UNITED STATES DEPARTMENT OF AGRICULTURE

SUPPORTING STATEMENT - PART B for

OMB Control Number: 0579-0260

Title: Center for Epidemiology and Animal Health (CEAH), National Animal Health Monitoring System (NAHMS) Poultry 2025 Small Enterprise Study: A National Study of Layers, Broilers, and Turkeys

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B. Collections of Information Employing Statistical Methods

1. Describe (including a numerical estimate) the potential respondent universe and any sampling or other respondent selection method to be used. Data on the number of entities (e.g., establishments, state and local government units, households, or persons) in the universe covered by the collection and in the corresponding sample are to be provided in tabular form for the universe as a whole and for each of the strata in the proposed sample. Indicate expected response rates for the collection as a whole. If the collection had been conducted previously, include the actual response rate achieved during the last collection.

The potential respondent universe of the Poultry 2025 Small Enterprise Study is all operations on the National Agricultural Statistics Service (NASS) frame

a) With an inventory of 1,000–74,999 table egg layer chickens (excluding hatching layers and pullets) [hereafter referred to as layers],
b) That sold or moved 1,000–99,999 broiler chickens (raised for meat production) in the year [hereafter referred to as broilers], or
c) That sold or moved 1,000–29,999 turkeys raised for meat production (excluding breeders) in the year [hereafter referred to as turkeys],

in all 50 states, with the reference population being all operations in all 50 states under definitions a-c above. See Tables A.1–A.4 in Appendix A for the historical size of the reference population.

The size categories were chosen to align with the National Poultry Improvement Plan[1] (NPIP) definitions of commercial operations to establish cut offs for small enterprise operations and to target a sub-population of the U.S. layer, broiler, and turkey population that is underserved, with many initiatives and studies around highly pathogenic avian influenza (HPAI) being focused on large commercial operations and backyard operations, but relatively few around the in-between, small enterprise group of operations.

The current study is an evolution of previous APHIS–NAHMS studies of the health and management of poultry in the U.S., with changes in the scope and design made in response to the recent HPAI outbreaks in the U.S. There have been APHIS–NAHMS Poultry studies in the following years, each with the given focus:

- The NAHMS Layer 1999 Study focused on table egg layer operations with 30,000 or more laying hens across 30 states[2].
- The NAHMS Poultry 2004 Study focused on:
    - Backyard/small production flocks with layers, broilers, or turkeys within a 1-mile radius of commercial operations with at least 10,000 chickens or at least 5,000 turkeys in 18 states, where the backyard/small production flocks all had between 1 and 999 birds, with an average of 35.1 birds[3],

[1] See https://www.poultryimprovement.org/ and 9 CFR 53.10 https://www.ecfr.gov/current/title-9/chapter-I/subchapter-B/part-53/section-53.10.
[2] See https://www.aphis.usda.gov/sites/default/files/layers99_dr_parti.pdf.
[3] See https://www.aphis.usda.gov/sites/default/files/poultry04_dr_parti.pdf.

    - Gamefowl breeder flocks that were members of the United Gamefowl Breeder Association (UGBA) and State gamefowl associations not associated with the UGBA[4], and
    - Live-poultry markets in seven regions in the U.S.[5]
- The NAHMS Poultry 2007 Study focused on small enterprise chicken operations with 1,000–19,999 chickens across all 50 states[6].
- The NAHMS Poultry 2010 Study had two parts focused on:
    - Households that owned poultry in four metropolitan areas in the U.S.[7], and
    - Customers of feed stores (three metropolitan areas) and a chicken club (one metropolitan area) in the U.S.[8].
    - Large chicken breeder, broiler, table-egg, and meat turkey companies from the WATT Poultry USA published lists of top poultry companies in the U.S.[9]
- The NAHMS Layers 2013 Study focused on table egg layer operations registered with the Food and Drug Administration with 3,000 or more laying hens across 19 states[10].
- The NAHMS HPAI 2022 Case-control studies focused on commercial table egg layer, pullet, and breeder operations in 8 states[11] and commercial meat turkey operations in 13 states[12].

The current study is most closely related to the NAHMS Poultry 2007 Study small enterprise component, with expanded focus on meat turkey operations, expanded definitions for the sizes of small enterprise operations, and inclusion of operations across all 50 states, which addresses one of the design goals of APHIS–NAHMS national study design, to include states that account for at least 70 percent of the animals and operators/producers in the United States.

APHIS–NAHMS will partner with NASS to complete the study. The survey will be administered by mail, web, and phone, and is expected to have a response rate of approximately 33 percent, where response is the percentage of completed surveys from respondents that meet the small enterprise layer, broiler, or turkey operation size criteria. The estimated response rate from previous APHIS–NAHMS studies are given in Table C.1 in Appendix C. Based on these rates, and the fact that this study will be multi-modal, we expect the response rate to be higher than it was in 2022 for the HPAI studies (which both used phone modes only), but lower than they were in 2007 and in 2013 for the NAHMS poultry studies in those years.

2. Describe the procedures for the collection of information including:

Statistical methodology for stratification and sample selection:

[4] See https://www.aphis.usda.gov/sites/default/files/poultry04_dr_partii.pdf.
[5] See https://www.aphis.usda.gov/sites/default/files/poultry04_dr_partiii.pdf.
[6] See https://www.aphis.usda.gov/sites/default/files/poultry07_smallchicken.pdf.
[7] See https://www.aphis.usda.gov/sites/default/files/poultry10_dr_urban_chicken_four.pdf.
[8] See https://www.aphis.usda.gov/sites/default/files/poultry10_dr_urban_chicken.pdf.
[9] See https://www.aphis.usda.gov/sites/default/files/poultry10_dr_breeder.pdf.
[10] See https://www.aphis.usda.gov/sites/default/files/layers2013-dr-parti.pdf.
[11] See https://www.aphis.usda.gov/sites/default/files/hpai-table-egg-layers-case-control-study-updated-findings.pdf.
[12] See https://www.aphis.usda.gov/sites/default/files/hpai-turkey-case-control-study-updated-findings.pdf.

A total sample of up to 5,525 operations will be sampled across all 50 states. The sample will be stratified by operation type (layers, broilers, and turkeys) and by state. Because there are relatively few broiler and turkey operations in the target population, it is expected that all of the broiler and turkey operations in the target population will be sampled. A subset of the layer operations will be selected, with stratification by state and by size category, with levels being defined by the inventory of layers (1,000–29,999 and 30,000–74,999). Given the number of broiler and turkey operations in the target population at the time of sampling, these operations may be sampled with similar stratification as well. The sample will be drawn from the NASS list frame, using information from the 2022 Census of Agriculture.

Reporting will be done for each operation type, and will be done at the National, regional, and size levels, with region and size being defined separately for each operation type, as below. In addition, if sample sizes are adequate, estimates will be given for operations in close proximity (less than 1-mile radius) to larger commercial operations.

- Layers
    - National
    - Region (states)
        - **West** (Alaska, Arizona, California, Colorado, Hawaii, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, Wyoming)
        - **Northeast** (Connecticut, Delaware, Illinois, Indiana, Iowa, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, Virginia, West Virginia, Wisconsin)
        - **Southeast** (Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee)
    - Size (inventory of layers)
        - **Small** (1,000–29,999)
        - **Large** (30,000–74,999)
- Broilers
    - National
    - Region (states) [same regions as above for the layer operations]
    - Size (number of broilers sold or moved in the year)
        - **Small** (1,000–19,999)
        - **Large** (20,000–99,999)
- Turkeys
    - National
    - Size (number of turkeys sold or moved in the year)
        - **Small** (1,000–9,999)
        - **Large** (10,000–29,999)

Estimation procedure:

The sampling design is a stratified random sample with unequal probabilities of selection. The statistical estimation will be undertaken using either SAS survey procedures, SUDAAN,

and/or R survey functions. The software packages use a Taylor series expansion to estimate appropriate variances for the stratified, weighted data.

Degree of precision needed for the purpose described in the justification:

APHIS–NAHMS' goal is to produce descriptive statistics (proportions or means) with a coefficient of variation (CV) of 20 percent or less. If possible, given adequate response rates, estimates will be produced by operation type and by the breakout variables for region and size as noted above.

In order to meet the precision criteria within each of the given stratification cells, we require an overall sample size of approximately 550-layer operations, 467 broiler operations, and 292 turkey operations, assuming that a simple random sample with a perfect response rate is taken. However, due to practical considerations, we must account for the expected completion rate of approximately 33 percent and an expected design effect of approximately 1.5 (derived from a sample of questions from NAHMS Poultry studies) to obtain estimates meeting the precision criterion of aiming for a CV of 20 percent or less. An overall sample size of 5,525 is required after adjusting for these factors and the total number of operations in the population.

Tables B.1 and B.2 in Appendix B show estimates of precision based on the total sample of 5,525, by operation type and by the breakout variables given above. All of the estimated CVs for proportion estimates of 0.25 or more, except for broiler operations in the West region, are expected to be below 20 percent.

Reporting strata may be adjusted depending on the number of respondents. In general, if sample sizes are too small or CVs too large, those estimates are not published.

- **Unusual problems requiring specialized sampling procedures and data collection cycles:**

  There are no unusual problems requiring specialized sampling procedures and data collection cycles.

- **Any use of periodic (less frequent than annual) data collection cycles to reduce burden:**

  The data collection described is not planned to be carried out on an annual or less than annual frequency basis.

3. Describe methods to maximize response rates and to deal with issues of non-response. The accuracy and reliability of information collected must be shown to be adequate for intended uses. For collections based on sampling, a special justification must be provided for any collection that will not yield "reliable" data that can be generalized to the universe studied.

- **Questionnaire Design and Training:**

1. The study minimizes collection of data to that which is absolutely necessary to meet the stated objectives. Questionnaires are extensively reviewed by APHIS–NAHMS, APHIS–Veterinary Services–Poultry Health Center staff, NASS staff, and industry experts.

2. The Poultry 2025 Small Enterprise Study lead has made numerous contacts and collaborative efforts to identify the information needs of the layer, broiler, and turkey industries and the best way to ask for that information via questionnaire.

3. Skip logic is used in the questionnaire to guide respondents to sections relevant to their operation and practices and avoid sections that would not be applicable or valuable for their operation. For example, some questions are asked for layer, broiler, and turkey operations, while other sections are asked only for those owning one type of bird, meaning those who don't own that type of bird will be able to skip out of the given section.

4. Data collectors and data handlers will have been trained on data and information security guidelines.

5. APHIS–NAHMS staff will develop training materials, including an interviewer's manual, for NASS enumerators that explain the purpose of the study, benefits of participation to producers and to the industry, and address anticipated difficulties with questions. APHIS–NAHMS and NASS will co-lead training meetings with NASS staff and enumerators.

- **<u>Contacting Respondents</u>:**

1. APHIS–NAHMS staff have coordinated with USDA–Economic Research Service (ERS) staff on the upcoming ERS study on broiler producers. Because the focus of the current study is on small enterprise operations, contacts of the small enterprise operations are expected to have minimal overlap with contacts for the ERS broiler study.

2. Communication of the study will be coordinated with APHIS and NASS public affairs groups. Communication will also be coordinated with and promoted through industry group channels, extension, and universities, and at industry meetings when possible.

3. Promotional materials will be published to announce the upcoming study to potential study participants and stakeholders via stakeholder releases, social media releases, and other communications with industry, extension, and related groups.

4. Presurvey letters will be sent to selected producers prior to the study to notify them of the benefits of participation to them and to the industry and the upcoming study activities and timelines.

5. Reminder cards will be sent to producers to encourage participation in the study.

6. 'Thank you' cards will be sent to producers who complete the study.

7. Data collectors will contact producers to set up a convenient time for the producer to complete the questionnaire and will let them know of the opportunities to complete the questionnaire themselves at a time that is convenient for them on a paper or web-based form.

8. NASS enumerators have gone through specific training to help them answer questions of reluctant producers to maximize response rates.

9. Where possible, translations of survey materials will be made to accommodate the needs of survey respondents.

- **<u>Nonresponse adjustment</u>:**

1. Baseline response rates are taken from the NAHMS Poultry 2007 Small Enterprise Chicken, NAHMS Layers 2013, HPAI 2022 Case-control Turkeys, and HPAI 2022 Case-control Layers studies and are shown in Table C.1 in Appendix C.

2. APHIS will adjust selection weights, which will be provided by NASS, for non-response using NASS-supplied stratification variables. Weights of eligible non-respondents will be transferred to responding operations that are most similar based on available data, including the state and size category stratification variables. The non-response adjustment will use the method of propensity scores, in which a logistic regression model is constructed to predict the probability of responding. The inverse of this probability is the nonresponse adjustment.

3. If the respondents differ substantially from the non-respondents, then there is potential for bias. NASS' List Frame data may be available for both respondents and non-respondents to allow for examination of potential differences in type of responding and non-responding operations. If needed, APHIS will perform a non-response bias analysis to investigate unexpected response patterns to guide future sampling efforts. If significant nonresponse bias is found, the factors contributing to the bias will be incorporated into the nonresponse weight adjustment using post-stratification raking procedures.

- **<u>Sampling and design strategies</u>:**

1. The study sample will use information collected on the 2022 Census of Agriculture, and will target small enterprise operations, which are expected to have less fluctuation in terms of animal ownership and business operations than smaller operations, while also avoiding contacting very large, commercial operations, which tend to be included in surveys with higher probability than the small commercial operations.

2. Multiple mode options for response were chosen to meet the varied response mode preferences of producers. Preferred response modes vary across the population, and so making available a selection of response opportunities to fit producer's schedules and preferences.

3. In-person data collection will not be required for this study, thereby eliminating the disease risk to the operation from outside persons coming onto the operation for survey administration.

4. Describe any tests of procedures or methods to be undertaken. Testing is encouraged as an effective means of refining collections of information to minimize burden and improve utility. Tests must be approved if they call for answers to identical questions from 10 or more respondents. A proposed test or set of tests may be submitted for approval separately or in combination with the main collection of information.

APHIS and NASS will pretest the survey prior to field enumeration, involving fewer than 10 respondents. APHIS will use the results of these pretests to refine the surveys in order to reduce respondent burden and improve the accuracy and usefulness of the information. The pretested and revised questions from the NAHMS Poultry 2007 Small Chicken, the NAHMS Layers 1999 and 2013 Studies, as well as the HPAI 2022 Turkey and HPAI 2022 Table Egg Case-Control studies have been used as a baseline, where possible, in order to borrow from the work performed during those studies and to ensure that trends on particular topics can be drawn across the studies. The final questionnaires will have been reviewed by a variety of experts, including academic researchers, industry representatives, extension agents, veterinarians, health specialists, and epidemiologists.

5. Provide the name and telephone number of individuals consulted on statistical aspects of the design and the name of the agency unit, contractor(s), grantee(s), or other person(s) who will actually collect and/or analyze the information for the agency.

The statistical aspects of the design were coordinated by:

- Mr. Matthew Branan, Mathematical Statistician, National Animal Health Monitoring System, USDA, APHIS, VS, CEAH, Fort Collins, CO (970-494-7349).

For survey design and methodology and for a NASS review of the OMB package submission, NAHMS will coordinate with survey methodologists reporting to:

- Mr. Daniel Beckler, Chief, Standards and Survey Development Methodology Branch, USDA, NASS, Washington, DC (202-720-8858).

The actual data collection will be conducted by NASS enumerators. Contact persons for data collection are:

- Ms. Suzanne Adams, Chief, Survey Administration Branch, USDA, NASS, Washington, DC (202-400-1202).

Analysis of the data will be accomplished by APHIS–NAHMS veterinarians, epidemiologists, and statisticians under the direction of:

- Dr. Katherine Marshall, Assistant Director, National Animal Health Monitoring System, USDA APHIS, VS, CEAH, Fort Collins, CO (970-494-7259).

Appendix A: Target Population
The numbers describing the target population are taken from the NASS 2022 Census of Agriculture.

Table A.1: Numbers of operations with any birds of the given type and number of birds of the given type on operations, by size category, in all 50 states. Number of birds for layer operations is inventory on December 31, 2022, and is the number sold or moved in 2022 for broiler and turkey operations. The middle, bolded rows for each type of operation are the closest to the target population published in the Census of Agriculture and are used as the basis for the target population here.

Type	**Size** (inventory for layers, number sold or moved for broilers and turkeys)	**Operations***	**Birds** (inventory for layers, number sold or moved for broilers and turkeys)
Layers	1-999	236,516	5,634,128
	1,000-74,999	**3,667**	**89,999,569**
	75,000 or more	347	292,875,342
	U.S.	240,530	388,509,039
Broilers	1-999	15,804	1,880,254
	1,000-99,999	**2,229**	**30,826,410**
	100,000 or more	13,844	9,144,102,727
	U.S.	31,877	9,176,809,391
Turkeys	1-999	7,657	317,356
	1,000-29,999	**898**	**4,757,384**
	30,000 or more	1,927	252,611,178
	U.S.	10,482	257,685,918

***Operation counts for layer operations exclude estimates of operations with sizes 400-999 and for broiler and turkey operations include estimates of operations with sizes 1,000-1,999, extrapolated from published NASS data. Inventories of birds not adjusted and are directly from NASS published data.

Table A.2: Numbers of operations and numbers of birds (inventory on December 31, 2022, for layers and number sold or moved in 2022 for broilers and turkeys) for operations in the target population, by state. Grey cells denote items not reported by NASS. Sums of operations and birds don't always sum to the U.S. total because of these suppressed values.

	Layers		Broilers		Turkeys	
State	Operations	Birds	Operations	Birds	Operations	Birds
AK	4	2,200	2			
AL	238	5,451,516	42	2,197,500		
AR	429	10,575,726	33	2,498,954	7	115,918
AZ	12	8,441	2			
CA	88	1,153,839	19	69,300		
CO	21	93,459	9	24,260	1	
CT	9	5,150	11	59,660	3	
DE	2		50	3,504,136	1	
FL	35	312,410	7	34,600		
GA	406	9,150,297	41	2,727,046	1	
HI	10	4,500	1			
IA	174	2,675,461	19	187,116	10	212,656
ID	12	11,935			1	
IL	87	693,006	36	447,729	6	98,706
IN	246	3,765,997	33	919,259	37	609,000
KS	22	55,540	3	8,000	1	
KY	139	2,225,907	18	174,800	1	
LA	42	771,879	3	6,000		
MA	34	30,805	11	52,425	5	11,200
MD	33	161,995	41	1,953,890	3	
ME	19	14,280	17	134,196	3	12,200
MI	55	183,951	19	93,000	7	21,200
MN	77	948,220	11	270,499	24	390,987
MO	305	5,356,693	41	824,487	34	534,393
MS	131	2,676,624	4	224,800		
MT	47	1,181,511	17	85,328	5	12,971
NC	318	8,836,216	51	1,876,652	22	388,102
ND	3		2		2	
NE	20	457,187	1		1	
NH	13	11,480	5		3	7,500
NJ	28	20,405	8	39,600	4	15,850
NM	5	6,440			2	
NV	2					
NY	98	712,613	32	320,655	4	6,700
OH	210	5,054,207	45	1,617,944	28	553,732
OK	149	2,437,110	4			
OR	38	36,983	13	63,200	1	
PA	516	10,375,966	163	4,379,084	44	703,664
RI	5	4,600	4		1	
SC	62	1,293,145	9	370,468	1	
SD	24	12,375	9	62,100	6	33,680
TN	124	2,187,610	10	34,104		
TX	178	3,926,103	19	228,395		
UT	3	4,500	1		2	
VA	105	1,288,665	43	2,371,823	35	552,521
VT	16	101,097	18	110,530		
WA	34	417,735	10	28,200		
WI	167	1,824,926	41	530,825	1	
WV	88	1,298,684	3		8	112,000
U.S.	**4,883**	**89,999,569**	**981**	**30,826,410**	**315**	**4,757,384**

Table A.3: Numbers of operations and numbers o[illegible]22, for layers and number sold or moved in 2022 for broilers and turkeys) for ope[illegible]lation, by region. Sums of operations and birds don't always sum to the U.S. total because of suppressed values.

Type	Region	Operations[1]	(inv[illegible]yers, number sold or m[illegible]oilers and turkeys)
Layers	West[2]	505	9,809,858
	Northeast[3]	1,822	36,754,108
	Southeast[4]	[illegible]	41,255,423
	U.S.	**3,667**	**89,999,569**
Broilers	West[2]	255	568,783
	Northeast[3]	1,520	17,991,658
	Southeast[4]	454	9,970,124
	U.S.	**2,229**	**30,826,410**
Turkeys	West[2]	63	46,651
	Northeast[3]	747	3,842,309
	Southeast[4]	88	504,020
	U.S.	**898**	**4,757,384**

[1]Operation counts for layer operations exclude estimates of operations with sizes 400-999 and for broiler and turkey operations include estimates of operations with sizes 1,000-1,999, extrapolated from published NASS data. Inventories of birds not adjus[illegible]hed data.

[2]West region: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, Wyoming

[3]Northeast region: Connecticut, Delaware, Illinois, Indiana, Iowa, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, Virgi[illegible] Wisconsin

[4]Southeast region: Alabama, Arkansas, Florida, Georgia, Louisiana, Mississi[illegible], South Carolina, Tennessee

Table A.4: Numbers of operations and numbers of birds (inventory on December 31, 2022, for layers and number sold or moved in 2022 for broilers and turkeys) for

operations in the target population, by size. Sums of operations and birds don't always sum to the U.S. total because of suppressed values.

Type	Size (inventory for layers, number sold or moved for broilers and turkeys)	Operations*	Birds (inventory for layers, number sold or moved for broilers and turkeys)
Layers	1,000–19,999	1,614	21,053,025
	20,000–74,999	2,053	66,766,364
	U.S.	**3,667**	**89,999,569**
Broilers	1,000–19,999	1,300	4,205,386
	20,000–99,999	929	24,325,179
	U.S.	**2,229**	**30,826,410**
Turkeys	1,000–9,999	608	1,078,352
	10,000–29,999	290	3,314,628
	U.S.	**898**	**4,757,384**

*****Operation counts for layer operations exclude estimates of operations with sizes 400-999 and for broiler and turkey operations include estimates of operations with sizes 1,000-1,999, extrapolated from published NASS data. Inventories of birds not adjusted and are directly from NASS published data.

Appendix B: Expected estimates of precision

Estimates of percentages of operations and percentages of birds will be reported at the national level, by region, and by size category (number of birds).

Estimates of precision are shown for proportions of 0.50, 0.25, 0.15, and 0.10. As an example, for layer operations in the West region and an expected proportion of 0.50, the CV is 8.4 percent. All listed estimates of proportions of 0.25 or more, except for broiler operations in the West region, are expected to have CVs below 20 percent.

Table B.1. Precision of estimates by operation type, by region, and by expected proportion, at 95 percent confidence.

Type	Region	Approximate sample size	Proportion estimate	CV estimate (%)
Layers	West[1]	505	0.50	8.4
			0.25	14.5
			0.15	19.9
			0.10	**25.1**
	Northeast[2]	1,015	0.50	6.3
			0.25	10.9
			0.15	14.9
			0.10	18.8
	Southeast[3]	983	0.50	6.2
			0.25	10.8
			0.15	14.8
			0.10	18.7
	U.S.	2,503	0.50	3.9
			0.25	6.8
			0.15	9.4
			0.10	11.8
Broilers	West[1]	255	0.50	11.8

			0.25	**20.4**
			0.15	**28.1**
			0.10	**35.4**
	Northeast[2]	1,415	0.50	5.1
			0.25	8.8
			0.15	12.0
			0.10	15.2
	Southeast[3]	454	0.50	8.8
			0.25	15.3
			0.15	**21.0**
			0.10	**26.5**
	U.S.	2,124	0.50	4.1
			0.25	7.1
			0.15	9.8
			0.10	12.3
Turkeys	**U.S.**	898	0.50	10.6
			0.25	18.4
			0.15	**25.3**
			0.10	**31.8**

[1]West region: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, Wyoming

[2]Northeast region: Connecticut, Delaware, Illinois, Indiana, Iowa, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, Virginia, West Virginia, Wisconsin

[3]Southeast region: Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee

Table B.2. Precision of estimates by operation type, by size, and by expected proportion, at 95 percent confidence.

Type	Size (inventory for layers, number sold or moved for broilers and turkeys)	Approximate sample size	Proportion estimate	CV estimate (%)
Layers	1,000–19,999	1,235	0.50	5.5
			0.25	9.6
			0.15	13.2
			0.10	16.6
	20,000–74,999	1,268	0.50	5.6
			0.25	9.6
			0.15	13.2
			0.10	16.7
	U.S.	2,503	0.50	3.9
			0.25	6.8
			0.15	9.4
			0.10	11.8
Broilers	1,000–19,999	1,090	0.50	5.8
			0.25	10.1
			0.15	13.9
			0.10	17.5
	20,000–99,999	1,034	0.50	5.8
			0.25	10.0
			0.15	13.7
			0.10	17.3
	U.S.	2,124	0.50	4.1
			0.25	7.1
			0.15	9.8
			0.10	12.3
Turkeys	1,000–9,999	608	0.50	7.6
			0.25	13.2
			0.15	18.2
			0.10	**22.9**
	10,000–29,999	290	0.50	11.1
			0.25	19.2
			0.15	**26.3**
			0.10	**33.2**
	U.S.	898	0.50	6.3
			0.25	10.9
			0.15	15.0
			0.10	18.9

Appendix C: Response rates

Table C.1. Completion counts and rates from previous NAHMS Poultry and other studies.

Study	Modes	Complete	Sample	% Complete
NAHMS Poultry 2007 Small Enterprise Chicken	Mail, phone	1,789	2,511	71.3
NAHMS Layers 2013	In-person	328	804	40.8
NAHMS Goat 2019	In-person	1,840	4,770	38.6
NAHMS Feedlot 2021	Mail, web, phone	1,025	5,342	19.2
NAHMS Swine 2021 Small Enterprise	Mail, web, phone	1,494	5,880	25.4
NAHMS Swine 2021 Large Enterprise	Mail, web, phone	585	2,380	24.6
NAHMS Bison 2022	Mail, web, phone	460	2,054	22.4
HPAI 2022 Case-control Turkeys[1]	Phone	125	500	25.0
HPAI 2022 Case-control Layers[2]	Phone	40	102	39.2
NAHMS Sheep 2024[3]	Mail, web, phone, in-person	2,469	4,940	50.0

[1]The cases and controls had differing response rates. The cases had a response rate of 58.9% while the controls had a response rate of 15.2%. We assume that a sample from the general population as in this study is likely closer to the overall response rate, ignoring case and control status.
[2]The cases and controls had differing response rates. The cases had a response rate of 81.8% while the controls had a response rate of 20.0%. We assume that a sample from the general population as in this study is likely closer to the overall response rate, ignoring case and control status.
[3]Preliminary estimate.

Appendix D: Burden estimates

Table D.1. Response burden estimates (in minutes) from the NAHMS Poultry 2007 Small Enterprise Chicken, NAHMS Layers 2013, HPAI 2022 Case-control Turkeys, and HPAI 2022 Case-control Layers studies and questionnaire page length.

Study	**Modes**	**Burden** (min)	**Pages**
NAHMS Poultry 2007 Small Enterprise Chicken	Mail, phone	30.0	8
NAHMS Layers 2013	In-person	74.8	22
HPAI 2022 Case-control Turkeys	Phone	75.0	26
HPAI 2022 Case-control Layers	Phone	75.0	24