the plant has multiple sections, year is provided for the oldest section.)</i>		
1. Before 1960	15	25.0
2. 1960–1969	11	18.3
3. 1970–1979	14	23.3
4. 1980–1989	7	11.7
5. 1990–1999	9	15.0
6. After 1999	4	6.7
Total	60	100.0
Year (mean response)	60	1970
5.2 ^a What is the approximate total square footage of all facilities that make up this plant? <i>(Includes all facilities, such as production space, warehouses, and office space.)</i>		
1. Under 30,000 sq. ft.	22	36.7
2. 30,000–59,999 sq. ft.	12	20.0
3. 60,000–89,999 sq. ft.	10	16.7
4. 90,000–199,999 sq. ft.	10	16.7
5. 200,000 sq. ft. or more	4	6.7
No response	2	3.3
Total	60	100.0
Square footage (mean response)	58	73,350
	n	Mean
5.3 Calculated as a percentage of total square footage given in Question 5.2, what is the approximate percentage of the square footage of this plant that is under 5 years old, 5 years to just under 20 years old, or 20 years old or more?		
Under 5 years old		14.6%
5 years to just under 20 years old		34.4%
20 years old or more		51.0%
Total	57	100.0%
No response	3	—
	n	%
5.4 How many production shifts are operated each day at this plant?		
1. One	34	56.7
2. Two	9	15.0
3. Three	16	26.7
No response	1	1.7
Total	60	100.0

(continued)

^aRespondents wrote in a number to answer this question. For reporting purposes, we grouped the responses into the categories shown.

Table 6-5. Weighted Responses for Section 5: Plant Demographics (continued)

	n	%
5.5 How many clean up shifts are operated each day at this plant?		
1. None	5	8.3
2. One	48	80.0
3. Two	3	5.0
4. Three	3	5.0
No response	1	1.7
Total	60	100.0
5.6 ^a Approximately how many people are employed at this plant?		
1. Fewer than 10	2	3.3
2. Between 10 and 499	58	96.7
3. 500 or more	0	0.0
Total	60	100.0
Number of employees (mean response)	60	74.8
5.7 Does this plant have a Food Safety Manager?		
1. Yes	39	65.0
2. No [Skip to Question 5.9]	19	31.7
No response [Skip to Question 5.9]	2	3.3
Total	60	100.0
5.8 [If Q5.7 = 1, n = 39] Approximately what percentage of this plant's Food Safety Manager's time is devoted to managing food safety activities at the plant?		
1. 1 to 24 percent	6	15.4
2. 25 to 49 percent	10	25.6
3. 50 to 74 percent	16	41.0
4. 75 to 99 percent	4	10.3
5. 100 percent	3	7.7
Total	39	100.0
5.9 ^a Approximately how many employees at this plant work in a quality control department?		
1. None/no quality control department	8	13.3
2. One	6	10.0
3. 2 to 5	32	53.3
4. 6 or more	12	20.0
No response	2	3.3
Total	60	100.0

(continued)

^aRespondents wrote in a number to answer this question. For reporting purposes, we grouped the responses into the categories shown.

Table 6-5. Weighted Responses for Section 5: Plant Demographics (continued)

	n	%
5.10 How many USDA-inspected plants are owned by the company that owns this plant?		
1. 1	19	31.7
2. 2 to 5	24	40.0
3. 6 to 20	16	26.7
4. 21 or more	1	1.7
Total	60	100.0
5.11 What was the approximate value of total plant sales revenue for the most recently completed fiscal year?		
1. Less than \$500 thousand	1	1.7
2. \$500 thousand to \$999 thousand	1	1.7
3. \$1 million to \$4.9 million	11	18.3
4. \$5 million to \$49.9 million	33	55.0
5. \$50 million or more	7	11.7
No response/don't know (<i>write in</i>)	7	11.7
Total	60	100.0

Tables 6-6 through 6-10 provide results by size of establishment:

- Small: 50,000,000 pounds or less (n = 39)
- Large: more than 50,000,000 pounds (n = 20)

Table 6-11 provides results for selected questions from Section 1 of the survey by source of eggs:

- Inline: 80 percent or more of annual production is provided by inline layer facilities (n = 14)
- Open market: 80 percent or more of annual production is provided by open market purchases (n = 29)
- Offline: all other establishments (n = 13)

Table 6-12 provides results for selected questions from Section 1 of the survey weighted by annual production volume (n = 59).

The results are weighted to adjust for nonresponse. 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. 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. When sample sizes are small caution should be exercised when making comparisons between categories (e.g., small vs. large or in-line vs. offline).

Table 6-6. Weighted Responses by Size for Section 1: Egg Products Processing Operations

		Small (≤50,000,000 lbs.)		Large (>50,000,000 lbs.)	
		n	Mean	n	Mean
1.1	What percentage of eggs processed by this plant are supplied by inline layer facilities, offline layer facilities, and open market purchases? (Means are percentage of annual production.)				
	Inline layer facilities		24.9%		48.5%
	Offline layer facilities		44.1%		25.4%
	Open market purchases		31.0%		26.1%
	Total	39	100.0%	17	100.0%
	Not applicable (<i>write in</i>)	0	—	2	—
	No response	0	—	1	—
1.2	What is the age of eggs—not including restricted eggs—when they are received by the processing facility of this plant? (Means are percentage of annual production using nonrestricted eggs.)				
	Less than 1 day		14.0%		38.9%
	1 to 3 days		27.1%		46.5%
	4 to 6 days		31.9%		10.6%
	7 to 10 days		16.2%		3.9%
	11 to 15 days		6.9%		0.1%
	16 to 20 days		2.4%		0.1%
	21 days or older		1.4%		0.0%
	Total	36	100.0%	17	100.0%
	Not applicable (<i>write in</i>)	2	—	2	—
	No response	1	—	1	—
		Small (≤50,000,000 lbs.)		Large (>50,000,000 lbs.)	
		n	%	n	%
1.3	What share of eggs processed at this plant are restricted eggs?				
	1. None	5	12.8	9	45.0
	2. Less than 1%	1	2.6	0	0.0
	3. 1% to 5%	2	5.1	5	25.0
	4. 6% to 10%	3	7.7	1	5.0
	5. 11% to 20%	5	12.8	3	15.0
	6. 21% or more	22	56.4	0	0.0
	No response/not applicable (<i>write in</i>)	1	2.6	2	10.0
	Total	39	100.0	20	100.0

(continued)

Table 6-6. Weighted Responses by Size for Section 1: Egg Products Processing Operations (continued)

	Small (≤50,000,000 lbs.)		Large (>50,000,000 lbs.)	
	n	Mean	n	Mean
1.4 [If Q1.3 = 2, 3, 4, 5, or 6] What is the age of restricted eggs when they are received by the processing facility of this plant? (Means are percentage of annual production using restricted eggs.)				
1 to 3 days		25.2%		64.4%
4 to 6 days		37.2%		16.7%
7 to 10 days		24.2%		17.8%
11 to 15 days		8.3%		1.1%
16 to 20 days		3.7%		0.0%
21 days or older		1.3%		0.0%
Don't know		0.2%		0.0%
Total	33	100.0%	9	100.0%
1.5 What percentage of offline and open market purchase eggs are refrigerated during transportation to this plant? (Means are percentage of all eggs received from offline and open market purchase sources.)				
Not refrigerated		14.1%		16.5%
45°F or below		60.4%		40.9%
46°F to 59°F		24.9%		42.6%
60°F or higher		0.5%		0.0%
Total	38	100.0%	11	100.0%
Not applicable (write in)	1	—	7	—
No response	0	—	2	—
1.6 Considering all sources of eggs processed by this plant, once eggs are received at your processing plant, how long are they stored before processing? (Means are percentage of annual production.)				
Less than 1 day		29.5%		47.1%
1 to 3 days		46.7%		39.6%
4 to 6 days		14.5%		7.8%
7 to 10 days		6.3%		5.2%
11 to 15 days		1.8%		0.3%
16 to 20 days		0.8%		0.0%
21 days or longer		0.4%		0.0%
Total	39	100.0%	16	100.0%
Not applicable (write in)	0	—	3	—
No response	0	—	1	—

(continued)

Table 6-6. Weighted Responses by Size for Section 1: Egg Products Processing Operations (continued)

	Small (≤50,000,000 lbs.)		Large (>50,000,000 lbs.)	
	n	%	n	%
1.7 At what temperature are eggs stored at this plant before breaking?				
1. 45°F or below	15	38.5	3	15.0
2. 46°F to 59°F	15	38.5	5	25.0
3. 60°F or higher	4	10.3	5	25.0
4. This plant does not break eggs	4	10.3	0	0.0
No response	0	0.0	1	5.0
Not applicable (<i>write in</i>)	1	2.6	6	30.0
Total	39	100.0	20	100.0
1.8 Does this plant temper eggs to ambient room temperature before breaking?				
1. Yes	19	48.7	8	40.0
2. No	16	41.0	7	35.0
3. This plant does not break eggs	4	10.3	0	0.0
No response	0	0.0	1	5.0
Not applicable (<i>write in</i>)	0	0.0	4	20.0
Total	39	100.0	20	100.0
1.9 ^a Which of the technologies, equipment, or practices listed below are currently in use at this plant?				
1. In-shell pasteurization process	*	0.0	*	5.0
2. Advanced pasteurization technology	7	17.9	6	30.0
3. Liquid egg concentrating technology	7	17.9	3	15.0
4. Integrated, computerized processing system	12	30.8	6	30.0
5. Environmentally controlled packaging system	9	23.1	4	20.0

(continued)

^aRespondents could select multiple responses. The results reported are percentage of respondents (n = 39 for small plants and 20 for large plants).

*The n is suppressed because of the small number of respondents.

Table 6-6. Weighted Responses by Size for Section 1: Egg Products Processing Operations (continued)

	Small (≤50,000,000 lbs.)		Large (>50,000,000 lbs.)	
	n	Mean ^a	n	Mean ^a
1.10 For each product category listed below, please write in the total pounds produced by this plant in the most recently completed fiscal year.				
a. Liquid	32	12,469,133	15	67,416,680
b. Blended and liquid	17	3,822,163	8	34,878,689
c. Frozen	22	4,192,900	7	17,088,367
d. Blended and frozen	12	5,337,703	8	13,051,021
e. Dried	9	5,859,224	4	8,828,387
f. Blended and dried	5	3,457,779	3	5,431,832
g. Extended shelf life liquid	3	15,500,000	2	113,930,000
h. Inedible	29	2,720,725	16	11,152,055
	n	%	n	%
1.11 ^b What types of food products does this plant produce?				
1. Ready to eat (RTE) products	4	10.3	4	20.0
2. Ready to cook (RTC) products	14	35.9	7	35.0
3. Products that are inputs to further processing by another plant	32	82.1	16	80.0
1.11 ^c What types of food products does this plant produce?				
1. RTE products only	0	0.0	0	0.0
2. RTC products only	5	12.8	3	15.0
3. Products that are inputs to further processing by another plant only	22	56.4	10	50.0
4. RTE and RTC products	0	0.0	0	0.0
5. RTE products and products that are inputs to further processing	*	2.6	*	10.0
6. RTC products and products that are inputs to further processing	6	15.4	*	10.0
7. RTE, RTC, and products that are inputs to further processing	3	7.7	*	10.0
8. No response	2	5.1	1	5.0
Total	39	100.0	20	100.0

(continued)

^aMeans are for respondents that produce the product category (i.e., nonzero responses).

^bRespondents could select multiple responses. The results reported are percentage of respondents (n = 39 for small plants and 20 for large plants).

^cFor Q1.11, we also estimated proportions for mutually exclusive categories so that the responses would sum to 100 percent.

*The n is suppressed because of the small number of respondents.

Table 6-6. Weighted Responses by Size for Section 1: Egg Products Processing Operations (continued)

	Small (≤50,000,000 lbs.)		Large (>50,000,000 lbs.)	
	n	%	n	%
1.12 ^a Who conducts independent, non-government, third-party audits of this plant's egg processing operations?				
1. Independent, non-government, third-party auditors that are hired by this plant	22	56.4	13	65.0
2. Customers of this plant	30	76.9	16	80.0
3. Independent, non-government, third-party auditors that are hired by customers of this plant	15	38.5	7	35.0
4. This plant's egg processing operations are not audited by independent, non-government, third-party auditors	7	17.9	3	15.0
1.13A Are this plant's egg processing operations certified by an independent, non-government, third-party organization?				
1. Yes	20	51.3	11	55.0
2. No	18	46.2	8	40.0
3. No response	1	2.6	1	5.0
Total	39	100.0	20	100.0
1.13B ^b [IF Q1.13A = 1] Who certifies this plant's egg processing operations?				
1. American Institute of Baking	10	50.0	8	72.7
2. Kosher organizations	6	30.0	0	0.0
3. Other organization	7	35.0	6	54.5
1.14 Does this plant have a written HACCP plan?				
1. Yes	29	74.4	18	90.0
2. No	10	25.6	*	10.0
Total	39	100.0	20	100.0

^aRespondents could select multiple responses. The results reported are percentage of respondents (n = 39 for small plants and 20 for large plants).

^bRespondents could enter multiple responses. The results reported are percentage of respondents who answered "yes" to Q1.13A (n = 20 for small plants and 11 for large plants). We recoded the open-ended responses into the categories shown.

*The n is suppressed because of the small number of respondents.

Table 6-7. Weighted Responses by Size for Section 2: Sanitation Practices

Small ($\leq 50,000,000$ lbs.)						
	Process Is Not Used by this Plant	Process Is Used, But Is Not Designated as a CCP nor Is It Described in a Written Prerequisite Plan at this Plant	Process Is Designated as a CCP in a HACCP Plan for this Plant	Process is Described in a Written Prerequisite Plan at this Plant	No Response/ Not Applicable ^a	Total
	%	%	%	%	%	
2.1 [If Q1.14 = 1, n = 29] For each process listed below, please identify how the process is addressed in the HACCP plan of this plant.						
Receiving eggs	3.4	27.6	13.8	51.7	3.4	100.0
a. b. Receiving nonegg ingredients	10.3	31.0	3.4	51.7	3.4	100.0
c. Receiving packaging materials	10.3	34.5	3.4	48.3	3.4	100.0
d. Storing shell eggs	20.7	24.1	10.3	41.4	3.4	100.0
e. In-shell pasteurization	86.2	6.9	3.4	0.0	3.4	100.0
f. Handling of restricted eggs	17.2	41.4	3.4	34.5	3.4	100.0
g. Breaking shell eggs	13.8	24.1	13.8	44.8	3.4	100.0
h. Blending formulation	20.7	17.2	6.9	51.7	3.4	100.0
i. Pasteurizing liquid eggs	20.7	0.0	72.4	3.4	3.4	100.0
j. Drying egg products	58.6	6.9	13.8	17.2	3.4	100.0
k. Pasteurizing dried egg whites	69.0	0.0	27.6	0.0	3.4	100.0
l. Packaging finished products	13.8	0.0	41.4	41.4	3.4	100.0
m. Storing finished products	6.9	13.8	37.9	37.9	3.4	100.0

(continued)

^aOne respondent (3.4 percent) did not complete the table. Any remaining nonresponse is due to respondents not selecting an answer for a row in the table.

Table 6-7. Weighted Responses by Size for Section 2: Sanitation Practices (continued)

Large (>50,000,000 lbs.)						
	Process Is Not Used by this Plant	Process Is Used, But Is Not Designated as a CCP nor Is It Described in a Written Prerequisite Plan at this Plant	Process Is Designated as a CCP in a HACCP Plan for this Plant	Process is Described in a Written Prerequisite Plan at this Plant	No Response/ Not Applicable ^a	Total
	%	%	%	%	%	
2.1 [If Q1.14 = 1, n = 18] For each process listed below, please identify how the process is addressed in the HACCP plan of this plant.						
a. Receiving eggs	5.6	27.8	5.6	50.0	11.1	100.0
Receiving nonegg ingredients		5.6	0.0	50.0	22.2	100.0
b. c. Receiving packaging materials		0.0	0.0	50.0	16.7	100.0
d. Storing shell eggs	22.2	11.1	11.1	44.4	11.1	100.0
In-shell pasteurization	72.2	0.0	5.6	0.0	22.2	100.0
e. Handling of restricted eggs	22.2	33.3	16.7	5.6	22.2	100.0
f. Breaking shell eggs	33.3	5.6	5.6	38.9	38.9	100.0
g. Blending formulation	22.2	11.1	5.6	44.4	16.7	100.0
h. Pasteurizing liquid eggs	22.2	0.0	55.6	5.6	16.7	100.0
i. Drying egg products	61.1	0.0	0.0	16.7	22.2	100.0
j. Pasteurizing dried egg whites		0.0	11.1	0.0	22.2	100.0
k. l. Packaging finished products	22.2	0.0	16.7	44.4	16.7	100.0
Storing finished products	16.7	0.0	27.8	50.0	5.6	100.0
m.						(continued)

^aOne respondent wrote in “not applicable” for Q2.1 (5.6 percent). Any remaining nonresponse is due to respondents not selecting an answer for a row in the table.

Table 6-7. Weighted Responses by Size for Section 2: Sanitation Practices (continued)

	Small (≤50,000,000 lbs.)		Large (>50,000,000 lbs.)	
	n	%	n	%
2.2 ^a [If Q1.14 = 1] What records does this plant maintain to verify performance of Prerequisite Plans?				
1. None; no records are kept	0	0.0	0	0.0
2. Quality assurance retention log	24	82.8	16	88.9
3. Calibration log	27	93.1	16	88.9
4. Receiving log	28	96.6	15	83.3
5. Measurement (weight or volume) verification log	23	79.3	12	66.7
6. Employee task performance log	20	69.0	13	72.2
7. Microbial data log	25	86.2	16	88.9
8. Time/temperature log	28	96.6	18	100.0
9. CCP verification log	21	72.4	16	88.9
10. Deviation and corrective action log	21	72.4	15	83.3
2.3 How often are drains sanitized at this plant?				
1. One or more times per shift	8	20.5	2	10.0
2. One or more times per day, but less than one time per shift	11	28.2	9	45.0
3. One or more times per week, but less than one time per day	10	25.6	4	20.0
4. Less than once per week	2	5.1	1	5.0
5. With no routine schedule	4	10.3	3	15.0
6. Drains are not sanitized	4	10.3	1	5.0
Total	39	100.0	20	100.0
2.4 For production shifts, does this plant routinely do a mid-shift clean-up?				
1. Yes	37	94.9	18	90.0
2. No	2	5.1	1	5.0
No response	0	0.0	1	5.0
Total	39	100.0	20	100.0

(continued)

^aRespondents could select multiple responses. The results reported are percentage of respondents who answered “yes” to Q1.14 (n = 29 for small plants and 18 for large plants).

Table 6-7. Weighted Responses by Size for Section 2: Sanitation Practices (continued)

	Small (≤50,000,000 lbs.)		Large (>50,000,000 lbs.)	
	n	%	n	%
2.5 ^a What sanitizing products are used at this plant?				
1. Quaternary ammonia	24	61.5	13	65.0
2. Trisodium phosphate	1	2.6	0	0.0
3. Chlorine	38	97.4	17	85.0
4. Iodine	14	35.9	4	20.0
5. Phosphoric acid	13	33.3	10	50.0
6. Acid quaternary compound	9	23.1	6	30.0
7. Acetic acid based compound	6	15.4	4	20.0
8. Dish washing detergent	9	23.1	0	0.0
9. Others	3	7.7	3	15.0
2.6 How frequently does this plant conduct sanitation inspections of product-contact zones?				
1. More than once per shift	19	48.7	10	50.0
2. Once per shift before shift operations begin	7	17.9	0	0.0
3. Once per day before daily operations begin	10	25.6	9	45.0
4. Once per week	1	2.6	1	5.0
5. Once per month	0	0.0	0	0.0
6. Less than once per month	0	0.0	0	0.0
7. No specific or regular frequency	1	2.6	0	0.0
8. This plant does not conduct sanitation inspections of product-contact zones	1	2.6	0	0.0
Total	39	100.0	20	100.0
2.7 How frequently does this plant conduct sanitation inspections of nonproduct contact zones?				
1. More than once per shift	11	28.2	8	40.0
2. Once per shift before shift operations begin	6	15.4	2	10.0
3. Once per day before daily operations begin	13	33.3	8	40.0
4. Once per week	2	5.1	2	10.0
5. Once per month	5	12.8	0	0.0
6. Less than once per month	0	0.0	0	0.0
7. No specific or regular frequency	1	2.6	0	0.0
8. This plant does not conduct sanitation inspections of nonproduct contact zones	1	2.6	0	0.0
Total	39	100.0	20	100.0

^aRespondents could select multiple responses. The results reported are percentage of respondents (n = 39 for small plants and 20 for large plants).

Table 6-8. Weighted Responses by Size for Section 3: Microbiological Testing Practices

		Small (≤50,000,000 lbs.)		Large (>50,000,000 lbs.)			
		n	%	n	%		
3.1 Does this plant conduct microbiological testing in addition to the mandatory testing for <i>Salmonella</i> required by FSIS regulation, using either its own lab or an independent commercial lab?							
1.	Yes	32	82.1	15	75.0		
2.	No	6	15.4	3	15.0		
	No response	1	2.6	2	10.0		
	Total	39	100.0	20	100.0		
3.2 ^a [If Q3.1 = 1, n = 32] Which methods of microbiological testing listed below are used by this plant, by either its own lab or an independent commercial lab for this plant?							
		Small (≤50,000,000 lbs.)					
		Not Used by this Plant	Used for Testing Product Before Pasteurization only	Used for Testing Product After Pasteurization only	Used for Testing Product Before and After Pasteurization	No Response ^b	
		%	%	%	%	Total %	
a.	Traditional cultural methods	18.8	9.4	50.0	15.6	6.2	100.0
	Rapid methods	12.5	6.3	43.8	18.8	18.8	100.0
b.	Enzyme linked	50.0	0.0	25.0	0.0	25.0	100.0
c.	immunoassay (ELISA)						
	Polymerase chain	62.5	3.1	6.2	3.1	25.0	100.0
d.	reaction (PCR)						

(continued)

^aIn the survey, respondents could select multiple responses for Q3.2. We added the category “Used for Testing Product Before and After Pasteurization” so that the estimated proportions would sum to 100 percent.

^bTwo small respondents (6.2 percent) did not complete the table for Q3.2. Any remaining nonresponse is due to respondents not selecting an answer for a row in the table.

Table 6-8. Weighted Responses by Size for Section 3: Microbiological Testing Practices (continued)

3.2^a [If Q3.1 = 1, n = 15]
Which methods of microbiological testing listed below are used by this plant, by either its own lab or an independent commercial lab for this plant?

		Large (>50,000,000 lbs.)					
		Not Used by this Plant	Used for Testing Product Before Pasteurization only	Used for Testing Product After Pasteurization only	Used for Testing Product Before and After Pasteurization	No Response	Total
		%	%	%	%	%	%
a.	Traditional cultural methods	0.0	40.0	26.7	33.3	0.0	100.0
	Rapid methods	6.7	6.7	33.3	26.7	26.7	100.0
b.	Enzyme linked	40.0	0.0	33.3	6.7	20.0	100.0
c.	immunoassay (ELISA)						
d.	Polymerase chain reaction (PCR)	60.0	0.0	6.7	0.0	33.3	100.0

(continued)

^aIn the survey, respondents could select multiple responses for Q3.2. We added the category “Used for Testing Product Before and After Pasteurization” so that the estimated proportions would sum to 100 percent.

Table 6-8. Weighted Responses by Size for Section 3: Microbiological Testing Practices (continued)

3.3^a [If Q3.1 = 1, n = 32]
What organisms does this plant test for in (a) pre-pasteurized egg product, (b) RTE product after packaging, or (c) RTC product after packaging?

	Small (≤50,000,000 lbs.)							Total
	Pre-pasteurized Egg Product Only	RTE Product Sampled After Packaging Only	RTC Product Sampled After Packaging Only	RTE and RTC Product	Pre-pasteurized Egg Product and RTE or RTC Product	Not Tested for by this Plant	No Response/ Not Applicable ^b	
	%	%	%	%	%	%	%	
a. Aerobic plate count (APC)	18.8	18.8	15.6	0.0	21.9	9.4	15.6	100.0
b. Total plate count (TPC)	6.3	15.6	31.3	3.1	9.4	25.0	9.4	100.0
c. Total coliforms	9.4	21.9	31.3	3.1	12.5	9.4	12.5	100.0
d. Generic <i>E. coli</i>	6.2	25.0	31.3	6.2	6.2	9.4	15.6	100.0
e. <i>Staphylococcus aureus</i>	0.0	25.0	28.1	3.1	0.0	28.1	15.6	100.0
f. <i>Salmonella</i> species	0.0	12.5	37.5	3.1	9.4	25.0	12.5	100.0
g. <i>Salmonella</i> Enteritidis	6.3	9.4	21.9	3.1	6.3	40.6	12.5	100.0
h. <i>Listeria</i> species	0.0	9.4	25.0	3.1	0.0	46.9	15.6	100.0
i. <i>Listeria monocytogenes</i>	0.0	9.4	12.5	6.3	3.1	46.9	21.9	100.0
j. Yeasts and molds	0.0	21.9	28.1	6.3	9.4	21.9	12.5	100.0

(continued)

^aIn the survey, respondents could select multiple responses for Q3.3. We added the categories "RTE and RTC Product" and "Pre-pasteurized Egg Product and RTE or RTC Product" so that the estimated proportions would sum to 100 percent.

^bTwo small respondents (6.2 percent) did not complete the table for Question 3.3. Any remaining nonresponse is due to respondents not selecting an answer for a row in the table.

Table 6-8. Weighted Responses by Size for Section 3: Microbiological Testing Practices (continued)

3.3^a [If Q3.1 = 1, n = 15]
What organisms does this plant test for in (a) pre-pasteurized egg product, (b) RTE product after packaging, or (c) RTC product after packaging?

	Large (>50,000,000 lbs.)							Total
	Pre-pasteurized Egg Product Only	RTE Product Sampled After Packaging Only	RTC Product Sampled After Packaging Only	RTE and RTC Product	Pre-pasteurized Egg Product and RTE or RTC Product	Not Tested for by this Plant	No Response/ Not Applicable ^b	
	%	%	%	%	%	%	%	%
a. Aerobic plate count (APC)	33.3	0.0	0.0	0.0	40.0	13.3	13.3	100.0
b. Total plate count (TPC)	26.7	0.0	6.7	0.0	26.7	26.7	13.3	100.0
c. Total coliforms	26.7	0.0	6.7	0.0	46.7	6.7	13.3	100.0
d. Generic <i>E. coli</i>	20.0	6.7	20.0	6.7	20.0	6.7	20.0	100.0
e. <i>Staphylococcus aureus</i>	6.7	6.7	33.3	13.3	0.0	20.0	20.0	100.0
f. <i>Salmonella</i> species	6.7	6.7	26.7	13.3	6.7	20.0	20.0	100.0
g. <i>Salmonella</i> Enteritidis	6.7	0.0	13.3	0.0	0.0	40.0	40.0	100.0
h. <i>Listeria</i> species	13.3	6.7	20.0	0.0	6.7	33.3	20.0	100.0
i. <i>Listeria monocytogenes</i>	6.7	13.3	20.0	6.7	6.7	20.0	26.7	100.0
j. Yeasts and molds	0.0	6.7	26.7	0.0	6.7	26.7	33.3	100.0

(continued)

^aIn the survey, respondents could select multiple responses for Q3.3. We added the categories “RTE and RTC Product” and “Pre-pasteurized Egg Product and RTE or RTC Product” so that the estimated proportions would sum to 100 percent.

^bOne large respondent did not complete the table (6.7 percent), and one large respondent wrote in “not applicable” for Q3.3 (6.7 percent). Any remaining nonresponse is due to respondents not selecting an answer for a row in the table.

Table 6-8. Weighted Responses by Size for Section 3: Microbiological Testing Practices (continued)

	Small (≤50,000,000 lbs.)		Large (>50,000,000 lbs.)	
	n	%	n	%
3.9A Does this plant test environmental samples?				
1. Yes	29	74.4	14	70.0
No	10	25.6	6	30.0
2. Total	39	100.0	20	100.0
3.9B ^a [If Q3.9A = 1]				
What method does this plant use to test environmental samples?				
1. Traditional cultural methods	17	58.6	11	78.6
Rapid methods	15	51.7	7	50.0
2. Adenosine trisodium phosphate (ATP) bioluminescence	6	20.7	6	42.9
3. Enzyme linked immunoassay (ELISA)	5	17.2	5	35.7
4. 5. Polymerase chain reaction (PCR)	3	10.3	*	7.1
3.10 [If Q3.9A = 1]				
How frequently does this plant's environmental sampling include testing for <i>Listeria</i> species?				
1. More than once per shift	0	0.0	0	0.0
Once per shift	0	0.0	0	0.0
2. Once per day	1	3.4	1	7.1
3. Once per week	6	20.7	7	50.0
4. 5. More than once per week	2	6.9	1	7.1
6. More than once per month	1	3.4	0	0.0
Once per month	4	13.8	2	14.3
7. Less than once per month	7	24.1	1	7.1
8. Never	8	27.6	2	14.3
9. Total	29	100.0	14	100.0

^aRespondents could select multiple responses. The results reported are percentage of respondents who answered "yes" to Q3.9A (n = 29 for small plants and 14 for large plants).

*The n is suppressed because of the small number of respondents.

Table 6-9. Weighted Responses by Size for Section 4: Employee Training

	Small (≤50,000,000 lbs.)		Large (>50,000,000 lbs.)	
	n	%	n	%
4.1 Which response below best describes food safety training for newly hired processing employees of this plant?				
1. Formal food safety course conducted by professional trainers	0	0.0	0	0.0
2. Formal food safety course conducted by plant personnel	13	33.3	11	55.0
3. Scheduled on-the-job food safety training conducted by plant personnel	10	25.6	6	30.0
4. Informal, unscheduled on-the-job food safety training only	13	33.3	2	10.0
5. Only written food safety training materials are given to new hires	2	5.1	0	0.0
6. No food safety training for new hires	0	0.0	1	5.0
No response	1	2.6	0	0.0
Total	39	100.0	20	100.0
4.2 Which response below best describes continuing food safety training for processing employees of this plant?				
1. Formal, periodic refresher course work conducted by professional trainers	0	0.0	1	5.0
2. Formal, periodic refresher course work conducted by plant personnel	14	35.9	11	55.0
3. Scheduled on-the-job refresher food safety training conducted by plant personnel	6	15.4	4	20.0
4. Continuing informal on-the-job food safety training only	17	43.6	3	15.0
5. Only written refresher materials are given to employees	0	0.0	0	0.0
6. No continuing food safety training for processing employees	1	2.6	1	5.0
No response	1	2.6	0	0.0
Total	39	100.0	20	100.0
4.3 Approximately how many employees currently working at this plant have completed formal HACCP training (for example, a 3- to 5-day course)?				
1. None	8	20.5	2	10.0
2. 1 to 3 employees	25	64.1	11	55.0
3. 4 to 9 employees	5	12.8	5	25.0
4. 10 to 20 employees	1	2.6	1	5.0
5. More than 20 employees	0	0.0	1	5.0
Total	39	100.0	20	100.0

Table 6-10. Weighted Responses by Size for Section 5: Plant Demographics

	Small (≤50,000,000 lbs.)		Large (>50,000,000 lbs.)	
	n	%	n	%
5.1 ^a In what calendar year was this plant built? <i>(If the plant has multiple sections, year is provided for the oldest section).</i>				
1. Before 1960	8	20.5	6	30.0
2. 1960–1969	10	25.6	1	5.0
3. 1970–1979	11	28.2	3	15.0
4. 1980–1989	5	12.8	2	10.0
5. 1990–1999	4	10.3	5	25.0
6. After 1999	1	2.6	3	15.0
Total	39	100.0	20	100.0
Year (mean response)	39	1968	20	1976
5.2 ^a What is the approximate total square footage of all facilities that make up this plant? <i>(Includes all facilities, such as production space, warehouses, and office space.)</i>				
1. Under 30,000 sq. ft.	17	43.6	4	20.0
2. 30,000–59,999 sq. ft.	9	23.1	3	15.0
3. 60,000–89,999 sq. ft.	5	12.8	5	25.0
4. 90,000–199,999 sq. ft.	5	12.8	5	25.0
5. 200,000 sq. ft. or more	1	2.6	3	15.0
No response	2	5.1	0	0.0
Total	39	100.0	20	100.0
Square footage (mean response)	37	60,663	20	99,587
	n	Mean	n	Mean
5.3 Calculated as a percentage of total square footage given in Question 5.2, what is the approximate percentage of the square footage of this plant that is under 5 years old, 5 years to just under 20 years old, or 20 years old or more?				
Under 5 years old		10.4%		22.9%
5 years to just under 20 years old		30.9%		41.4%
20 years old or more		58.7%		35.6%
Total	36	100.0%	20	100.0%
No response	3		0	
	n	%	n	%
5.4 How many production shifts are operated each day at this plant?				
1. One	25	64.1	9	45.0
2. Two	4	10.3	5	25.0
3. Three	10	25.6	5	25.0
No response	0	0.0	1	5.0
Total	39	100.0	20	100.0

(continued)

^aRespondents wrote in a number to answer this question. For reporting purposes, we grouped the responses into the categories shown.

Table 6-10. Weighted Responses by Size for Section 5: Plant Demographics (continued)

	Small (≤50,000,000 lbs.)		Large (>50,000,000 lbs.)	
	n	%	n	%
5.5 How many clean-up shifts are operated each day at this plant?				
1. None	3	7.7	1	5.0
2. One	29	74.4	19	95.0
3. Two	3	7.7	0	0.0
4. Three	3	7.7	0	0.0
No response	1	2.6	0	0.0
Total	39	100.0	20	100.0
5.6 ^a Approximately how many people are employed at this plant?				
1. Fewer than 10	2	5.1	0	0.0
2. Between 10 and 499	37	94.9	20	100.0
3. 500 or more	0	0.0	0	0.0
Total	39	100.0	20	100.0
Number of employees (mean response)	39	55.8	20	114.2
5.7 Does this plant have a Food Safety Manager?				
1. Yes	22	56.4	16	80.0
2. No [Skip to Question 5.9]	15	38.5	4	20.0
No response [Skip to Question 5.9]	2	5.1	0	0.0
Total	39	100.0	20	100.0
5.8 [If Q5.7 = 1] Approximately what percentage of this plant's Food Safety Manager's time is devoted to managing food safety activities at the plant?				
1. 1 to 24 percent	3	13.6	3	18.8
2. 25 to 49 percent	6	27.3	4	25.0
3. 50 to 74 percent	8	36.4	7	43.7
4. 75 to 99 percent	2	9.1	2	12.5
5. 100 percent	3	13.6	0	0.0
Total	22	100.0	16	100.0
5.9 ^a Approximately how many employees at this plant work in a quality control department?				
1. None/no quality control department	6	15.4	2	10.0
2. One	4	10.3	1	5.0
3. 2 to 5	22	56.4	10	50.0
4. 6 or more	5	12.8	7	35.0
No response	2	5.1	0	0.0
Total	39	100.0	20	100.0

(continued)

^aRespondents wrote in a number to answer this question. For reporting purposes, we grouped the responses into the categories shown.

Table 6-10. Weighted Responses by Size for Section 5: Plant Demographics (continued)

	Small (≤50,000,000 lbs.)		Large (>50,000,000 lbs.)	
	n	%	n	%
5.10 How many USDA-inspected plants are owned by the company that owns this plant?				
1. 1	15	38.5	4	20.0
2. 2 to 5	16	41.0	7	35.0
3. 6 to 20	8	20.5	8	40.0
4. 21 or more	0	0.0	*	5.0
Total	39	100.0	20	100.0
5.11 What was the approximate value of total plant sales revenue for the most recently completed fiscal year?				
1. Less than \$500 thousand	*	2.6	*	0.0
2. \$500 thousand to \$999 thousand	*	2.6	*	0.0
3. \$1 million to \$4.9 million	9	23.1	*	10.0
4. \$5 million to \$49.9 million	22	56.4	10	50.0
5. \$50 million or more	*	2.6	6	30.0
No response/don't know (<i>write in</i>)	5	12.8	2	10.0
Total	39	100.0	20	100.0

*The n is suppressed because of the small number of respondents.

Table 6-11. Weighted Responses for Selected Questions in Section 1 by Source of Eggs: Egg Products Processing Operations

	Inline		Offline		Open Market	
	n	Mean	n	Mean	n	Mean
1.2	What is the age of eggs—not including restricted eggs—when they are received by the processing facility of this plant? (<i>Means are percentage of annual production using nonrestricted eggs.</i>)					
		71.2%		0.9%		5.7%
		19.1%		53.4%		32.6%
		8.4%		24.4%		33.6%
		0.5%		14.1%		17.5%
		0.7%		4.5%		6.8%
		0.0%		2.6%		2.1%
		0.0%		0.1%		1.7%
	Total	14 100.0%	11 100.0%	28 100.0%		
	Not applicable (<i>write in</i>)	0 —	1 —	1 —		
	No response	0 —	1 —	0 —		
1.6	Considering all sources of eggs processed by this plant, once eggs are received at your processing plant, how long are they stored before processing? (<i>Means are percentage of annual production.</i>)					
		48.5%		30.8%		30.1%
		42.2%		55.0%		41.0%
		5.4%		9.6%		17.0%
		3.1%		4.0%		8.2%
		0.8%		0.5%		2.1%
		0.0%		0.1%		1.0%
		0.0%		0.1%		0.5%
	Total	13 100.0%	13 100.0%	29 100.0%		
	Not applicable (<i>write in</i>)	1 —	0 —	0 —		
	No response	0 —	0 —	0 —		

Table 6-12. Responses for Selected Questions in Section 1 Weighted by Annual Production: Egg Products Processing Operations

	n	Mean
1.1 What percentage of eggs processed by this plant are supplied by inline layer facilities, offline layer facilities, and open market purchases? (<i>Means are percentage of annual production.</i>)		
Inline layer facilities		40.5%
Offline layer facilities		29.5%
Open market purchases		30.1%
Total	56	100.0%
Not applicable (<i>write in</i>)	2	—
No response	1	—
1.2 What is the age of eggs—not including restricted eggs—when they are received by the processing facility of this plant? (<i>Means are percentage of annual production using nonrestricted eggs.</i>)		
Less than 1 day		28.3%
1 to 3 days		45.3%
4 to 6 days		17.9%
7 to 10 days		6.6%
11 to 15 days		1.1%
16 to 20 days		0.6%
21 days or older		0.2%
Total	53	100.0%
Not applicable (<i>write in</i>)	4	—
No response	2	—
	n	%
1.3 What share of eggs processed at this plant are restricted eggs?		
1. None	14	34.9
2. Less than 1%	1	1.6
3. 1% to 5%	7	23.2
4. 6% to 10%	4	5.4
5. 11% to 20%	8	12.9
6. 21% or more	22	16.1
No response/not applicable (<i>write in</i>)	3	5.9
Total	59	100.0

(continued)

Table 6-12. Responses for Selected Questions in Section 1 Weighted by Annual Production: Egg Products Processing Operations (continued)

	n	Mean
1.4 [If Q1.3 = 2, 3, 4, 5, or 6; n = 42] What is the age of restricted eggs when they are received by the processing facility of this plant? (<i>Means are percentage of annual production using restricted eggs.</i>)		
1 to 3 days		50.5%
4 to 6 days		26.3%
7 to 10 days		19.3%
11 to 15 days		2.6%
16 to 20 days		0.9%
21 days or older		0.4%
Don't know		0.1%
Total	42	100.0%
1.5 What percentage of offline and open market purchase eggs are refrigerated during transportation to this plant? (<i>Means are percentage of all eggs received from offline and open market purchase sources.</i>)		
Not refrigerated		14.6%
45°F or below		38.4%
46°F to 59°F		46.7%
60°F or higher		0.3%
Total	49	100.0%
Not applicable (<i>write in</i>)	8	—
No response	2	—
1.6 Considering all sources of eggs processed by this plant, once eggs are received at your processing plant, how long are they stored before processing? (<i>Means are percentage of annual production.</i>)		
Less than 1 day		36.2%
1 to 3 days		49.2%
4 to 6 days		9.5%
7 to 10 days		4.0%
11 to 15 days		0.7%
16 to 20 days		0.3%
21 days or longer		0.1%
Total	55	100.0%
Not applicable (<i>write in</i>)	3	—
No response	1	—

(continued)

Table 6-12. Responses for Selected Questions in Section 1 Weighted by Annual Production: Egg Products Processing Operations (continued)

	n	%
1.7 At what temperature are eggs stored at this plant before breaking?		
1. 45°F or below	18	17.2
2. 46°F to 59°F	20	36.2
3. 60°F or higher	9	17.6
4. This plant does not break eggs	4	1.7
No response	1	2.5
Not applicable (<i>write in</i>)	7	24.9
Total	59	100.0
1.8 Does this plant temper eggs to ambient room temperature before breaking?		
1. Yes	27	37.2
2. No	23	41.6
3. This plant does not break eggs	4	1.7
No response	1	2.5
Not applicable (<i>write in</i>)	4	17.0
Total	59	100.0
1.11 ^a What types of food products does this plant produce?		
1. Ready to eat (RTE) products	8	27.1
2. Ready to cook (RTC) products	21	31.4
3. Products that are inputs to further processing by another plant	48	87.8
1.11 ^b What types of food products does this plant produce?		
1. RTE products only	0	0.0
2. RTC products only	8	9.5
3. Products that are inputs to further processing by another plant only	32	51.1
4. RTE and RTC products	0	0.0
5. RTE products and products that are inputs to further processing	3	14.8
6. RTC products and products that are inputs to further processing	8	9.6
7. RTE, RTC, and products that are inputs to further processing	5	12.3
8. No response	3	2.7
Total	59	100.0

(continued)

^aRespondents could select multiple responses. The results reported are percentage of respondents (n = 59).

^bFor Q1.11, we also estimated proportions for mutually exclusive categories so that the responses would sum to 100 percent.

Table 6-12. Responses for Selected Questions in Section 1 Weighted by Annual Production: Egg Products Processing Operations (continued)

	n	%
1.14 Does this plant have a written HACCP plan?		
1. Yes	47	87.5
2. No	12	12.5
Total	59	100.0

7

Conclusion

RTI conducted a survey of egg packing and egg products processing plants to collect information about the types of technologies and food safety practices used in the egg industry. FSIS will use the survey data to guide regulatory policy making and to conduct required regulatory impact analysis.

RTI used a mail survey with initial contact by telephone to identify the target respondent and follow-up telephone calls to encourage response to the survey. This section summarizes lessons that we learned in the administration and analysis of the Egg Industry Surveys. We recommend that FSIS consider these findings in future surveys of the egg industry and the upcoming meat and poultry industry surveys.

The overall response rate for the Egg Industry Surveys was 77 percent, which exceeded our target response rate of 75 percent. This is higher than response rates typically achieved for establishment surveys. According to a review of 46 establishment surveys conducted by Paxson, Dillman, and Tarnai (1995), the average response rate for voluntary surveys was 55 percent. We attribute the high response rate for the Egg Industry Surveys to the following:

- ▶ using a multimodal approach (initial and follow-up telephone calls, postcard reminder),
- ▶ working with UEP to secure their endorsement of the survey,
- ▶ using project staff to conduct refusal conversion telephone calls,
- ▶ operating a toll-free survey help line,

- providing the option of completing the survey over the telephone (proved especially helpful for small plants), and
- re-mailing the survey instrument to nonrespondents near the end of the data collection period.

We recommend that similar procedures be employed in future industry surveys conducted by FSIS.

Through respondent calls to the survey help line and the collection of survey responses over the telephone, we identified survey questions that proved troublesome for respondents or required clarification. Additionally, when analyzing the survey data we identified questions that had high item nonresponse or were not applicable for many establishments. Tables 7-1 and 7-2 identify questions that we suggest revising in the Egg Packing Survey and Egg Products Survey to reduce item nonresponse and improve the validity of responses. Where appropriate, we suggest that similar changes be incorporated in the survey instruments for the meat and poultry industry surveys. Additionally, we suggest that the survey instruments and results be reviewed with industry technical personnel to assess the overall survey performance and evaluate changes that may improve the clarity of questions where problems were observed, particularly the questions on microbial testing.

Table 7-1. Suggested Revisions for Egg Packing Survey

Question	Problem	Recommended Revision
1.1 What percentage of eggs packed by this plant are supplied by inline layer facilities, offline layer facilities, and open market purchases?	Some small establishments were not familiar with inline and offline terminology	Add definition for inline layer facilities
1.2 What is the age of eggs when they are received by the packing facility of this plant?	"Age of egg" has regulatory and nonregulatory meanings	Define age of egg using the regulatory definition
1.3 What percentage of offline and open market purchase eggs are refrigerated during transportation to this plant?	Not applicable for plants that receive all eggs from inline facilities	Add "not applicable" as response option
1.1 What percentage of eggs packed by this plant are supplied by inline layer facilities, offline layer facilities, and open market purchases? 1.3 What percentage of offline and open market purchase eggs are refrigerated during transportation to this plant?	"Open market" can have several meanings	Define open market; consider whether open market should be divided into additional categories
1.4 Once eggs are received at your packing plant, how long are they typically stored before packing? 1.5 At what temperature are eggs stored at this plant before packing?	Many respondents that receive all eggs from inline facilities wrote in "not applicable" because they do not consider their eggs to be stored prior to packing	Add instructions to clarify how inline facilities should answer questions and/or add response option
1.9 Who certifies this plant's egg packing operations?	Some respondents wrote in "not applicable," and some respondents wrote in "government inspectors" (an invalid response); the open-ended format required coding of responses	Revise question to provide list of possible response options (e.g., customers of the plant, kosher organizations)
2.4 When sanitation problems are found, how quickly are corrective actions begun?	Some respondents wrote in that frequency depended on whether the area was a critical or product-contact zone	Add response option to account for severity of problem
2.6 How frequently is washing and candling equipment at this plant cleaned thoroughly? 2.7 How frequently is grading and packing equipment at this plant cleaned thoroughly?	Some plants clean equipment at the end of the shift rather than before the shift Some respondents selected more than one response option	Clarify response options (e.g., before/after each shift) Add instructions to emphasize that only one response option should be selected (e.g., select the ONE response that best describes the frequency)

(continued)

Table 7-1. Suggested Revisions for Egg Packing Survey (continued)

Question	Problem	Recommended Revision
3.1 Which response below best describes food safety training for newly hired processing employees of this plant? 3.2 Which response below best describes continuing food safety training for processing employees of this plant?	Many respondents selected more than one response option	Allow for multiple responses or add instructions to emphasize that only one response option should be selected
4.4 How many packing shifts are operated each day at this plant?	Some plants do not operate daily	Add "do not operate on a daily basis" as response option
4.5 How many clean up shifts are operated each day at this plant?	Some plants do not have separate staff for clean-up shift	Provide explanation within question that clean-up shift does not require separate set of staff
4.6 Approximately how many people are employed at this plant? 4.9 Approximately how many employees at this plant work in a quality control department?	Some plants have part-time employees	Ask about number of part-time vs. full-time employees or full-time equivalents (FTE)
4.7 Does this plant have a Food Safety Manager?	Many respondents incorrectly identified staff within their plants as a Food Safety Manager	Incorporate definition of Food Safety Manager into question (e.g., "Does this plant have a person whose primary responsibility is to manage food safety activities?")
4.11 Does this plant participate in the shell egg grading program operated by the Agricultural Marketing Service (AMS)?	Some respondents were not aware of AMS shell egg grading program	Provide definition
—	No question on production volume	Add question that asks for number of eggs packed per year (in dozens)

Table 7-2. Suggested Revisions for Egg Products Processing Survey

Question	Problem	Recommended Revision
<p>1.1 What percentage of eggs processed by this plant are supplied by inline layer facilities, offline layer facilities, and open market purchases?</p> <p>1.2 What is the age of eggs—not including restricted eggs—when they are received by the processing facility of this plant?</p> <p>1.3 What share of eggs processed at this plant are restricted eggs?</p> <p>1.5 What percentage of offline and open market purchase eggs are refrigerated during transportation to this plant?</p>	<p>Not applicable for plants that receive only liquid egg products</p>	<p>Add “not applicable—only receive liquid eggs” as response option</p>
<p>1.2 What is the age of eggs—not including restricted eggs—when they are received by the processing facility of this plant?</p> <p>1.4 What is the age of restricted eggs when they are received by the processing facility of this plant?</p>	<p>“Age of egg” has regulatory and nonregulatory meanings</p>	<p>Define age of egg using the regulatory definition</p>
<p>1.1 What percentage of eggs processed by this plant are supplied by inline layer facilities, offline layer facilities, and open market purchases?</p> <p>1.5 What percentage of offline and open market purchase eggs are refrigerated during transportation to this plant?</p>	<p>“Open market” can have several meanings</p>	<p>Define open market; consider whether open market should be divided into additional categories</p>
<p>1.2 What is the age of eggs—not including restricted eggs—when they are received by the processing facility of this plant?</p>	<p>Not applicable for plants that use only restricted eggs</p>	<p>Add “not applicable—only use restricted eggs” as response option</p>
<p>1.5 What percentage of offline and open market purchase eggs are refrigerated during transportation to this plant?</p>	<p>Not applicable for plants that receive all eggs from inline facilities</p>	<p>Add “not applicable” as response option</p>
<p>1.11 What types of food products does this plant produce?</p>	<p>Inconsistent responses for Q1.11, Q.3.5/3.6, Q3.7/3.8, 3.11, and 3.12 (production of RTE and RTC products)</p>	<p>Move Q1.11 to Section 3 and use as filter for subsequent questions; add additional clarifying instructions</p>
<p>1.13 Who certifies this plant’s egg processing operations?</p>	<p>Some respondents wrote in “not applicable,” and some respondents wrote in “government inspectors” (an invalid response); the open-ended format required coding of responses</p>	<p>Revise question to provide list of possible response options (e.g., customers of the plant, kosher organizations)</p>

(continued)

Table 7-2. Suggested Revisions for Egg Products Processing Survey (continued)

Question	Problem	Recommended Revision
2.3 How often are drains sanitized at this plant? 2.6 How frequently does this plant conduct sanitation inspections of product-contact zones? 2.7 How frequently does this plant conduct sanitation inspections of non-product contact zones?	Some respondents selected more than one response option	Add instructions to emphasize that only one response option should be selected
3.2 Which methods of microbiological testing listed below are used by this plant, by either its own lab or an independent commercial lab for this plant?	High item nonresponse	Ask separate question for each column of table
3.3 What organisms does this plant test for in (a) pre-pasteurized egg product, (b) RTE product after packaging, or (c) RTC product after packaging?	High item nonresponse, no response option available for products that are inputs to further processing	Evaluate whether question is necessary because Q3.4, 3.5, and 3.6 collect information on frequency of testing
3.4 For each organism listed below, how frequently is microbiological testing done on product that is sampled before pasteurization? 3.6 For each organism listed below, how frequently is microbiological testing done on RTE product that is sampled after pasteurization? 3.8 For each organism listed below, how frequently is microbiological testing done on RTC product that is sampled after it is packaged for your customers? 3.11 How frequently is environmental sampling done for each RTE area listed below? 3.12 How frequently is environmental sampling done for each RTC area listed below?	High item nonresponse for Q3.4, 3.6, and 3.8 Some plants only test when there is reason for concern or at customers' request, with no regular frequency	Move "never" response option to the first column, then order response options from most to least frequent; consider reducing number of response options to simplify table; add instructions to emphasize that one response option needs to be circled for each row Add column for "no specific or regular frequency"
3.10 How frequently does this plant's environmental sampling include testing for <i>Listeria</i> species?	Some plants only test when there is reason for concern or at customers' request, with no regular frequency	Add "no specific or regular frequency" as response option
4.1 Which response below best describes food safety training for newly hired processing employees of this plant? 4.2 Which response below best describes continuing food safety training for processing employees of this plant?	Many respondents selected more than one response option	Allow for multiple responses or add instructions to emphasize that only one response option should be selected

(continued)

Table 7-2. Suggested Revisions for Egg Products Processing Survey (continued)

Question	Problem	Recommended Revision
5.4 How many production shifts are operated each day at this plant?	Some plants do not operate daily	Add “do not operate on a daily basis” as response option
5.5 How many clean up shifts are operated each day at this plant?	Some plants do not have separate staff for clean-up shift	Provide explanation within question that clean-up shift does not require separate set of staff
5.6 Approximately how many people are employed at this plant? 5.9 Approximately how many employees at this plant work in a quality control department?	Some plants have part-time employees	Ask about number of part-time vs. full-time employees or full-time equivalents (FTE)
5.7 Does this plant have a Food Safety Manager?	Many respondents incorrectly identified staff within their plants as a Food Safety Manager	Incorporate definition of Food Safety Manager into question
—	No question on length of time liquid egg product is stored prior to pasteurization	Add question

References

- Food Safety and Inspection Service, U.S. Department of Agriculture. 2002. "Survey of Egg, Meat, and Poultry Plants: Current Practices and Technologies for Controlling Pathogens in Manufacturing Processes." Information Collection Request Supporting Statement submitted to the Office of Management and Budget.
- Paxson, M.C., D.A. Dillman, and J. Tarnai. 1995. "Improving Response to Business Mail Surveys." In *Business Survey Methods*, B.G. Cox (ed.). New York: John Wiley & Sons.
- SAS Institute, Inc. 1999. *SAS/STAT User's Guide*, Version 8, Cary, NC. SAS Institute, Inc.
- Viator, C.L., and D.L. Kendall. "Pathogen Reduction and Other Technological Changes in the Meat, Poultry, and Egg Industries: Pretest Results Report." Prepared for the U.S. Department of Agriculture, Food Safety and Inspection Service, August 2002.

Appendix A: Survey Instruments

Egg Packing Plants



Form Approved: OMB No. 0583-0125
Expiration Date: 8-31-06
See OMB Statement on inside cover

SURVEY OF EGG PACKING PLANTS

Place label here.

**This survey applies only to
the plant listed on this label.
Refer to this label as instructed
in the survey.**

Public reporting burden for this collection of information is estimated to average 30 minutes per response, including the time for reviewing instructions, searching 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:

Ron Meekhof
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300 12th Street, SW, Room 112
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e-mail: Ronald.Meekhof@fsis.usda.gov

An agency may not conduct or sponsor and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number.

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

Instructions

RTI International (RTI)* is conducting a survey of egg packing plants on behalf of the U.S. Department of Agriculture, Food Safety and Inspection Service (USDA, FSIS). This survey collects data about technologies and food safety practices used in the industry to control pathogens. FSIS needs accurate, up-to-date information to guide policy making and help the agency fulfill its regulatory responsibilities with the minimum burden possible to industry. This survey research will benefit the egg packing industry by improving the agency's understanding of current industry practices.

The survey will take about 30 minutes to complete. Please answer each question by **circling** the appropriate answer(s) for multiple-choice questions or writing your answer legibly in the space provided for fill-in-the-blank questions. ***We ask that you consult with other members of your organization if you do not know the answer to a particular question.*** For purposes of this survey, we use certain words to have particular meanings. For any word printed in **bold** type in a question, please read the definition provided in the margin near the question.

Please answer all questions as they pertain only to the specific plant named on the mailing label attached to the front of this survey booklet. ***By "plant" we mean all the buildings and facilities, including warehouses, used in your egg packing operations within the general area of the address shown on the mailing label.*** This survey asks about **current** practices at your plant. Please answer all questions as they apply at your plant right now.

Your participation in this survey is voluntary, and we truly appreciate your help. We will keep your answers strictly **confidential**. We will report only unidentified data to FSIS. We will not identify any of your answers to FSIS by your name, the name of your company, or your plant. We will also protect your privacy by reporting only aggregate results to the public.

Your participation in this survey is vitally important, and we thank you for your help. As a respondent to the survey, you will receive a summary report of survey results. ***We ask that you return the completed survey within 5 business days in the enclosed postage-paid return envelope, or to RTI, P.O. Box 12194, Research Triangle Park, NC 27709.***

Questions?

Call the Survey Helpline (1-800-334-8571)

If you have any questions as you complete the survey, please call the Survey Helpline at 1-800-334-8571 and ask for Sheri Cates, extension 6810. The Helpline is operated on weekdays from 8:00 a.m. to 5:00 p.m. EST.

* RTI International is a trade name of Research Triangle Institute.

1

Egg Packing Operations

Please answer all questions as they apply to your plant right now.

1.1 What percentage of eggs packed by this plant are supplied by inline layer facilities, **offline** layer facilities, and open market purchases? *Please enter your responses as a percentage of annual production between zero and 100 for each source of eggs listed below. Your entries should add to 100% across the row in the table below.*

By **offline** layer facilities we mean company-owned or contracted layer facilities that are not inline, but are located within 25 miles of the packing plant.

	Source of Eggs Packed by this Plant			
	Inline Layer Facilities	Offline Layer Facilities	Open Market Purchases	Total
Percent of annual production	%	%	%	100%

By **age** we mean number of days since eggs were collected from the layer facility.

1.2 What is the **age** of eggs when they are received by the packing facility of this plant? *For each age category shown below, please enter your responses as a percentage of annual production between zero and 100. Your entries should add to 100% across the row in the table below.*

	Age of Eggs When They Are Received by the Packing Facility of this Plant							
	Less than 1 day	1 to 3 days	4 to 6 days	7 to 10 days	11 to 15 days	16 to 20 days	21 days or older	Total
Percent of annual production	%	%	%	%	%	%	%	100%

1.3 What percentage of offline and open market purchase eggs are refrigerated during transportation to this plant? ***For each temperature category shown below, please enter your responses as a percentage between zero and 100. Your entries should add to 100% across the row in the table below.***

	Temperature of Refrigerated Transportation				Total
	Not refrigerated	45° F or below	46° F to 59° F	60° F or higher	
Percent of all eggs from offline and open market purchase sources	%	%	%	%	100%

1.4 Once eggs are received at your packing plant, how long are they typically stored before packing? ***For each time category shown below, please enter your responses as a percentage of annual production between zero and 100. Your entries should add to 100% across the row in the table below.***

	Number of Days Eggs Are Stored Before Packing							Total
	Less than 1 day	1 to 3 days	4 to 6 days	7 to 10 days	11 to 15 days	16 to 20 days	21 days or longer	
Percent of annual production	%	%	%	%	%	%	%	100%

1.5 At what temperature are eggs stored at this plant before packing?

1. 45° F or below
2. 46° F to 59° F
3. 60° F or higher

1.6 Which of the technologies or equipment listed below are currently in use at this plant? ***Please circle all responses below that apply for this plant***

1. Integrated, computerized production system
2. Rapid egg cooling technology
3. Updated, stainless steel, shell egg grading and packing equipment
4. Automatic equipment that detects any defects, such as dirties, checks, and bloods

By **HACCP plan** we mean a set of written documents based on the seven principles of Hazard Analysis and Critical Control Points. A HACCP plan consists of (a) product description, (b) process flow diagram, (c) schedule of hazards identified by hazard analysis, (d) critical limits for critical control points, (e) preventive measures and corrective actions, (f) written records that verify monitoring and frequency of monitoring of critical control points and corrective actions.

1.7 Of the choices listed below, what type(s) of written food safety plans does this plant have? **Please circle all responses below that apply for this plant.**

1. Written **HACCP plan**
2. Written **quality assurance plan**
3. Written **sanitation plan**
4. Written **audit plan**
5. This plant does not have a written food safety plan

By **quality assurance plan** we mean written documents that specify practices the plant follows to ensure that its products meet minimum standards of quality.

By **sanitation plan** we mean written documents that specify procedures and frequency for cleaning equipment and facilities.

By **audit plan** we mean written documents that specify procedures and frequency for reviewing and verifying packing operations at this plant.

By **audits** we mean review and verification of processes used.

1.8 Who conducts independent, non-government, third-party **audits** of this plant's egg packing operations? **Please circle all responses below that apply for this plant.**

1. Independent, non-government, third-party auditors that are hired by this plant.
2. Customers of this plant.
3. Independent, non-government, third-party auditors that are hired by customers of this plant.
4. This plant's egg packing operations are not audited by independent, non-government, third-party auditors.

By **certifies** we mean verification and endorsement from an independent, non-government organization, using a formal, specified, and regular procedure of inspection and review.

1.9 Who **certifies** this plant's egg packing operations?

1. This plant's egg packing operations are not certified by an independent, non-government, third-party organization.
2. Please write in the names of the independent, non-government organizations that certify this plant's egg packing operations.

2 Sanitation Practices

- 2.1** How frequently does this plant conduct pre-operative sanitation inspections?
1. This plant does not conduct pre-operative sanitation inspections **Skip to Question 2.5**
 2. Once per production shift, before beginning each production shift
 3. Once per day, before beginning daily operations
 4. Less than once per day
 5. This plant conducts pre-operative sanitation inspections, but with no specific, regular frequency

- 2.2** What areas of the plant are inspected routinely during pre-operative sanitation inspections? **Please circle all responses below that apply for this plant.**

1. Pre-washers, loaders, conveyers, and orienters
2. Washer compartments, nozzles, and brushes
3. Egg drying equipment
4. Egg oiling equipment
5. Mass scanning equipment
6. Scales
7. Egg packing equipment
8. Processing rooms
9. Coolers and storage areas
10. Outside premises
11. Refuse handling areas

- 2.3** Does this plant maintain written records of its pre-operative sanitation inspections?
1. Yes
 2. No

- 2.4** When sanitation problems are found, how quickly are corrective actions begun?
1. Same production shift, before beginning shift operations
 2. Same day, before beginning daily operations
 3. Other (please specify) _____

By **cleaned thoroughly** we mean cleaned sufficiently to be free of adhering foreign materials.

2.5 For packing shifts, does this plant routinely do a mid-shift clean-up?

1. Yes
2. No

2.6 How frequently is washing and candling equipment at this plant **cleaned thoroughly**?

1. Once per production shift, before beginning each production shift
2. Once per day, before beginning daily operations
3. Less than once per day
4. This plant cleans its washing and candling equipment, but with no specific, regular frequency

2.7 How frequently is grading and packing equipment at this plant **cleaned thoroughly**?

1. Once per production shift, before beginning each production shift
2. Once per day, before beginning daily operations
3. Less than once per day
4. This plant cleans its grading and packing equipment, but with no specific, regular frequency

2.8 What cleaning products does this plant use to clean equipment in the plant? ***Please circle all responses that apply for this plant.***

1. Quaternary ammonia
2. Trisodium phosphate
3. Chlorine
4. Iodine
5. Phosphoric acid
6. Acid quaternary compound
7. Acetic acid based compound
8. Dish washing detergent
9. Others (please specify) _____

3

Employee Training

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

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

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

By **HACCP** we mean Hazard Analysis and Critical Control Points. HACCP training teaches people principles and practices of a formal seven-step method for promoting food safety in food manufacturing processes.

3.1 Which response below best describes **food safety training** for **newly hired** processing employees of this plant?

1. **Formal food safety course** conducted by professional trainers
2. Formal food safety course conducted by plant personnel
3. Scheduled on-the-job food safety training conducted by plant personnel
4. Informal, unscheduled on-the-job food safety training only
5. Only written food safety training materials are given to new hires
6. No food safety training for new hires

By **newly hired** we mean any production employee who has worked at the plant less than one month.

3.2 Which response below best describes **continuing food safety training** for processing employees of this plant?

1. Formal, periodic refresher course work conducted by professional trainers
2. Formal, periodic refresher course work conducted by plant personnel
3. Scheduled on-the-job refresher food safety training conducted by plant personnel
4. Only written refresher materials are given to employees
5. Continuing informal on-the-job food safety training only
6. No continuing food safety training for processing employees

3.3 Approximately how many employees currently working at this plant have completed formal **HACCP** training (for example, a 3 to 5 day course)?

1. None
2. 1 to 3 employees
3. 4 to 9 employees
4. 10 to 20 employees
5. More than 20 employees

4

Plant Demographics

By **plant** we mean all buildings located at the physical address to which this survey was mailed. For an inline facility, this includes layer houses.

4.1 In what calendar year was this **plant** built? *If the plant has multiple sections, please provide the date for the oldest section.*

a. _____

4.2 What is the approximate total square footage of all facilities that make up this plant? *Please include all facilities, such as production space, warehouses, and office space.*

b. _____ square feet

4.3 Calculated as a percentage of total square footage given in Question 4.2, what is the approximate percentage of the square footage of this plant that is under 5 years old, 5 years to just under 20 years old, or 20 years old or more? *Your responses should sum to 100%.*

- | | |
|---------------------------------------|------------|
| 1. Under 5 years old | [_____ %] |
| 2. 5 years to just under 20 years old | [_____ %] |
| 3. 20 years old or more | [_____ %] |
| | 100% |

4.4 How many packing shifts are operated each day at this plant?

1. One
2. Two
3. Three

4.5 How many clean up shifts are operated each day at this plant?

1. None
2. One
3. Two
4. Three

4.6 Approximately how many people are employed at this plant?

c. _____ employees

4.7 Does this plant have a **Food Safety Manager**?

1. Yes Continue to Question 4.8
2. No Skip to Question 4.9

By **Food Safety Manager** we mean a person whose job description includes managing food safety activities at the plant.

4.8 Approximately what percentage of this plant's food safety manager's time is devoted to managing food safety activities at the plant?

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

4.9 Approximately how many employees at this plant work in a quality control department?

1. _____ employees
2. This plant does not have a quality control department.

4.10 How many plants are owned by the company that owns this plant?

1. 1
2. 2 to 5
3. 6 to 20
4. 21 or more

4.11 Does this plant participate in the shell egg grading program operated by the Agricultural Marketing Service (AMS)?

1. Yes
2. No

4.12 What was the approximate value of total plant sales revenue for the most recently completed fiscal year?

1. Less than \$1 million
2. \$1 million to \$5.9 million
3. \$6 million to \$9.9 million
4. \$10 million to \$14.9 million
5. \$15 million or more

All answers you give in this survey will be kept strictly confidential.

Egg Products Processing Plants



Form Approved: OMB No. 0583-0125
Expiration Date: 8-31-06
See OMB Statement on inside cover

SURVEY OF EGG PRODUCTS PROCESSING PLANTS

Place label here.

**This survey applies only to
the plant listed on this label.
Refer to this label as instructed
in the survey.**

Public reporting burden for this collection of information is estimated to average 30 minutes per response, including the time for reviewing instructions, searching 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:

Ron Meekhof
USDA, FSIS
300 12th Street, SW, Room 112
Washington, DC 20250
Phone: 1-202-690-1816
e-mail: Ronald.Meekhof@fsis.usda.gov

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The survey will take about 30 minutes to complete. Please answer each question by **circling** the appropriate answer(s) for multiple-choice questions or writing your answer legibly in the space provided for fill-in-the-blank questions. ***We ask that you consult with other members of your organization if you do not know the answer to a particular question.*** For purposes of this survey, we use certain words to have particular meanings. For any word printed in **bold** type in a question, please read the definition provided in the margin near the question.

Please answer all questions as they pertain only to the specific plant named on the mailing label attached to the front of this survey booklet. ***By "plant" we mean all the buildings and facilities, including warehouses, used in your egg products operations within the general area of the address shown on the mailing label.*** This survey asks about **current** practices at your plant. Please answer all questions as they apply at your plant right now.

Your participation in this survey is voluntary, and we truly appreciate your help. We will keep your answers strictly **confidential**. We will report only unidentified data to FSIS. We will not identify any of your answers to FSIS by your name, the name of your company, or your plant. We will also protect your privacy by reporting only aggregate results to the public.

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* RTI International is a trade name of Research Triangle Institute.

1

Egg Products Processing Operations

Please answer all questions as they apply to your plant right now.

1.1 What percentage of eggs processed by this plant are supplied by inline layer facilities, **offline** layer facilities, and open market purchases? *Please enter your responses as a percentage of annual production between zero and 100 for each source of eggs listed below. Your entries should add to 100% across the row in the table below.*

By **offline** layer facilities we mean company-owned or contracted layer facilities that are not inline, but are located within 25 miles of the packing plant.

	Source of Eggs Processed by this Plant			
	Inline Layer Facilities	Offline Layer Facilities	Open Market Purchases	Total
Percent of annual production	%	%	%	100%

By **age** we mean number of days since eggs were collected from the layer facility.

1.2 What is the **age** of eggs—not including restricted eggs—when they are received by the processing facility of this plant? *For each age category shown below, please enter your responses as a percentage of annual production between zero and 100. Your entries should add to 100% across the row in the table below.*

	Age of Eggs When They Are Received by the Processing Facility of this Plant							
	Less than 1 day	1 to 3 days	4 to 6 days	7 to 10 days	11 to 15 days	16 to 20 days	21 days or older	Total
Percent of annual production using non-restricted eggs	%	%	%	%	%	%	%	100%

1.3 What share of eggs processed at this plant are **restricted eggs**?

By **restricted eggs** we mean eggs that are dirties, checks, inedibles, or loss.

1. None **Skip to Question 1.5**
2. Less than 1%
3. 1% to 5%
4. 6% to 10%
5. 11% to 20%
6. 21% or more

1.4 What is the age of **restricted** eggs when they are received by the processing facility of this plant? **For each age category shown below, please enter your responses as a percentage of annual production between zero and 100. Your entries should add to 100% across the row in the table below.**

	Age of Restricted Eggs When They Are Received by the Processing Facility of this Plant							
	1 to 3 days	4 to 6 days	7 to 10 days	11 to 15 days	16 to 20 days	21 days or older	Don't know	Total
Percent of annual production using restricted eggs	%	%	%	%	%	%	%	100%

1.5 What percentage of offline and open market purchase eggs are refrigerated during transportation to this plant? **For each temperature category, please enter your responses as a percentage between zero and 100. Your entries should add to 100% across the row in the table below.**

	Temperature of Refrigerated Transport				Total
	Not refrigerated	45° F or below	46° F to 59° F	60° F or higher	
Percent of all eggs received from offline and open market purchase sources	%	%	%	%	100%

1.6 Considering all sources of eggs processed by this plant, once eggs are received at your processing plant, how long are they stored before processing? ***For each time category shown below, please enter your responses as an approximate percentage of annual production. Your entries should add to 100% across the row in the table below.***

	Number of Days Eggs Are Stored before Processing							Total
	Less than 1 day	1 to 3 days	4 to 6 days	7 to 10 days	11 to 15 days	16 to 20 days	21 days or longer	
Percent of annual production	%	%	%	%	%	%	%	100%

1.7 At what temperature are eggs stored at this plant before breaking?

1. 45° F or below
2. 46° F to 59° F
3. 60° F or higher
4. This plant does not break eggs

1.8 Does this plant temper eggs to ambient room temperature before breaking?

1. Yes
2. No
3. This plant does not break eggs

1.9 Which of the technologies, equipment, or practices listed below are currently in use at this plant? ***Please circle all items below that are currently used by this plant.***

1. In-shell pasteurization process
2. Advanced pasteurization technology
3. Liquid egg concentrating technology
4. Integrated, computerized processing system
5. Environmentally controlled packaging system

1.10 For each product category listed below, please write in the total pounds produced by this plant in the most recently completed fiscal year. **Please write “zero” for any product category that is not produced at this plant.**

By **blended** we mean egg products that contain non-egg ingredients.

Product Category	Pounds of Annual Production
a. Liquid	lbs.
b. Blended and Liquid	lbs.
c. Frozen	lbs.
d. Blended and Frozen	lbs.
e. Dried	lbs.
f. Blended and Dried	lbs.
g. Extended Shelf Life Liquid	lbs.
h. Inedible	lbs.

By **RTE** we mean food products that may be re-heated by consumers, but does not require heating to an internal temperature sufficient to kill pathogens.

1.11 What types of food products does this plant produce? **Please circle all responses below that apply for this plant.**

1. Ready-to-eat (**RTE**) products for consumers.
2. Ready-to-cook (**RTC**) products for consumers.
3. Products that are inputs to further processing by another plant.

By **RTC** we mean food products that must be heated by consumers to an internal temperature sufficient to kill pathogens.

1.12 Who conducts independent, non-government, third-party **audits** of this plant’s egg processing operations? **Please circle all responses below that apply for this plant.**

1. Independent, non-government, third-party auditors that are hired by this plant.
2. Customers of this plant.
3. Independent, non-government, third-party auditors that are hired by customers of this plant.
4. This plant’s egg processing operations are not audited by independent, non-government, third-party auditors.

By **audits** we mean review and verification of processes used.

By **certifies** we mean verification and endorsement from an independent, non-government organization, using a formal, specified, and regular procedure of inspection and review.

1.13 Who **certifies** this plant's egg processing operations?

1. This plant's egg processing operations are not certified by an independent, non-government, third-party organization.
2. Please write in the names of the independent, non-government organizations that certify this plant's egg processing operations.

By **HACCP plan** we mean a set of written documents based on the seven principles of Hazard Analysis and Critical Control Points. A HACCP plan consists of (a) product description, (b) process flow diagram, (c) schedule of hazards identified by hazard analysis, (d) critical limits for critical control points, (e) preventive measures and corrective actions, (f) written records that verify monitoring and frequency of monitoring of critical control points and corrective actions.

1.14 Does this plant have a written **HACCP plan**?

1. Yes **Continue to Question 2.1**
2. No **Skip to Question 2.3**

2 Sanitation Practices

By **CCP**, we mean Critical Control Point.

Examples of **Prerequisite Plans** include Sanitation Standard Operating Procedures (SSOP) and Good Manufacturing Practices (GMP).

2.1 For each process listed below, please identify how the process is addressed in the HACCP plan of this plant. **Please circle only one response in each row of the table below.**

Process	Process Is Not Used by this Plant	Process Is Used, But Is Not Designated as a CCP nor Is It Described in a Written Prerequisite Plan at this Plant	Process Is Designated as a CCP in a HACCP Plan for this Plant	Process Is Described in a Written Prerequisite Plan at this Plant
a. Receiving eggs	1	2	3	4
b. Receiving non-egg ingredients	1	2	3	4
c. Receiving packaging materials	1	2	3	4
d. Storing shell eggs	1	2	3	4
e. In-shell pasteurization	1	2	3	4
f. Handling of restricted eggs	1	2	3	4
g. Breaking shell eggs	1	2	3	4
h. Blending formulation	1	2	3	4
i. Pasteurizing liquid eggs	1	2	3	4
j. Drying egg products	1	2	3	4
k. Pasteurizing dried egg whites	1	2	3	4
l. Packaging finished products	1	2	3	4
m. Storing finished products	1	2	3	4

By **records** we mean written or electronic logs or diaries used to document tasks completed, observations made, and any corrective actions taken.

2.2 What **records** does this plant maintain to verify performance of Prerequisite Plans? **Please circle all responses that apply for this plant.**

1. None; no records are kept
2. Quality assurance retention log
3. Calibration log
4. Receiving log
5. Measurement (weight or volume) verification log
6. Employee task performance log
7. Microbial data log
8. Time/temperature log
9. CCP verification log
10. Deviation and corrective action log

2.3 How often are drains sanitized at this plant?

1. One or more times per shift
2. One or more times per day, but less than one time per shift
3. One or more times per week, but less than one time per day
4. Less than once per week
5. With no routine schedule
6. Drains are not sanitized

2.4 For production shifts, does this plant routinely do a mid-shift clean-up?

1. Yes
2. No

2.5 What sanitizing products are used at this plant? **Please circle all responses that apply for this plant.**

1. Quaternary ammonia
2. Trisodium phosphate
3. Chlorine
4. Iodine
5. Phosphoric acid
6. Acid quaternary compound
7. Acetic acid based compound
8. Dish washing detergent
9. Others (please specify) _____

- 2.6** How frequently does this plant conduct sanitation inspections of product-contact zones?
1. More than once per shift
 2. Once per shift before shift operations begin
 3. Once per day before daily operations begin
 4. Once per week
 5. Once per month
 6. Less than once per month
 7. No specific or regular frequency
 8. This plant does not conduct sanitation inspections of product-contact zones

- 2.7** How frequently does this plant conduct sanitation inspections of non-product contact zones?
1. More than once per shift
 2. Once per shift before shift operations begin
 3. Once per day before daily operations begin
 4. Once per week
 5. Once per month
 6. Less than once per month
 7. No specific or regular frequency
 8. This plant does not conduct sanitation inspections of non-product contact zones

3 Microbiological Testing Practices

3.1 Does this plant conduct microbiological testing in addition to the mandatory testing for *Salmonella* required by FSIS regulation, using either its own lab or an independent commercial lab?

1. Yes
2. No

3.2 Which methods of microbiological testing listed below are used by this plant, by either its own lab or an independent commercial lab for this plant? ***In each row of the table below, please circle all responses that apply for this plant.***

Methods Used for Microbiological Testing	Not Used by this Plant	Used for Testing Product before Pasteurization	Used for Testing Product after Pasteurization
a. Traditional cultural methods	1	2	3
b. Rapid methods	1	2	3
c. Enzyme linked immunoassay (ELISA)	1	2	3
d. Polymerase chain reaction (PCR)	1	2	3

By **RTE** we mean food products that may be reheated by consumers, but does not require heating to an internal temperature sufficient to kill pathogens.

By **RTC** we mean food products that must be heated by consumers to an internal temperature sufficient to kill pathogens.

3.3 What organisms does this plant test for in (a) pre-pasteurized egg product, (b) **RTE** product after packaging, or (c) **RTC** product after packaging? ***In each row of the table below, please circle all responses that apply for this plant.***

Organisms	Pre-pasteurized Egg Product	RTE Product Sampled After Packaging	RTC Product Sampled After Packaging	Not Tested for by this Plant
a. Aerobic plate count (APC)	1	2	3	4
b. Total plate count (TPC)	1	2	3	4
c. Total coliforms	1	2	3	4
d. Generic <i>E. coli</i>	1	2	3	4
e. <i>Staphylococcus aureus</i>	1	2	3	4
f. <i>Salmonella</i> species	1	2	3	4
g. <i>Salmonella</i> Enteritidis	1	2	3	4
h. <i>Listeria</i> species	1	2	3	4
i. <i>Listeria monocytogenes</i>	1	2	3	4
j. Yeasts and molds	1	2	3	4

- 3.4** For each organism listed below, how frequently is microbiological testing done on product that is sampled before pasteurization? **Please circle only one response in each row of the table below.**

Organisms	Frequency of Microbiological Testing on Pre-Pasteurized Egg Product								
	More than Once per Shift	Once per Shift	Once per Day	Once per Week	More than Once per Week	More than Once per Month	Once per Month	Less than Once per Month	Never
a. Aerobic plate count (APC)	1	2	3	4	5	6	7	8	9
b. Total plate count (TPC)	1	2	3	4	5	6	7	8	9
c. Total coliforms	1	2	3	4	5	6	7	8	9
d. Generic <i>E. coli</i>	1	2	3	4	5	6	7	8	9
e. <i>Staphylococcus aureus</i>	1	2	3	4	5	6	7	8	9
f. <i>Salmonella</i> species	1	2	3	4	5	6	7	8	9
g. <i>Salmonella</i> Enteritidis	1	2	3	4	5	6	7	8	9
h. <i>Listeria</i> species	1	2	3	4	5	6	7	8	9
i. <i>Listeria monocytogenes</i>	1	2	3	4	5	6	7	8	9
j. Yeasts and molds	1	2	3	4	5	6	7	8	9

By **RTE** we mean food products that may be re-heated by consumers, but does not require heating to a sufficient internal temperature to kill pathogens.

3.5 Does this plant produce **RTE** food products?

1. Yes Continue to Question 3.6
2. No Skip to Question 3.7

3.6 For each organism listed below, how frequently is microbiological testing done on **RTE** product that is sampled after pasteurization? **Please circle only one response in each row of the table below.**

	Frequency of Microbiological Testing on RTE Product after Pasteurization								
	More than Once per Shift	Once per Shift	Once per Day	Once per Week	More than Once per Week	More than Once per Month	Once per Month	Less than Once per Month	Never
a. Aerobic plate count (APC)	1	2	3	4	5	6	7	8	9
b. Total plate count (TPC)	1	2	3	4	5	6	7	8	9
c. Total coliforms	1	2	3	4	5	6	7	8	9
d. Generic <i>E. coli</i>	1	2	3	4	5	6	7	8	9
e. <i>Staphylococcus aureus</i>	1	2	3	4	5	6	7	8	9
f. <i>Salmonella</i> species	1	2	3	4	5	6	7	8	9
g. <i>Salmonella</i> Enteritidis	1	2	3	4	5	6	7	8	9
h. <i>Listeria</i> species	1	2	3	4	5	6	7	8	9
i. <i>Listeria monocytogenes</i>	1	2	3	4	5	6	7	8	9
j. Yeasts and molds	1	2	3	4	5	6	7	8	9

3.7 Does this plant produce **RTC** food products?

1. Yes Continue to Question 3.8
2. No Skip to Question 3.9

By **RTC** we mean food products that must be heated by consumers to an internal temperature sufficient to kill pathogens.

3.8 For each organism listed below, how frequently is microbiological testing done on **RTC** product that is sampled after it is packaged for your customers? **Please circle only one response in each row of the table below.**

Organisms	Frequency of Microbiological Testing on RTC Product after Packaging								
	More than Once per Shift	Once per Shift	Once per Day	Once per Week	More than Once per Week	More than Once per Month	Once per Month	Less than Once per Month	Never
a. Aerobic plate count (APC)	1	2	3	4	5	6	7	8	9
b. Total plate count (TPC)	1	2	3	4	5	6	7	8	9
c. Total coliforms	1	2	3	4	5	6	7	8	9
d. Generic <i>E. coli</i>	1	2	3	4	5	6	7	8	9
e. <i>Staphylococcus aureus</i>	1	2	3	4	5	6	7	8	9
f. <i>Salmonella</i> species	1	2	3	4	5	6	7	8	9
g. <i>Salmonella</i> Enteritidis	1	2	3	4	5	6	7	8	9
h. Yeasts and molds	1	2	3	4	5	6	7	8	9

By **environmental sampling** we mean sampling for indicator or target micro-organisms on surfaces of equipment and facility structures

3.9 What method does this plant use to test **environmental samples**? **Please circle all responses that apply for this plant.**

1. This plant does not test environmental samples **Skip to Question 4.1**
2. Traditional cultural methods
3. Rapid methods
4. Adenosine trisodium phosphate (ATP) bioluminescence
5. Enzyme Linked Immunoassay (ELISA)
6. Polymerase chain reaction (PCR)

3.10 How frequently does this plant's **environmental sampling** include testing for *Listeria* species?

1. More than once per shift
2. Once per shift
3. Once per day
4. Once per week
5. More than once per week
6. More than once per month
7. Once per month
8. Less than once per month
9. Never



Please Read Before Continuing!

If your plant produces ready-to-eat (**RTE**) product, please answer **Question 3.11**.

If your plant produces ready-to-cook (**RTC**) product, please answer **Question 3.12**.

If your plant produces both **RTE** and **RTC**, please answer both **Questions 3.11 & 3.12**.

By **RTE** we mean food products that may be re-heated by consumers, but do not require heating to a sufficient internal temperature to kill pathogens.

By **RTC** we mean food products that must be heated by consumers to an internal temperature sufficient to kill pathogens.

3.11 How frequently is **environmental sampling** done for each RTE area listed below? *Please circle only one response in each row of the table below.*

RTE Areas Sampled for Contamination	Frequency of Environmental Sampling for Bacterial Contamination								
	More than Once per Shift	Once per Shift	Once per Day	Once per Week	More than Once per Week	More than Once per Month	Once per Month	Less than Once per Month	Never
a. Equipment surfaces that come into direct contact with RTE product	1	2	3	4	5	6	7	8	9
b. Equipment surfaces that do not come into direct contact with RTE product	1	2	3	4	5	6	7	8	9
c. Walls	1	2	3	4	5	6	7	8	9
d. Overhead structures	1	2	3	4	5	6	7	8	9
e. Drains	1	2	3	4	5	6	7	8	9

3.12 How frequently is **environmental sampling** done for each RTC area listed below? *Please circle only one response in each row of the table below.*

RTC Areas Sampled for Contamination	Frequency of Environmental Sampling for Bacterial Contamination								
	More than Once per Shift	Once per Shift	Once per Day	Once per Week	More than Once per Week	More than Once per Month	Once per Month	Less than Once per Month	Never
a. Equipment surfaces that come into direct contact with RTC product	1	2	3	4	5	6	7	8	9
b. Equipment surfaces that do not come into direct contact with RTC product	1	2	3	4	5	6	7	8	9
c. Walls	1	2	3	4	5	6	7	8	9
d. Overhead structures	1	2	3	4	5	6	7	8	9
e. Drains	1	2	3	4	5	6	7	8	9

4 Employee Training

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

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

- 4.1** Which response below best describes **food safety training** for **newly hired** processing employees of this plant?
1. **Formal food safety course** conducted by professional trainers
 2. Formal food safety course conducted by plant personnel
 3. Scheduled on-the-job food safety training conducted by plant personnel
 4. Informal, unscheduled on-the-job food safety training only
 5. Only written food safety training materials are given to new hires
 6. No food safety training for new hires

By **newly hired** we mean any production employee who has worked at the plant less than one month.

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

- 4.2** Which response below best describes **continuing food safety training** for processing employees of this plant?
1. Formal, periodic refresher course work conducted by professional trainers
 2. Formal, periodic refresher course work conducted by plant personnel
 3. Scheduled on-the-job refresher food safety training conducted by plant personnel
 4. Continuing informal on-the-job food safety training only
 5. Only written refresher materials are given to employees
 6. No continuing food safety training for processing employees

By **HACCP** we mean Hazard Analysis and Critical Control Points. HACCP training teaches people principles and practices of a formal seven-step method for promoting food safety in food manufacturing processes.

- 4.3** Approximately how many employees currently working at this plant have completed formal **HACCP** training (for example, a 3 to 5 day course)?
1. None
 2. 1 to 3 employees
 3. 4 to 9 employees
 4. 10 to 20 employees
 5. More than 20 employees

5

Plant Demographics

By **plant** we mean all the buildings and facilities, including warehouses, used in your egg products operations within the general area of the address shown on the mailing label.

5.1 In what calendar year was this **plant** built? *If the plant has multiple sections, please provide the date for the oldest section.*

5.2 What is the approximate total square footage of all facilities that make up this plant? *Please include all facilities, such as production space, warehouses, and office space.*

_____square feet

5.3 Calculated as a percentage of total square footage given in Question 5.2, what is the approximate percentage of the square footage of this plant that is under 5 years old, 5 years to just under 20 years old, or 20 year old or more? *Your responses should sum to 100%.*

- | | |
|---------------------------------------|------------|
| 1. Under 5 years old | [_____]% |
| 2. 5 years to just under 20 years old | [_____]% |
| 3. 20 years old or more | [_____]% |
| | 100% |

5.4 How many production shifts are operated each day at this plant?

1. One
2. Two
3. Three

5.5 How many clean up shifts are operated each day at this plant?

1. None
2. One
3. Two
4. Three

5.6 Approximately how many people are employed at this plant?

_____employees

5.7 Does this plant have a **Food Safety Manager**?

1. Yes Continue to Question 5.8
2. No Skip to Question 5.9

By **Food Safety Manager** we mean a person whose job description includes managing food safety activities at the plant.

5.8 Approximately what percentage of this plant's food safety manager's time is devoted to managing food safety activities at the plant?

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

5.9 Approximately how many employees at this plant work in a quality control department?

1. _____ employees
2. This plant does not have a quality control department

5.10 How many USDA inspected plants are owned by the company that owns this plant?

1. 1
2. 2 to 5
3. 6 to 20
4. 21 or more

All answers you give in this survey will be kept strictly confidential.

5.11 What was the approximate value of total plant sales revenue for the most recently completed fiscal year?

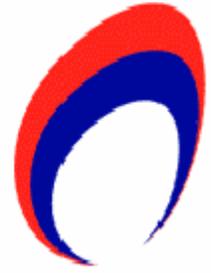
1. Less than \$500 thousand
2. \$500 thousand to \$999 thousand
3. \$1 million to \$4.9 million
4. \$5 million to \$49.9 million
5. \$50 million or more

**Appendix B:
United Egg
Producers Letter**



United Egg

UEP Headquarters
1720 Windward Concourse, Suite 230, Alpharetta, Georgia 30005
(770) 360-9220 · FAX (770) 360-7058



October, 2003

Re: RTI International Survey

Dear UEP and UEA Members:

In the near future you may receive a survey from an organization by the name of RTI International. If your Plant is one selected randomly for the survey, we recommend that you cooperate by participating. The survey is a critical component in developing federal regulations that will apply to your Plant. While the survey is being funded by and for the use of USDA Food Safety Inspection Service (FSIS), no individual company survey will be available to FSIS. The only report will be a summary of the survey, which will be available to both you, as a participant, and USDA/FSIS. This survey is part of the Presidents Egg Food Safety Initiative.

UEP and UEA have had the opportunity to review the survey as well as provide input in its development, and encourage every member to complete and send in the survey.

You have a choice of whether or not to complete the survey of course, but either way federal regulation will be developed. Our recommendation is to cooperate by participating in the survey, as it is intended to achieve regulations based on the best possible input.

Aside from the surveys value in developing any regulations, the information being gathered and the summary results will be very helpful for many other reasons to both UEP/UEA and the Egg Industry.

We urge that either you or someone you assign, complete the RTI Survey. Completing the survey should not take more than 20-30 minutes. Please have the Plant Manager on the lookout for the Survey.

Thanks in advance,



Official U.S. Council Representative

Mike Bynum
C.K.

Mike Bynum
UEP Chairman

Al Pope
UEP President

Elliot Gibber
UEA Chairman



FLP
Food, Land & People

MB:AP:EG/dk

Washington Offices
UEP Government Relations
One Massachusetts Avenue, NW, Suite 800
Washington, D.C. 20001
(202) 843-2245 · Fax (202) 843-2275

Egg Nutrition Center
1050 17th Street, NW, Suite 580
Washington, D.C. 20036
(202) 833-8850 · Fax (202) 463-0102

UEP Iowa Office
Box 170
Eldridge, IA 52748
(563) 285-9100 · Fax (563) 285-9109

**Appendix C:
FSIS Pre-Notice
Letter and
Information
Brochure**

October 27, 2003

Plant Manager/Owner Name
Plant Name
Street Address
City, State Zip

Dear (Plant Manager/Owner Name):

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 processing practices and technologies used in the egg packing and egg product industries to control pathogens and promote food safety. The information from this survey will help ensure that FSIS develops regulations that are science-based and efficient in improving food safety and that also minimize the potential economic burden on establishments such as yours.

Your establishment is among the 432 egg packing and egg products 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 (RTI) to develop and conduct this nationwide survey. A representative from RTI will call you soon to ask for your help, and RTI will send you the survey to complete at your convenience.

As RTI has done with other surveys it has conducted for Federal agencies, RTI will keep individual responses to this survey completely confidential. Neither FSIS employees nor others will be able to identify the survey results for a particular establishment. The results of the survey will be reported only in summary form so that individual responses or respondents can not 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 Dr. Ron Meekhof, the Agency's principal economist for this survey, at (202) 690-1816 or at Ronald.Meekhof@fsis.usda.gov.

FSIS appreciates your help in this important endeavor.

Sincerely,



Garry L. McKee, Ph.D., M.P.H.
Administrator

Enclosure

Q. Who is RTI International?*

A. RTI International (RTI) is a not-for-profit contract research institute 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.

Q. How can I find out more about this survey?

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

Ron Meekhof
USDA, FSIS
300 12th Street SW, Room 112
Washington, DC 20250-3700
Telephone: 202-690-1816
E-mail: Ronald.Meekhof@fsis.usda.gov

Sheri Cates
RTI International
3040 Cornwallis Road
P.O. Box 12194
Research Triangle Park, NC 27709
Telephone: 1-800-334-8571, ext. 6810
E-mail: scc@rti.org

*RTI International is a trade name of Research Triangle Institute

Survey of Egg Packers and Egg Products Processing Plants: Current Practices and Technologies for Controlling Pathogens



Q. What is this study about?

A. This survey, sponsored by the Food Safety and Inspection Service (FSIS), is designed to collect accurate, up-to-date information about current practices and technologies used by egg packers and egg products processing plants to control pathogens and promote food safety. The survey also asks questions about pathogen testing practices, food safety training for employees, and plant demographics. FSIS has contracted with RTI International (RTI) to develop and conduct this nationwide survey.

Q. Why should I complete this survey?

A. Accurate, up-to-date information is needed by FSIS to help the agency avoid unnecessary or inefficient regulation of your industry. The information you provide will help FSIS meet its regulatory responsibilities with the minimum burden possible for industry.

Your participation in the survey is voluntary, but to ensure that survey results are statistically representative for the whole industry, we cannot substitute another plant in your place if you decide not to participate. Without your help, data gathered by this survey could be incomplete and misleading.

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

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

A. The survey should take less than 30 minutes to complete.

Q. When should I return my completed survey?

A. We ask that you return the completed questionnaire as soon as possible. Periodically, RTI will send follow-up reminders and make reminder phone calls to plants that have not returned a completed questionnaire. To reduce the need for follow-up contacts, please return your completed questionnaire within one week.

Q. How was I selected to participate?

A. Your plant was selected as part of a random sample of all egg packers and egg products processing plants in the United States, using methods to ensure statistically valid results. That's one reason your response to the survey is so important. Without your response, the sampling methods used to select your plant could fail to produce information that accurately represents the industry.

Q. Is the survey confidential?

A. Absolutely. As it has for other surveys it conducts for federal agencies, RTI will keep individual responses to this survey completely confidential. Neither FSIS nor others will be able to identify the survey results for a particular plant. The results of the survey will be reported only in summary form so as to not identify individual responses or respondents.

**Appendix D:
Thank You /
Reminder Postcard**



November 2003

Dear *[Insert Respondent Name]*:

Recently, you received a survey on the current practices and technologies used in the egg packing and egg product industries for controlling pathogens. RTI International (RTI) 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 using the return envelope that was included with your survey. The information that you provide will help ensure that FSIS develops regulations that are science-based and efficient and that also minimize the potential economic burden on establishments such as yours.

If you have any questions, please contact Sheryl Cates at 1-800-334-8571, extension 6810 or scc@rti.org. Thank you again.

Sincerely,

A handwritten signature in black ink that reads "Sheryl C. Cates". The signature is written in a cursive style.

Sheryl C. Cates
Project Leader

