

B. Collections of Information Employing Statistical Methods

1. Describe the potential respondent universe and any sampling or other respondent selection methods to be used.

For objectives 1 and 2, which address the US commercial poultry industry, the potential respondent universe will be all farms that belong to or contract with 56 large poultry companies. Multiple farms will be selected for participation from each company. The sampling plan will be a stratified random sample of farms within the companies (strata). A single representative from each company will be responsible for ensuring the completion of questionnaires for all of the farms selected from their company.

These 56 large companies are of 4 types: layer companies (table egg production – 24 companies), broiler companies (chicken meat production – 14 companies), turkey companies (turkey meat production – 10 companies), and breeder companies (8 companies - these companies own the breeding birds that supply chicks and poults to layer, broiler and turkey companies). The NAHMS program has established an operational goal of representing at least 70 percent of the operations and 70 percent of a specific commodity. These 56 companies account for approximately 84 percent of broiler meat, 71 percent of layers, and 72 percent of turkeys slaughtered, based on WATT Poultry USA publications in 2007 and 2008 (see Appendix A). All US commercial primary breeder companies (100percent) are included in the NAHMS Poultry 2010 study.

The WATT poultry publication was used for company selection because it provides company-level information. WATT Poultry USA company size rankings are based primarily on an exclusive survey of companies, but also include data from published sources and industry estimates. The publication is well-cited by the industry. A comparison of overall industry figures from WATT and similar statistics published by the National Agricultural Statistics Service (NASS) demonstrated good agreement. For example, the NASS estimate for total ready to cook weight for turkeys in 2006 was 36.0 billion pounds, and the WATT estimate was 38.2 billion pounds.

These 56 large companies were selected with study efficiency in mind; companies were selected if they represented at least 2 percent of their respective industries (broiler and layer companies) or 3 percent of the industry (turkey companies). A large number of additional smaller companies would be needed to gain a small increase in industry coverage. Also for efficiency, companies are the primary sampling unit for this study. Farms within companies will be sampled and one company veterinarian, who has the ability to respond for the company's farms, will make the farm contacts.

For the urban chicken prevalence record (Urban Chicken Phase I), four separate case studies will be conducted in four cities. Estimates will be generated for the following inference populations: urban residents of LA, urban residents of Denver, urban residents of Miami, and urban residents of New York City. The sampling plan will be a systematic random sample of urban residents from each city using an address-based list purchased from a company such as Genesis. Four large cities were chosen to provide geographic

coverage, as well as anticipated populations of long-term and new chicken owners. This data collection effort will provide information about this growing chicken-owning phenomenon which may have public health and commercial poultry health implications. See Appendix D for media references about the trend of urban chicken ownership.

For the urban chicken questionnaire (Urban Chicken Phase II), a convenience sample of chicken owners at feed stores will be used, because the respondent universe cannot be precisely defined for this population. This is a rare population that has never been studied previously. This population is important because of public health and commercial poultry health implications. For example, the 2003 Newcastle disease outbreak in Southern California initially started in urban chicken flocks and spilled over to commercial poultry. The outbreak cost more than \$160 million to fight and resulted in the depopulation of more than 3 million birds.

The goal of the feed store portion of the study is to gain insight about the population rather than to create precise population estimates. This information will be useful for developing appropriate outreach programs and identifying general areas of concern. The respondent universe will be limited to all urban residents with chickens in specified areas of four U.S. cities who purchase chicken feed in feed stores. Based on expert opinion and web-based research, urban chicken owners primarily obtain chicken feed from feed stores, as the expense of having feed shipped to their homes is generally cost-prohibitive. Also, most urban chicken owners will need to purchase chicken feed because it is unlikely that other dietary sources alone (household scraps, foraging) would be sufficient to sustain the chickens. APHIS data collectors will assemble a list of feed stores serving each of the 4 cities to be studied. We expect no more than 10 to 20 feed stores per city, based on a comprehensive list of feed stores in the Los Angeles area that was compiled after the Newcastle disease outbreak in California, and based on informal reviews of urban chicken websites. Customers purchasing chicken feed on days that feed stores are visited by data collectors and who meet the criteria for participation (urban residents of the four cities) will be asked to complete a questionnaire.

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

- **Statistical methodology for stratification and sample selection:**

Company questionnaire: All 56 large companies will be selected to complete a company-level survey.

Breeder questionnaire: Of the original 56 companies, currently 25 companies have chicken breeder farms. All 25 of these companies will be selected for participation. A systematic random sample of breeder farms will be selected from each company. A standard sampling protocol will be provided to companies to allow them to randomly select farms for participation. Assistance in the randomization process will be available on request. The number of farms allocated to each company will be proportional to the number of breeder farms operated by the company.

Turkey questionnaire: Of the originally identified 56 companies, 10 companies raise turkeys. All 10 of these companies will be selected for participation. Case farms and control farms will be selected from participating turkey companies. The most severely affected farms meeting case definition criteria will be selected as case farms for each company, and the least affected farms will be chosen as control farms. Data on the number of affected farms and the degree of the problem for each farm will be collected on the company questionnaire. The number of case and control farms allocated to each company will be proportional to the number of case farms and control farms available from each company. A standard sampling protocol will be provided.

Urban Chicken Prevalence Record (Urban Chicken Phase I): Sample selection will be performed by an outside survey company contracting with NAHMS. An address list representing a systematic random sample of urban representatives in each city will be purchased by the contracting company. These representatives will be contacted by mail to complete the survey. A second mailing will be sent to non respondents. Non-responders to the second mailing will be contacted by telephone. Telephone numbers associated with the addresses will be obtained via reverse lookup method, which is expected to provide valid phone numbers for 60-70 percent of the addresses.

Urban Chicken Questionnaire (Urban Chicken Phase II): In feed stores, all representatives purchasing chicken feed will be asked to complete the urban chicken questionnaire via personal interview. (see Item 1 above for sample selection details). Total contacts and refusals will be recorded. If possible, reason for refusal will be noted.

- **Estimation procedures:**

For objectives 1 and 2, the inference population is the 56 companies selected to participate; therefore the initial sampling weight is one for all records at the company level. A weight adjustment will be performed to account for non-response as needed for the company-level questionnaire data. This company-level weight will be adjusted by the number of farms owned by or contracting with the company divided by the number of farms for which a farm-level survey is completed, to create a farm weight for the breeder and turkey questionnaires.

For Urban Chicken Phase I, the contracting company will provide information on the inference population of urban residents in the four cities, so that weights can be created to adjust for sampling and for non-response as needed.

For Urban Chicken Phase II, the sample of chicken owners at feed stores will be considered equivalent to a simple random sample since the sample design does not lend itself to having a reliable basis for determining weights.

The statistical estimation will be undertaken using either SAS survey procedures or SUDAAN for the weighted components of this study. Both software packages use a Taylor series expansion to estimate appropriate variances for the stratified, weighted data. Phase II of the urban chicken will be analyzed using standard SAS procedures.

- **Degree of accuracy needed:**

The study has been designed with a goal of 80 percent power, 95 percent confidence and a coefficient of variation less than 20 percent.

For objective 1: In order to obtain an estimate of 10 percent +/- 3 percent (cv = 15 percent), a sample size of 350 breeder farms is needed when a simple random sample is taken. This same sample size will allow estimates of 50 percent +/- 5 percent (cv=5 percent). Assuming a response rate of 70 percent, a sample size of 500 farms was chosen (an average of approximately 20 farms for each participating company) to provide 350 completed surveys. The response rate estimate is based on contacts that have already been made with representatives from the poultry companies – most companies have already agreed to participate. The non-response adjustment in this study will cause some variance inflation, but the final coefficient of variation is expected to be below 20 percent, which is the goal for NAHMS studies.

For objective 2: The selection of 300 case turkey farms and 300 control turkey farms, with a response rate of 70 percent (resulting in 210 case farms and 210 control farm), will allow detection of Odds Ratio (OR) =2 if at least 20 percent of control farms have the factor, OR=3 if at least 5 percent of control farms have the factor, and OR=4 if at least 3percent of control farms have the factor.

For objective 3, Urban Chicken Phase I: The prevalence of urban chicken ownership was estimated to be 1percent based on a previous study of backyard birds in Denver (personal communication, Kristy Pabilonia). The contracted survey company will be responsible for returning 3,000 completed surveys per city, which will allow a prevalence estimate of 0.5percent +/- 0.25 percent (e.g., 0.25 percent to 0.75 percent). Considering the low prevalence, the sample size provides reasonable accuracy. Although the response rate on surveys of the general public is often low (we estimate 60 percent response rate), the survey company will maximize response rate by sending two mailings and doing follow-up phone calls for non-responders.

For objective 3, Urban Chicken Phase II: A sample size of 200 respondents at feed stores for each of the 4 cities will allow estimates of 50 percent +/- 6.2 percent and 10 percent +/- 3.7percent (cv =18.5 percent). Assuming a response rate of 70 percent, 1143 customers would be approached to get 800 completed surveys.

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

The prevalence of chicken ownership in urban settings is extremely low (APHIS anticipates about 1 percent) and there is no list frame for this population. Therefore, finding urban chicken owners presents a challenge requiring specialized sampling procedures. Since our research indicates that the majority of these chicken owners purchase feed in feed stores, this is the best opportunity to obtain enough respondents to conduct a meaningful survey of management practices. There are already some lists of feed stores maintained by state animal health officials that may be accessed for this study. Additionally, local Federal personnel will conduct additional searches to assure as complete a list as possible. Feed stores will be visited multiple times until the allocated number of completed surveys is achieved. Data will not be weighted. The inference population is urban customers of feed stores purchasing chicken feed and who reside in the four cities. The potential for non-response bias will be evaluated based on available data on non-respondents (timing of interview, stated refusal reason).

3. Describe methods to maximize response rates and to deal with issues of non-responses:

Study Design:

- Many proven questions have been repeated from previous NAHMS poultry studies conducted in 1999 and 2004.
- The study minimizes collection of data to that which is absolutely necessary to meet the stated objectives.
- The Poultry specialist for NAHMS has made numerous contacts and collaborative efforts to identify the information needs of the industry and the best way to ask for that information via questionnaire.
- For objectives 1 and 2, the study is being limited to 56 large poultry companies that account for the majority of poultry production.
- For objective 3 (Urban Chicken Phase I), non-respondents will be recontacted via a second mailing, and non-respondents to both mailings will be contacted by phone.
- For objective 3 (Urban Chicken Phase II), respondents will be offered a discount on a bag of chicken feed as compensation for their time. The potential for non-response bias will be evaluated based on available data on non-respondents (timing of interview, stated refusal reason).

Contacting Respondents:

- For objectives 1 and 2, a single representative from each company will be the respondent. Each respondent will be assigned multiple farms. Company representatives will be contacted directly by NAHMS via email or telephone. The poultry specialist has met several times in-person and via conference call with the poultry veterinary associations, in addition to one-on-one phone calls to each company veterinarian/representative. Company representatives are periodically updated to keep them engaged in the study so as to maximize response rates.
- An outside company with experience in conducting public opinion polls and maximizing response rates will conduct Urban Chicken Phase I for objective 3.
- For objective 3 (Urban Chicken Phase II), APHIS data collectors will ask feed store business customers purchasing chicken feed to complete the survey. Respondents will be offered a discount on a bag of chicken feed as compensation for their time. APHIS will track the number of customers that purchase feed on the days that it is in feed stores as well as the number of customers that are asked to participate but refuse.

Data Collection Steps:

- Company veterinarians/representatives have the option of completing the company and breeder questionnaires on-line or via hard copy.
- Participating company representatives will be told they will get a copy of the summary reports for all collected data.

Data Analysis Steps:

The response rate for the questionnaires involving the commercial poultry companies, given the methods described above, will have two phases. First, APHIS expects that about 70 percent of companies will agree to participate. Then, APHIS expects that each participating company representative will complete 70 percent of the farm questionnaires assigned to them. These estimates are based on contacts that have already been made with each of the 56 companies. If the respondents differ substantially from the nonrespondents there will be the potential for bias. Since all companies in the inference population are to be included in the initial sample, unlike other NAHMS studies that use complex sampling design, the initial weight will be one. However, to address potential bias due to nonresponse the weights of nonrespondents can be transferred to responding operations that are most similar based on available data (i.e., industry segment: breeder, broiler, table egg layer, or turkey company). Within categories, the sum of weights of the nonrespondents and respondents will be divided by the sum of the weights of the respondents only. This factor will be used to adjust the weights of the respondents within the category. All weights for nonrespondents will be set to zero.

The response rate for the Clostridial dermatitis sample collection record is expected to be close to 100 percent, since participating companies will be choosing farms for participation. These companies have already been involved in discussions about the study.

For Urban Chicken Phase I (Prevalence Record), the response rate is expected to be 60 percent. If the respondents differ substantially from the nonrespondents there will be the potential for bias. To help adjust for non-response bias, non-respondents will be contacted by phone to investigate differences between respondents and non-respondents. Weight adjustments will be made based on auxiliary data known for the entire sample (e.g., census data).

For Urban Chicken Phase II (Urban Chicken Questionnaire), the response rate is expected to be approximately 70 percent, based on experience with a similar population in the Poultry 2004 study, and the Small Enterprise Chicken Study 2007 (Appendix B). Data will not be weighted.

4. Describe any tests of procedures or methods to be undertaken.

Initially, the questionnaire will receive extensive review by a wide variety of experts including researchers, extension, veterinarians/poultry health specialists and epidemiologists. The proposed questionnaire will be tested during the pretest phase involving less than 10 respondents. Results of these pretests will be utilized to refine the information collection in order to reduce respondent burden and improve the usefulness of the information.

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 Dr. Bruce Wagner, Mathematical Statistician, and Dr. Lindsey Garber, Analytic Epidemiologist, USDA: APHIS, Veterinary Services, CEAH, Fort Collins, CO, (970) 494-7250. The actual data collection will be conducted by APHIS designated data collectors. Contact persons for data collection are:

- Dr. John Clifford, Deputy Administrator, USDA: APHIS, Veterinary Services, Washington, DC (202) 447-6835.

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

- Mr. George Hill, Acting Director, National Animal Health Monitoring System, USDA: APHIS, VS, CEAH, 2150 Centre Avenue, Building B MS2E7, Fort Collins, CO 80526-8117 (970) 494-7250.

Poultry experts participated in focus groups and provided input into this study. Several consultants were used for the Poultry 2010 study. Some examples include:

David A. Halvorson, DVM, ACPV, Extension Veterinarian - Avian Health, College Of Veterinary Medicine, University of Minnesota, 1971 Commonwealth Avenue, Saint Paul, Minnesota 55108, (612) 625-5292.

Mr. Andrew Rhorer, Director, National Poultry Improvement Plan, USDA:APHIS:VS, 1498 Klondike Rd., Conyers, GA (770) 922-3496.

Dr. Becky Tilley, DVM, ACPV, President Association of Veterinarians in Turkey Practice, Goldsboro Milling Co, PO Box 10009, Goldsboro, NC 27532 (919) 778-3130.

Appendix A: U.S. Commercial Poultry Operations, 2006-2007¹

| | Million Pounds of Meat (average weekly production) 2006 | Million Pounds of Meat (average weekly production) 2007 |
|-----------------------------|---------------------------------------------------------------|---------------------------------------------------------------|
| US | 734.56 | 735.58 |
| Top 14 broiler companies | 623.34 | 617.31 |
| | 84.9 percent | 83.9 percent |

| | Million Layers in Production On 12/31/2007 |
|---------------------------|-----------------------------------------------|
| US | 253.6 |
| Top 24 layer companies | 179.1 |
| | 70.6 percent |

| | Slaughter Volume 2007 (Billion Live Pounds Processed) |
|----------------------------|-------------------------------------------------------------|
| US | 7.090 |
| Top 10 turkey companies | 5.094 |
| | 71.8 percent |

¹ Based on WATT Poultry USA publications in 2007 and 2008 (For access, visit <http://www.wattagnet.com/>):

Thornton, Gary. "Top 10 Broiler Companies" and "Broiler Companies, A-Z Profiles". WATT Poultry USA, February 2007. Pages 28-40.

O'Keefe, Terrence. "Top Turkey Company Profiles." WATT Poultry USA, February 2007. Pages 56-65.

Clark, Edward. "Producers Less Optimistic on 2008 Prices." Egg Industry, January 2007. 113(1), pages 1-5.

Appendix B: NAHMS Review of Response Rates

1. Poultry 2004 and Small Enterprise Chicken Study 2007 sample review

a. Questionnaire response rates:

| Year | Questionnaire | Collection Dates | Sample | Complete | Complete Percent |
|-------------|--------------------------------------------------------|-------------------------|---------------|-----------------|-------------------------|
| 2004 | Small Production and Backyard Flock Questionnaire (VS) | 10/1/04-12/1/04 | 763 | 540 | 70.8 |
| 2007 | Small Enterprise Chicken Report (NASS) | 8/1/07 – 9/30/07 | 2511 | 1789 | 71.2 |

Appendix C: Estimated Response Rates for the Poultry 2010 study

Estimated response percentages and counts for the Poultry survey.

| Phase | Response category | Percentage in Phase | Expected counts |
|------------------------|-------------------------------------------------|---------------------|-----------------|
| Company Questionnaire | | | |
| | Complete | 71.4 | 40 |
| | Refusal | 28.6 | 16 |
| | Total | 100.0 | 56 |
| Breeder Questionnaire | | | |
| | Complete | 70.0 | 350 |
| | Refusal | 30.0 | 150 |
| | Total | 100.0 | 500 |
| Turkey Questionnaire | | | |
| | Complete | 70.0 | 420 |
| | Refusal | 30.0 | 180 |
| | Total | 100.0 | 600 |
| Urban Chicken Phase I | | | |
| | Complete | 60.0 | 12,000 |
| | Refusal | 20.0 | 4,000 |
| | Inaccessible (e.g., vacant, no phone number) | 20.0 | 4,000 |
| | Total | 100.0 | 20,000 |
| Urban Chicken Phase II | | | |
| | Complete | 70.0 | 800 |
| | Refusal | 30.0 | 343 |
| | Total | 100.0 | 1,143 |

Appendix D: Urban Chicken Media Publications

1. The Huffington Post. "Urban Chickens: The Latest Trend in New York City." Includes video of urban chicken feature on the Today Show.
http://www.huffingtonpost.com/2009/09/02/urban-chickens-the-latest_n_274987.html
2. The New York Times. "Keeping Their Eggs in Their Backyard Nests." August 3, 2009.
<http://www.nytimes.com/2009/08/04/business/04chickens.html>
3. USA Today. "Chickens Given Roosts in Urban Backyards." January 2, 2009.
http://www.usatoday.com/news/offbeat/2009-01-02-urban-chicken_N.htm
4. The Arizona Republic. "Urban Chickens the Latest Healthful-Living Trend." May 9, 2009.
<http://www.azcentral.com/news/articles/2009/05/09/20090509urbanchickens0506.html>
5. USA Today. "Chickens Come Home to Roost in Backyards Around the USA." November 10, 2009.
http://www.usatoday.com/news/nation/environment/2009-11-09-urbanchickens09_ST_N.htm
6. Newsweek. "The New Coop De-Ville: The Craze for Urban Chicken Farming." November 17, 2008.
<http://www.newsweek.com/id/168740>
7. Channel 7 News Denver. "Battle Over Urban Livestock Heats Up." May 12, 2009.
<http://www.thedenverchannel.com/news/19445825/detail.html>
8. NBC Miami. "Dangerous Urban Chicken Craze Has Legs." August 19, 2009.
<http://www.nbcmiami.com/news/weird/Dangerous-Urban-Chicken-Craze-Has-Legs-53621602.html>