

**September 30, 2014**

# **2014 Egg Products Industry Survey**

## **Final Report**

Prepared for

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RTI Project Number 0211740.015.001



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# 1 Introduction

In July 2001, the Food Safety and Inspection Service (FSIS) awarded a contract to RTI International (contract no. 43-3A94-1-5028) to design a survey to collect information about technologies and food safety practices used in the meat, poultry, and egg packing and egg products industries. Separate contracts were subsequently issued to administer the survey to each of these industries, with the egg packing and products industries being surveyed first in 2003/2004.<sup>1</sup> To assess changes in industry's use of technologies and food safety practices and to collect information on additional topics of interest to the agency, FSIS contracted with RTI in 2010 to update the survey instruments (contract no. AG-3A94-B-08-0006). FSIS again chose the egg products industry to be surveyed first in the second round. FSIS awarded RTI contract no. AG-3A94-K-12-0115 in 2012 to review and update the survey instrument and Information Collection Request for the Office of Management and Budget (OMB), administer the survey, and conduct the analysis.

FSIS received OMB approval to conduct the Egg Products Industry Survey in Support of Public Health Risk-Based Inspection, also known as the Egg Products Industry Survey, in December 2013. RTI conducted the Egg Products Industry Survey using a multimodal approach, allowing respondents to choose whether they wanted to complete a paper or Web survey, and contacting the plants using a variety of telephone, mail, and e-mail methods.

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<sup>1</sup> Cates, S. C., Viator, C., Karns, S., & Kendall, D. C. (2004, August). *Survey of Egg Packing and Egg Products Processing Plants*. Prepared for the U.S. Department of Agriculture, Food Safety and Inspection Service. Research Triangle Park, NC: RTI International. Viator, C. L., Cates, S. C., Karns, S. A., Muth, M. K., & Meekhof, R. (2007). Food safety practices used at egg packing and egg processing establishments. *Food Protection Trends*, 26(4), 238–245.

This report describes the survey design and administration procedures and presents the results of the Egg Products Industry Survey. Remaining sections are as follows:

- Section 2 describes the sample design and the design and administration of the survey.
- Section 3 describes the weighting and analysis procedures.
- Section 4 presents tabulated survey results for egg products processing plants in aggregate and by small and large plant size.
- Section 5 presents a comparative analysis of the results from the 2004 and 2014 surveys.
- Section 6 concludes the report.

# 2

## Sample Design, Survey Design, and Administration

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

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### **2.1 SAMPLE DESIGN**

FSIS's Performance Based Inspection System (PBIS) was used as the sampling frame for the egg products survey. PBIS provides information on inspection authority code, inspection status, location, contact information, HACCP size, and other information for all federally inspected plants.

FSIS provided the most recent download of all egg products plants in the United States to RTI in December 2013. It included 84 active federally inspected plants. Because of the small number of plants, we selected all plants to complete the survey (i.e., a census was taken).

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### **2.2 SURVEY INSTRUMENT DESIGN**

The purpose of the survey was to obtain information on technological and food safety practices needed to guide regulatory policy making and to conduct required regulatory impact analysis.

As described in Section 1, the Egg Products Industry Survey was initially developed and administered in 2004. RTI developed the original survey instrument in conjunction with surveys for meat and poultry slaughter and processing plants. We designed and updated the survey instrument in consultation

with various stakeholders across multiple program offices 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.

For the second round of the survey, RTI updated and pretested the original questionnaire in 2010 under contract no. AG-3A94-B-08-0006. Under the current contract, RTI updated the survey to reflect the most recent technologies, practices, and issues facing the egg products industry, such as test-and-hold practices, traceability, and crisis management practices.

The survey instrument was divided into five sections, as described in Table 2-1.

**Table 2-1. Types of Information Collected in the Egg Products Industry Survey**

Section	Types of Information Collected
Section 1: Egg Products Processing Operations	<ul style="list-style-type: none"> <li>▪ Source and age of eggs</li> <li>▪ Storage and refrigeration practices</li> <li>▪ Production volumes</li> <li>▪ Pasteurization times and temperatures</li> </ul>
Section 2: Sanitation and Other Practices	<ul style="list-style-type: none"> <li>▪ Hazard Analysis and Critical Control Point (HACCP) and other written plans</li> <li>▪ Sanitation inspections</li> <li>▪ Traceability and crisis management practices</li> </ul>
Section 3: Plant Microbial Testing Practices	<ul style="list-style-type: none"> <li>▪ Type of lab used</li> <li>▪ Pathogens tested for and when</li> <li>▪ Environmental testing</li> </ul>
Section 4: Employee Training	<ul style="list-style-type: none"> <li>▪ New hire and continuous training for permanent and temporary employees</li> <li>▪ Types of training and resources used</li> </ul>
Section 5: Plant Characteristics	<ul style="list-style-type: none"> <li>▪ Production shifts and number of employees</li> <li>▪ Audits and certifications</li> <li>▪ Packaging and branding</li> <li>▪ Sales revenue</li> </ul>

**2.2.1 Pretest Procedures**

In 2010, RTI conducted pretest interviews with plant managers from three different egg products plants that varied in plant size and geographic location. FSIS recruited eligible plants, and

RTI scheduled and conducted telephone interviews to pretest the survey instrument. The purpose of the interviews was to evaluate participants' comprehension and interpretation of the survey questions and to identify unclear terminology, ambiguous phrasing, and inappropriate (or missing) multiple-choice response options.

Participants were sent a copy of the survey instrument to complete before participating in the telephone interview. During the telephone interview, we recorded participants' responses, probed for areas of difficulty, and asked a series of debriefing questions to assess participants' overall understanding of the survey questions.

Overall the survey instrument was well received and understood. Changes made to the survey instrument included adding skip patterns where needed, adding instruction boxes for some questions or clarifying question instructions, adding definitions for some terms, and changing the order of some response options. Some pretest participants expressed concern about the need for several questions and found other questions confusing. These questions were either revised or deleted from the survey instruments.

Under the current contract, two egg industry trade associations, the United Egg Producers and the U.S. Poultry & Egg Export Association, reviewed the revised survey instrument and provided minor suggestions to improve the survey.

As required by OMB, three egg products plants completed the survey to estimate respondent burden (i.e., the time required to complete the survey).<sup>2</sup> Because the average time to complete the survey was longer than anticipated, we simplified some questions and eliminated seven questions. Based on these revisions, the estimated burden was 60 minutes.

FSIS submitted the Information Collection Request (ICR) Supporting Statement to OMB on October 17, 2013. OMB approved the information collection on December 13, 2013. Appendix A provides the final survey instrument for the Egg Products Industry Survey.

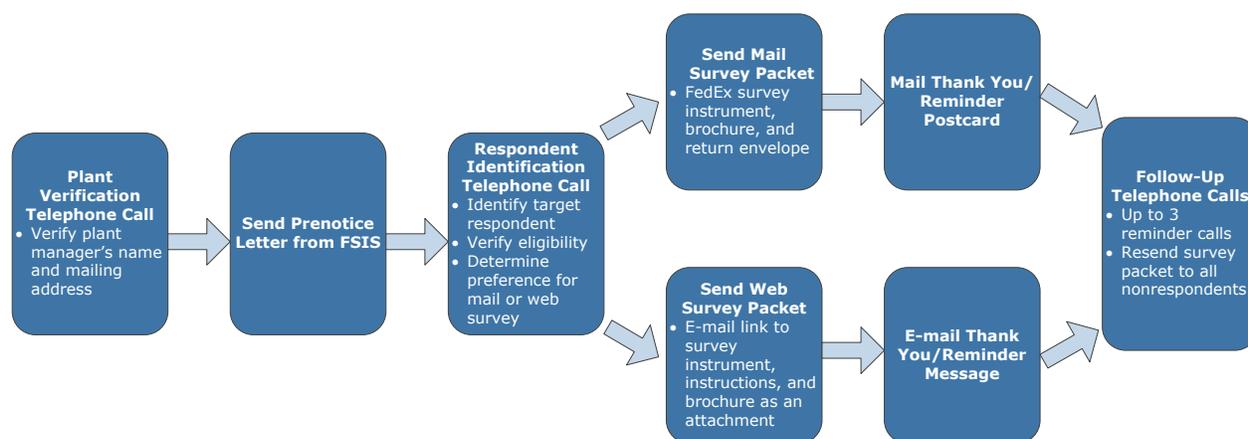
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<sup>2</sup> These completed surveys were included in the final dataset.

## 2.3 SURVEY ADMINISTRATION PROCEDURES

We conducted the full-scale data collection over a 16-week period from February 17, 2014, to June 9, 2014. Figure 2-1 illustrates the steps in the data collection process. We briefly describe each step below.

**Figure 2-1. Data Collection Procedures for the Egg Products Industry Survey**



**Contact with Inspection Personnel.** FSIS’s Office of Field Operations (OFO) sent an e-mail to all of the District Offices. This initial contact asked the District Offices to inform the supervisory inspectors at egg products plants in their districts about the survey, in order to verify the legitimacy of the survey to plant management if needed.

**Plant Verification Telephone Call.** RTI contacted each egg products plant to verify the plant manager’s name and plant’s mailing address.

**FSIS Prenotice Letter.** We mailed a letter and information brochure (see Appendix B) to plant managers at each egg products plant. 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, trifold 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 prenotice letters, RTI contacted the

plant managers at egg products plants. The purpose of this telephone call was to identify the target respondent for the survey (if not the plant manager), determine whether they preferred to complete the survey via paper or Web, confirm their contact information, and gain their cooperation for the survey. This telephone call also assisted in verifying eligibility of the plant for participation in the survey (i.e., whether the plant currently processes egg products).

**Questionnaire Distribution.** For plants that preferred a mail survey, we sent the survey packet via Federal Express. The survey packet included a one-page cover letter on RTI letterhead, another copy of the information brochure, the survey booklet, and a metered (prepaid) envelope for returning the completed questionnaire. For plants that preferred a Web survey, we e-mailed the plant's individualized Web link to the survey, instructions for accessing the survey, and the brochure as an attachment. The Web survey was completed using Snap, a software program designed for survey administration.

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

**Postcard/E-mail Reminder.** Approximately 10 days after mailing the survey packets, we sent participating eligible plants a personalized postcard (see Appendix B). If the plant chose the mail survey, the postcard was sent by mail; if the plant chose the Web survey, the message was sent by e-mail. 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/e-mail reminder was sent, we 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.

**Remailing of Survey Packet.** Six to seven weeks after the original mailing, we sent a paper survey packet (via Federal Express) to all nonrespondents. We made the final set of follow-up telephone calls approximately 1 week after the remailing.

The universe included two plants without a telephone number. We sent these plants an FSIS prenotice letter, a survey packet, and reminder postcard. Because we were unable to contact these plants 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.

## 2.4 SURVEY RESPONSE

Table 2-2 shows the final disposition and the eligibility and response rates. We received 57 completed surveys for egg products processing plants. Of these, 26 (46%) completed the survey by mail and 31 (54%) completed the Web survey.

**Table 2-2. Final Disposition for the Egg Products Industry Survey and Eligibility and Response Rates**

	<b>Number of Plants</b>
Completes	57
Refusals	22
Ineligibles	5
Total	84
Eligibility rate (%)	94%
Response rate (%)	72%

We assigned each plant a disposition of *complete*, *refusal*, or *ineligible*. Completes are those plants that completed the survey. Two plants only completed the first section of the survey; thus, they are classified as refusals and their responses were not included in the results. Refusals are those plants that were eligible for the survey but declined to participate. The ineligibles disposition includes plants that do not process eggs and those that previously processed eggs but are now out of business.

The eligibility rate—the proportion of the total number of plants that were eligible for the survey—is calculated as follows:

$$\text{Eligibility Rate} = \frac{\text{Refusals} + \text{Completes}}{\text{Total Number of Plants}} \quad (2.1)$$

The eligibility rate was 94%. Four of the five ineligible plants do not process egg products. We were unable to reach the fifth egg products plant by phone or by mail; thus, we concluded this plant was ineligible.

Fifty-four percent of plants completed the Web survey; thus, we recommended that this option be offered for the next round of surveys of the meat and poultry industries.

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

$$\text{Response Rate} = \frac{\text{Completes}}{\text{Refusals} + \text{Completes}} \quad (2.2)$$

The response rate was 72%.

Response rates varied by plant HACCP size and FSIS region as shown in Table 2-3. Large plants had a higher response rate than small or very small plants. Response rates were highest in the South and lowest in the West.

**Table 2-3. Response Rates for the Egg Products Industry Survey by HACCP Size and Region**

HACCP Size	FSIS Region				Total
	Midwest	Northeast	South	West	
Very small	33.3	100.0	100.0	70.0	66.7
Small	70.3	83.3	100.0	50.0	72.2
Large	77.8	100.0	N/A	N/A	80.0
Total	69.4	87.5	100.0	62.5	72.2

N/A = The population did not include any plants for this size and region.

Plant HACCP size was provided by FSIS in the sample file.

Very small plants have 9 or fewer employees and annual revenue of \$2.5 million or less.

Small plants have between 10 and 499 employees.

Large plants have 500 or more employees.

Nonresponse may cause bias in survey estimates if plants choosing not to respond (i.e., refusals) would have provided answers to questions that differ systematically from answers provided by plants that choose to respond (i.e., respondents). Using weighting class adjustments in developing the survey weights can help reduce the biases of nonresponse to the extent that weighting classes are homogeneous. However, the number of respondents was too small to compute nonresponse adjustment factors by weighting class.

We conducted a nonresponse bias analysis to determine if the refusal plants have different characteristics from the completed plants. We compared the distribution of the refusals and completes by HACCP size and by FSIS region. The overall differences in distributions between refusals and completes follows a similar pattern to the response rates. We also compared the distributions of the refusals and completes by HACCP size cross-tabulated with FSIS region, but the number of respondents was too small for a meaningful comparison of the differences in distributions between refusals and completes at a more disaggregated level.

# 3

## Analysis Procedures

This section describes weighting procedures, including how an adjustment was made to account for nonresponse to the survey, and procedures used to edit, enter, code, and clean the survey data. It also describes our analysis procedures and how we compared these survey results to the 2004 survey results.

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### 3.1 WEIGHTING PROCEDURES

We generated all statistical estimates for the Egg Products Industry Survey by applying an appropriate survey weight to the respondent record data. We computed a survey weight by using a ratio adjustment to adjust the initial sampling weights for nonresponse to the survey.

Because we conducted a census of egg products processing plants, the sampling weight,  $W_0$ , for each plant was equal to one. Therefore, the sum of the initial sampling weights across all sampled plants is equal to the initial population ( $N = 84$ ).

Nonresponse adjustments ensure that, within each weighting class, respondent weights sum to the population counts of eligible plants. 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.

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

We calculated the adjustment factor ( $F_1$ ) as follows:

$$F_1 = \frac{\text{sum of weight } (W_0) \text{ for eligibles}}{\text{sum of weight } (W_0) \text{ for respondents}} \cdot \quad (3.1)$$

The adjusted weight for each responding plant is equal to

$$W_1 = W_0 * F_1. \quad (3.2)$$

We weighted all results using the final adjusted weights ( $W_1$ ). The sum of the final adjusted weights across all respondents is equal to the population of eligible plants ( $N = 79$ ).

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## **3.2 PREPARING THE ANALYSIS DATASET**

Prior to tabulating the survey results, we edited, entered, coded, and cleaned the data. We describe these analysis procedures below.

### **3.2.1 Data Editing and Data Entry**

Each egg products plant had a unique link to the online survey. For those plants that chose to reply to the Web survey, their responses were automatically saved into an electronic database so that data entry was not needed. For those plants that chose to reply to the mail survey, we manually keyed their responses into the Snap online survey using their unique link. All keyed data were visually verified by a second analyst (i.e., 100% verification) for quality control purposes, and all data entry errors were corrected.

We edited the mail survey questionnaires to resolve any errors prior to data entry. Several questions in the survey are in a table format (e.g., Questions 1.11, 1.12, and 2.1). The most common error made with regard to the tabular questions involved those that required numerical values. Several respondents entered responses that were inconsistent across response items, particularly for Question 1.11 on annual production and typical lot size. In these instances, we resolved the error by contacting the respondents by phone and e-mail to clarify their answer. Several tabular questions required respondents to enter numeric responses that sum to 100% (e.g., Question 1.3 asks for the distribution of the age of eggs when received by the facility). A few mail respondents entered values that did not sum to 100%, so we contacted those respondents to clarify. In the Web survey, the numbers summed automatically; therefore, respondents could see that the percentages summed to 100%.

Another respondent mistake on the mail survey was selecting multiple responses for questions where only one response was

allowed. We called the plant manager to determine the correct response or we selected the most logical answer choice. For example, for Question 3.5, if a respondent selected “This plant does not hold product while waiting for product test results ” but also selected other responses indicating they do hold product, we used the response indicating they held product. In one instance, the respondent said that they hold product for some customers but not for all; thus, we recorded their response indicating they held product.

### **3.2.2 Data Cleaning and Coding**

Prior to tabulating survey responses, we systematically examined the survey dataset to isolate and address data inconsistencies, reporting errors, or otherwise erroneous data. Once all of the data were compiled electronically, we identified outliers and attempted to contact the respondent to verify the response. If we were unable to contact the respondent, we removed the response for that question from the dataset. For Question 1.12, several respondents mixed up their responses for the time and temperature columns; to resolve this error, we switched their responses between the two columns.

Several questions required the respondent to enter a text response (e.g., Question 2.5 provides a response option where the respondent can enter other types of sanitizing products used). For questions with open-ended text responses, we manually reviewed the responses and, when possible, recoded to the correct response category. In some cases, we created new response options if multiple respondents provided the same response. These are noted as “write in” responses in the results tables.

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## **3.3 DESCRIPTIVE ANALYSIS FOR THE 2014 SURVEY**

Section 4 provides tables with overall survey results and results by plant size for the egg products processing plants that completed the survey (n = 57). We defined two size categories (small vs. large) based on information provided in the survey for annual production volume (Question 1.11):<sup>3</sup>

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<sup>3</sup> We did not have volume information from one plant; thus, this plant was excluded from our plant size analysis.

- Small: 50,000,000 pounds or less (n = 26)
- Large: more than 50,000,000 pounds (n = 30)

By using 50 million pounds as the cutoff value, the number of respondents in each size category was similar.

Eleven respondents did not provide production volumes in Question 1.11. For 10 of the 11 respondents, information on production volume was provided by FSIS and was used to assign respondents to the appropriate size category. We excluded the one respondent for which production data were not available from the plant size analysis, although this plant was included in the overall analysis.

We considered using traditional HACCP size categories to distinguish plant size for the analysis. Each plant's HACCP size was provided by FSIS. However, for multiple plants, the values reported for number of employees in Question 5.4 did not align with the plant's designated HACCP size provided by FSIS (9 or fewer for very small plants, 10–499 for small plants, and 500 or more for large plants). We contacted several plants to confirm the number of employees, and it was consistent with their reported values in the survey.

All analyses were conducted using SAS<sup>®</sup>, a statistical analysis software tool (SAS, 2002–2010), 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. Confidence intervals (CIs) are not provided because we conducted a census; therefore, calculation of CIs is not appropriate. Furthermore, statistical tests of difference are not necessary because this is a survey of the universe and not a statistical sample.

In reporting results, we masked the data for some questions to preserve confidentiality of responses and to avoid the possibility of revealing the identity of plants that responded. For questions deemed sensitive in nature (e.g., Question 5.12), we masked data that had fewer than five responses. For all other questions, we masked data that had fewer than three responses. To mask the data, we either collapsed (i.e., combined) categories when possible or suppressed data. Combined categories are noted in the results tables with a

footnote. Suppressions are noted in the results tables with an asterisk (\*).

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### **3.4 ANALYSIS COMPARING THE RESULTS OF THE 2004 AND 2014 SURVEYS**

Section 5 provides tables that compare the overall weighted results from this survey (n = 57) to the overall weighted results from the 2004 survey (n = 60). We selected the questions that had similar wording in both surveys to compare. In addition, we only compared results for questions in which the same populations would have responded in both surveys (i.e., skip patterns were not present). Similar to the overall analysis, we masked the data for some questions to preserve confidentiality of responses by collapsing or suppressing data with few responses or by suppressing entire questions.



# 4

## Descriptive Analysis for 2014 Survey

Tables 4-1 through 4-5 provide survey results for egg products processing plants (n = 57). The results are weighted to adjust for nonresponse. We computed means for questions that required a numeric response from respondents and 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. If there was any item nonresponse, this was noted by providing the number of respondents that did not answer the question ("no response"). In some cases, several respondents left the entire table blank. In reporting results for questions in a table format, the number of respondents that left the entire table blank is provided. Any remaining nonresponse is due to respondents not providing a response to an item in the table.

Selected findings from the Egg Products Industry Survey, grouped by survey section, include the following:

### ***Egg Products Processing Operations***

- About 30% of plants receive shell eggs only, about 30% of plants receive liquid or dried eggs only, and nearly 40% of plants receive both shell eggs and liquid or dried eggs [Question 1.1].
- For plants that receive shell eggs, almost half of the annual production is sourced by offline company-owned or contracted layer facilities [Question 1.2].
- For plants that receive shell eggs, 21% do not process restricted eggs (i.e., eggs that are dirt, checks, inedibles, or loss); of those plants that process restricted eggs, about two-thirds of the annual production using restricted eggs is from eggs that are 7

to 10 days or younger when received by the plant [Questions 1.4 and 1.5].

- For plants that receive shell eggs, 71% of all eggs received at plants are stored 3 days or fewer before breaking; about one-third of all eggs are broken in less than 1 day [Question 1.7]
- For plants that receive shell eggs, 55% of plants store their eggs at temperatures greater than 45°F [Question 1.8].
- Plants employ a variety of technologies to process eggs; the majority use advanced pasteurization technology (51% of plants) and an integrated, computerized processing system (61%) [Question 1.10].
- The most common forms of products produced are liquid (73% of plants) with an estimated total annual production volume of 36.4 million pounds and blended and liquid (57%) with an estimated annual production volume of 20 million pounds [Question 1.11].
- The average time spent pasteurizing egg products ranges from 3.9 to 5.0 minutes at average temperatures ranging from 130 to 147.9 degrees F [Question 1.12].

#### ***Sanitation and Other Practices***

- About 93% of egg product processing plants use a written HACCP plan to address at least one production step in their process [Question 2.1];<sup>4</sup>
- Storing shell or liquid eggs, storing finished product, and pasteurizing liquid eggs are the steps most often covered under a written HACCP plan [Question 2.1].
- About 88% of plants conduct sanitation inspections of product contact zones at least daily or more frequently, and 84% of plants conduct sanitation inspections of nonproduct contact zones at least daily or more frequently [Questions 2.6 and 2.7].
- About 85% of plants follow traceability practices, including tracking product backward to specific suppliers and forward to specific customers [Question 2.8].
- Nearly 93% of plants have written policies and procedures for recalling product, 89% of plants conduct mock recalls of lot codes delivered to specific customers, and 78% of plants conduct mock recalls of lot codes backward to specific suppliers [Question 2.9].

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<sup>4</sup> Result not shown in table.

### **Microbial Testing Practices**

- Approximately 93% of egg product processing plants conduct microbiological testing in addition to mandatory testing required by FSIS; of these, 90% use either an on-site or off-site FSIS-approved Pasteurized Egg Products Recognized Laboratory (PEPRLab) [Questions 3.1 and 3.2].
- More than 76% of plants test egg products before pasteurization, and 83% or more test egg products after pasteurization, product contact surfaces, and nonproduct contact surfaces [Question 3.3].
- For plants conducting microbiological testing, the most common tests were for total coliforms (96%), aerobic plate count (APC) (86%), generic *E. coli* (82%), *Salmonella* species (78%), yeasts and molds (75%), *Listeria* species (75%), and total plate count (TPC) (73%) during the past year [Question 3.4].
- Approximately 79% of plants hold product while waiting for microbial test results and most hold the product on site (in house); however, most plants do not hold product while waiting for environmental test results [Questions 3.5 and 3.6].

### **Employee Training**

- All plants provide some type of food safety training for newly hired permanent production employees; the most common training methods are providing written materials, on-the-job training, and formal courses taught by plant personnel or professional trainers [Question 4.1].
- Nearly all plants provide continuing food safety training to permanent employees in the form of written materials, on-the-job training, formal courses, or other method [Question 4.3].
- Nearly 90% of plants reported that management employees received HACCP training during the past year and 77% of plants provided HACCP training to production employees [Question 4.5].
- About one-third of plants used FSIS resources (Web site, webinars, workshops, or DVDs) for training during the past year [Question 4.6].

### **Plant Characteristics**

- About 42% of egg products processing plants operate more than one shift [Question 5.2].

- About 82% of plants operate a separate clean-up shift [Question 5.3].
- Approximately 84% of plants have food safety audits conducted by an independent, third-party auditor or by its customers [Question 5.7].
- Nearly 72% of plants are required by their customers to have the Global Food Safety Initiative (GFSI) benchmarked certification [Question 5.8].
- Over half of all plants export product outside of the United States [Question 5.9].
- Approximately 51% of plants had egg product sales revenue of \$25 million or more during the past year [Question 5.11].

**Table 4-1. Weighted Responses for Section 1: Egg Products Processing Operations**

Question		n	%		
1.1	Which statement below describes how this plant receives egg inputs?				
1.	This plant receives shell eggs only	17	30.4		
2.	This plant receives both shell eggs and liquid or dried eggs	22	39.3		
3, 4.	This plant receives liquid or dried eggs only <sup>a</sup>	17	30.4		
	Total	56	100.0		
	No response	1			
Question		n	Mean	Min	Max
1.2	[If Q1.1 = 1, 2, or no response] What is the source of eggs processed by this plant? (Means are percentage of annual production.)				
	Inline layer	40	29.9	0.0	100.0
	Offline-company-owned or contracted layer facilities	40	46.3	0.0	100.0
	Open market purchases	40	23.9	0.0	100.0
	Total	40	100.0	100.0	100.0
Question		n	%		
	Does this plant receive restricted eggs only? <sup>b</sup>				
1.	Yes	3	8.3		
2.	No	33	91.7		
	Total	36	100.0		
	No response	4			
Question		n	Mean	Min	Max
1.3	[If Q1.1 = 1 or 2 and above question = 2 or no response] What is the age of non-restricted eggs when they are received at this plant? (Means are percentage of annual production using non-restricted eggs.)				
	Less than 1 day	37	31.9	0.0	100.0
	1 to 3 days	37	30.5	0.0	100.0
	4 to 6 days	37	14.0	0.0	70.0
	7 to 10 days	37	10.9	0.0	80.0
	11 to 15 days	37	7.1	0.0	50.0
	16 to 20 days	37	2.4	0.0	20.0
	21 days or older	37	3.1	0.0	40.0
	Total	37	100.0	100.0	100.0

(continued)

<sup>a</sup> Responses were combined because of the small number of respondents.<sup>b</sup> This question served as a skip pattern and did not have a number.<sup>c</sup> Respondents could select multiple responses.

**Table 4-1. Weighted Responses for Section 1: Egg Products Processing Operations (continued)**

Question		n	%		
1.4	[If Q1.1 = 1, 2, or no response] What percentage of eggs processed at this plant are restricted eggs?				
1.	None	8			21.1
2, 3.	Less than 10 percent <sup>a</sup>	11			29.0
4.	11 to 20 percent	3			7.9
5.	21 to 50 percent	6			15.8
6.	51 to 100 percent	10			26.3
	Total	38			100.0
	No response	2			
Question		n	Mean	Min	Max
1.5	[If Q1.1 = 1, 2 or no response and Q1.4 = 2, 3, 4, 5, 6 or no response] What is the age of restricted eggs when they are received at this plant? ( <i>Means are percentage of annual production using restricted eggs.</i> )				
	Less than 36 hours	29	23.7	0.0	100.0
	36 hours to 3 days	29	16.5	0.0	75.0
	4 to 6 days	29	21.4	0.0	90.0
	7 to 10 days	29	23.8	0.0	100.0
	11 to 15 days	29	9.7	0.0	51.0
	16 to 20 days	29	4.3	0.0	49.0
	21 days or older	29	0.5	0.0	5.0
	Total	29	100.0	100.0	100.0
	No response	3			
Question		n	%		
	Does this plant receive eggs from an inline source only? <sup>b</sup>				
1.	Yes	5			17.2
2.	No	24			82.8
	Total	29			100.0
	No response	3			

(continued)

<sup>a</sup> Responses were combined because of the small number of respondents.<sup>b</sup> This question served as a skip pattern and did not have a number.<sup>c</sup> Respondents could select multiple responses.

**Table 4-1. Weighted Responses for Section 1: Egg Products Processing Operations (continued)**

Question		n	%		
1.6	[If Q1.1 = 1 or 2 and above question = 2 or no response] Are eggs that are received by your plant within 36 hours of lay refrigerated during transportation to this plant?				
	1. This plant does not receive eggs within 36 hours of lay	4	12.9		
	2. Yes	22	71.0		
	3. No	5	16.1		
	Total	31	100.0		
	No response	4			
Question		n	Mean	Min	Max
1.7	[If Q1.1 = 1, 2 or no response] Considering all sources of eggs processed by this plant, once eggs are received at this processing plant, how long are they stored before breaking? ( <i>Means are percentage of annual production.</i> )				
	Less than 1 day	39	33.7	0.0	100.0
	1 to 3 days	39	37.6	0.0	100.0
	4 to 6 days	39	13.7	0.0	90.0
	7 to 10 days	39	6.5	0.0	50.0
	11 to 15 days	39	6.0	0.0	100.0
	16 to 20 days	39	2.2	0.0	30.0
	21 days or longer	39	0.3	0.0	5.0
	Total	39	100.0	100.0	100.0
	No response	1			
1.8	[If Q1.1 = 1, 2 or no response] At what temperature are eggs stored at this plant before breaking?				
	1. 45°F or below			18	45.0
	2. 46°F to 59°F			11	27.5
	3. 60°F or higher			11	27.5
	Total			40	100.0

(continued)

<sup>a</sup> Responses were combined because of the small number of respondents.<sup>b</sup> This question served as a skip pattern and did not have a number.<sup>c</sup> Respondents could select multiple responses.

**Table 4-1. Weighted Responses for Section 1: Egg Products Processing Operations (continued)**

Question	n	%
1.9 [If Q1.1 = 1, 2, or no response] To what temperature do you temper eggs before breaking?		
1. This plant does not temper eggs before breaking	18	45.0
2. 45 to 60°F	12	30.0
3. 61 to 75°F	10	25.0
4. 76 to 90°F	0	0.0
5. 91°F or above	0	0.0
Total	40	100.0
Question	n	%
1.10 <sup>c</sup> Which of the technologies, equipment, or practices listed below are currently used by this plant?		
1. In-shell pasteurization process	*	*
2. Advanced pasteurization technology	29	50.9
3. Liquid egg concentrating technology	6	10.5
4. Integrated, computerized processing system	35	61.4
5. Environmentally controlled packaging system	12	21.1
6. Egg white drying process (with or without ingredients)	8	14.0
7. Egg yellow drying process (with or without ingredients)	11	19.3
8. Enzyme modified yellow process	7	12.3
9. Repackaging of dried egg whites product	6	10.5
10. Repackaging of dried yellow egg product	5	8.8
11. Other new technologies	*	*
12. None of the above	11	19.3
Total	57	

(continued)

<sup>a</sup> Responses were combined because of the small number of respondents.

<sup>b</sup> This question served as a skip pattern and did not have a number.

<sup>c</sup> Respondents could select multiple responses.

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

**Table 4-1. Weighted Responses for Section 1: Egg Products Processing Operations (continued)**

Question	Plant Produces Form		Annual Production (pounds)		Typical Lot Size (pounds)	
	n	%	n	Mean	n	Mean
1.11 <sup>c</sup> Does this plant produce this egg product form? If yes, provide an estimate of the total pounds produced by this plant during the past year and the typical lot size.						
a. Liquid	41	73.2	32	36,431,179	31	128,502
b. Blended and liquid	32	57.1	25	19,967,080	27	106,593
c. Frozen	22	39.3	21	6,887,724	20	45,085
d. Blended and frozen	23	41.1	19	7,284,697	19	131,063
e. Dried	15	26.8	13	6,616,867	12	36,099
f. Blended and dried	10	17.9	7	3,899,429	7	33,414
g. Extended shelf life liquid	17	30.4	11	74,862,139	12	414,917
h. Inedible	36	64.3	27	4,208,495	25	41,761
No response	1					
Question	Whole Egg Products		Pasteurization Time (minutes)		Pasteurization Temp (°F)	
	n	%	n	Mean	n	Mean
1.12.1 <sup>c</sup> Plant produces whole egg product						
a. Plain whole eggs	46	93.9	31	4.2	31	142.5
b. Whole egg blends (with less than 2% added non-egg ingredients)	24	49.0	22	3.9	22	143.8
c. Fortified whole eggs and blends (24-38% egg solids, 2-12% added non-egg ingredients)	26	53.1	22	4.0	22	144.9
d. Whole eggs with less than 2% added salt	5	10.2	4	4.3	4	146.0
e. Whole eggs with 2-12% added sugar	7	14.3	5	4.8	5	144.8
No response	8					

(continued)

<sup>a</sup> Responses were combined because of the small number of respondents.<sup>b</sup> This question served as a skip pattern and did not have a number.<sup>c</sup> Respondents could select multiple responses.

**Table 4-1. Weighted Responses for Section 1: Egg Products Processing Operations (continued)**

Question	Yolk Products		Pasteurization Time (minutes)		Pasteurization Temp (°F)	
	n	%	n	Mean	N	Mean
1.12.2 <sup>c</sup> Plant produces yolk product						
a. Plain yolks	39	100.0	28	4.3	28	143.8
b. Yolks with greater than 2% salt added	27	69.2	23	4.4	23	147.9
c. Yolks with greater than 2% sugar added	23	59.0	21	4.4	21	147.3
d. Yolks with less than 2% non-egg ingredients	3	7.7	2	5.0	2	147.5
e. Yolks with greater than 2% non-egg ingredients	6	15.4	4	4.0	4	145.5
No response	18					
Question	Egg White Products		Pasteurization Time (minutes)		Pasteurization Temp (°F)	
	n	%	n	Mean	n	Mean
1.12.3 <sup>c</sup> Plant produces egg white product						
a. Plain egg whites (no chemicals)	29	69.1	18	4.0	18	134.4
b. Egg whites with less than 2% non-egg ingredients	14	33.3	10	5.0	10	134.8
c. Egg whites with greater than 2% non-egg ingredients	4	9.5	4	5.0	4	135.0
d. Egg whites with processing aids	26	61.9	21	4.0	21	130.4
e, f. Egg whites with processing aids and non-egg ingredients <sup>a</sup>	10	23.8	8	4.0	8	130.1
g. Egg substitutes	9	21.4	9	4.0	9	136.1
No response	15					

(continued)

<sup>a</sup> Responses were combined because of the small number of respondents.<sup>b</sup> This question served as a skip pattern and did not have a number.<sup>c</sup> Respondents could select multiple responses.

**Table 4-1. Weighted Responses for Section 1: Egg Products Processing Operations (continued)**

Question	n	%
1.13 Does this plant use processing aids in producing egg whites?		
1. This plant does not produce egg whites	4	7.5
2. Yes	31	58.5
3. No	18	34.0
Total	53	100.0
No response	4	
Question	n	%
1.14 <sup>c</sup> Which statement(s) below describes this plant's importing practices for egg inputs?		
1. This plant does not receive imported shell or liquid eggs	45	84.9
2, 3. This plant receives imported shell or liquid eggs <sup>a</sup>	8	15.1
Total	53	
No response	4	

<sup>a</sup> Responses were combined because of the small number of respondents.

<sup>b</sup> This question served as a skip pattern and did not have a number.

<sup>c</sup> Respondents could select multiple responses.

Table 4-2. Weighted Responses for Section 2: Sanitation and Other Practices

Question	1. Not Used by this Plant		2. Used but Not Addressed in a Written HACCP Plan		3. Used and Addressed in a Written HACCP Plan		4. Used and Addressed in Some Other Type of Written Plan (not HACCP)		Total	
	n	%	n	%	n	%	n	%	n	%
2.1 What production steps are used by this plant, and if used, is the step addressed in a written plan?										
a. Receiving shell eggs	17	32.1	*	*	29	54.7	6	11.3	53	100.0
b. Receiving liquid eggs	12	23.5	0	0.0	33	64.7	6	11.8	51	100.0
c. Receiving nonegg ingredients	10	19.2	*	*	34	65.4	7	13.5	52	100.0
d. Receiving packaging materials	11	20.8	0	0.0	34	64.2	8	15.1	53	100.0
e. Storing shell or liquid eggs	0	0.0	3	5.6	45	83.3	6	11.1	54	100.0
f. Storing non-egg ingredients	10	19.6	0	0.0	34	66.7	7	13.7	51	100.0
g. Storing packaging material	11	21.2	0	0.0	33	63.5	8	15.4	52	100.0
h. In-shell pasteurization	47	94.0	0	0.0	3	6.0	0	0.0	50	100.0
i. Handling of restricted eggs	22	40.7	*	*	25	46.3	5	9.3	54	100.0
j. Breaking shell eggs	14	25.9	4	7.4	34	63.0	*	*	54	100.0
k. Blending formulation	8	15.7	0	0.0	33	64.7	10	19.6	51	100.0
l. Pasteurizing liquid eggs	11	20.8	*	*	40	75.5	*	*	53	100.0
m. Drying egg products	36	72.0	0	0.0	13	26.0	*	*	50	100.0
n. Pasteurizing dried egg whites	42	82.4	0	0.0	9	17.7	0	0.0	51	100.0
o. Packaging finished products	11	20.8	0	0.0	35	66.0	7	13.2	53	100.0
p. Storing finished products	5	9.1	*	*	42	76.4	7	12.7	55	100.0
No response	1									

<sup>a</sup> Respondents could select multiple responses.

<sup>b</sup> Responses were combined because of the small number of respondents.

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

(continued)

**Table 4-2. Weighted Responses for Section 2: Sanitation and Other Practices (continued)**

Question	n	%
2.2 <sup>a</sup> Which of the following records that are not required by FSIS does this plant maintain?		
1. Employee task performance log verification	43	78.2
2. Deviation and corrective action log	48	87.3
3. Other records not required by FSIS	18	32.7
Total	55	
No response	2	
Question	n	%
2.3 How often are drains sanitized at this plant?		
1. Drains are not sanitized	3	5.9
2. One or more times per shift	8	15.7
3. One or more times per day, but not every shift	18	35.3
4. One or more times per week, but not every day	11	21.6
5. Less than once per week	4	7.8
6. No specific or regular frequency	7	13.7
Total	51	100.0
No response	6	
Question	n	%
2.4 Does this plant rotate sanitizing chemicals used on food contact equipment on an annual or more frequent basis?		
1. Yes	15	28.8
2. No	37	71.2
Total	52	100.0
No response	5	

(continued)

<sup>a</sup> Respondents could select multiple responses.<sup>b</sup> Responses were combined because of the small number of respondents.

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

**Table 4-2. Weighted Responses for Section 2: Sanitation and Other Practices (continued)**

<b>Question</b>	<b>n</b>	<b>%</b>
2.5 <sup>a</sup> What sanitizing products are used at this plant?		
1. Quaternary ammonia	34	63.0
2. Trisodium phosphate	0	0.0
3. Chlorine	44	81.5
4. Iodine	8	14.8
5. Phosphoric acid	19	35.2
6. Acid quaternary compound	11	20.4
7. Acetic acid based compound	27	50.0
8. Dishwashing detergent	8	14.8
9. Other	0	0.0
Total	54	
No response	3	
<b>Question</b>	<b>n</b>	<b>%</b>
2.6 How frequently does this plant conduct sanitation inspections of product contact zones?		
1. More than once per shift	19	33.3
2. Once per shift before shift operations begin	11	19.3
3. Once per day before daily operations begin	20	35.1
4, 5. Once per week or once per month <sup>b</sup>	7	12.3
6. Less than once per month	0	0.0
7. No specific or regular frequency	0	0.0
8. This plant does not conduct sanitation inspections of product contact zones	0	0.0
Total	57	100.0

(continued)

<sup>a</sup> Respondents could select multiple responses.<sup>b</sup> Responses were combined because of the small number of respondents.

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

**Table 4-2. Weighted Responses for Section 2: Sanitation and Other Practices (continued)**

	<b>Question</b>	<b>n</b>	<b>%</b>
2.7	How frequently does this plant conduct sanitation inspections of non-product contact zones?		
	1. More than once per shift	18	31.6
	2. Once per shift before shift operations begin	9	15.8
	3. Once per day before daily operations begin	21	36.8
4, 5.	Once per week or once per month <sup>b</sup>	9	15.8
	6. Less than once per month	0	0.0
	7. No specific or regular frequency	0	0.0
	8. This plant does not conduct sanitation inspections of product contact zones	0	0.0
	Total	57	100.0
	<b>Question</b>	<b>n</b>	<b>%</b>
2.8 <sup>a</sup>	Which of the following traceability practices does this plant currently use in its operations?		
	1. Identifies and tracks its products using a traceable code, by production lot, backward to specific suppliers of egg inputs	46	85.2
	2. Identifies and tracks its products using a traceable code, by production lot, forward to specific customers	45	83.3
	3. None of the above	0	0.0
	Total	54	
	No response	3	
	<b>Question</b>	<b>n</b>	<b>%</b>
2.9 <sup>a</sup>	Which of the following food recall and crisis management practices does this plant currently use in its operations?		
	1. Has written policies and procedures for recalling product	50	92.6
	2. Conducts mock recalls of lot codes delivered to specific customers	48	88.9
	3. Conducts mock recalls of lot codes backwards to raw material suppliers	42	77.8
	4. Documents mock recall exercises and conducts a self-assessment	44	81.5
	5. Has a written crisis management program beyond the scope of product recalls	43	79.6
	6. Conducts crisis management exercises	35	64.8
	7. None of the above	0	0.0
	Total	54	
	No response	3	

<sup>a</sup> Respondents could select multiple responses.

<sup>b</sup> Responses were combined because of the small number of respondents.

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

**Table 4-3. Weighted Responses for Section 3: Plant Microbial Testing Practices**

	<b>Question</b>	<b>n</b>	<b>%</b>
3.1	Does this plant conduct microbiological testing in addition to the mandatory testing for <i>Salmonella</i> required by FSIS regulation?		
	1. Yes, using a company owned lab	22	38.6
	2. Yes, using an independent commercial lab	7	12.3
	3. Yes, using both company and commercial labs	24	42.1
	4. No	4	7.0
	Total	57	100.0
	<b>Question</b>	<b>n</b>	<b>%</b>
3.2	[If Q3.1 = 1, 2, or 3] Does this plant use an FSIS-approved Pasteurized Egg Products Recognized Laboratory (PEPRLab) for testing not required by FSIS regulation?		
	1. Yes, using an onsite PEPRLab	24	46.2
	2. Yes, using an offsite PEPRLab	23	44.2
	3. No	5	9.6
	Total	52	100.0
	No response	1	
	<b>Question</b>	<b>n</b>	<b>%</b>
3.3 <sup>a</sup>	[If Q3.1 = 1, 2, or 3] During the past year, this plant tested which of the following?		
	1. Egg products before pasteurization	36	76.6
	2. Egg products after pasteurization	39	83.0
	3. Product contact surfaces	39	83.0
	4. Non-product contact surfaces	40	85.1
	Total	47	
	No response	6	

(continued)

<sup>a</sup> Respondents could select multiple responses.

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

**Table 4-3. Weighted Responses for Section 3: Plant Microbial Testing Practices (continued)**

Question	n	%
3.4 <sup>a</sup> [If Q3.1 = 1, 2, or 3] During the past year, what microbial indicators and pathogens were tested for by this plant?		
1. Aerobic plate count (APC)	44	86.3
2. Total plate count (TPC)	37	72.5
3. Total coliforms	49	96.1
4. Generic <i>E. coli</i>	42	82.4
5. Enterobacteriaceae	17	33.3
6. Yeasts and molds	38	74.5
7. <i>Bacillus cereus</i>	6	11.8
8. <i>Clostridium perfringens</i>	4	7.8
9. <i>Listeria</i> species	38	74.5
10. <i>Salmonella</i> species (presence or absence)	40	78.4
11. <i>Salmonella</i> species enumeration (cfu/g)	10	19.6
12. <i>Salmonella</i> serotype	15	29.4
13. <i>Staphylococcus aureus</i>	29	56.9
14. None of the above	0	0.0
Total	51	
No response	2	
Question	n	%
3.5 <sup>a</sup> [If Q3.1 = 1, 2, or 3] Where does this plant hold product while waiting for product microbiological test results?		
1. This plant does not hold product while waiting for product test results	11	20.8
2. Onsite (in house)	38	71.7
3. Offsite warehouse	19	35.8
4. Refrigerated truck (secured and stationary)	8	15.1
5. Sealed in-transit in company-owned refrigerated truck	10	18.9
6. Other	0	0.0
7. Sealed in-transit in third-party-owned refrigerated truck (write-in response)	3	5.7
Total	53	

(continued)

<sup>a</sup> Respondents could select multiple responses.

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

**Table 4-3. Weighted Responses for Section 3: Plant Microbial Testing Practices (continued)**

Question	n	%
3.6 [If Q3.1 = 1, 2, or 3] Does this plant hold product while waiting for environmental test results?		
1, 3. No, or this plant does not conduct environmental tests	45	84.9
2. Yes	8	15.1
Total	53	100.0

<sup>a</sup> Respondents could select multiple responses.

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

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

Question	n	%
4.1 <sup>a</sup> What food safety training is provided for newly hired permanent production employees of this plant?		
1. Written food safety training materials are given to new hires	46	80.7
2. Informal, unscheduled on-the-job food safety training	35	61.4
3. Scheduled on-the-job food safety training conducted by plant personnel	48	84.2
4. Formal food safety course conducted by plant personnel	26	45.6
5. Formal food safety course conducted by professional trainers	8	14.0
6. None of the above	0	0.0
Total	57	
Question	n	%
4.2 <sup>a</sup> What food safety training is provided for temporary production employees of this plant?		
1. Written food safety training materials are given to temporary hires	28	51.9
2. Informal, unscheduled on-the-job food safety training	32	59.3
3. Scheduled on-the-job food safety training conducted by plant personnel	28	51.9
4, 5. Formal food safety course conducted by plant personnel or professional trainers	16	29.6
6. None of the above	6	11.1
Total	54	
No response	3	

(continued)

<sup>a</sup> Respondents could select multiple responses.<sup>b</sup> Responses were combined because of the small number of respondents.

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

**Table 4-4. Weighted Responses for Section 4: Employee Training (continued)**

Question	n	%	
4.3 <sup>a</sup> What continuing food safety training is provided for permanent production employees of this plant?			
1. Written refresher materials are given to employees	34	59.6	
2. Continuing informal on-the-job food safety training	36	63.2	
3. Scheduled on-the-job refresher food safety training conducted by plant personnel	37	64.9	
4. Formal, periodic refresher course work conducted by plant personnel	38	66.7	
5. Formal, periodic refresher course work conducted by professional trainers	8	14.0	
6. None of the above	*	*	
Total	57		

Question	n	Mean	Min	Max
4.4 Approximately how many permanent production employees currently working at this plant have completed formal HACCP training?				
Number of employees	57	5.9	0.0	50.0

Question	Management		Production	
	n	%	n	%
4.5 <sup>a</sup> During the past year, what types of food safety training did permanent employees of this plant receive?				
a. HACCP	51	89.5	44	77.2
b. Sanitation SOPs	45	79.0	52	91.2
c. Recall procedures	50	87.7	13	22.8
d. Quality control	50	87.7	40	70.2
e. Records and documentation	49	86.0	41	71.9
f. Lock out / tag out (LOTO)	48	84.2	53	93.0
g. Food defense	50	87.7	49	86.0

(continued)

<sup>a</sup> Respondents could select multiple responses.

<sup>b</sup> Responses were combined because of the small number of respondents.

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

**Table 4-4. Weighted Responses for Section 4: Employee Training (continued)**

Question	n	%
4.6 <sup>a</sup> During the past year, what FSIS resources did this plant use for training?		
1. None	37	67.3
2. FSIS Web site	14	25.5
3. CDs produced by FSIS	0	0.0
4, 7. DVDs produced by FSIS or other FSIS resources <sup>b</sup>	6	10.9
5, 6. FSIS-sponsored webinars or workshops <sup>b</sup>	3	5.5
Total	55	
No response	2	

<sup>a</sup> Respondents could select multiple responses.

<sup>b</sup> Responses were combined because of the small number of respondents.

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

**Table 4-5. Weighted Responses for Section 5: Plant Characteristics**

	<b>Question</b>	<b>n</b>	<b>Mean</b>	<b>Min</b>	<b>Max</b>
5.1	What is the approximate percentage of the square footage of the production space of this plant? ( <i>Means are percentage of production space.</i> )				
a.	Under 5 years old	56	10.3	0.0	100.0
b.	5 years to just under 20 years old	56	32.9	0.0	100.0
c.	20 years old or more	56	56.9	0.0	100.0
	Total	56	100.0	100.0	100.0
	No response	1			
	<b>Question</b>			<b>n</b>	<b>%</b>
5.2	How many production shifts are operated each day at this plant?				
1.	One			33	57.9
2.	Two			10	17.5
3.	Three			14	24.6
	Total			57	100.0
	<b>Question</b>			<b>n</b>	<b>%</b>
5.3	Does this plant operate a separate clean up shift?				
1.	No			10	17.9
2.	Yes, performed by plant personnel			42	75.0
3.	Yes, performed by contractors			5	8.9
	Total			56	100.0
	No response			1	
	<b>Question</b>	<b>n</b>	<b>Mean</b>	<b>Min</b>	<b>Max</b>
5.4	Approximately how many production employees are employed at this plant? ( <i>Means are number of employees.</i> )				
a.	Full-time permanent employees	52	72.0	5.0	372.0
b.	Part-time permanent employees	52	3.1	0.0	50.0
c.	Temporary employees	52	3.9	0.0	50.0
	No response	5			

(continued)

<sup>a</sup> Respondents could select multiple responses.

<sup>b</sup> Responses were combined because of the small number of respondents.

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

Question	n	%
5.5 Approximately how many employees at this plant work in a quality control/quality assurance (QC/QA) department, including food safety?		
1, 2. 0 to 5 <sup>b</sup>	42	73.7
3. 6 to 10	6	10.5
4. 11 or more	9	15.8
Total	57	100.0
Question	n	%
5.6 [If Q5.5 = 2, 3, or 4] For the person who manages the QC/QA department, what percentage of their time is devoted to managing QC/QA activities?		
1. 1 to 24 percent	6	11.3
2. 25 to 49 percent	6	11.3
3. 50 to 74 percent	4	7.5
4. 75 to 99 percent	21	39.6
5. 100 percent	16	30.2
Total	53	100.0
No response	1	
Question	n	%
5.7 <sup>a</sup> Who conducts independent, third-party food safety audits of this plant's egg products processing operations?		
1. This plant's egg products processing operations are not audited by independent, third-party auditors	9	15.8
2. Independent, third-party auditors that are hired by this plant or corporate headquarters	43	75.4
3. Independent, third-party auditors that are hired by customers of this plant	19	33.3
4. Customers of this plant (for example, food service, military)	34	59.6
Total	57	

(continued)

<sup>a</sup> Respondents could select multiple responses.<sup>b</sup> Responses were combined because of the small number of respondents.

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

<b>Question</b>		<b>n</b>	<b>%</b>		
5.8 <sup>a</sup>	What certifications are required by customers of this plant?				
1.	None	8	14.0		
2.	Global Food Safety Initiative (GFSI) benchmarked certifications	41	71.9		
3.	Organic certification	15	26.3		
4.	Other	6	10.5		
5.	Kosher and/or Halal (write-in response)	10	17.5		
6.	Certified Humane (write-in response)	5	8.8		
	Total	57			
<b>Question</b>		<b>n</b>	<b>%</b>		
5.9	What percentage of this plant's product is exported outside of the United States?				
1.	None	27	47.4		
2.	1 to 24 percent	27	47.4		
3, 4.	25 to 74 percent <sup>b</sup>	3	5.3		
5.	75 to 100 percent	0	0.0		
	Total	57	100.0		
<b>Question</b>		<b>n</b>	<b>Mean</b>	<b>Min</b>	<b>Max</b>
5.10	How were this plant's products packaged and branded during the past year? ( <i>Means are percentage of products packaged and branded.</i> )				
a.	Generic consumer packaging and no brand labeling	53	0.1	0.0	6.0
b.	Consumer packaging with plant's own company brand name	53	20.5	0.0	100.0
c.	Consumer packaging with another company's brand name	53	8.1	0.0	100.0
d.	Institutional size or bulk products with no brand name	53	8.1	0.0	100.0
e.	Institutional size or bulk products with plant's company or brand name	53	25.9	0.0	100.0
f.	Bulk products labeled as "Distributed By" or "Packed For" another company or brand name	53	8.4	0.0	100.0
g.	Unpasteurized bulk product sent to other egg plants that will pasteurize the product	53	28.8	0.0	100.0
h.	Other	53	0.0	0.0	0.0
	Total	53	100.0	100.0	100.0
	No response	4			

(continued)

<sup>a</sup> Respondents could select multiple responses.

<sup>b</sup> Responses were combined because of the small number of respondents.

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

Question	n	%
5.11 What was the approximate value of egg product sales revenue during the past year?		
1-4. Under \$2.49 million <sup>b</sup>	8	17.1
5. \$2.5 million to \$24.9 million	15	31.9
6. \$25 million to \$49.9 million	8	17.0
7-9. \$50 million to \$499.9 million <sup>b</sup>	16	34.0
10. \$500 million or more	0	0.0
Total	47	100.0
No response	10	
Question	n	%
5.12 What was the approximate value of total plant sales revenue during the past year?		
1-4. Under \$2.49 million <sup>b</sup>	7	15.0
5. \$2.5 million to 24.9 million	14	29.8
6. \$25 million to \$49.9 million	7	14.9
7-9. \$50 million to \$499.9 million <sup>b</sup>	19	40.4
10. \$500 million or more	0	0.0
Total	47	100.0
No response	10	

<sup>a</sup> Respondents could select multiple responses.

<sup>b</sup> Responses were combined because of the small number of respondents.

Tables 4-6 through 4-10 provide results by plant size. Plant size was determined based on their production volumes, as reported in the survey and described in greater detail in Section 3.2.3. Production volume was not available for one plant; thus, this plant is excluded from the plant size analysis. The plant size analysis includes 26 small plants (annual production volume of 50,000,000 pounds or less) and 30 large plants (annual production volume of more than 50,000,000 pounds).

Notable findings across plant sizes are as follows, by survey section:

#### ***Egg Products Processing Operations***

- More than 50% of eggs at large plants are sourced by inline layer facilities, while more than 55% of eggs at small plants are sourced by offline company-owned or contracted layer facilities [Question 1.2].

- Nearly 60% of eggs at small plants compared with 83% of eggs at large plants are stored 3 days or less before breaking [Question 1.7].

#### **Sanitation and Other Practices**

- The percentage of plants that use a written HACCP plan to address at least one production step in their process is similar for small and large plants (92% for small plants and 93% for large plants)<sup>5</sup> [Question 2.1].

#### **Microbial Testing Practices**

- Small plants were more apt to test for *Salmonella* species (presence or absence, enumeration, or serotype) than large plants during the past year [Question 3.4].
- About 87% of small plants and 71% of large plants hold product while waiting for microbiological test results [Question 3.5].

#### **Employee Training**

- Nearly 57% of large plants compared with 35% of small plants provide formal food safety training conducted by plant personnel for newly hired production employees [Question 4.1].
- Production employees in 83% of large plants compared with 69% of small plants received HACCP food safety training during the past year [Question 4.5].
- About 44% of small plants compared with nearly 21% of large plants used FSIS training resources during the past year [Question 4.6].

#### **Plant Characteristics**

- Approximately 53% of large plants compared with 61% of small plants operate one production shift, but approximately three-fourths of small and over 90% of large plants operate a separate clean-up shift [Questions 5.2 and 5.3]. The length of each shift is not known.
- Nearly 39% of small plants have organic certification, more than twice the percentage of large plants that have organic certification [Question 5.8].
- More than 65% of small plants had egg product sales revenue less than \$24.9 million during the past year, while almost 70% of large plants had total egg product sales revenues of \$25 million to \$499.9 million during the past year [Question 5.11].

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<sup>5</sup> Result not shown in tables.

**Table 4-6. Weighted Responses by Size for Section 1: Egg Products Processing Operations**

Question	Small		Large	
	n	%	n	%
1.1 Which statement below describes how this plant receives egg inputs?				
1. This plant receives shell eggs only	7	26.9	10	34.5
2. This plant receives both shell eggs and liquid or dried eggs	12	46.2	10	34.5
3. This plant receives liquid or dried eggs only <sup>a</sup>	7	26.9	9	31.0
Total	26	100.0	29	100.0
No response			1	
Question	n	Mean	n	Mean
1.2 [If Q1.1 = 1, 2, or nonresponse] What is the source of eggs processed by this plant? ( <i>Means are percentage of annual production.</i> )				
Inline layer	19	7.1	21	50.5
Offline-company-owned or contracted layer facilities	19	55.5	21	37.9
Open market purchases	19	37.4	21	11.7
Total	19	100.0	21	100.0

(continued)

<sup>a</sup> Responses were combined because of the small number of respondents.<sup>b</sup> This question served as a skip pattern and did not have a number.<sup>c</sup> Respondents could select multiple responses.

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

**Table 4-6. Weighted Responses by Size for Section 1: Egg Products Processing Operations (continued)**

Question	Small		Large	
	n	Mean	n	Mean
1.3 [If Q1.1 = 1 or 2 and above question = 2 or no response] What is the age of non-restricted eggs when they are received at this plant? ( <i>Means are percentage of annual production using non-restricted eggs.</i> )				
Less than 1 day	17	26.8	20	36.3
1 to 3 days	17	17.1	20	41.9
4 to 6 days	17	20.4	20	8.6
7 to 10 days	17	15.0	20	7.5
11 to 15 days	17	13.0	20	2.2
16 to 20 days	17	4.1	20	0.9
21 days or older	17	3.6	20	2.8
Total	17	100.0	20	100.0

Question	Small		Large	
	n	%	n	%
1.4 [If Q1.1 = 1, 2, or no response] What percentage of eggs processed at this plant are restricted eggs?				
1, 2, 3. 0 to 10 percent <sup>a</sup>	5	26.3	14	73.7
4. 11 to 20 percent	3	15.8	0	0.0
5. 21 to 50 percent	4	21.1	*	*
6. 51 to 100 percent	7	36.8	3	15.8
Total	19	100.0	19	100.0
No response			2	

(continued)

<sup>a</sup> Responses were combined because of the small number of respondents.

<sup>b</sup> This question served as a skip pattern and did not have a number.

<sup>c</sup> Respondents could select multiple responses.

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

**Table 4-6. Weighted Responses by Size for Section 1: Egg Products Processing Operations (continued)**

Question	Small		Large	
	n	Mean	n	Mean
1.5 [If Q1.1 = 1, 2 or no response and Q1.4 = 2, 3, 4, 5, 6 or no response] What is the age of restricted eggs when they are received at this plant? ( <i>Means are percentage of annual production using restricted eggs.</i> )				
Less than 36 hours	17	15.0	12	36.1
36 hours to 3 days	17	24.9	12	4.6
4 to 6 days	17	19.7	12	23.9
7 to 10 days	17	22.1	12	26.2
11 to 15 days	17	11.2	12	7.6
16 to 20 days	17	6.4	12	1.3
21 days or older	17	0.6	12	0.4
Total	17	100.0	12	100.0
No response			3	
Question	n	%	n	%
Does this plant receive eggs from an inline source only? <sup>b</sup>				
1. Yes	1	6.7	4	28.6
2. No	14	93.3	10	71.4
Total	15	100.0	14	100.0
No response	2		1	
Question	n	%	n	%
1.6 [If Q1.1 = 1 or 2 and above question = 2 or no response] Are eggs that are received by your plant within 36 hours of lay refrigerated during transportation to this plant?				
1, 3. No, or this plant does not receive eggs within 36 hours of lay	3	18.8	6	40.0
2. Yes	13	81.3	9	60.0
Total	16	100.0	15	100.0
No response	2		2	

(continued)

<sup>a</sup> Responses were combined because of the small number of respondents.<sup>b</sup> This question served as a skip pattern and did not have a number.<sup>c</sup> Respondents could select multiple responses.

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

**Table 4-6. Weighted Responses by Size for Section 1: Egg Products Processing Operations (continued)**

Question	Small		Large	
	n	Mean	n	Mean
1.7 [If Q1.1 = 1, 2 or no response] Considering all sources of eggs processed by this plant, once eggs are received at this processing plant, how long are they stored before breaking? ( <i>Means are percentage of annual production.</i> )				
Less than 1 day	19	18.9	20	47.8
1 to 3 days	19	40.7	20	34.7
4 to 6 days	19	18.0	20	9.6
7 to 10 days	19	10.5	20	2.7
11 to 15 days	19	8.4	20	3.8
16 to 20 days	19	3.2	20	1.3
21 days or longer	19	0.3	20	0.3
Total	19	100.0	20	100.0
No response			1	
Question	n	%	n	%
1.8 [If Q1.1 = 1, 2, or no response] At what temperature are eggs stored at this plant before breaking?				
1. 45°F or below	10	52.6	8	38.1
2. 46°F to 59°F	6	31.6	5	23.8
3. 60°F or higher	3	15.8	8	38.1
Total	19	100.0	21	100.0

(continued)

<sup>a</sup> Responses were combined because of the small number of respondents.

<sup>b</sup> This question served as a skip pattern and did not have a number.

<sup>c</sup> Respondents could select multiple responses.

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

**Table 4-6. Weighted Responses by Size for Section 1: Egg Products Processing Operations (continued)**

Question	Small		Large	
	n	%	n	%
1.9 [If Q1.1 = 1, 2, or no response]				
To what temperature do you temper eggs before breaking?				
1. This plant does not temper eggs before breaking	6	31.6	12	57.1
2. 45 to 60°F	9	47.4	3	14.3
3. 61 to 75°F	4	21.1	6	28.6
4. 76 to 90°F	0	0.0	0	0.0
5. 91°F or above	0	0.0	0	0.0
Total	19	100.0	21	100.0
Question	n	%	n	%
1.10 <sup>c</sup> Which of the technologies, equipment, or practices listed below are currently used by this plant?				
1. In-shell pasteurization process	*	*	*	*
2. Advanced pasteurization technology	14	53.8	15	50.0
3. Liquid egg concentrating technology	*	*	*	*
4. Integrated, computerized processing system	15	57.7	20	66.7
5. Environmentally controlled packaging system	5	19.2	7	23.3
6. Egg white drying process (with or without ingredients)	5	19.2	*	*
7. Egg yellow drying process (with or without ingredients)	5	19.2	6	20.0
8. Enzyme modified yellow process	*	*	5	16.7
9. Repackaging of dried egg whites product	5	19.2	0	0.0
10. Repackaging of dried yellow egg product	4	15.4	0	0.0
11. Other new technologies	*	*	*	*
12. None of the above	4	15.4	7	23.3
Total	26		30	

(continued)

<sup>a</sup> Responses were combined because of the small number of respondents.<sup>b</sup> This question served as a skip pattern and did not have a number.<sup>c</sup> Respondents could select multiple responses.

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

**Table 4-6. Weighted Responses by Size for Section 1: Egg Products Processing Operations (continued)**

Question	Small					
	Plant Produces Form		Annual Production (pounds)		Typical Lot Size (pounds)	
	n	%	n	Mean	n	Mean
1.11 <sup>c</sup> Does this plant produce this egg product form? If yes, provide an estimate of the total pounds produced by this plant during the past year and the typical lot size.						
a. Liquid	18	69.2	15	10,930,071	13	38,538
b. Blended and liquid	16	61.5	12	5,542,251	12	37,083
c. Frozen	13	50.0	12	3,261,851	11	21,882
d. Blended and frozen	10	38.5	8	2,290,531	8	28,275
e. Dried	9	34.6	8	4,939,727	7	19,391
f. Blended and dried	*	*	*	1,905,333	*	19,633
g. Extended shelf life liquid	5	19.2	*	9,915,683	*	43,333
h. Inedible	16	61.5	14	2,922,467	12	37,233
Question	Large					
	Plant Produces Form		Annual Production (pounds)		Typical Lot Size (pounds)	
	n	%	n	Mean	n	Mean
1.11 <sup>c</sup> Does this plant produce this egg product form? If yes, provide an estimate of the total pounds produced by this plant during the past year and the typical lot size.						
a. Liquid	23	76.7	17	58,932,156	18	193,475
b. Blended and liquid	16	53.3	13	33,282,308	15	162,200
c. Frozen	9	30.0	9	11,722,222	9	73,444
d. Blended and frozen	13	43.3	11	10,916,818	11	205,818
e. Dried	6	20.0	5	9,300,290	5	59,490
f. Blended and dried	6	20.0	*	5,395,000	*	43,750
g. Extended shelf life liquid	12	40.0	8	99,217,059	9	538,778
h. Inedible	20	66.7	13	5,593,447	13	45,941

(continued)

<sup>a</sup> Responses were combined because of the small number of respondents.

<sup>b</sup> This question served as a skip pattern and did not have a number.

<sup>c</sup> Respondents could select multiple responses.

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

**Table 4-6. Weighted Responses by Size for Section 1: Egg Products Processing Operations (continued)**

Question	Small					
	Whole Egg Products		Pasteurization Time (minutes)		Pasteurization Temp (°F)	
	n	%	n	Mean	n	Mean
1.12.1 <sup>c</sup> Plant produces whole egg product						
a. Plain whole eggs	22	100.0	17	4.2	17	142.6
b. Whole egg blends (with less than 2% added non-egg ingredients)	11	50.0	10	4.1	10	143.3
c. Fortified whole eggs and blends (24-38% egg solids, 2-12% added non-egg ingredients)	12	54.6	10	4.1	10	145.3
d. Whole eggs with less than 2% added salt	*	*	*	5.0	*	148.0
e. Whole eggs with 2-12% added sugar	5	22.7	3	5.3	3	145.3
No response	4					
Question	Large					
	Whole Egg Products		Pasteurization Time (minutes)		Pasteurization Temp (°F)	
	n	%	n	Mean	n	Mean
1.12.1 <sup>c</sup> Plant produces whole egg product						
a. Plain whole eggs	24	88.9	14	4.3	14	142.3
b. Whole egg blends (with less than 2% added non-egg ingredients)	13	48.2	12	3.8	12	144.2
c. Fortified whole eggs and blends (24-38% egg solids, 2-12% added non-egg ingredients)	14	51.9	12	3.9	12	144.6
d. Whole eggs with less than 2% added salt	3	11.1	3	4.0	3	145.3
e. Whole eggs with 2-12% added sugar	*	*	*	4.0	*	144.0
No response	3					

(continued)

<sup>a</sup> Responses were combined because of the small number of respondents.<sup>b</sup> This question served as a skip pattern and did not have a number.<sup>c</sup> Respondents could select multiple responses.

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

**Table 4-6. Weighted Responses by Size for Section 1: Egg Products Processing Operations (continued)**

Question	Small					
	Yolk Products		Pasteurization Time (minutes)		Pasteurization Temp (°F)	
	n	%	n	Mean	n	Mean
1.12.2 <sup>c</sup> Plant produces yolk product						
a. Plain yolks	17	100.0	13	4.2	13	143.7
b. Yolks with greater than 2% salt added	14	82.4	12	4.4	12	147.6
c. Yolks with greater than 2% sugar added	13	76.5	11	4.5	11	147.4
d. Yolks with less than 2% non-egg ingredients	*	*	*	5.0	*	147.0
e. Yolks with greater than 2% non-egg ingredients	3	17.7	*	4.0	*	146.0
No response	9					
Question	Large					
	Yolk Products		Pasteurization Time (minutes)		Pasteurization Temp (°F)	
	n	%	n	Mean	n	Mean
1.12.2 <sup>c</sup> Plant produces yolk product						
a. Plain yolks	22	100.0	15	4.3	15	143.9
b. Yolks with greater than 2% salt added	13	59.1	11	4.4	11	148.3
c. Yolks with greater than 2% sugar added	10	45.5	10	4.3	10	147.3
d. Yolks with less than 2% non-egg ingredients	*	*	*	5.0	*	148.0
e. Yolks with greater than 2% non-egg ingredients	3	13.6	3	4.0	3	145.3
No response	8					

(continued)

<sup>a</sup> Responses were combined because of the small number of respondents.

<sup>b</sup> This question served as a skip pattern and did not have a number.

<sup>c</sup> Respondents could select multiple responses.

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

**Table 4-6. Weighted Responses by Size for Section 1: Egg Products Processing Operations (continued)**

Question	Small					
	Egg White Products		Pasteurization Time (minutes)		Pasteurization Temp (°F)	
	n	%	n	Mean	n	Mean
1.12.3 <sup>c</sup> Plant produces egg white product						
a. Plain egg whites (no chemicals)	13	72.2	8	4.4	8	133.9
b. Egg whites with less than 2% non-egg ingredients	6	33.3	3	5.0	3	133.7
c. Egg whites with greater than 2% non-egg ingredients	3	16.7	3	4.7	3	135.3
d. Egg whites with processing aids	9	50.0	6	3.8	6	129.0
e, f. Egg whites with processing aids and non-egg ingredients <sup>a</sup>	6	33.3	4	4.0	4	128.5
g. Egg substitutes	*	*	*	4.0	*	134.0
No response	8					
Question	Large					
	Egg White Products		Pasteurization Time (minutes)		Pasteurization Temp (°F)	
	n	%	n	Mean	n	Mean
1.12.3 <sup>c</sup> Plant produces egg white product						
a. Plain egg whites (no chemicals)	16	66.7	10	4.2	10	134.8
b. Egg whites with less than 2% non-egg ingredients	8	33.3	7	4.4	7	135.3
c. Egg whites with greater than 2% non-egg ingredients	1	4.2	*	4.0	*	134.0
d. Egg whites with processing aids	17	70.8	15	4.3	15	131.0
e, f. Egg whites with processing aids and non-egg ingredients <sup>a</sup>	4	16.7	4	4.0	4	131.8
g. Egg substitutes	7	29.2	7	4.6	7	136.7
No response	6					

(continued)

<sup>a</sup> Responses were combined because of the small number of respondents.<sup>b</sup> This question served as a skip pattern and did not have a number.<sup>c</sup> Respondents could select multiple responses.

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

**Table 4-6. Weighted Responses by Size for Section 1: Egg Products Processing Operations (continued)**

Question	Small		Large	
	n	%	n	%
1.13 Does this plant use processing aids in producing egg whites?				
1, 3. No, or this plant does not produce egg whites <sup>a</sup>	10	43.5	12	40.0
2. Yes	13	56.5	18	60.0
Total	23	100.0	30	100.0
No response	3			
Question	n	%	n	%
1.14 <sup>c</sup> Which statement(s) below describes this plant's importing practices for egg inputs?				
1. This plant does not receive imported shell or liquid eggs	22	95.7	22	75.9
2, 3. This plant receives imported shell or liquid eggs <sup>a</sup>	*	*	7	24.1
Total	23		29	
No response	3			

<sup>a</sup> Responses were combined because of the small number of respondents.

<sup>b</sup> This question served as a skip pattern and did not have a number.

<sup>c</sup> Respondents could select multiple responses.

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

**Table 4-7. Weighted Responses by Size for Section 2: Sanitation and Other Practices**

Question	Small									
	1. Not Used by this Plant		2. Used but Not Addressed in a Written HACCP Plan		3. Used and Addressed in a Written HACCP Plan		4. Used and Addressed in Some Other Type of Written Plan (not HACCP)		Total	
	n	%	n	%	N	%	n	%	n	%
2.1 What production steps are used by this plant, and if used, is the step addressed in a written plan?										
a. Receiving shell eggs	5	20.8	*	*	14	58.3	4	16.7	24	100.0
b. Receiving liquid eggs	3	14.3	0	0.0	15	71.4	3	14.3	21	100.0
c. Receiving non-egg ingredients	*	*	*	*	16	72.7	4	18.2	22	100.0
d. Receiving packaging materials	*	*	0	0.0	17	73.9	5	21.7	23	100.0
e. Storing shell or liquid eggs	0	0.0	*	*	20	83.3	3	12.5	24	100.0
f. Storing non-egg ingredients	*	*	0	0.0	16	76.2	4	19.1	21	100.0
g. Storing packaging material	*	*	0	0.0	17	73.9	5	21.7	23	100.0
h. In-shell pasteurization	18	90.0	0	0.0	*	*	0	0.0	20	100.0
i. Handling of restricted eggs	7	29.2	*	*	12	50.0	3	12.5	24	100.0
j. Breaking shell eggs	5	20.8	*	*	15	62.5	*	*	24	100.0
k. Blending formulation	*	*	0	0.0	15	71.4	5	23.8	21	100.0
l. Pasteurizing liquid eggs	*	*	*	*	19	82.6	*	*	23	100.0
m. Drying egg products	12	60.0	0	0.0	7	35.0	*	*	20	100.0
n. Pasteurizing dried egg whites	16	76.2	0	0.0	5	23.8	0	0.0	21	100.0
o. Packaging finished products	*	*	0	0.0	17	77.3	4	18.2	22	100.0
p. Storing finished products	*	*	*	*	18	75.0	4	16.7	24	100.0
No response	1									

(continued)

<sup>a</sup> Respondents could select multiple responses.  
<sup>b</sup> Responses were combined because of the small number of respondents.  
 \* Results suppressed because of the small number of respondents.

Table 4-7. Weighted Responses by Size for Section 2: Sanitation and Other Practices (continued)

Question		Large									
		1. Not Used by this Plant		2. Used but Not Addressed in a Written HACCP Plan		3. Used and Addressed in a Written HACCP Plan		4. Used and Addressed in Some Other Type of Written Plan (not HACCP)		Total	
		n	%	n	%	n	%	n	%	n	%
2.1	What production steps are used by this plant, and if used, is the step addressed in a written plan?										
a.	Receiving shell eggs	12	41.4	0	0.0	15	51.7	*	*	29	100.0
b.	Receiving liquid eggs	9	30.0	0	0.0	18	60.0	3	10.0	30	100.0
c.	Receiving non-egg ingredients	9	30.0	0	0.0	18	60.0	3	10.0	30	100.0
d.	Receiving packaging materials	10	33.3	0	0.0	17	56.7	3	10.0	30	100.0
e.	Storing shell or liquid eggs	0	0.0	*	*	25	83.3	3	10.0	30	100.0
f.	Storing non-egg ingredients	9	30.0	0	0.0	18	60.0	3	10.0	30	100.0
g.	Storing packaging material	10	34.5	0	0.0	16	55.2	3	10.3	29	100.0
h.	In-shell pasteurization	29	96.7	0	0.0	*	*	0	0.0	30	100.0
i.	Handling of restricted eggs	15	50.0	0	0.0	13	43.3	*	*	30	100.0
j.	Breaking shell eggs	9	30.0	*	*	19	63.3	0	0.0	30	100.0

(continued)

<sup>a</sup> Respondents could select multiple responses.<sup>b</sup> Responses were combined because of the small number of respondents.

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

**Table 4-7. Weighted Responses by Size for Section 2: Sanitation and Other Practices (continued)**

Question	Large									
	1. Not Used by this Plant		2. Used but Not Addressed in a Written HACCP Plan		3. Used and Addressed in a Written HACCP Plan		4. Used and Addressed in Some Other Type of Written Plan (not HACCP)		Total	
	n	%	n	%	n	%	n	%	n	%
k. Blending formulation	7	23.3	0	0.0	18	60.0	5	16.7	30	100.0
l. Pasteurizing liquid eggs	9	30.0	0	0.0	21	70.0	0	0.0	30	100.0
m. Drying egg products	24	80.0	0	0.0	6	20.0	0	0.0	30	100.0
n. Pasteurizing dried egg whites	26	86.7	0	0.0	4	13.3	0	0.0	30	100.0
o. Packaging finished products	10	33.3	0	0.0	17	56.7	3	10.0	30	100.0
p. Storing finished products	4	13.3	0	0.0	23	76.7	3	10.0	30	100.0

(continued)

<sup>a</sup> Respondents could select multiple responses.

<sup>b</sup> Responses were combined because of the small number of respondents.

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

**Table 4-7. Weighted Responses by Size for Section 2: Sanitation and Other Practices (continued)**

Question	Small		Large	
	n	%	n	%
2.2 <sup>a</sup> Which of the following records that are not required by FSIS does this plant maintain?				
1. Employee task performance log verification	18	75.0	24	80.0
2. Deviation and corrective action log	19	79.2	28	93.3
3. Other records not required by FSIS	11	45.8	7	23.3
Total	24		30	
No response	2			
Question	n	%	n	%
2.3 How often are drains sanitized at this plant?				
1. Drains are not sanitized	3	12.5	0	0.0
2. One or more times per shift	3	12.5	5	19.2
3. One or more times per day, but not every shift	8	33.3	10	38.5
4. One or more times per week, but not every day	5	20.8	6	23.1
5, 6. Less than once per week, or no specific or regular frequency <sup>a</sup>	5	20.8	5	19.2
Total	24	100.0	26	100.0
No response	2		4	
Question	n	%	n	%
2.4 Does this plant rotate sanitizing chemicals used on food contact equipment on an annual or more frequent basis?				
1. Yes	7	28.0	8	30.8
2. No	18	72.0	18	69.2
Total	25	100.0	26	100.0
No response	1		4	

(continued)

<sup>a</sup> Respondents could select multiple responses.<sup>b</sup> Responses were combined because of the small number of respondents.

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

**Table 4-7. Weighted Responses by Size for Section 2: Sanitation and Other Practices (continued)**

Question	Small		Large	
	n	%	n	%
2.5 <sup>a</sup> What sanitizing products are used at this plant?				
1. Quaternary ammonia	17	68.0	16	57.1
2. Trisodium phosphate	0	0.0	0	0.0
3. Chlorine	22	88.0	21	75.0
4. Iodine	6	24.0	*	*
5. Phosphoric acid	7	28.0	12	42.9
6. Acid quaternary compound	6	24.0	5	17.9
7. Acetic acid based compound	13	52.0	14	50.0
8. Dishwashing detergent	3	12.0	4	14.3
9. Other	0	0.0	0	0.0
Total	25		28	
No response	1		2	
Question	n	%	n	%
2.6 How frequently does this plant conduct sanitation inspections of product contact zones?				
1. More than once per shift	9	34.6	9	30.0
2. Once per shift before shift operations begin	7	26.9	4	13.3
3. Once per day before daily operations begin	8	30.8	12	40.0
4, 5. Once per week or once per month <sup>b</sup>	*	*	5	16.7
6. Less than once per month	0	0.0	0	0.0
7. No specific or regular frequency	0	0.0	0	0.0
8. This plant does not conduct sanitation inspections of product contact zones	0	0.0	0	0.0
Total	26	100.0	30	100.0

(continued)

<sup>a</sup> Respondents could select multiple responses.<sup>b</sup> Responses were combined because of the small number of respondents.

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

**Table 4-7. Weighted Responses by Size for Section 2: Sanitation and Other Practices (continued)**

Question	Small		Large	
	n	%	n	%
2.7 How frequently does this plant conduct sanitation inspections of non-product contact zones?				
1. More than once per shift	9	34.6	9	30.0
2. Once per shift before shift operations begin	5	19.2	4	13.3
3. Once per day before daily operations begin	10	38.5	11	36.7
4, 5. Once per week or once per month <sup>b</sup>	*	*	6	20.0
6. Less than once per month	0	0.0	0	0.0
7. No specific or regular frequency	0	0.0	0	0.0
8. This plant does not conduct sanitation inspections of product contact zones	0	0.0	0	0.0
Total	26	100.0	30	100.0
Question	n	%	n	%
2.8 <sup>a</sup> Which of the following traceability practices does this plant currently use in its operations?				
1. Identifies and tracks its products using a traceable code, by production lot, backward to specific suppliers of egg inputs	20	83.3	25	86.2
2. Identifies and tracks its products using a traceable code, by production lot, forward to specific customers	19	79.2	26	89.7
3. None of the above	0	0.0	0	0.0
Total	24		29	
No response	2		1	

(continued)

<sup>a</sup> Respondents could select multiple responses.<sup>b</sup> Responses were combined because of the small number of respondents.

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

**Table 4-7. Weighted Responses by Size for Section 2: Sanitation and Other Practices (continued)**

Question	Small		Large	
	n	%	n	%
2.9 <sup>a</sup> Which of the following food recall and crisis management practices does this plant currently use in its operations?				
1. Has written policies and procedures for recalling product	23	95.8	27	93.1
2. Conducts mock recalls of lot codes delivered to specific customers	21	87.5	27	93.1
3. Conducts mock recalls of lot codes backwards to raw material suppliers	17	70.8	24	82.8
4. Documents mock recall exercises and conducts a self-assessment	18	75.0	26	89.7
5. Has a written crisis management program beyond the scope of product recalls	15	62.5	28	96.6
6. Conducts crisis management exercises	13	54.2	22	75.9
7. None of the above	0	0.0	0	0.0
Total	24		29	
No response	2		1	

<sup>a</sup> Respondents could select multiple responses.

<sup>b</sup> Responses were combined because of the small number of respondents.

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

**Table 4-8. Weighted Responses by Size for Section 3: Plant Microbial Testing Practices**

Question	Small		Large	
	n	%	n	%
3.1 Does this plant conduct microbiological testing in addition to the mandatory testing for <i>Salmonella</i> required by FSIS regulation?				
1. Yes, using a company owned lab	7	26.9	15	50.0
2. Yes, using an independent commercial lab	6	23.1	0	0.0
3. Yes, using both company and commercial labs	11	42.3	13	43.3
4. No	*	*	*	*
Total	26	100.0	30	100.0
Question	n	%	n	%
3.2 [If Q3.1 = 1, 2, or 3] Does this plant use an FSIS-approved Pasteurized Egg Products Recognized Laboratory (PEPRLab) for testing not required by FSIS regulation?				
1. Yes, using an onsite PEPRLab	8	34.8	16	57.1
2. Yes, using an offsite PEPRLab	14	60.9	8	28.6
3. No	*	*	4	14.3
Total	23	100.0	28	100.0
No response	1			
Question	n	%	n	%
3.3 <sup>a</sup> [If Q3.1 = 1, 2, or 3] During the past year, this plant tested which of the following?				
1. Egg products before pasteurization	15	68.2	21	87.5
2. Egg products after pasteurization	19	86.4	19	79.2
3. Product contact surfaces	17	77.3	22	91.7
4. Non-product contact surfaces	17	77.3	23	95.8
Total	22		24	
No response	2		4	

(continued)

<sup>a</sup> Respondents could select multiple responses.

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

**Table 4-8. Weighted Responses by Size for Section 3: Plant Microbial Testing Practices (continued)**

Question	Small		Large	
	n	%	n	%
3.4 <sup>a</sup> [If Q3.1 = 1, 2, or 3] During the past year, what microbial indicators and pathogens were tested for by this plant?				
1. Aerobic plate count (APC)	22	95.7	22	81.5
2. Total plate count (TPC)	16	69.6	21	77.8
3. Total coliforms	22	95.7	27	100.0
4. Generic <i>E. coli</i>	22	95.7	20	74.1
5. Enterobacteriaceae	6	26.1	11	40.7
6. Yeasts and molds	20	87.0	18	66.7
7. <i>Bacillus cereus</i>	*	*	4	14.8
8. <i>Clostridium perfringens</i>	*	*	3	11.1
9. <i>Listeria</i> species	18	78.3	20	74.1
10. <i>Salmonella</i> species (presence or absence)	21	91.3	18	66.7
11. <i>Salmonella</i> species enumeration (cfu/g)	6	26.1	3	11.1
12. <i>Salmonella</i> serotype	8	34.8	6	22.2
13. <i>Staphylococcus aureus</i>	14	60.9	15	55.6
14. None of the above	0	0.0	0	0.0
Total	23		27	
No response	1		1	

(continued)

<sup>a</sup> Respondents could select multiple responses.

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

**Table 4-8. Weighted Responses by Size for Section 3: Plant Microbial Testing Practices (continued)**

Question	Small		Large	
	n	%	n	%
3.5 <sup>a</sup> [If Q3.1 = 1, 2, or 3]				
Where does this plant hold product while waiting for product microbiological test results?				
1. This plant does not hold product while waiting for product test results	3	12.5	8	28.6
2. Onsite (in house)	20	83.3	17	60.7
3. Offsite warehouse	8	33.3	11	39.3
4. Refrigerated truck (secured and stationary)	4	16.7	4	14.3
5. Sealed in-transit in company-owned refrigerated truck	5	20.8	5	17.9
6. Other	0	0.0	0	0.0
7. Sealed in-transit in third-party-owned refrigerated truck (write-in response)	0	0.0	3	10.7
Total	24		28	
Question	n	%	n	%
3.6 [If Q3.1 = 1, 2, or 3]				
Does this plant hold product while waiting for environmental test results?				
1. This plant does not conduct environmental tests	0	0.0	0	0.0
2. Yes	3	12.5	5	17.9
3. No	21	87.5	23	82.1
Total	24	100.0	28	100.0

<sup>a</sup> Respondents could select multiple responses.

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

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

Question	Small		Large	
	n	%	n	%
4.1 <sup>a</sup> What food safety training is provided for newly hired permanent production employees of this plant?				
1. Written food safety training materials are given to new hires	20	76.9	26	86.7
2. Informal, unscheduled on-the-job food safety training	12	46.2	22	73.3
3. Scheduled on-the-job food safety training conducted by plant personnel	22	84.6	25	83.3
4. Formal food safety course conducted by plant personnel	9	34.6	17	56.7
5. Formal food safety course conducted by professional trainers	0	0.0	8	26.7
6. None of the above	0	0.0	0	0.0
Total	26		30	
<b>Question</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>
4.2 <sup>a</sup> What food safety training is provided for temporary production employees of this plant?				
1. Written food safety training materials are given to temporary hires	13	54.2	15	51.7
2. Informal, unscheduled on-the-job food safety training	14	58.3	17	58.6
3. Scheduled on-the-job food safety training conducted by plant personnel	13	54.2	15	51.7
4, 5. Formal food safety course conducted by plant personnel or professional trainers <sup>b</sup>	3	12.5	13	44.8
6. None of the above	*	*	5	17.2
Total	24		29	
No response	2		1	

(continued)

<sup>a</sup> Respondents could select multiple responses.<sup>b</sup> Responses were combined because of the small number of respondents.

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

**Table 4-9. Weighted Responses by Size for Section 4: Employee Training (continued)**

Question	Small		Large	
	n	%	n	%
4.3 <sup>a</sup> What continuing food safety training is provided for permanent production employees of this plant?				
1. Written refresher materials are given to employees	13	50.0	21	70.0
2. Continuing informal on-the-job food safety training	14	53.8	21	70.0
3. Scheduled on-the-job refresher food safety training conducted by plant personnel	13	50.0	23	76.7
4. Formal, periodic refresher course work conducted by plant personnel	17	65.4	21	70.0
5. Formal, periodic refresher course work conducted by professional trainers	3	11.5	5	16.7
6. None of the above	*	*	0	0.0
Total	26		30	
Question	n	Mean	n	Mean
4.4 Approximately how many permanent production employees currently working at this plant have completed formal HACCP training?				
Number of employees	26	4.5	30	7.3

(continued)

<sup>a</sup> Respondents could select multiple responses.

<sup>b</sup> Responses were combined because of the small number of respondents.

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

**Table 4-9. Weighted Responses by Size for Section 4: Employee Training (continued)**

Question	Small				Large			
	Management		Production		Management		Production	
	n	%	n	%	n	%	n	%
4.5 <sup>a</sup> During the past year, what types of food safety training did permanent employees of this plant receive?								
a. HACCP	23	88.5	18	69.2	27	90.0	25	83.3
b. Sanitation SOPs	18	69.2	23	88.5	26	86.7	28	93.3
c. Recall procedures	22	84.6	8	30.8	27	90.0	4	13.3
d. Quality control	22	84.6	17	65.4	27	90.0	23	76.7
e. Records and documentation	21	80.8	17	65.4	27	90.0	23	76.7
f. Lock out / tag out (LOTO)	19	73.1	23	88.5	28	93.3	29	96.7
g. Food defense	20	76.9	20	76.9	29	96.7	28	93.3

Question	Small		Large	
	n	%	n	%
4.6 <sup>a</sup> During the past year, what FSIS resources did this plant use for training?				
1. None			14	56.0
2. FSIS Web site			8	32.0
3. CDs produced by FSIS			0	0.0
4, 7. DVDs produced by FSIS or other FSIS resources <sup>b</sup>			4	16.0
5, 6. FSIS-sponsored webinars or workshops <sup>b</sup>			*	*
Total			25	
No response			1	

<sup>a</sup> Respondents could select multiple responses.

<sup>b</sup> Responses were combined because of the small number of respondents.

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

**Table 4-10. Weighted Responses by Size for Section 5: Plant Characteristics**

Question	Small		Large	
	n	Mean	n	Mean
5.1 What is the approximate percentage of the square footage of the production space of this plant? ( <i>Means are percentage of production space.</i> )				
a. Under 5 years old	26	9.0	29	11.7
b. 5 years to just under 20 years old	26	39.1	29	26.3
c. 20 years old or more	26	51.8	29	62.0
Total	26	100.0	29	100.0
No response			1	
Question	n	%	n	%
5.2 How many production shifts are operated each day at this plant?				
1. One	16	61.5	16	53.3
2. Two	5	19.2	5	16.7
3. Three	5	19.2	9	30.0
Total	26	100.0	30	100.0
Question	n	%	n	%
5.3 <sup>a</sup> Does this plant operate a separate clean up shift?				
1. No	6	23.1	3	10.3
2, 3. Yes, performed by plant personnel or by contractors	20	76.9	27	93.1
Total	26	100.0	29	100.0
No response			1	
Question	n	Mean	n	Mean
5.4 Approximately how many production employees are employed at this plant? ( <i>Means are number of employees.</i> )				
a. Full-time permanent employees	25	47.9	26	97.5
b. Part-time permanent employees	25	1.3	26	4.8
c. Temporary employees	25	3.5	26	4.5
No response	1		4	

(continued)

<sup>a</sup> Respondents could select multiple responses.<sup>b</sup> Responses were combined because of the small number of respondents.

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

**Table 4-10. Weighted Responses by Size for Section 5: Plant Characteristics (continued)**

Question	Small		Large	
	n	%	n	%
5.5 Approximately how many employees at this plant work in a quality control/quality assurance (QC/QA) department, including food safety?				
1, 2. 0 to 5 <sup>b</sup>	24	92.3	18	60.0
3, 4. 6 or more <sup>b</sup>	*	*	12	40.0
Total	26	100.0	30	100.0
Question	n	%	n	%
5.6 [If Q5.5 = 2, 3, or 4] For the person who manages the QC/QA department, what percentage of their time is devoted to managing QC/QA activities?				
1. 1 to 24 percent	4	16.0	*	*
2. 25 to 49 percent	5	20.0	*	*
3. 50 to 74 percent	3	12.0	*	*
4. 75 to 99 percent	7	28.0	14	51.9
5. 100 percent	6	24.0	10	37.0
Total	25	100.0	27	100.0
No response			1	
Question	n	%	n	%
5.7 <sup>a</sup> Who conducts independent, third-party food safety audits of this plant's egg products processing operations?				
1. This plant's egg products processing operations are not audited by independent, third-party auditors	4	15.4	4	13.3
2. Independent, third-party auditors that are hired by this plant or corporate headquarters	20	76.9	23	76.7
3. Independent, third-party auditors that are hired by customers of this plant	8	30.8	11	36.7
4. Customers of this plant (for example, food service, military)	13	50.0	21	70.0
Total	26		30	

(continued)

<sup>a</sup> Respondents could select multiple responses.<sup>b</sup> Responses were combined because of the small number of respondents.

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

**Table 4-10. Weighted Responses by Size for Section 5: Plant Characteristics (continued)**

Question	Small		Large	
	n	%	n	%
5.8 <sup>a</sup> What certifications are required by customers of this plant?				
1. None	5	19.2	2	6.7
2. Global Food Safety Initiative (GFSI) benchmarked certifications	17	65.4	24	80.0
3. Organic certification	10	38.5	5	16.7
4. Other	3	11.5	3	10.0
5. Kosher and/or Halal (write-in response)	3	11.5	7	23.3
6. Certified Humane (write-in response)	2	7.7	3	10.0
Total	26		30	
5.9 What percentage of this plant's product is exported outside of the United States?				
1. None	12	46.2	15	50.0
2. 1 to 24 percent	12	46.2	14	46.7
3, 4. 25 to 74 percent <sup>b</sup>	*	*	*	*
5. 75 to 100 percent	0	0.0	0	0.0
Total	26	100.0	30	100.0

(continued)

<sup>a</sup> Respondents could select multiple responses.<sup>b</sup> Responses were combined because of the small number of respondents.

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

**Table 4-10. Weighted Responses by Size for Section 5: Plant Characteristics (continued)**

Question	Small		Large	
	n	Mean	n	Mean
5.10 How were this plant's products packaged and branded during the past year? <i>(Means are percentage of products packaged and branded.)</i>				
a. Generic consumer packaging and no brand labeling	25	0.0	27	0.2
b. Consumer packaging with plant's own company brand name	25	26.0	27	12.5
c. Consumer packaging with another company's brand name	25	8.0	27	8.4
d. Institutional size or bulk products with no brand name	25	6.8	27	9.7
e. Institutional size or bulk products with plant's company or brand name	25	32.9	27	20.4
f. Bulk products labeled as "Distributed By" or "Packed For" another company or brand name	25	10.0	27	7.3
g. Unpasteurized bulk product sent to other egg plants that will pasteurize the product	25	16.3	27	41.5
h. Other	25	0.0	27	0.0
Total	25	100.0	27	100.0
No response	1		3	
Question	n	%	n	%
5.11 What was the approximate value of egg product sales revenue during the past year?				
1-4. Under \$2.49 million <sup>b</sup>	5	21.6	*	*
5. \$2.5 million to \$24.9 million	10	43.5	5	21.7
7-9. \$25 million to \$499.9 million <sup>b</sup>	8	34.8	16	69.5
10. \$500 million or more	0	0.0	0	0.0
Total	23	100.0	23	100.0
No response	3		7	

(continued)

<sup>a</sup> Respondents could select multiple responses.<sup>b</sup> Responses were combined because of the small number of respondents.

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

**Table 4-10. Weighted Responses by Size for Section 5: Plant Characteristics (continued)**

Question	Small		Large	
	n	%	n	%
5.12 What was the approximate value of total plant sales revenue during the past year?				
1-4. Under \$2.49 million <sup>b</sup>	4	17.3	*	*
5. \$2.5 million to \$24.9 million	9	39.1	5	21.7
6. \$25 million to \$49.9 million	5	21.7	*	*
7-9. \$50 million to \$499.9 million <sup>b</sup>	5	21.7	14	60.8
10. \$500 million or more	0	0.0	0	0.0
Total	23	100.0	23	100.0
No response	3		7	

<sup>a</sup> Respondents could select multiple responses.

<sup>b</sup> Responses were combined because of the small number of respondents.

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

# 5

## Comparative Analysis of 2004 and 2014 Survey Results

The wording for many of the survey questions from the 2004 survey was the same as the wording in the 2014 survey. For those questions that remained the same, we compared overall weighted responses from the two surveys (n = 57 for the 2014 survey and n = 60 for the 2004 survey). The results of this analysis provide information on changes in food safety technologies and practices that have occurred in the egg products processing industry over the past 10 years. Tables 5-1 through 5-5 present the comparative results. The question numbers and wording shown in the tables are from the 2014 survey.

Select findings from the comparative analysis include the following:

- From 2004 to 2014, the percentage of plants using advanced pasteurization technology increased from 23 to 51%, and the percentage of plants using integrated, computerized processing systems increased from 32 to 61% [Question 1.10].
- The types of sanitizing products used have changed. The percentage of plants using chlorine (93 vs. 82%) and iodine (32 vs. 15%) decreased, and the percentage of plants using acetic acid-based compounds increased (18 vs. 50%) [Question 2.5].
- The percentage of plants conducting microbiological testing on egg products prior to pasteurization increased from 48% in 2004 to 77% in 2014. Specifically, plants are now more likely to test for APC, TPC, total coliforms,

generic *E. coli*, yeasts and molds, *Listeria* species, and *Salmonella* species than previously [Question 3.4].

- Compared with 2004, there is a trend toward plants having more production employees complete formal HACCP training [Question 4.4].
- The percentage of plants operating a separate clean-up shift decreased from 92% in 2004 to 82% in 2014 [Question 5.3].
- There is a trend toward more plants being audited by independent, third-party auditors hired by the plant or corporate headquarters (75 vs. 60%) and fewer plants being audited by customers (78 vs. 60%) [Question 5.7].

**Table 5-1. Comparison of Weighted Responses for Section 1: Egg Products Processing Operations, 2004 and 2014**

Question	2004		2014	
	n	%	n	%
1.10 <sup>a</sup> Which of the technologies, equipment, or practices listed below are currently used by this plant?				
1. In-shell pasteurization process	*	*	*	*
2. Advanced pasteurization technology	13	23.2	29	50.9
3. Liquid egg concentrating technology	10	17.9	6	10.5
4. Integrated, computerized processing system	18	32.1	35	61.4
5. Environmentally controlled packaging system	13	23.2	12	21.1
Total	56	100.0	57	100.0
No response	6		0	
	Annual Production (pounds)			
	2004		2014	
Question	n	Mean	n	Mean
1.11 <sup>a</sup> Plant produces egg product form				
a. Liquid	47	30,005,584	32	36,431,179
b. Blended and liquid	25	13,760,251	25	19,967,080
c. Frozen	29	7,305,599	21	6,887,724
d. Blended and frozen	20	8,423,030	19	7,284,697
e. Dried	13	6,772,813	13	6,616,867
f. Blended and dried	8	4,198,049	7	3,899,429
g. Extended shelf life liquid	5	54,872,000	11	74,862,139
h. Inedible	45	5,718,531	27	4,208,495
No response	6		1	

<sup>a</sup> Respondents could select multiple responses.

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

**Table 5-2. Comparison of Weighted Responses for Section 2: Sanitation and Other Practices, 2004 and 2014**

Question	1. Not Used by this Plant				2. Used but Not Addressed in a Written Plan				3. Used and Addressed in a Written HACCP Plan				4. Used and Addressed in Some Other Type of Written Plan (not HACCP)				Total				
	2004		2014		2004		2014		2004		2014		2004		2014		2004		2014		
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	
2.1 <sup>a</sup> What production steps are used by this plant, and if used, is the step addressed in a written plan?																					
c. Receiving non-egg ingredients	7	16.3	10	19.2	10	23.3	*	*	*	*	34	65.4	25	58.1	7	13.5	43	100.0	52	100.0	
d. Receiving packaging materials	9	20.5	11	20.8	10	22.7	0	0.0	*	*	34	64.2	24	54.6	8	15.1	44	100.0	53	100.0	
e. Storing shell or liquid eggs	11	24.4	0	0.0	9	20.0	3	5.6	5	11.1	45	83.3	20	44.4	6	11.1	45	100.0	54	100.0	
h. In-shell pasteurization	39	90.7	47	94.0	*	*	0	0.0	*	*	3	6.0	0	0.0	0	0.0	43	100.0	50	100.0	
i. Handling of restricted eggs	12	27.9	22	40.7	15	34.9	*	*	*	*	25	46.3	14	32.6	5	9.3	43	100.0	54	100.0	
j. Breaking shell eggs	6	13.3	14	25.9	8	17.8	4	7.4	11	24.4	34	63.0	20	44.4	*	*	45	100.0	54	100.0	

(continued)

<sup>a</sup> Only the steps listed in both the 2004 and 2014 surveys are shown.  
 \* Results are suppressed because of the small number of respondents.

**Table 5-2. Comparison of Weighted Responses for Section 2: Sanitation and Other Practices, 2004 and 2014 (continued)**

Question	1. Not Used by this Plant				2. Used but Not Addressed in a Written Plan				3. Used and Addressed in a Written HACCP Plan				4. Used and Addressed in Some Other Type of Written Plan (not HACCP)				Total			
	2004		2014		2004		2014		2004		2014		2004		2014		2004		2014	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
k. Blending formulation	10	22.7	8	15.7	7	15.9	0	0.0	3	6.8	33	64.7	24	54.6	10	19.6	44	100.0	51	100.0
l. Pasteurizing liquid eggs	10	22.7	11	20.8	0	0.0	*	*	32	72.7	40	75.5	*	*	*	*	44	100.0	53	100.0
m. Drying egg products	28	65.1	36	72.0	*	*	0	0.0	5	11.6	13	26.0	8	18.6	*	*	43	100.0	50	100.0
n. Pasteurizing dried egg whites	32	74.4	42	82.4	0	0.0	0	0.0	11	25.6	9	17.7	0	0.0	0	0.0	43	100.0	51	100.0
o. Packaging finished products	8	18.2	11	20.8	0	0.0	0	0.0	15	34.1	35	66.0	21	47.7	7	13.2	44	100.0	53	100.0
p. Storing finished products	5	10.9	5	9.1	4	8.7	*	*	16	34.8	42	76.4	21	45.7	7	12.7	46	100.0	55	100.0
No response																	0		1	

(continued)

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

**Table 5-2. Comparison of Weighted Responses for Section 2: Sanitation and Other Practices, 2004 and 2014 (continued)**

Question	2004		2014	
	n	%	n	%
2.2 <sup>a</sup> Which of the following records that are not required by FSIS does this plant maintain?				
1. Employee task performance log verification	34	70.8	43	78.2
2. Deviation and corrective action log	37	77.1	48	87.3
Total	59		55	
No response	0		2	
Question	n	%	n	%
2.3 How often are drains sanitized at this plant?				
1. Drains are not sanitized	5	8.3	3	5.9
2. One or more times per shift	10	16.7	8	15.7
3. One or more times per day, but not every shift	21	35.0	18	35.3
4. One or more times per week, but not every day	14	23.3	11	21.6
5. Less than once per week	3	5.0	4	7.8
6. No specific or regular frequency	7	11.7	7	13.7
Total	60	100.0	51	100.0
No response	0		6	
Question	n	%	n	%
2.5 <sup>a</sup> What sanitizing products are used at this plant?				
1. Quaternary ammonia	38	63.3	34	63.0
2. Trisodium phosphate	*	*	0	0.0
3. Chlorine	56	93.3	44	81.5
4. Iodine	19	31.7	8	14.8
5. Phosphoric acid	24	40.0	19	35.2
6. Acid quaternary compound	15	25.0	11	20.4
7. Acetic acid based compound	11	18.3	27	50.0
8. Dishwashing detergent	10	16.7	8	14.8
9. Other	7	11.7	0	0.0
Total	60		54	
No response	0		3	

(continued)

<sup>a</sup> Respondents could select multiple responses.

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

**Table 5-2. Comparison of Weighted Responses for Section 2: Sanitation and Other Practices, 2004 and 2014 (continued)**

Question	2004		2014	
	n	%	n	%
2.6 How frequently does this plant conduct sanitation inspections of product contact zones?				
1. More than once per shift	30	50.0	19	33.3
2. Once per shift before shift operations begin	7	11.7	11	19.3
3. Once per day before daily operations begin	19	31.7	20	35.1
4, 5. Once per week or once per month <sup>b</sup>	*	*	7	12.3
6. Less than once per month	0	0.0	0	0.0
7. No specific or regular frequency	*	*	0	0.0
8. This plant does not conduct sanitation inspections of product contact zones	*	*	0	0.0
Total	60	100.0	57	100.0
No response	0		0	
<b>Question</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>
2.7 How frequently does this plant conduct sanitation inspections of non-product contact zones?				
1. More than once per shift	19	31.7	18	31.6
2. Once per shift before shift operations begin	8	13.3	9	15.8
3. Once per day before daily operations begin	22	36.7	21	36.8
4, 5. Once per week or once per month <sup>b</sup>	9	15.0	9	15.8
6. Less than once per month	0	0.0	0	0.0
7. No specific or regular frequency	*	*	0	0.0
8. This plant does not conduct sanitation inspections of product contact zones	*	*	0	0.0
Total	60	100.0	57	100.0
No response	0		0	

<sup>a</sup> Respondents could select multiple responses.

<sup>b</sup> Responses were combined because of the small number of respondents.

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

**Table 5-3. Comparison of Weighted Responses for Section 3: Plant Microbial Testing Practices, 2004 and 2014**

Question	2004		2014	
	n	%	n	%
3.1 <sup>b</sup> Does this plant conduct microbiological testing in addition to the mandatory testing for <i>Salmonella</i> required by FSIS regulation?				
1. Yes	48	84.2	53	93.0
2. No	9	15.8	4	7.0
Total	57	100.0	57	100.0
No response	3		0	
Question	n	%	n	%
3.3 <sup>a</sup> During the past year, this plant tested which of the following?				
1. Egg products before pasteurization	23	47.9	36	76.6
2. Egg products after pasteurization	39	81.3	39	83.0
3. Product contact surfaces	25	86.2	39	83.0
4. Non-product contact surfaces	27	90.0	40	85.1
Total	30		47	
No response	3		6	
Question	n	%	n	%
3.4 <sup>a,c</sup> During the past year, what microbial indicators and pathogens were tested for by this plant?				
1. Aerobic plate count (APC)	36	75.0	44	86.3
2. Total plate count (TPC)	31	64.6	37	72.6
3. Total coliforms	38	79.2	49	96.1
4. Generic <i>E. coli</i>	36	75.0	42	82.4
6. Yeasts and molds	28	58.3	38	74.5
9. <i>Listeria</i> species	26	54.2	38	74.5
10. <i>Salmonella</i> species (presence or absence)	36	75.0	40	78.4
13. <i>Staphylococcus aureus</i>	29	60.4	29	56.9
Total	48		51	
No response	1		2	

<sup>a</sup> Respondents could select multiple responses.

<sup>b</sup> Response options in the two surveys differed; therefore, the results are combined so they can be compared.

<sup>c</sup> Only the pathogens listed in both the 2004 and 2014 surveys are shown.

**Table 5-4. Comparison of Weighted Responses for Section 4: Employee Training, 2004 and 2014**

Question	2004		2014	
	n	%	n	%
4.4 Approximately how many permanent production employees currently working at this plant have completed formal HACCP training?				
1. None	10	16.7	9	15.8
2. 1 to 3 employees	37	61.7	22	38.6
3. 4 to 9 employees	10	16.7	19	33.3
4. 10 to 20 employees	*	*	3	5.3
5. More than 20 employees	*	*	4	7.0
Total	60	100.0	57	100.0
No response	0		0	

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

**Table 5-5. Comparison of Weighted Responses for Section 5: Plant Characteristics, 2004 and 2014**

Question	2004		2014	
	n	Mean	n	Mean
5.1 What is the approximate percentage of the square footage of the production space of this plant? ( <i>Means are percentage of production space.</i> )				
a. Under 5 years old	57	14.6	56	10.3
b. 5 years to just under 20 years old	57	34.4	56	32.9
c. 20 years old or more	57	51.0	56	56.9
No response	3		1	
Question	n	%	n	%
5.2 How many production shifts are operated each day at this plant?				
1. One	34	57.6	33	57.9
2. Two	9	15.3	10	17.5
3. Three	16	27.1	14	24.6
Total	59	100.0	57	100.0
No response	1		0	
Question	n	%	n	%
5.3 <sup>a</sup> Does this plant operate a separate clean up shift?				
1. Yes	54	91.5	46	82.1
2. No	5	8.5	10	17.9
Total	59	100.0	56	100.0
No response	1		1	
Question	n	Mean	n	Mean
5.4 Approximately how many production employees are employed at this plant? ( <i>Means are number of employees.</i> )				
Number of employees	60	74.8	52	79.1
No response	0		5	

(continued)

<sup>a</sup> Response options in the two surveys differed; therefore, the results are combined so they can be compared.<sup>b</sup> Responses were combined because of the small number of respondents.

**Table 5-5. Comparison of Weighted Responses for Section 5: Plant Characteristics, 2004 and 2014 (continued)**

Question	2004		2014	
	n	%	n	%
5.5 Approximately how many employees at this plant work in a quality control/quality assurance (QC/QA) department, including food safety?				
1, 2. 0 to 5 <sup>b</sup>	46	79.3	42	73.7
3. 6 to 10	8	13.8	6	10.5
4. 11 or more	4	6.9	9	15.8
Total	58	100.0	57	100.0
No response	2		0	
Question	n	%	n	%
5.7 <sup>a</sup> Who conducts independent, third-party food safety audits of this plant's egg products processing operations?				
1. This plant's egg products processing operations are not audited by independent, third-party auditors	10	16.7	9	15.8
2. Independent, third-party auditors that are hired by this plant or corporate headquarters	36	60.0	43	75.4
3. Independent, third-party auditors that are hired by customers of this plant	23	38.3	19	33.3
4. Customers of this plant (for example, food service, military)	47	78.3	34	59.7
Total	60		57	
No response	0		0	

<sup>a</sup> Respondents could select multiple responses.

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



# 6

## Conclusions

Over half of respondents completed the survey by Web; thus, we recommend that FSIS continue to offer this as an option in future industry surveys.

RTI conducted the 2014 Egg Products Industry Survey as a follow-up to a survey of egg packing and products industries that was conducted for FSIS in 2004. The purpose of the 2014 survey was to assess changes in industry's use of technologies and food safety practices and to collect information on additional topics of interest to the agency.

The survey was administered using a multimodal approach, allowing respondents to choose whether they wanted to complete a paper or Web survey and contacting the plants using a variety of telephone, mail, and e-mail methods. A total of 57 plants completed the survey (72% response rate).

The survey findings suggest some improvements in the egg product processing industry's use of food safety technologies and practices over the past 10 years. Plants employ a variety of technologies to process eggs. Comparing the 2004 and 2014 survey results, the percentage of plants using advanced pasteurization technology and an integrated, computerized processing system increased by almost 30 percentage points since 2004.

Although current regulations do not require a written HACCP plan, 93% of plants use a written HACCP plan to address at least one production step in their process. Each egg products plant has an average of six employees with formal HACCP training. Furthermore, 90% of plants have management employees that are trained in HACCP.

Most egg products plants (93%) conduct microbiological testing in addition to mandatory testing required by FSIS. Almost 80% of plants hold product while awaiting test results. Comparing the 2004 and 2014 surveys, the percentage of plants conducting microbiological testing on egg products prior to pasteurization has increased by almost 30 percentage points,

while the percentage of plants conducting testing on egg products after pasteurization and on product contact surfaces was similar in both years. The largest increase in testing was for *Listeria* species, with a 21 percentage point increase from 2004 to 2014.

Egg products plants emphasize traceability and recalls: the percentage of plants that trace products and conduct mock recalls was quite high. A higher percentage of large plants (annual production volume > 50,000,000 pounds) conduct and document mock recalls and crisis management exercises compared with small plants, but over half of all small plants conduct these activities.

All plants provide some type of food safety training for new hires. Similarly, almost all plants also provide continuing food safety training for permanent production employees. However, most plants reported that they do not use FSIS resources such as the FSIS Web site, DVDs, webinars, or workshops for training purposes. This could be an area for further exploration to understand why these resources have not been used and how their use might increase.

# **Appendix A: Survey Instrument**

Form Approved: OMB No. 0583-0162  
Expiration Date: 12/31/2016  
See OMB Statement on inside cover

# Survey of Egg Products Processing Plants

**2014**

**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 60 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:

Gary Noyes  
Policy Analysis Division  
Office of Policy and Program Development  
Food Safety and Inspection Service, USDA  
Phone: (301) 504-3672  
E-mail: [Gary.Noyes@fsis.usda.gov](mailto:Gary.Noyes@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 any questions about your rights as a study participant, you may call RTI's Office of Research Protection at 1-866-214-2043.

## Instructions

The U.S. Department of Agriculture, Food Safety and Inspection Service (USDA, FSIS), has contracted with RTI International to conduct a survey of egg products processing plants. This survey, a follow-up to a survey that was conducted in 2003, collects information about industry's use of food safety technologies and practices. The purpose of this new survey is to understand changes in industry's use of food safety technologies and practices and to collect accurate, up-to-date information to guide policy making and help FSIS fulfill its regulatory responsibilities with the minimum burden possible to industry.

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

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

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

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

**Please return the completed survey within 10 business days in the enclosed postage-paid return envelope, or to RTI International at 3040 Cornwallis Rd, Hobbs Building 116, Research Triangle Park, NC 27709.**

### Questions?

#### Contact the Survey Helpline

If you have any questions as you complete the survey, please send an e-mail to [SurveyFSIS@rti.org](mailto:SurveyFSIS@rti.org) or call toll-free at 866-590-7468. We operate the Helpline on weekdays from 9:00 a.m. to 5:00 p.m. EST.

# 1 Egg Products Processing Operations

By **egg inputs** we mean eggs that are received for further processing and /or repackaging.

- 1.1** Which statement below describes how this plant receives **egg inputs**?
1. This plant receives shell eggs only
  2. This plant receives both shell eggs and liquid or dried eggs
  3. This plant receives liquid eggs only
  4. This plant receives dried eggs only

**If this plant receives liquid or dried eggs only, go to Question 1.10 on page 4**

- 1.2** What is the source of eggs processed by this plant? **Enter responses as a percentage of annual production between zero and 100 for each source of eggs listed below. Responses should add to 100%.**

	Source of Eggs Processed by this Plant			
	Inline Layer Facilities	Offline Layer Facilities		Total
		Company-Owned or Contracted Layer Facilities	Open Market Purchases	
Percentage of annual production	%	%	%	100%

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

**If this plant receives restricted eggs only, check (✓) the box and go to Question 1.4.**

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

**1.3** What is the **age** of non-restricted eggs when they are received at this plant? **For each age category shown below, enter your responses as a percentage of annual production between zero and 100. Responses should add to 100%.**

	Age of Non-restricted Eggs When They Are Received							
	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
Percentage of annual production using non-restricted eggs	%	%	%	%	%	%	%	100%

**1.4** What percentage of eggs processed at this plant are restricted eggs?

1. None **Go to Question 1.6**
2. Less than 5 percent
3. 6 to 10 percent
4. 11 to 20 percent
5. 21 to 50 percent
6. 51 to 100 percent

**1.5** What is the age of restricted eggs when they are received at this plant? **For each age category shown below, enter responses as a percentage of annual production between zero and 100. Responses should add to 100%.**

	Age of Restricted Eggs When They Are Received							
	Less than 36 Hours	36 Hours to 3 Days	4 to 6 Days	7 to 10 Days	11 to 15 Days	16 to 20 Days	21 Days or Older	Total
Percentage of annual production using restricted eggs	%	%	%	%	%	%	%	100%

**If this plant receives eggs from an inline source only, check (✓) the box and go to Question 1.7.**

**1.6** Are eggs that are received by your plant within 36 hours of lay refrigerated during transportation to this plant?

1. This plant does not receive eggs within 36 hours of lay
2. Yes
3. No

**1.7** Considering all sources of eggs processed by this plant, once eggs are received at this processing plant, how long are they stored before breaking? **For each time category shown below, enter your responses as a percentage of annual production between zero and 100. Responses should add to 100%.**

	Number of Days Eggs Are Stored before Breaking							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	
Percentage of annual production	%	%	%	%	%	%	%	100%

**1.8** 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

**1.9** To what temperature do you temper eggs before breaking?

1. This plant does not temper eggs before breaking
2. 45 to 60°F
3. 61 to 75°F
4. 76 to 90°F
5. 91°F or above

By **advanced pasteurization technology** we mean validated processing technologies that result in *Salmonella*-negative product.

By **integrated, computerized processing system** we mean the use of computerized systems to manage and control part or all of a manufacturing process.

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

By **inedible** we mean egg products that are sold (not discarded) for pet food or other nonedible uses.

By **typical lot size** we mean an approximation of lot size for most production runs.

**1.10** Which of the technologies, equipment, or practices listed below are currently used by this plant? **Circle all that apply.**

1. In-shell pasteurization process
2. **Advanced pasteurization technology**
3. Liquid egg concentrating technology (for example, reverse osmosis)
4. **Integrated, computerized processing system**
5. Environmentally controlled packaging system
6. Egg white drying process (with or without ingredients)
7. Egg yellow drying process (with or without ingredients)
8. Enzyme modified yellow process
9. Repackaging of dried egg whites product
10. Repackaging of dried yellow egg product
11. Other new technologies (specify: \_\_\_\_\_)
12. None of the above

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

**1.11** For each product form listed below, circle "Yes" or "No" to indicate whether this plant produces the product form. If "Yes," provide an estimate of the total pounds produced by this plant during the past year and the **typical lot size.**

Product Form	Does Plant Produce this Product Form?		Annual Production (pounds)	Typical Lot Size (pounds)
a. Liquid	Yes	No		
b. <b>Blended</b> and liquid	Yes	No		
c. Frozen	Yes	No		
d. Blended and frozen	Yes	No		
e. Dried	Yes	No		
f. Blended and dried	Yes	No		
g. Extended shelf life liquid	Yes	No		
h. <b>Inedible</b>	Yes	No		

**1.12** For each product type listed below, circle “Yes” or “No” to indicate whether this plant produces the product type. If “Yes,” provide the time and temperature for pasteurization.

<b>Whole Egg Products</b>	<b>Does Plant Produce this Product Type?</b>		<b>Pasteurization Time (minutes)</b>	<b>Pasteurization Temperature (°F)</b>
a. Plain whole eggs	Yes	No		
b. Whole egg blends (with less than 2% added non-egg ingredients)	Yes	No		
c. Fortified whole eggs and blends (24-38% egg solids, 2-12% added non-egg ingredients)	Yes	No		
d. Whole eggs with less than 2% added salt	Yes	No		
e. Whole eggs with 2-12% added sugar	Yes	No		

<b>Yolk Products</b>	<b>Does Plant Produce this Product Type?</b>		<b>Pasteurization Time (minutes)</b>	<b>Pasteurization Temperature (°F)</b>
a. Plain yolks	Yes	No		
b. Yolks with greater than 2% salt added	Yes	No		
c. Yolks with greater than 2% sugar added	Yes	No		
d. Yolks with less than 2% non-egg ingredients	Yes	No		
e. Yolks with greater than 2% non-egg ingredients	Yes	No		

<b>Egg White Products</b>	<b>Does Plant Produce this Product Type?</b>		<b>Pasteurization Time (minutes)</b>	<b>Pasteurization Temperature (°F)</b>
a. Plain egg whites (no chemicals)	Yes	No		
b. Egg whites with less than 2% non-egg ingredients	Yes	No		
c. Egg whites with greater than 2% non-egg ingredients	Yes	No		
d. Egg whites with processing aids	Yes	No		
e. Egg whites with processing aids and less than 2% non-egg ingredients	Yes	No		
f. Egg whites with processing aids and greater than 2% non-egg ingredients	Yes	No		
g. <b>Egg substitutes</b>	Yes	No		

By **egg substitutes** we mean egg white products that are made nutritionally equivalent to an egg product by the addition of vitamins and minerals.

By **processing aids** we mean substances that enable pasteurization at a lower temperature while achieving the same lethality and minimizing the impact on the functional properties of the product.

**1.13** Does this plant use **processing aids** in producing egg whites?

1. This plant does not produce egg whites
2. Yes
3. No

**1.14** Which statement(s) below describes this plant's importing practices for egg inputs? **Circle all that apply**

1. This plant does not receive imported shell or liquid eggs
2. This plant receives imported shell eggs
3. This plant receives imported liquid eggs

## 2 Sanitation and Other Practices

**2.1** What production steps are used by this plant, and if used, is the step addressed in a written plan? **Check (✓) only one response in each row of the table below.**

<b>Production Step</b>	<b>Not Used by this Plant</b> 1	<b>Used but Not Addressed in a Written Plan</b> 2	<b>Used and Addressed in a Written HACCP Plan</b> 3	<b>Used and Addressed in Some Other Type of Written Plan (not HACCP)</b> 4
a. Receiving shell eggs				
b. Receiving liquid eggs				
c. Receiving non-egg ingredients				
d. Receiving packaging materials				
e. Storing shell or liquid eggs				
f. Storing non-egg ingredients				
g. Storing packaging material				
h. In-shell pasteurization				
i. Handling of restricted eggs				
j. Breaking shell eggs				
k. Blending formulation				
l. Pasteurizing liquid eggs				
m. Drying egg products				
n. Pasteurizing dried egg whites				
o. Packaging finished products				
p. Storing finished products				

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 (CCPs), (e) preventive measures and corrective actions, and (f) written records that verify monitoring and frequency of monitoring of CCPs and corrective actions.

At this time, HACCP is not required by FSIS for egg products processing plants.

By **records** we mean written or electronic logs or diaries used to document:

- (1) tasks completed,
- (2) observations made, and
- (3) any corrective actions taken.

**2.2** Which of the following **records** that are not required by FSIS does this plant maintain? **Circle all that apply.**

- 1. Employee task performance log verification
- 2. Deviation and corrective action log
- 3. Other records not required by FSIS (specify)

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**2.3** How often are drains sanitized at this plant?

- 1. Drains are not sanitized
- 2. One or more times per shift
- 3. One or more times per day, but not every shift
- 4. One or more times per week, but not every day
- 5. Less than once per week
- 6. No specific or regular frequency

**2.4** Does this plant rotate sanitizing chemicals used on food contact equipment on an annual or more frequent basis?

- 1. Yes
- 2. No

**2.5** What sanitizing products are used at this plant? **Circle all that apply.**

- 1. Quaternary ammonia
- 2. Trisodium phosphate
- 3. Chlorine
- 4. Iodine
- 5. Phosphoric acid
- 6. Acid quaternary compound
- 7. Acetic acid based compound
- 8. Dishwashing detergent
- 9. Other (specify)

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**2.6** How frequently does this plant conduct sanitation inspections of product contact zones? **Circle only one response.**

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? **Circle only one response.**

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

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

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

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

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

1. Has written policies and procedures for recalling product
2. Conducts mock recalls of lot codes delivered to specific customers
3. Conducts mock recalls of lot codes backwards to raw material suppliers
4. Documents mock recall exercises and conducts a self-assessment
5. Has a written crisis management program beyond the scope of product recalls
6. Conducts crisis management exercises
7. None of the above

### 3 Plant Microbial Testing Practices

**Please answer the questions in this section for voluntary testing that is conducted by this plant.**

**3.1** Does this plant conduct microbiological testing in addition to the mandatory testing for *Salmonella* required by FSIS regulation?

1. Yes, using a company owned lab
2. Yes, using an independent commercial lab
3. Yes, using both company and commercial labs
4. No **Go to Question 4.1 on page 13**

**3.2** Does this plant use an FSIS-approved Pasteurized Egg Products Recognized Laboratory (PEPRLab) for testing not required by FSIS regulation?

1. Yes, using an onsite PEPRLab
2. Yes, using an offsite PEPRLab
3. No

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

1. Egg products before pasteurization
2. Egg products after pasteurization
3. Product contact surfaces
4. Non-product contact surfaces

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

1. Aerobic plate count (APC)
2. Total plate count (TPC)
3. Total coliforms
4. Generic *E. coli*
5. *Enterobacteriaceae*
6. Yeasts and molds
7. *Bacillus cereus*
8. *Clostridium perfringens*
9. *Listeria* species
10. *Salmonella* species (presence or absence)
11. *Salmonella* species enumeration (cfu/g)
12. *Salmonella* serotype
13. *Staphylococcus aureus*
14. None of the above

Note: Generic *E. coli* testing is **not** the same as testing for general coliforms.

**3.5** Where does this plant hold product while waiting for product microbiological test results? **Circle all that apply.**

1. This plant does not hold product while waiting for product test results
  2. Onsite (in house)
  3. Offsite warehouse
  4. Refrigerated truck (secured and stationary)
  5. Sealed in-transit in company-owned refrigerated truck
  6. Other (specify)
- 

**3.6** Does this plant hold product while waiting for environmental test results?

1. This plant does not conduct environmental tests
2. Yes
3. No

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

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

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

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

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

## 4 Employee Training

**4.1** What **food safety training** is provided for **newly hired permanent production employees** of this plant? **Circle all that apply.**

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

**4.2** What food safety training is provided for **temporary production employees** of this plant? **Circle all that apply.**

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

**4.3** What **continuing food safety training** is provided for permanent production employees of this plant? **Circle all that apply.**

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

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

**4.4** Approximately how many permanent production employees currently working at this plant have completed formal **HACCP** training (for example, an online or multi-day, in person course)? ***If none, write 0.***

|\_|\_|\_| employees

**4.5** During the past year, what types of food safety training did permanent employees of this plant receive? ***For each type of employee, check (✓) each type of training that was provided. Include informal and scheduled training.***

Type of Training	Type of Employee	
	Management Employees	Production Employees
a. HACCP		
b. Sanitation SOPs		
c. Recall procedures		
d. Quality control		
e. Records and documentation		
f. Lock out / tag out (LOTO)		
g. Food defense		

**4.6** During the past year, what FSIS resources did this plant use for training?

1. None
2. FSIS Web site
3. CDs produced by FSIS
4. DVDs produced by FSIS
5. FSIS-sponsored Webinars
6. FSIS-sponsored Workshops
7. Other FSIS resources

## 5 Plant Characteristics

Your best estimates are acceptable.

**5.1** What is the approximate percentage of the square footage of the production space of this plant that is under 5 years old, 5 years to just under 20 years old, or 20 years old or more? **Responses should add to 100%.**

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

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

1. One
2. Two
3. Three

**5.3** Does this plant operate a separate clean up shift? **Circle all that apply.**

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

**5.4** Approximately how many production employees are employed at this plant? **Provide an average number over the past year for each type of employee.**

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

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

**5.5** Approximately how many employees at this plant work in a quality control/quality assurance (QC/QA) department, including food safety?

1. None Go to Question 5.7
2. 1 to 5
3. 6 to 10
4. 11 or more

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

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

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

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

**5.7** Who conducts independent, third-party food safety **audits** of this plant's egg products processing operations? **Circle all that apply.**

1. This plant's egg products processing operations are not audited by independent, third-party auditors
2. Independent, third-party auditors that are hired by this plant or corporate headquarters
3. Independent, third-party auditors that are hired by customers of this plant
4. Customers of this plant (for example, food service, military)

**5.8** What **certifications** are required by customers of this plant? **Circle all that apply.**

1. None
2. Global Food Safety Initiative (GFSI) benchmarked certifications (includes FSSC 22000, BRC, IFS, and SQF)
3. Organic certification
4. Other (specify)  
\_\_\_\_\_  
\_\_\_\_\_

**5.9** What percentage of this plant's product is exported outside of the United States?

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

**5.10** Calculated as a percentage of total production, how were this plant’s products packaged and branded during the past year? **Responses should add to 100%.**

Packaged Within Producing Plant	Type of Packaging and Branding	Percentage (%)
Consumer packaged	a. Generic consumer packaging and no brand labeling	
	b. Consumer packaging with plant’s own company brand name	
	c. Consumer packaging with another company’s brand name (for example, private label or store brand)	
Bulk packaged pasteurized product	d. Institutional size or bulk products with no brand name	
	e. Institutional size or bulk products with plant’s company or brand name	
	f. Bulk products labeled as “Distributed By” or “Packed For” another company or brand name	
Unpasteurized bulk product	g. Unpasteurized bulk product sent to other egg plants that will pasteurize the product	
Other	h. Specify: _____	
Total		100%

**5.11** What was the approximate value of egg product sales revenue during the past year?

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

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

**5.12** What was the approximate value of total plant sales revenue during the past year?

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

***Thank you for completing the survey.***

# **Appendix B: Survey Materials**

## FSIS PRENOTICE LETTER



United States Department of Agriculture

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Food Safety and  
Inspection Service

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

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

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 products industries to control pathogens and promote food safety. The enclosed brochure provides additional information on the survey. You may recall receiving a similar survey a few years ago. This survey contains similar questions that will be used to assess food safety and technology adoption trends over time.

All egg products plants were 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 plant, complete the survey.

FSIS has contracted with RTI International to develop and conduct this nationwide survey. A representative from RTI will call you soon to identify the person at your plant who should complete the survey. RTI will then send this individual the survey to complete (the survey is not enclosed).

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

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

Sincerely,

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

Alfred V. Almanza  
Administrator

## INFORMATIONAL BROCHURE

### Q. What is this study about?

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

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

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

### Q. Why should I complete this survey?

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

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

It is important that all selected plants, including those that are state-inspected and those that are very small, complete the survey.

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

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

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

### Q. When should I return my completed survey?

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

### Q. How was my plant selected to participate?

A. Because of the small number of plants, all egg products plants in the United States are being asked to complete the survey. Without your response, the survey could fail to produce information that accurately represents the industry, so your participation is very important.

### Q. Is the survey confidential?

A. Individual data collected by RTI International in this study will be kept confidential to the extent permissible by law. Only anonymous data (no identifying information on your firm) will be provided to FSIS. RTI is a respected leader in survey research, and we will not jeopardize our reputation by compromising our pledge of confidentiality.

**Q. Who is RTI International?**

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

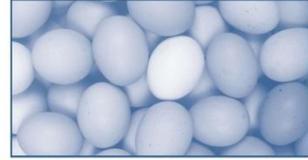
**Q. How can I find out more about this survey?**

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

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

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

## Survey of Egg Products Processing Plants



## THANK YOU/REMINDER POSTCARD



(Date)

Dear [Respondent Name]:

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

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

If you have any questions, please contact me toll-free at 1-866-590-7468 or [SurveyFSIS@rti.org](mailto:SurveyFSIS@rti.org). Thank you again.

Sincerely,

[interviewer name]

RTI International