

Supporting Statement
Center for Epidemiology and Animal Health (CEAH),
NAHMS Backyard Animal Keeping 2024 Study: A National Study of Poultry, Pigs,
Rabbits, and Goats
OMB Control Number 0579-XXXX

Part 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.

a. Study components

The National Animal Health Monitoring System (NAHMS) Backyard Animal Keeping 2024 study (the “Study”) will be a cross-sectional study with two primary components.

1. National Survey Component
 - a. Estimate the prevalence of ownership of poultry¹, pigs, rabbits, and goats among U.S. households in urban and non-urban areas.
 - b. For owners of the species of interest, describe opinions regarding backyard and urban chicken ownership, food security, and animal management practices, particularly surrounding health issues and biosecurity practices including those relevant to antimicrobial stewardship.
 - c. For non-owners of the species of interest, describe opinions regarding backyard and urban chicken ownership, food security, any contact with live poultry, and intention to own any of these species of interest in the future.
2. City Survey Component
 - a. Estimate the prevalence of ownership of chickens, pigs, rabbits, and goats among U.S. households in two of the cities surveyed on urban chicken ownership in the [NAHMS Poultry 2010 study](#)¹ (Denver and Miami; USDA, 2012) and how the prevalence of chicken ownership has changed in those cities since the NAHMS Poultry 2010 study. For both owners and non-owners of the four species of interest, describe opinions regarding backyard and urban chicken ownership.

¹The National Survey asks about poultry, including chickens, ducks, geese, turkeys, and gamebirds. The City Survey focuses on chickens since this was the species asked about in the NAHMS Poultry 2010 study.

The primary data collection instrument for the National Survey component will be the Backyard Animal Keeping 2024 Study survey, which will be administered by computer-assisted self-interview (CASI) using a web-based survey and by computer-assisted telephone interviews (CATI) by a private survey company sub-contracted under a cooperative agreement. For the National Survey component, there will be two ways that participants will be recruited to take the survey: a probability-based survey panel and a nonprobability-based opt-in sample of participants. The probability-based survey panel is a list frame of households that was recruited probabilistically from frames so that the group of participants (i.e., the panel) statistically represents the population of U.S. households. This group of participants on the survey panel have been pre-recruited and agree to participate in surveys sent to the panel. The nonprobability-based opt-in portion of the sample will include a sample of households that voluntarily complete the survey. They will be recruited through online outreach and is not based on probabilistic sampling methods and so statistical methods will be used to combine the probability panel portion of the sample and nonprobability-based opt-in portion of the sample.

For the National Survey component, members of a probability-based survey panel will be sent the Backyard Animal Keeping 2024 Study survey. All respondents will answer questions regarding ownership of the species of interest to address component 1.a. Owners of the species of interest will answer further questions regarding management and biosecurity to address component 1.b. For non-owners of the species of interest, a subset of 800 respondents will answer opinion questions regarding backyard and urban chicken ownership, food security, any contact with live poultry, and intention to own any of the species of interest in the future to address component 1.c. A nonprobability sample of owners of the species of interest will be selected, if needed, to increase the sample size of species owners to answer the questions regarding animal ownership and biosecurity specifically (part of component 1.b) due to the low expected numbers of owners of some of the less commonly owned species (pigs, goats).

The primary data collection instrument for the City Survey component will be the Backyard Animal Prevalence Record, which will be administered by computer-assisted self-interview (CASI) using a web-based survey and, for those who don't complete over the web, a paper survey will be offered, followed by a telephone follow-up to a subset of respondents. All respondents will answer questions regarding ownership of the four species of interest, opinions regarding ownership of backyard and urban chickens, and intention to own chickens in the future to address component 2.a.

b. Target population

The target population for the National Survey is all U.S. households. The target population for the City Survey is all U.S. households within the two cities of interest (Denver and Miami). Data from the U.S. Census Bureau's American Community Survey (ACS) describing the three target populations are provided in Table A.1 and Figure A.1 in Appendix A.

c. Sampling and respondent selection

For the National Survey, all households will be selected from the Nonpartisan and Objective Research Organization (NORC) at the University of Chicago [AmeriSpeak® probability-based household panel](#) (NORC, 2022). This survey panel was designed to be representative of all households in the U.S.

Briefly, the AmeriSpeak panel is recruited from address-based sample (ABS) frames and the [NORC National Sample Frame](#) (the “National Frame”; NORC, n.d.; NORC, 2022), which is a list frame constructed using a two-stage probability sample, selecting U.S. Census areas of populations of 10,000 or more at the first stage and selecting segments, defined as Census tracts or blocks containing at least 300 housing units, in the second stage. At each stage, samples are taken using stratified random sampling with probability proportional to size. The National Frame is constructed using the United States Postal Service Delivery Sequence File (USPS-DSF) in most of the segments and by field enumeration in segments for which the USPS-DSF household counts differed substantially from the U.S. Census household counts. The National Frame is representative of over 97 percent of U.S. households, with a known gap in very remote and sparsely populated areas, especially in Alaska (accounting for approximately 0.03 percent of the U.S. population and 13.7 percent of the U.S. by area) due to prohibitive costs to enumerate. In addition to the NORC National Sample Frame, households are also selected from ABS frames to supplement the National Frame to ensure households from every State are represented in the AmeriSpeak Panel (including in Alaska, Iowa, North Dakota, and Wyoming).

The AmeriSpeak panel currently contains over 43,000 households. These households are recruited from the National Frame and ABS frames through multi-stage, multi-phase, stratified random sampling. Households are selected from the National and ABS frames using stratified random sampling with strata defined by race/ethnicity and age categories and a stratified random sample of nonrespondents are followed up with using nonresponse follow-up (NRFU) procedures, typically involving in-person interviews. The panel has close benchmark percentages compared to the ACS and can be viewed [online](#) (NORC, 2019).

The cumulative weighted household response rate for years that include NRFU is 34.0 percent, and the annual panel retention rate is 85.0 percent. For surveys administered to panel members, typical expected response rates fall between 10 and 20 percent, accounting for panel recruitment, retention, and responses to the specific survey itself.

To increase sample size of owners of the species of interest, a nonprobability sample of owners of the species of interest will be taken to address estimation of prevalence of animal management and biosecurity factors to address study component 1.b. This nonprobability sample will be calibrated to the probability sample using [NORC’s TrueNorth® Calibration method](#) (NORC, 2021) so that accurate estimates regarding animal management and biosecurity can be made. The methodology uses a sample-matching procedure that assigns weights to nonprobability records using similar records from the probability sample, where similarity is measured on sets of factors known for both probability and nonprobability sample records. A small number of key content

variables are then used to calibrate the nonprobability sample to the probability sample within 20-40 sub-populations using small area models and then use this information and standard Census demographic benchmarks to calibrate the combined dataset. This component will be advertised broadly, such as through advertisements on the internet and on social media sites as well as through electronic mailing lists. Only experimental estimates of practices for species owners will include data from the nonprobability panel.

The City Survey Component sample will be selected using a simple random sample from an ABS frame constructed based on the USPS-DSF, which has high reliability for highly populated areas such as Denver, Colorado and Miami, Florida. This same sampling approach was used in the NAHMS Poultry 2010 study and will be replicated here to support comparison of results from the two studies.

d. Stratification

Beyond the stratification performed in the preparation and recruitment of the AmeriSpeak probability panel, there will be no stratification in the remaining sampling components of the Study. Because a census of households from the AmeriSpeak probability panel will be taken, stratification won't be used further to select households from the probability panel. Likewise, stratification won't be used for the nonprobability sample for owners of the species of interest, because of the self-selection of the nonprobability sample, or the City Survey component to make sure the methodology was as close to that used in the NAHMS Poultry 2010 study.

e. Response rates

The expected response rates across components of the Study and response rates from previous related studies are presented in Appendix B. Table B.3 contains expected response rates and counts by sub-component, including for owners of each of the species of interest separately in estimating prevalence of animal management and biosecurity factors for component 1.b.

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

Statistical methodology for stratification and sample selection:

Details on sample selection are provided in Section 1.c for each component of the Study and details on stratification are provided in Section 1.d.

Estimation procedure:

For both the National Survey and City Survey components of the Study, APHIS will receive de-identified, record-level datasets with selection weights adjusted for nonresponse and calibrated to known population information. Some of the information regarding specific weighting decisions are proprietary, but are described in part publicly (NORC, 2019; NORC, 2021; NORC, 2022). The probability panel information will account for sampling that occurred in the creation of the frame and the panel, recruitment from the panel, and nonresponse reweighting from panelist invitations to participate in the Study. The nonprobability sample will be calibrated to the probability panel using the TrueNorth® calibration methodology and will use

known population information from the American Community Survey. Adjusted survey weights will be provided to APHIS for the probability panel component to allow inference to the population of U.S. households for components 1.a-1.c. Weights will also be provided for the probability panel combined with the nonprobability sample to provide experimental estimates for component 1.b.

The City Survey component information will be adjusted for nonresponse and calibrated to known Census information, following the same methodology used in the NAHMS Poultry 2010 study to maximize comparability of the estimates from the two studies. Adjusted survey weights will be provided to APHIS to make inference to the population of U.S. households in Denver and Miami for component 2.a.

APHIS will coordinate the statistical estimation with the contractor using SAS, SUDAAN, R, or other appropriate statistical software to estimate variances appropriate to the survey design, including the non-response adjusted sampling weights.

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

The APHIS goal is to develop descriptive statistics (proportions or means) with a coefficient of variation (CV) of 20 percent or less.

Table C.1 presents estimates of precision for each of the components of the Study. Most of the CV estimates presented don't exceed 20 percent. For component 1.a, estimates of percentages down to 0.6 percent, the estimated percentage of households that own the least common of the species of interest at the national level, aren't expected to exceed a CV of 20 percent. For component 1.b, with a focus on households owning any of the species of interest, and for component 1.c, estimates of percentages of households down to 10.0 percent aren't expected to exceed a CV of 20 percent. For component 1.b, for households with either poultry or rabbits, estimates of percentages of households down to 25.0 percent aren't expected to exceed a CV of 20 percent, though for households with either goats or pigs, estimates down to 25.0 percent are expected to exceed a CV of 20 percent, as ownership of those species is less common. For component 2.a, estimates down to 1.0-2.5 percent are not expected to exceed a CV of 20 percent, which matches the precision of estimates observed in the NAHMS Poultry 2010 study.

For components 1.a-1.c, the primary level of reporting will be at the National level. For component 1.a, potential reporting levels include by species, urban/non-urban regions, housing type, age, gender, race/ethnicity, and region. For components 1.b-1.c, potential reporting levels include by species and urban/non-urban regions. For component 2.a for each of Denver and Miami, the primary level of reporting will be at the city level. For component 2.a, potential reporting levels include by housing type, age, gender, and race/ethnicity, to match the reporting from NAHMS Poultry 2010 study.

In general, if sample sizes are too small or CVs too large for any estimates, those estimates are not published or are reported at a more aggregate level.

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

The only unusual problem requiring specialized sampling procedures is the use of the nonprobability sample to increase the number of respondents with any of the species of interest to address study component 1.b. The ownership of any of these species is expected to be very low, about 4% of households owning poultry and less than 1% for pigs, for example, and ensuring that the sample has enough owners of these less commonly owned animal species is important for estimating proportions of owners by animal management or biosecurity practice, especially.

This approach is being considered for a several reasons. First, a census of the probability-based survey panel is being used and so no sample size increases would be possible using the probability panel only and the use of a nonprobability sample is substantially cheaper than another method such as employing a second probability panel with a separate entity. Second, the use of the nonprobability sample method, and the method of calibrating the nonprobability and probability-based samples to generate combined estimates is experimental and targeted to a secondary study objective, with an aim to examine the feasibility of generating accurate estimates for rare populations using those methods. It is important to have methods to reach backyard owners of animals, especially to gather information important for combating foreign animal or other diseases affecting livestock, such as African swine fever (ASF) and rabbit hemorrhagic disease virus serotype 2 (RHDV2), or poultry, such as highly pathogenic avian influenza (HPAI).

Because estimates from nonprobability samples are experimental, we will use estimates from the probability-based survey panel as the default estimates to address study component 1.b, comparing estimates generated using the probability and nonprobability sample methods and to assess the feasibility of using those methods for future study of those rare populations. We will estimate bias in estimates generated using the probability and nonprobability samples combined compared to estimates generated using the probability panel only, both overall and by selected demographic factors. Methods to combine probability and nonprobability samples are a topic of interest in statistical methodology and Federal statistical methodology (Lee, 2006; Lee and Valliant, 2009; Baker, 2013; Elliot and Valliant, 2017; Mercer et al., 2017; Dever, 2018) to address declining response rates (Czajka and Beyler, 2016) and increasing survey costs while borrowing from the rigorous methodology of probability-based surveys. These methods are also being used in the Centers for Disease Control and Prevention (CDC) Research and Development Survey (RANDS; NCHS, 2022) as experimental to assess the methodology for human-based health research.

- **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:

The Study minimizes collection of data to that which is absolutely necessary to meet the stated objectives. Surveys are extensively reviewed by APHIS staff, including a survey methodologist, and experts both in industry and in academia.

The questionnaire used in the NAHMS Poultry 2010 study performed well for that survey cycle and was used as the baseline for the City Survey, with minimal changes made to that questionnaire. Questions from previous NAHMS questionnaires that have been tested and performed well in the past have been used as a baseline for the National Survey.

The questionnaires will be delivered in a variety of modes (mail, web, telephone), and the electronic versions of the questionnaires will take advantage of time-saving features of those modes, such as automatic survey routing and skipping.

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

Panelists on the probability-based survey panel, which make up the majority of expected respondents to the Study, will have decreased burden compared to other subjects in the Study because they will have had demographic information captured already, as a part of their ordinary involvement with the panel, reducing the number of questions they would need to answer on the survey.

APHIS staff have made numerous contacts and have been involved in collaborative efforts to identify the information needs of stakeholders, including the Veterinary Services subject matter experts and public health officials at the Centers for Disease Control and Prevention, and the best way to ask for and incentivize the information collection.

Contacting respondents:

- Panelist invitation to the National Survey will occur using email, text, and telephone invitations, based on preference of the panelists. The probability survey panel participants for the National Survey will receive "AmeriPoints" from NORC as a part of their membership on the panel in return for completing the survey, with estimated value approximately \$2.00. Non-probability survey panelists will be offered a similar incentive for complete participation in the National Survey.

- Recruitment of the nonprobability sample will attempt to target owners of the species of interest to focus on that specific subset of U.S. households using advertisements through social media and through email.
- For the City Survey, selected subjects will be notified and offered a chance to participate in the survey in a variety of ways, including an announcement postcard, a push-to-web letter, a mailed paper questionnaire, a reminder postcard, and a subset who will receive a telephone follow-up.
- Half of the respondents in each city in the City Survey will be provided a \$2.00 incentive with the initial mailing, as a partial compensation for their time. Telephone enumerators will have gone through specific training to help answer questions of reluctant respondents to maximize response rates.

Non-response adjustment:

Baseline expected response rates are taken from the NAHMS Poultry 2010 study and conversations and documentation from the private survey companies.

For both the National and City Surveys, non-response will be accounted for using weighting class adjustments, and weights will be calibrated to American Community Survey benchmarks using demographic variables. To combine the probability and nonprobability samples, calibration will be made on demographic variables and on select content variables from the questionnaire using small area modeling using NORC’s TrueNorth® Calibration method (NORC, 2021). Demographic information will be collected from participants for non-probability survey panel members of the National Survey, and demographic information that has already been collected for the probability survey panel members will be used in non-response adjustments.

Non-response adjustment for the City Survey will adopt the same method used for the NAHMS Poultry 2010 study to maximize comparability of the results from the two studies.

- If the respondents differ substantially from the non-respondents, then there is potential for bias. The demographic information for the probability-based survey panel members will be known for both respondents and non-respondents to allow for examination of potential differences in type of responding and non-responding households for that component of the National Survey. This information won’t be available for the nonprobability sample component or for the City Survey. If needed, APHIS will perform a non-response bias analysis to investigate unexpected response patterns to guide future sampling efforts. If significant non-response bias is found, the factors contributing to the bias will be incorporated into the non-response weight adjustment using post-stratification and calibration procedures.

Sampling and design strategies:

Panelists on the probability-based survey panel have some level of agreement to accept survey inquiries, and NORC purposefully manages the level of burden placed on the panelists to help to maintain adequate response rates. The NORC AmeriSpeak panel has shown high panel recruitment and retention rates for panelists compared to similar commercial panels (NORC, 2022).

Sampling for the City Survey will be similar to the methodology used in the NAHMS Poultry 2010 study to maximize comparability of the results from the two studies. Various modes of administration through mail, web, and telephone were chosen to meet the varied response mode preferences of U.S. households. Preferred response modes vary across the population, and so making available a selection of response opportunities to fit household's schedules and preferences has been important to maximizing response in a COVID-19-influenced environment and will continue to be important going forward.

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 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 previous NAHMS studies, including the NAHMS Poultry 2010 study, will be 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. The final surveys 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, USDA, APHIS, VS, NAHMS, Fort Collins, CO (970-494-7349; matthew.a.branan@usda.gov).

For a NASS review of the OMB package submission, NAHMS will coordinate with agricultural statisticians reporting to:

- Mr. Daniel Beckler, Chief, Standards and Survey Development Methodology Branch, USDA, NASS, Washington, DC (202-720-8858; dan.beckler@usda.gov).

The actual enumerated data collection will be conducted under a cooperative agreement, overseen by:

- Dr. Victoria Fields, Veterinary Medical Officer (Epidemiology), USDA APHIS, VS, CEAH, NAHMS, Fort Collins, CO (970-286-1514; victoria.fields@usda.gov) and

- Dr. Becca Jablonski, Associate Professor and Food Systems Extension Economist, Colorado State University, Fort Collins, CO (970-491-6133; becca.jablonski@colostate.edu).

The data collection will be conducted under direction of the following:

- Corona Insights, Denver, CO (303-894-8246; matt@coronainsights.com).
- NORC at the University of Chicago, Chicago, IL (AmeriSpeak-BD@norc.org).

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

- Dr. Amy Delgado, Director, Center for Epidemiology and Animal Health, USDA APHIS, VS, Fort Collins, CO (970-494-7302; amy.h.delgado@usda.gov).

References

- Baker, R. Brick, J.M., Bates, N.A., Battaglia, M., Couper, M.P., Dever, J.A., Gile, K.J., Tourangeau, R. (2013). Report of the AAPOR task force on non-probability sampling. https://www.aapor.org/AAPOR_Main/media/MainSiteFiles/NPS_TF_Report_Final_7_revised_FNL_6_22_13.pdf. Accessed July 26, 2022.
- Czajka, J.L. and Beyler, A. (2016). Background Paper – Declining Response Rates in Federal Surveys: Trends and Implications. Mathematical Policy Research.
- Dever, J.A. (2018). Combining Probability and Nonprobability Samples to form Efficient Hybrid Estimates: An Evaluation of the Common Support Assumption. Proceedings of the 2018 Federal Committee on Statistical Methodology (FCSM) Research Conference. https://copafs.org/wp-content/uploads/2020/05/COPAFS-A4_Dever_2018FCSM.pdf. Accessed July 26, 2022.
- Elliot, M.R. and Valliant, R. (2017). Inference for Nonprobability Samples. *Statistical Science* 32(2), 249-264.
- Lee, S. (2006). Propensity Score Adjustment as a Weighting Scheme for Volunteer Panel Web Surveys. *Journal of Official Statistics* 22(2), 329-349.
- Lee, S. and Valliant, R. (2009). Estimation for Volunteer Panel Web Surveys Using Propensity Score Adjustment and Calibration Adjustment. *Sociological Methods & Research* 37(3), 319-343.
- Mercer, A.W., Kreuter, F., Keeter, S., Stuart, E.A. (2017). Theory and Practice in Nonprobability Surveys. *Public Opinion Quarterly* 81, 250-271.
- National Center for Health Statistics (NCHS) (2022). RANDES during COVID-19 Round 2 Non-Probability Sample Technical Documentation. https://www.cdc.gov/nchs/rands/files/RANDES_COVID_2_np_technical_documentation.pdf. Accessed August 4, 2022.
- NORC (n.d.). 2010 National Sample Frame. <https://www.norc.org/Research/Projects/Pages/2010-national-sample-frame.aspx>. Accessed July 26, 2022.
- NORC (2019). AmeriSpeak® Panel Demographics Report. NORC at the University of Chicago. Updated October 24, 2019. <https://amerispeak.norc.org/content/dam/amerispeak/research/pdf/AmeriSpeak%20Panel%20Demographic%20Report.pdf>. Accessed July 26, 2022.
- NORC (2021). NORC’s TrueNorth Calibration tool for probability and nonprobability samples: New Version 2.0 even more effective. NORC at the University of Chicago. Updated August, 2021. <https://amerispeak.norc.org/content/dam/amerispeak/research/pdf/NORC%20-%20White%20Paper%20-%20TrueNorth%20Calibration%20tool%20for%20probability>

[%20and%20nonprobability%20samples%20-%20March%202020.pdf](#). Accessed July 26, 2022.

NORC (2022). Technical Overview of the AmeriSpeak® Panel – NORC’s Probability-Based Household Panel. NORC at the University of Chicago. Updated February 8, 2022. <https://amerispeak.norc.org/content/dam/amerispeak/research/pdf/AmeriSpeak%20Technical%20Overview%202019%2002%2018.pdf>. Accessed July 26, 2022.

USDA (2012). Poultry 2010 – Urban Chicken Ownership in Four U.S. Cities. USDA–APHIS–VS, CEAH. Fort Collins, CO. #661.0413.

Appendix A – Target Populations

Target population data come from the U.S. Census Bureau, specifically from the American Community Survey (ACS) 2020, on the number of households in the U.S., in Denver, Colorado (as constructed to mimic the Denver area used in the NAHMS Poultry 2010 study, depicted in Figure A.1 below), and in Miami, Florida (as constructed to mimic the Miami area used in the NAHMS Poultry 2010 study, depicted in Figure A.1 below).

Table A.1: Overall number of households, by area.

Area	Number of Households	Margin of Error
U.S.	122,354,219	211,970
Denver ¹	771,717	1,390 ³
Miami ²	697,807	1,554 ³

¹Colorado tracts used to construct the Denver area include the following, by county.

Adams County: 78.01, 78.02, 79, 80, 81, 82, 83.08, 83.09, 85.05, 85.06, 85.07, 85.08, 85.33, 85.34, 85.50, 85.51, 87.05, 87.06, 87.09, 88.01, 88.02, 89.01, 90.01, 90.03, 90.04, 91.01, 91.03, 91.04, 92.02, 92.03, 92.04, 92.06, 92.07, 93.04, 93.06, 93.07, 93.08, 93.09, 93.10, 93.16, 93.18, 93.19, 93.20, 93.21, 93.22, 93.23, 93.25, 93.26, 93.27, 94.01, 94.06, 94.07, 94.08, 94.09, 94.10, 94.11, 95.01, 95.02, 95.53, 96.03, 96.04, 96.06, 96.07, 96.08, 97.51, 97.52, 150

Arapahoe County: 49.51, 49.52, 55.51, 55.52, 55.53, 56.11, 56.12, 56.14, 56.19, 56.20, 56.21, 56.22, 56.23, 56.24, 56.25, 56.26, 56.27, 56.28, 56.29, 56.30, 56.31, 56.32, 56.33, 56.34, 56.35, 56.36, 57.01, 57.02, 58, 59.51, 59.52, 60, 61, 62, 63, 64, 65.01, 65.02, 66.01, 66.03, 66.04, 67.04, 67.05, 67.06, 67.07, 67.08, 67.09, 67.11, 67.12, 67.13, 68.08, 68.15, 68.54, 68.57, 68.59, 68.60, 68.61, 68.62, 68.63, 68.64, 71.08, 71.10, 72.01, 72.02, 73.01, 73.02, 74, 75, 76, 77.02, 77.03, 77.04, 151, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810.01, 810.02, 811.01, 811.02, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832.01, 832.02, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860.01, 860.02, 861, 862, 863, 864, 865, 868.01, 868.02, 869, 870, 871, 872, 873.01, 873.02, 9800

Broomfield County: 302, 311.01, 311.03, 9801, 9802

Denver County: 1.02, 2.01, 2.02, 3.01, 3.02, 3.03, 4.01, 4.03, 4.04, 5.01, 5.03, 5.04, 6, 7.03, 7.04, 7.05, 7.06, 8, 9.02, 9.03, 9.04, 9.05, 10, 11.01, 11.02, 13.01, 13.02, 14.01, 14.02, 14.03, 15, 16.01, 16.02, 16.03, 17.03, 17.04, 17.05, 17.06, 17.07, 18, 19.01, 20, 21.01, 21.02, 23, 24.02, 24.04, 24.05, 26.02, 26.03, 26.04, 27.04, 27.05, 27.06, 27.07, 27.08, 27.09, 28.01, 28.02, 28.04, 28.05, 29.01, 29.02, 30.02, 30.03, 30.04, 30.05, 30.06, 31.01, 31.02, 32.02, 32.03, 32.04, 32.05, 33, 34.01, 34.02, 35.01, 35.02, 36.01, 36.02, 36.03, 37.01, 37.02, 37.03, 38.01, 38.02, 39.01, 39.02, 40.02, 40.03, 40.04, 40.05, 40.06, 41.01, 41.02, 41.03, 41.04, 41.08, 41.09, 41.10, 41.11, 41.12, 41.13, 42.01, 42.02, 43.02, 43.03, 43.06, 43.07, 43.08, 43.09, 43.10, 44.03, 44.04, 44.06, 44.07, 45.03, 45.04, 45.05, 45.06, 46.01, 46.02, 46.03, 47, 48.01, 50.01, 50.03, 50.04, 51.02, 51.04, 52, 53, 55.02, 55.03, 67.01, 68.04, 68.10, 68.12, 68.13, 68.14, 68.15, 68.16, 68.17, 68.18, 69.02, 69.03, 70.06, 70.13, 70.37, 70.88, 70.90, 70.91, 83.04, 83.05, 83.06, 83.12, 83.86, 83.87, 83.88, 119.02, 119.03, 120.01, 120.10, 120.15, 120.16, 153, 154, 155, 156, 157, 158, 9801, 9802

Douglas County: 140.14, 140.15

Jefferson County: 98.07, 98.15, 98.23, 98.24, 98.27, 98.28, 98.29, 98.30, 98.31, 98.32, 98.33, 98.34, 98.35, 98.36, 98.39, 98.40, 98.41, 98.51, 98.52, 102.05, 102.06, 102.08, 102.09, 102.10, 102.11, 102.12, 102.13, 103.03, 103.04, 103.05, 103.06, 103.07, 103.08, 104.02, 104.03, 104.05, 104.06, 105.02, 105.03, 105.04, 106.03, 106.04, 107.01, 107.02, 108.01, 109.01, 109.02, 110, 111.01, 111.02, 112.02, 113, 114.01, 114.02, 115.51, 115.52, 116.01, 116.02, 117.01, 117.02, 117.08, 117.09, 117.10, 117.27, 117.28, 117.29, 117.30, 118.03, 118.04, 118.06, 118.07, 118.08, 119.04, 119.51, 120.23, 120.46, 120.47, 120.48, 120.49, 120.50, 120.51, 120.52, 120.53, 120.54, 120.55, 120.57, 120.59, 120.60, 158, 159, 603, 604, 605.01, 9800, 9804

²Florida tracts used to construct the Miami area include the following, by county.

Broward County: 1103.64, 1103.65

Miami-Dade County: 1.07, 1.09, 1.15, 1.18, 1.20, 1.21, 1.22, 1.23, 1.24, 1.25, 1.26, 1.27, 1.28, 1.29, 1.30, 1.31, 1.32, 1.34, 1.40, 1.42, 1.43, 1.44, 1.45, 1.46, 2.04, 2.06, 2.11, 2.12, 2.13, 2.15, 2.16, 2.18, 2.19, 2.20, 2.21, 2.22, 2.23, 2.24, 2.25, 2.26, 2.27, 2.28, 3.02, 3.06, 3.07, 3.08, 3.09, 3.10, 3.11, 3.12, 4.02, 4.05, 4.08, 4.09, 4.10, 4.11, 4.13, 4.14, 4.15, 4.16, 4.17, 4.21, 4.19, 4.20, 5.04, 5.05, 5.06, 5.07, 5.08, 5.09, 6.01, 6.02, 6.03, 6.05, 6.07, 6.09, 6.10, 6.11, 6.12, 7.05, 7.10, 7.11, 7.12, 7.13, 7.14, 7.15, 7.16, 7.17, 7.18, 7.19, 7.20, 8.04, 8.05, 8.06, 8.07, 8.08, 9.03, 9.04, 9.05, 9.06, 9.07, 9.08, 10.03, 10.04, 10.05, 10.06, 10.07, 10.08, 11.01, 11.02, 11.03, 11.04, 12.04, 12.05, 12.06, 12.07, 12.08, 12.09, 13.01, 13.02, 14.01, 14.02, 15.01, 15.02, 16.03, 16.05, 16.06, 16.07, 16.08, 17.01, 17.02, 17.04, 17.05, 18.01, 18.02, 18.03, 19.01, 19.03, 19.04, 20.01, 20.03, 20.04, 21, 22.01, 22.02, 23, 24.02, 24.03, 24.04, 25.01, 25.02, 26, 27.02, 27.05, 27.07, 27.08, 27.09, 27.10, 28, 29, 30.01, 30.04, 30.05, 30.06, 31, 34, 36.03, 36.04, 36.05, 36.06, 36.07, 37.03, 37.04, 37.05, 37.06, 37.07, 37.08, 37.09, 37.10, 38.01, 38.03, 38.04, 39.06, 39.09, 39.11, 39.12, 39.13, 39.14, 39.15, 39.16, 39.17, 39.18, 39.19, 39.21, 39.22, 40, 41.02, 41.03, 41.05, 41.06, 42.04, 42.05, 42.06, 42.07, 42.08, 43.01, 43.03, 43.04, 44.03, 44.04, 44.05, 44.06, 45, 46.02, 46.05, 46.07, 46.08, 47.01, 47.03, 47.04, 47.05, 49.01, 49.03, 49.04, 50.02, 50.03, 50.04, 51.02, 51.03, 51.04, 52.01, 52.02, 53.03, 53.04, 53.05, 53.06, 54.03, 54.05, 54.06, 54.07, 54.09, 54.10, 55.03, 55.04, 55.05, 55.06, 56, 57.01, 57.05, 57.06, 57.07, 57.08, 58.03, 58.04, 58.05, 58.06, 59.01, 59.02, 59.03, 59.04, 60.02, 60.03, 60.04, 61.03, 61.04, 61.05, 61.06, 62.01, 62.03, 62.05, 62.06, 63.02, 63.03, 63.04, 64.01, 64.02, 64.03, 65.01, 65.03, 65.04, 66.03, 66.04, 66.05, 66.06, 66.07, 66.08, 67.05, 67.06, 67.07, 67.09, 67.13, 67.14, 67.15, 67.16, 67.17, 67.18, 67.19, 67.20, 67.21, 67.22, 68.01, 68.02, 69.01, 69.02, 70.03, 70.04, 70.05, 70.06, 70.07, 71.01, 71.03, 71.04, 72, 73, 74.01, 74.02, 74.03, 75.01, 75.03, 76.01, 76.03, 76.05, 76.07, 76.08, 76.09, 76.10, 77.04, 77.05, 77.06, 77.07, 77.08, 77.09, 78.01, 78.05, 78.06, 78.07, 78.08, 78.09, 79.01, 79.02, 80, 81.01, 81.02, 82.05, 82.06, 83.05, 83.12, 83.13, 84.09, 84.15, 84.16, 84.18, 84.19, 84.20, 84.21, 84.22, 84.23, 84.24, 84.25, 84.26, 84.27, 84.28, 84.29, 84.30, 84.31, 85.02, 85.03, 85.04, 86.01, 86.03, 86.04, 87.02, 87.03, 87.04, 88.05, 88.06, 88.07, 88.08, 88.09, 88.10, 89.04, 89.06, 89.07, 89.08, 89.09, 89.10, 89.11, 90.10, 90.14, 90.15, 90.20, 90.21, 90.22, 90.24, 90.26, 90.27, 90.28, 90.29, 90.30, 90.31, 90.39, 90.40, 90.43, 90.44, 90.48, 90.49, 90.50, 90.51, 90.52, 90.53, 90.54, 90.55, 90.56, 90.57, 90.58, 90.59, 90.60, 90.61, 90.62, 90.63, 90.64, 90.65, 90.66, 91.01, 91.02, 92, 93.05, 93.12, 93.14, 93.15, 93.16, 93.17, 93.18, 93.19, 93.20, 93.21, 93.22, 93.23, 93.24, 93.25, 93.26, 93.27, 94.01, 94.02, 95.03, 95.04, 95.05, 95.06, 96.01, 96.02, 97.03, 97.04, 97.05, 97.06, 98.03, 98.04, 98.06, 98.09, 98.10, 98.11, 98.12, 99.03, 99.04, 99.05, 99.06, 99.07, 99.08, 99.09, 100.10, 100.12, 100.13, 100.15, 100.16, 100.17, 100.18, 100.19, 100.20, 100.21, 100.22, 100.23, 100.24, 100.25, 100.26, 116.01, 116.02, 117.01, 117.02, 118, 119, 120.01, 120.02, 121.01, 121.02, 121.03, 121.04, 121.05, 122, 123.01, 123.02, 124.01, 124.02, 124.03, 125.01, 125.02, 126.01, 126.02, 127.01, 127.02, 128.01, 128.02, 129, 130, 131, 132.01, 132.02, 133.01, 133.02, 134, 135, 136, 137, 138.01, 138.02, 139, 156, 4901, 9803, 9804, 9805, 9808, 9810

³Estimated by NAHMS.

Appendix B: Estimated response rates

Three tables of response rates are presented below. The information in Table B.1 comes from the NAHMS Poultry 2010 study and represents the percentages of households selected in Denver, Colorado and Miami, Florida by response category and gives estimates for response rates for the City Survey for the NAHMS Backyard Animal Keeping 2024 study. The information in Table B.2 comes from a test questionnaire that NORC had run on a small subset of their probability survey panel and gives estimated percentages of respondents that owned any of the species of interest and any individual species of interest for the current study. The information in Table B.3 uses response rate information from Table B.1 and B.2, as well as information from NORC regarding standard response rates for current surveys they perform.

Table B.1: Response rates for Denver and Miami from the NAHMS Poultry 2010 study.

Response category	City			
	Denver		Miami	
	No.	Pct.	No.	Pct.
Any completion	2,994	39.1	1,997	23.5
Completed - Mail or online	2,793	36.5	1,889	22.2
Completed - telephone	201	2.6	108	1.3
Undeliverable	619	8.1	853	10.0
Refusal/no response	4,037	52.8	5,650	66.5
Total	7,650	100.0	8,500	100.0

Table B.2: Response rates from NORC test questionnaire.

Category of subject	No.	Pct.
Respondent	1,004	
Respondent with any of the four species	55	5.5
Respondent with chickens	40	4.0
Respondent with rabbits	17	1.7
Respondent with goats	10	1.0
Respondent with pigs	6	0.6
Respondents with none of the four species	949	94.5

Table B.3: Expected response rates for the NAHMS Backyard Animal Keeping 2024 study.

Category of subject	Study sub-component(s)	Probability panel		Nonprobability panel		Total
		No.	Pct.	No.	Pct.	No.
National Survey						
Available for response		43,000 ¹		54,745		97,745
Respondent	1.a	8,600	20.0 ²	5,474	10.0 ³	14,074
Respondent with any of the species	1.a, 1.b	471	5.5	300 ³	5.5	771
Respondent with poultry ⁵	1.a, 1.b	342	4.0	218	4.0	560
Respondent with rabbits	1.a, 1.b	145	1.7	93	1.7	238
Respondent with goats	1.a, 1.b	86	1.0	55	1.0	141
Respondent with pigs	1.a, 1.b	52	0.6	33	0.6	84
Respondents with none of the species	1.a	8,129	94.5	5,174	94.5	13,303
Subset of respondents with none of the species	1.b, 1.c	800		0		800
City Survey - Denver						
Available for response	2.a	7,500				7,500
Respondent	2.a	2,933	39.1 ⁴			2,933
Respondent with any of the four species	2.a	360	4.8			360
Respondent with chickens	2.a	261	3.5			261
Respondent with rabbits	2.a	111	1.5			111
Respondent with goats	2.a	66	0.9			66
Respondent with pigs	2.a	39	0.5			39
Respondents with none of the four species	2.a	7,140	95.2			7,140
City Survey - Miami						
Available for response	2.a	7,500				7,500
Respondent	2.a	1,755	23.4 ⁴			1,755
Respondent with any of the four species	2.a	873	11.6			873
Respondent with chickens	2.a	634	8.5			634
Respondent with rabbits	2.a	269	3.6			269
Respondent with goats	2.a	159	2.1			159
Respondent with pigs	2.a	96	1.3			96
Respondents with none of the four species	2.a	6,627	88.4			6,627

¹Estimated size of the AmeriSpeak probability-based survey panel (NORC, 2022).

²Estimated percentage of panelists that respond in a given survey (NORC, 2022, conversations with private survey companies).

³Estimated response rate for a general, web-based nonprobability sample survey of the U.S. population and the count of owners that respond was estimated to be 300 in conversations with private survey companies, though that number could fluctuate.

⁴City Survey response rates are expected to be similar to those observed in the NAHMS Poultry 2010 study (Table B.1).

⁵Projection information from Table B.2 are based on respondents owning chickens only. That information is used here to project the proportion of households with backyard poultry (including chickens, turkeys, ducks, and other poultry species).

Table B.4: Expected response times for the NAHMS Backyard Animal Keeping 2024 Study.

Respondent type	Study sub-component(s)	Response burden average (in hours)	Number of respondents ¹	Total response burden (in hours)
National Survey – Probability panel				
Nonrespondent		0.033	34,400	1,135.2
Respondent with poultry ² only	1.a, 1.b	0.110	173	19.1
Respondent with rabbits only	1.a, 1.b	0.110	74	8.1
Respondent with goats only	1.a, 1.b	0.110	44	4.8
Respondent with pigs only	1.a, 1.b	0.110	26	2.9
Respondent with 2 species ³	1.a, 1.b	0.165	108	17.9
Respondent with 3 species ³	1.a, 1.b	0.220	31	6.8
Respondent with all 4 species ³	1.a, 1.b	0.275	15	4.3
Respondents with none of the species that answer the questions for non-owners	1.a	0.050	800	40.0
Respondents with none of the species that don't answer the questions for non-owners	1.b, 1.c	0.042	7,329	307.8
Any respondent (weighted average response)		0.048		
National Survey – Nonprobability panel				
Nonrespondent		0.033		
Respondent with poultry ² only	1.a, 1.b	0.123	110	13.5
Respondent with rabbits only	1.a, 1.b	0.123	47	5.7
Respondent with goats only	1.a, 1.b	0.123	28	3.4
Respondent with pigs only	1.a, 1.b	0.123	17	2.0
Respondent with 2 species ³	1.a, 1.b	0.178	69	12.2
Respondent with 3 species ³	1.a, 1.b	0.233	20	4.6
Respondent with all 4 species ³	1.a, 1.b	0.288	10	2.8
Respondents with none of the species that answer the questions for non-owners	1.a	0.063	0	0.0
Respondents with none of the species that don't answer the questions for non-owners	1.b, 1.c	0.055	5,174	282.0
Any respondent (weighted average response)		0.060		
City Survey				
Nonrespondent	2.a	0.017	10,313	340.3
Respondent	2.a	0.050	4,688	234.4
Any respondent (weighted average response)		0.050		

¹Projected number from calculations in Table B.3.

²Estimated using an estimate of 1.8 percent of respondents owning multiple species from the NAHMS Poultry 2010 data and, of those, 70.0 percent owning 2 species, 20.0 percent owning 3, and 10.0 percent owning all 4 species.

³Projection information from Table B.2 are based on respondents owning chickens only. That information is used here to project the proportion of households with backyard poultry (including chickens, turkeys, ducks, and other poultry species).

Appendix C: Expected precision of estimates

Estimates of precision for percentages ranging from 50.0 down to 0.6 are shown in Table C.1 for each component and subcomponent of the NAHMS Backyard Animal Keeping 2024 study. The estimates are generated assuming a 95 percent confidence level, finite population corrections according to the Expected Population Size and Expected Sample Size columns, and design effect according to the Expected Design Effect column. Some components exceed the precision criteria of a coefficient of variation (CV) equal to 20 percent or less (the cells colored red) and so reporting strata will be collapsed to maintain average CV estimates.

Table C.1: Precision of estimates by study component and sub-component at various estimates of percentages, at 95% confidence.

Study Sub-component	Expected Population Size ¹	Expected Sample Size ²	Expected Design Effect ³	Estimated Percentage	Margin of Error	CV ⁴
National Survey						
1.a	122,354,219	8,600	2.0	10.0	0.9	4.6
				5.0	0.7	6.6
				2.5	0.5	9.5
				1.0	0.3	15.2
				0.6	0.2	19.6
1.b - any	6,729,482	771	3.0	50.0	6.1	6.2
				25.0	5.3	10.8
				10.0	3.7	18.7
1.b – poultry ⁵	4,869,698	560	3.0	5.0	2.7	27.2
				50.0	7.2	7.3
				25.0	6.2	12.7
				10.0	4.3	22.0
				5.0	3.1	31.9
1.b - rabbits	2,067,786	238	3.0	50.0	11.0	11.2
				25.0	9.5	19.5
				10.0	6.6	33.7
				5.0	4.8	49.0
1.b - goats	1,223,542	141	3.0	50.0	14.3	14.6
				25.0	12.4	25.3
				10.0	8.6	43.8
				5.0	6.2	63.6
1.b - pigs	734,125	84	3.0	50.0	18.5	18.8
				25.0	16.0	32.6
				10.0	11.1	56.5
				5.0	8.1	82.2
1.c	115,624,737	800	2.0	50.0	4.9	5.0
				25.0	4.2	8.7
				10.0	2.9	15.0
				5.0	2.1	21.8
City Survey - Denver						
2.a	771,717	2,933	1.0	50.0	1.8	1.8
				25.0	1.6	3.2
				10.0	1.1	5.5
				5.0	0.8	8.0
				2.5	0.6	11.5
				1.0	0.4	18.3
City Survey - Miami	697,807	1,755	1.0	0.6	0.3	23.7
				50.0	2.3	2.4
				25.0	2.0	4.1
				10.0	1.4	7.2
				5.0	1.0	10.4
2.a	697,807	1,755	1.0	2.5	0.7	14.9
				1.0	0.5	23.7
				0.6	0.3	30.7

¹Population sizes are estimated counts of U.S. households in the population of interest from the American Community Survey (Table A.1).

²Expected sample sizes are from Table B.3.

³Design effects for components 1.a and 1.c are based on design effects from similar probability panel-based surveys based on conversations with private survey companies and that for component 2.a is based on the fact that it uses a simple random sampling scheme from an ABS. The estimated design effect for the nonprobability sample component is unknown but expected to exceed that for the other components.

⁴Coefficients of variation (CV) estimates are computed as the ratio of the standard error to the point estimate. CV estimates exceeding 20 percent are colored red.

⁵Projection information from Table B.2 are based on respondents owning chickens only. That information is used here to project the proportion of households with backyard poultry (including chickens, turkeys, ducks, and other poultry species).