SUPPORTING STATEMENT FOR INFORMATION COLLECTION
PART B

UNITED STATES DEPARTMENT OF AGRICULTURE (USDA)

ANIMAL AND PLANT HEALTH INSPECTION SERVICE (APHIS)

VETERINARY SERVICES (VS)

THE CENTERS FOR EPIDEMIOLOGY AND ANIMAL HEALTH (CEAH),

NATIONAL CENTER FOR ANIMAL HEALTH SURVEILLANCE (NCAHS)

NAHMS SWINE 2006 STUDY LARGE ENTERPRISE COMPONENT
and
SWINE 2006 SMALL ENTERPRISE COMPONENT

B. Collections of Information Employing Statistical Methods

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

LARGE ENTERPRISE COMPONENT

The potential respondent universe of the Swine 2006 **large** enterprise study is all swine farmers with 100 or more pigs in their operations that are on the NASS swine list frame, in 17 States[1]. These 17 States are selected to match the States that NASS visits on a quarterly basis and for which they publish detailed inventory estimates. The advantage of using these states is that the NASS list frame is more complete and up to date for these states because of the quarterly survey. Examination of the 2002 Census of Agriculture summary information (the last publication of all State hog and farm inventory information) demonstrates that these 17 States account for over 93% of swine farms with 100 or more pigs in the United States and over 94% of hogs and pigs on swine farms with 100 or more pigs in the United States (Appendix C – farm/inventory table). Based on previous NAHMS swine surveys (Appendix A), the estimated response rate for the NASS on farm component of the Swine 2006 study is 60 percent (response rate calculations appear in Appendix B). Almost all (98%) of the respondents from the NASS component of the study will be eligible to participate in the Veterinary Medical Officer (VMO) component of the study. Criterion for eligibility is their July 1 reported inventory of 100 head.

****

SMALL ENTERPRISE COMPONENT

The potential respondent universe of the **small** enterprise component of the Swine 2006 study is all swine farms with fewer than 100 pigs in their operations that are on the NASS swine list frame, in 31 states[2]. These 31 States are primarily selected based on results from assessments of risk pathways for the two diseases of interest (Classical Swine Fever (CSF) and Pseudorabies, Appendix F). Five of the 31 States (CO, MI, PA, SD, and WI) are also in the large enterprise study. These 31 States account for over 84% of swine farms with less than 100 hogs and 89% of the hogs on farms with less than 100 hogs in the United States (Appendix E). Based on previous NAHMS swine surveys, the estimated response rate for the **small** producer component of the Swine 2006 study is 70 percent (Appendix E).

[1] Arkansas, Colorado, Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Carolina, Ohio, Oklahoma, Pennsylvania, South Dakota, Texas, Wisconsin.

.

[2] AL, AZ, AR, CA, CO, FL, GA, HI, IL, IN, IA, KS, LA, MI, MN, MS, MO, NE, NJ, NM, NY, NC, OH, OK, PA, SC, SD, TN, TX, WA, and WI.

2. Describe the procedures for the collection of information.

LARGE ENTERPRISE COMPONENT

- Statistical methodology for stratification and sample selection:

Sampling methodology — Swine 2006 **large** enterprise study: 5,005 swine farms will be selected from NASS' swine list frame. The sample will be selected as a stratified random sample with the strata being both state and operation size. Operation size is based on total inventory. The state-level allocation will be based on a weighted proportion of the number of operations in the state and the hog inventory relative to the U.S. levels for swine farms with 100 or more hogs (Appendix B). The percentage of U.S. swine farms in the State will get a weight of 0.4 and the percentage of hogs will get a weight of 0.6. For example, Iowa has 28.5% of the hogs and 30.6% of farms. Iowa will initially be assigned 29.4% (28.5*0.6+30.6*0.4=29.4) of the sample of 5,005. States with similar proportions of inventory and farms were combined for an overall calculation. The allocation will be adjusted to move some of the sample from Iowa, Minnesota, and North Carolina to other states with fewer samples. Within States the State-level sample will be allocated within size strata. Allocation will follow the same strategy as the state-level allocation since proportions of operations and proportions (ratios) of hogs will be estimated using the data obtained from this study.

Three to five telephone calls will be made by the NASS enumerator to set up a convenient time to introduce the study. If the producer is unable to be contacted via phone, the enumerator will drive to the farm to initiate contact and will either complete the interview at that time or establish another time for the interview. If the farm location cannot be established, the selected unit will be coded inaccessible. Once contact is made, the NASS enumerator will administer NAHMS-176 (General Swine Farm Report questionnaire). Upon completion of the interview, if the respondent had 100 or more hogs they will be asked to sign a consent form allowing NASS to turn their name over to APHIS for further consideration in the study; this will complete Phase I of the study. NASS will provide the list of producers willing to participate in the second phase of the study (Veterinary Medical Officer Questionnaire) to NAHMS coordinators in each State immediately following Phase I. Once all the information on NAHMS-176 has been entered and validated, NASS will send a cleaned dataset to NCAHS along with completed questionnaires via mail. The estimated response rate based on previous NAHMS swine studies is 60% for Phase I.

Phase II of the study consists of an on farm interview administered by an APHIS designated data collector (typically a veterinary medical officer (VMO)). The data collector will contact the producer to set up a time to administer the study questionnaires and take samples. Upon arrival on the premises, the data collector will present NAHMS-183 (Producer Agreement) to the producer which allows the producer to indicate what portion(s) of the Swine 2006 study they agree to participate in. Once NAHMS-183 is completed and signed, the data collector will administer NAHMS 178 (Initial Visit

questionnaire) to the producer. Once NAHMS-178 has been completed, a separate time will be set up for the data collector to come back and administer NAHMS-179 (Second Visit questionnaire) and take biologic samples (NAHMS-180 (blood), NAHMS-181 (fecal)) depending on what the producer indicates on NAHMS-183. The data collector may set up to two separate times to come back to the farm (once per sample) to complete the biological sampling. Once NAHMS-179 is completed, and all of the samples indicated on NAHMS-183 have been taken, Phase II of the study is complete. The completed questionnaires will be returned to NCAHS via U.S. mail. The estimated response rate based on previous NAHMS swine studies is 75% for Phase II.

- 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 or SUDAAN. Both software packages use a Taylor series expansion to estimate appropriate variances for the stratified, weighted data.

- Degree of accuracy needed:

  The overall NCAHS program goal is to develop descriptive statistics with a coefficient of variation less than 20%. In order to obtain an estimate of 10% +/- 2.0% (cv=20.0%) a sample size of 836 is needed when a simple random sample is taken. Similarly, to obtain a prevalence/proportion estimate of 50%+/-10% (cv=20%) would require a simple random sample of only 96. However, the complex survey design typically will result in variances that are inflated. The design effect from the Swine 2000 study indicates the magnitude of the variance inflation that can be expected (Appendix D). Design effects ranged from less than one up to almost 6 for the selected variables. Assuming a typical design effect of 3, a sample size of 2,508 would be required to obtain the desired precision when the estimate is 10%. The sample size required for a similar precision goal when the estimate is 50% is much less than 2,508.

  The design of the Swine 2000 study was very similar to the proposed design for the Swine 2006 study. The initial sample size for the NASS component was similar (n=4,749). Estimates, standard errors and coefficients of variation (based on 2,328 completed questionnaires) presented in Appendix D indicate that the minimum degree of precision that was desired was attained and, in all cases, exceeded for the NASS component. Similarly, the estimates, standard errors, and coefficients of variation for the VMO component (based on 895 completed questionnaires) met the desired accuracy goals (Appendix D).

- Unusual problems requiring specialized sampling procedures and data collection

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

****

SMALL ENTERPRISE COMPONENT

- Statistical methodology for stratification and sample selection*:*

Swine 2006 **small** enterprise study: 5,000 swine farms will be selected from NASS' swine list frame. The sample will be selected as a stratified random sample with both State and operation size strata. Operation size is based on total inventory from NASS' list frame. The State-level allocation will be based on a weighted proportion of the number of operations in the State and the hog inventory relative to the U.S. levels for swine farms with less than 100 hogs (Appendix E). The percentage of swine farms in the State, relative to the 31-State total, will get a weight of 0.4 and the percentage of hogs will get a weight of 0.6. For example, Ohio and Texas have 7.8% and 7.6%, respectively, of the hogs and 7.1% and 10.8% of farms. The two States will initially be assigned 16.5% ((7.8+7.6)*0.6+(7.1+10.6)*0.4=16.4%) of the sample of 5,000. Similar to the combination of Ohio and Texas, the remaining States with similar proportions of inventory and farms were combined for overall calculations. The allocation will be adjusted to move some of the sample from groups 1 through 3 (OH, TX, IA, IN, PA, MN, MO, WI, IL, MI, NE, OK) to groups 5 and 6 (AL, AR, CO, LA, MS, WA, AZ, HI, NJ, NM) that have fewer samples. Within States, the State-level sample will be allocated within size strata. Allocation will follow the same strategy as the State-level allocation since proportions of operations and proportions (ratios) of hogs will be estimated using the data obtained from this study.

- 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 or SUDAAN. Both software packages use a Taylor series expansion to estimate appropriate variances for the stratified, weighted data.

- Degree of accuracy needed:

The overall NCAHS program goal is to develop descriptive statistics with a coefficient of variation less than 20 percent. In order to obtain an estimate of 10% +/- 2.0% (cv=20.0%) a sample size of 836 is needed when a simple random sample is taken. Similarly, to obtain a prevalence/proportion estimate of 50%+/-10% (cv=20%) would require a simple random sample of only 96. However, the complex survey design typically will result in variances that are inflated. The design effect from the Swine 2000 study, which focused on larger hog operations, indicates the magnitude of the variance inflation that can be expected. Design effects ranged from less than one up to almost 6 for the selected variables. Assuming a typical design effect of 3, a sample size of 2,508 would be required to obtain the desired precision when the estimate is 10%. The sample size required for a similar precision goal when the estimate is 50% is much less than 2,508. Given an expected response rate of 70%, the initial sample should result in adequate completed surveys to attain the desired confidence intervals. Additional sample size calculations are shown in Appendix C. Due to NASS' recent comment predicting larger drop out (higher percent of small producers not having pigs during the survey period), the larger sample size (5,000) was chosen to more adequately support the regional estimation.

Non Response Adjustment

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

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

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

LARGE ENTERPRISE COMPONENT

Study Design:

- Many questions have been repeated from previous NAHMS swine studies in 1990, 1995, and 2000.

- The study minimizes collection of data to that which is absolutely necessary.

- NAHMS will develop a training CD for NASS enumerators that explains the purpose of the study and addresses anticipated difficulties with questions, including proper pronunciation of diseases. Each enumerator will receive a CD.

- After participating in an onsite training session with NAHMS staff, the NAHMS coordinator (VMO, one per State) will help train NASS enumerators in their home State.

- The NAHMS' coordinator conducting training will acquaint the NASS enumerators with NCAHS, their role in the information collection, and the type of information to be reported resulting from the data collected.

- Similarly, for the on-farm component, each NAHMS coordinator (one per State) will receive three days of specialized training via NAHMS staff and in return train the APHIS field data collectors in their State.

- The Swine specialist for NCAHS 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.

- A sample of 5,005 swine producers with 100 or more head will be drawn from NASS' producer list.

- A pre-survey letter will be sent along with the brochure. Upon personal contact by the enumerator, the brochure will again be presented.

- Two separate data collection efforts by two agencies within USDA have been combined instead of NASS conducting two separate surveys (NASS chemical usage and NAHMS – health and management).

Contacting Respondents:

- The study has been announced and is supported by the National Pork Board and the American Association of Swine Veterinarians (AASV).

- Producers will be called by the NASS enumerator 3 to 5 times followed by an on farm visit before they are listed as refused or inaccessible.

- The APHIS designated data collector will contact farms that have consented to have their name turned over to APHIS and set up a convenient time for the producer to complete the questionnaire.

Data Collection Steps:

- Data collectors will arrive at the premises at the agreed time.

- The data collectors will administer NAHMS 176-181 and 183 to the producer.

Data Analysis Steps:

Response rates, given the methods described above are expected to be approximately 60% and 75% for the two phases of data collection. If the respondents differ substantially from the non respondents there will be the potential for bias. There are two approaches that we will use to examine for potential bias. First, NASS's control data on their list frame will be available for both respondents and non-respondents to allow for examination of potential differences in the types of responding and non-responding producers. The information will include number of hogs owned as well as the number of hogs on the land operated, contractor/contractee status, type of operation (farrow to wean, farrow to finish, finish only, farrow to feeder, and nursery), and State. For the VMO phase (Phase II) we will have the data from the completed initial survey available for comparing respondents versus non respondents as well as the control data from the NASS' list frame. Secondly, we can compare estimates from the study with available indicators from other sources. For example, although we do not publish estimates of hogs, the survey results will allow NCAHS to make estimates that we can use to compare against NASS' inventory estimates. This study is the fourth swine study that NCAHS has conducted and we can compare current estimates with results from previous studies (1990, 1995, and 2000).

The complex sampling design necessitates the use of weights which reflect the initial sample selection probabilities (the inverse of the selection interval). Weights of non respondents will be transferred to responding operations that are most similar, based on available data. This data will be available from the NASS list frame for the NASS component of the study. The VMO phase weight adjustments will be based on data available from both the NASS list

frame and the NASS component questionnaire results. Within categories, the sum of weights of the respondents and non-respondents will be divided by only the sum of the weights of the respondents. This factor will be used to adjust the weights of the respondents with the category. All weights for non respondents will be set to zero.

****

SMALL ENTERPRISE COMPONENT

Study Design:

- Minimizing collection of data to that which is absolutely necessary.

- The swine specialist for NCAHS has made numerous contacts and collaborative efforts to identify the information needs of the industry and how best to ask for that information via the **small** producer questionnaire.

- A mail out questionnaire with a reminder card, and telephone followup will boost the response rate to the estimated 70 percent.

Non Response:

- The study has been announced and is supported by the National Pork Board and the American Association of Swine Practitioners

- The questionnaire will be sent out via U.S. Mail with a cover letter and brochure announcing the study to give respondents more information on the study and why participation is important.

- A reminder card will be sent out 2 weeks after the questionnaire is sent out if a response is not received.

- If no response is received one month after the initial questionnaire is mailed out (2 weeks after the reminder card), a NASS enumerator will contact the producer via telephone and attempt to get the producer to complete the questionnaire or schedule a convenient time to complete the questionnaire.

- Producers will be called a minimum of 5 times before they are listed as inaccessible.

Data Analysis Steps:

Response rates, given the methods described above, are expected to be approximately 70% for this study. If the respondents differ substantially from the non-respondents there will be the potential for bias. There are two approaches that APHIS will use to examine for potential bias. First, NASS's control data on their list frame will be available for both respondents and non-respondents to allow for examination of potential differences in the types of responding

and non-responding producers. The information will include number of hogs owned as well as the number of hogs on the land operated, type of operation (farrow to wean, farrow to finish, finish only, farrow to feeder, and nursery), and State. Secondly, APHIS can compare estimates from the study with available indicators from other sources. For example, although APHIS does not publish estimates of hogs, the survey results will allow APHIS to make estimates that it can use to compare against NASS' inventory estimates. When possible, results from this study will be compared to results from the four swine studies that APHIS conducted by NCAHS (1990, 1995, 2000, and 2006). Also, APHIS will compare its results to values available from the scientific literature. APHIS believes there only will be limited opportunities for comparison because little national data exists for the type of information that is to be collected.

The complex sampling design necessitates the use of weights which reflect the initial sample selection probabilities (the inverse of the selection interval). Weights of non-respondents will be transferred to responding operations that are most similar based on available data. Within categories, the sum of weights of the non-respondents 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 with the category. All weights for non respondents will be set to zero.

4. Describe any test procedures or methods to be undertaken.

The proposed questionnaires will be tested during the pretest phase involving less than 10 respondents. Results from 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, contact(s), grantee(s), or other person(s) who will actually collect and /or analyze the information for the agency.

LARGE ENTERPRISE COMPONENT

The statistical aspects of the design were coordinated by Mr. George Hill, Survey Statistician, 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 NCAHS veterinarians, epidemiologists, and statisticians under the direction of:

- Dr. Nora Wineland, Co-Leader, National Center for Animal Health Surveillance, USDA: APHIS, VS, CEAH, 2150 Centre Avenue, Building B MS2E7, Fort Collins, CO 80526-8117 (970) 494-7230.

Appendix A: NAHMS Swine 2006 Large Enterprise Study Review of Response Rates

1. Swine 2000 sample review
   Screening sample drawn in 17 NASS quarterly hog and pig states.

   a. Telephone screening response rates:

Response category	No. Ops.	% of total
Eligible (100+inventory)	7,156	55.1
Not eligible	3,189	24.6
Out of business	537	4.1
Out of scope	256	2.0
Refusal	1,040	8.0
Inaccessible	810	6.2
	12,988	100.0

Out of the 7,156 eligible operations with 100 head or more total inventory, 4,749 were randomly selected for the on farm study.

   b. General Swine Farm Report (NASS) response rates compared to Dairy 2002:

Response category	No. Ops.	% of total	No. Sites	% of total	Dairy '02 %
Complete & VMO consent	1,208	25.4	1,316	26.7	37.1
Complete & refused cons.	1,120	23.6	1.183	24.0	23.3(3.0)
No pigs on 6/1/2000	181	3.8	181	3.7	5.9
Out of business	67	1.4	67	1.4	4.7
Out of scope	29	0.6	29	0.6	1.2
Refusal	1,736	36.6	1,736	35.3	23.3
Inaccessible	408	8.6	408	8.3	3.5
	4,749	100.0	4,920	100.0	100.0

Consent for further participation in the Swine study was asked on June 1 of those with 100+ head. There were 2,499 sites with good, positive, complete data or 50.8% (63.4 % for Dairy 2002) of the total sample (56.4 % if zeroes, out of business and out of scope are included – compares to 75.2% for Dairy 2002).

The summarized complete data included 2,499 sites of which 1,316 consented (52.7% compared to a consent rate for Dairy 2002 of 61.4%). For the dairy 2002 study 3.0% completed the survey but were ineligible for the VMO phase – this should be a coding requirement for Swine 2006 since there will be a greater chance of being ineligible than in Swine 2000, due to the screening sample used. The comparison of swine and dairy illustrates the need for better response rates for the 3 opportunities: - the enumerator phase (49.0 % of sample was complete for good data), consent phase, and the VMO phase (shown below).

VMO Visit Response Rates:

	Initial VMO Visit		Dairy '02	Second VMO Visit	
Response category	No. Ops.	% of total	%	No. Ops.	% of total
Complete	895	68.0	70.4	799	89.3
Refusal	292	22.2	22.9	91	10.1
Ineligible	25	1.9	1.4	NA	NA
Inaccessible	104	7.9	5.3	5	0.6
	1,316	100.0	100.0	895	100.0

2. Setting Total Sample Size for Swine 2006

As shown above, the Swine 2000 selected sample of 4,749 provided 2,499 good useable data from enumerator interviews but came up a little short of good data from our VMO visit of only 895. Note: that for both of these the number of inaccessible reports seems on the high side and should be reduced. As a rough goal we should target 2,500 good useable (positive) data from the enumerator interview and 1,250 from the VMO visit. Since most of the out of business operations are screened out prior to the enumerator visit it is assumed the number will increase over the 67 operations identified by enumerators. Based upon these considerations, we need a total sample size between 4500 and 5000. Further consideration of sample size is shown in the next table.

Appendix B: Preliminary NAHMS Swine 2006 Large Producer Sample Allocation

Strata	States (with calculation for weight)	Sample Sizes per State									
		NASS						VMO		VMO Biologics	
		States/ Grp.	Wtd. Sum	Adj. Wtd Sum[1]	Sample[1]	Good[2] (60%)	Eligible[3] (98%)	Over[4] (60%)	Quest[5] (75%)	80 or 60% of Quest[5]	
1.	**IA** Hogs = 28.5 % Farms = 30.6 % Wtd. Sum = **29.4 %**	1	29.4	22.0	1,100	660	647	388	291	233	175
2.	**MN NC** Hogs = 11.5 + 17.4 = 28.9 % Farms = 14.3 + 6.2 = 20.5 % Wtd. Sum = 12.6 + 12.9 = **25.5 %**	2	25.5	22.5 (11.3)	1,126 (563)	338	331	199	149	119	89
3.	**IL IN MO NE** Hogs = 7.0 + 5.5 + 5.1 + 5.0 = 22.6 % Farms = 8.9 + 6.8 + 4.3 + 7.0 = 27.0 % Wtd. Sum = 7.8 + 6.0 + 4.8 + 5.8 = **24.4 %**	4	24.4	27.0 (6.8)	1,352 (338)	203	199	119	89	71	54
4.	**KS OH OK PA SD** Hogs = 3.0 + 2.5 + 4.2 + 1.9 + 2.4 = 14.0 % Farms = 2.2 + 5.0 + 1.2 + 3.5 + 3.3 = 15.2 % Wtd. Sum = 2.7 + 3.5 + 3.0 + 2.5 + 2.7 = **14.4 %**	5	14.4	16.0 (3.2)	800 (160)	96	94	56	42	34	25
5.	**AR MI TX WI** Hogs = 0.6 + 1.6 + 1.7 + 0.7 = 4.6% Farms = 0.7 + 2.3 + 0.7 + 2.8 = 6.5% Wtd. Sum = 0.6 + 1.9 + 1.3 + 1.6 = **5.4%**	4	5.4	10.6 (2.7)	532 (133)	80	78	47	35	28	21

6	**CO** Hogs = 1.4% Farms = 0.2% Wtd. Sum.= **0.9%** (maximum sample available)	1	0.9	1.9	95	57	56	34	25	20	15
	Total (group total in state columns)	17	100.0	100.0	5,005	3,001	2,941	1,765	1,324	1,059	794

[1] Parenthesis indicates number above allocated by states within the group.
[2] NASS enumerator response rates are estimated at 60% across all States.
[3] Number of producers eligible for the VMO phase should be very high (98%) because of the screening and 100 head eligible criteria for the enumerator sample.
[4] Of those completing the enumerator questionnaire and having 100+ hogs, approximately 60% will consent to have their names given to APHIS.
[5] VMO response rates are estimated at 75% and then 80 to 60% (two columns shown) for sub-sampling participation.

On Dec. 1, 2004 there were 60,501,000 hogs (revised to 60,975,000 in Sept. 2005) in the US' 50 States. There were 69,420 operations in 2004. An operation is any place having one or more head of hogs on hand at any time during the year. These 17 States account for 94.0% of the inventory and 94.2% of the operations with 100 head of hogs.(similar percents using 2002 Census of Agriculture). Likewise, the 17 States account for 93.8% of the inventory and 73.3% of the operations with one or more hogs (similar percents using 2002 Census of Agriculture). There were 27,405 operations in the US with 100 head or more, totaling 59,895,500 head of inventory (the 17 States had 56,290,900 head on 25,805 operations). The sample allocation is based on the contribution of each State to the total of the 17 States for this population of 100 head or more for the initial Dec. 1, 2004 inventory estimates.

Note: In the table above, States are grouped according to their size. All percentages provided in the table are for operations with 100 + hogs. The number of hogs and number of farms for each State are shown as a percent of the 17 States' total. These percents are shown below each State name. The percent contribution of each size group was calculated as a weighted percent with the weighted percent of hogs (weight=.6) and the percent of farms (weight=.4). The adjusted percent shown was used to trim some samples from the **large**r size groups and move additional samples to the smallest size group.

Appendix C: Total U.S. Farm and Pig Inventory

Total Farms & All Hogs and Pigs Inventory on Farms with 100 or Hogs and Pigs, 2002

State	Total Farms*	Percent of U.S. Total	All Hogs & Pigs Inventory*	Percent of U.S. Total
AL	85	0.28	161,579	0.28
AK	2	0.01	0	0.00
AZ	6	0.02	0	0.00
AR***	163	0.54	295,913	0.51
CA	95	0.31	147,579	0.27
CO***	198	0.65	773,028	1.30
CT	7	0.02	1,750	0.01
DE	15	0.05	9,068	0.02
FL	55	0.18	7,073	0.06
GA	248	0.82	329,931	0.58
HI	50	0.17	20,337	0.04
ID	31	0.10	12,507	0.04
IL***	2,641	8.73	4,012,048	6.80
IN***	2,329	7.70	3,389,904	5.78
IA***	8,655	28.60	13,263,736	25.71
KS***	571	1.89	1,485,028	2.53
KY	251	0.83	366,835	0.64
LA	29	0.10	9,701	0.03
ME	10	0.03	987	0.01
MD	59	0.19	13,147	0.00
MA	24	0.08	3,745	0.02
MI***	554	1.83	901,489	1.54
MN***	3,694	12.21	6,399,080	10.69
MS	64	0.21	295,649	0.50
MO***	1,452	4.80	2,866,121	4.83
MT	98	0.32	166,281	0.29
NE***	2,114	6.70	2,902,183	4.87
NV	3	0.01	0	0.00
NH	5	0.02	0	0.00
NJ	25	0.08	8,643	0.02
NM	9	0.03	0	0.01
NY	69	0.23	62,966	0.14
NC***	1,583	5.23	9,862,957	16.42
ND	150	0.50	123,960	0.23
OH***	1,365	4.51	1,328,568	2.36
OK***	194	0.64	2,221,616	3.73
OR	37	0.12	8,956	0.03
PA***	887	2.93	1,187,269	2.04

RI	9	0.03	1,685	0.00
SC	135	0.45	277,876	0.48
SD***	925	3.06	1,356,325	2.28
TN	189	0.62	212,862	0.38
TX***	214	0.71	900,713	1.58
UT	33	0.11	665,292	1.11
VT	2	0.01	0	0.00
VA	94	0.31	399,802	0.68
WA	50	0.17	22,550	0.05
WV	13	0.04	0	0.02
WI***	741	2.45	496,282	0.89
WY	28	0.09	111,595	0.19
Top 17 States	28,280	93.46	55,715,606	94.18
US total	*30,260*	*100.00*	59,157,962	*100.00*

*NASS 2002 Census of Agriculture--State data; ***Top swine States

Appendix D: Selected Estimates from Swine 2000 with Associated Standard Errors, Coefficients of Variation, and Design Effects

Phase I: NASS enumerator portion				
Variable	Point estimate	Standard Error	Coefficient of variation	Design effect
Percent of operations that use local veterinary practitioners	66.9	1.5	2.2	2.6
Percent of operations that vaccinate hogs and pigs for porcine reproductive and respiratory syndrome (PRRS)	28.3	1.6	5.6	3.0
Percent of breeding-age females that died percent died between Dec.1, 1999 and May 31, 2000 (ratio estimate)	3.3	0.15	4.5	0.24
Phase II: Veterinary medical officer visit				
Percent of operations that did not have PRRS present in breeding females in the past 12 months	80.6	3.3	4.1	3.3
Percent of operations that use all-in, all-out in the farrowing phase (to control or prevent *Mycoplasma pneumonia*)	72.6	2.7	3.7	2.8
Percent of operations that record any data when treating grower/finisher pigs with antibiotics	63.6	4.8	7.6	5.8

Appendix E: Table XX. Estimated response percentages and counts for the Swine survey for the three study phases.

Phase	Response category	Percentage in Phase	Expected counts
Phase I			
	Zero on hand or out of business	10.0	501
	Complete and agree to continue	35.3	1,765
	Complete but ineligible to continue to phase II (<100 hogs)	1.0	53
	Complete and do not agree to continue	23.7	1,185
	Response to Phase I	70.0	3,504
	Refusal	29.0	1,451
	Out of scope (ineligible for phase I)	1.0	50
	Total	100.0	5005
Phase II			
	Complete	35.3*75.0=26.5	1,324
	Refusal	35.3*25.0=8.8	441
	Subtotal	35.3	1,765
	Ineligible from first phase	11.0	604
	Refusal from first phase	54.0	2,636
	Total	100.0	5,005
Phase III			
	Complete	35.0*75.0*90.0=23.62	1,192
	Refusal	35.0*75.0*10.0=2.63	132
	Subtotal	26.45	1,324
	Ineligible from first phase	12.05	604
	Refusal from first two phases	61.5	3,077
	Total	100.0	5,005

****

SMALL ENTERPRISE COMPONENT

The statistical aspects of the design were coordinated by Mr. George Hill, Survey Statistician, 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:

-Norm Bennett, Chief, Survey Administration Branch, Mail Stop 2024, 1400 Independence Ave., S.W., Washington, D.C. 20250, (202) 720-2248.

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

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

- Dr. Nora Wineland, Co-Leader, National Center for Animal Health Surveillance, USDA: APHIS, VS, CEAH, 2150 Centre Avenue, Building B MS2E7, Fort Collins, CO 80526-8117 (970) 494-7230.

Appendix A: Risk Factors associated with Classical Swine Fever (CSF) and Pseudorabies in Swine for Small Operations (< 100 pigs on-site)

- Densities of pigs per pen.
- Numbers of pig herds in a municipality.
- Frequencies of the contact rate between swine herds.
- Outside housing or access to the outside for pigs raised and integrity of fencing to prevent wild visitors.
- Vaccination protocols.
- Frequency of replacement animals (gilts and boars) used and quarantine methods used.
- Pig flow management within farms.
- Disease status and preventative disease measures in the herd.
- Transport vehicle hygiene and non-farm personnel entry.
- Reproductive management, primarily use of high health technologies to introduce new genetic stock (AI, MMEW, SEW, or Embryo Transfer).
- Veterinary monitoring of herd health status.
- Building biosecurity protocols.
- Garbage feeding to swine.

Appendix B: Desired Mode of Collection and Predicted Response Rate

A questionnaire totaling 31 questions and requiring approximately 25 minutes to fill out will be mailed to producers selected from the sampling frame for this study. Approximately two weeks after the mail out, enumerators from the National Agricultural Statistics Service (NASS) will call producers on the mailing list that did not return the mail survey. A total of three to five calls will be made to complete an interview before coding the respondent as unavailable. They will attempt to collect the information over the telephone over a 15-20 minute call. There will not be a letter or any attempt to convert refusals other than a clear explanation of the importance of their voluntary participation in the initial phone call. The predicted response rate to the questionnaire using this combination of data collection techniques is predicted to be 70%.

Appendix C: Sample Design and Coverage

Sample size unadjusted for sampling design.

Expected Prevalence		**50%**	**30%**		**50%**	**30%**		**50%**	**30%**
N = 42,000	Sample size			Sample size			Sample size		
n selected for NASS	3,000	CI (+/-)	CI (+/-)	4,000	CI (+/-)	CI (+/-)	5,000	CI (+/-)	CI (+/-)
n NASS good @ 70%	2100	2.14	1.96	2800	1.85	1.70	3500	1.66	1.52
n NASS good @ 60%	1,800	2.31	2.12	2,400	2.00	1.83	3,000	1.79	1.64

Expected Prevalence	Sample size	**50%**	**30%**	**10%**	Sample size	**50%**	**30%**	**10%**
N = 42,000								
n selected for NASS	2,500	CI (+/-)	CI (+/-)	CI (+/-)	5,000	CI (+/-)	CI (+/-)	CI (+/-)
n NASS good @ 70%	1,750	2.30	2.10	1.40	3,500	1.66	1.52	0.98
n NASS good @ 60%	1,500	2.31	2.30	1.50	3,000	1.79	1.64	1.06

Appendix D: Sample Allocation to States

	1 to 99							
State	Total farms for the 3 categories	Total Hogs for the 3 categories	Percent of 31-State Total	Percent of 31-State Total	Weighting	Sample size 3,000	Sample size 4,000	Sample size 5,000
Texas	4457	52,577	10.86	7.63	8.92	268	357	446
Ohio	2921	53,992	7.12	7.83	7.55	226	302	377
Pennsylvania	2938	39,576	7.16	5.74	6.31	189	252	315
Missouri	1997	43,488	4.87	6.31	5.73	172	229	287
Iowa	1550	47,933	3.78	6.96	5.68	171	227	284
Wisconsin	2252	39,111	5.49	5.68	5.60	168	224	280
Minnesota	1934	40,987	4.71	5.95	5.45	164	218	273
Indiana	1758	40,470	4.28	5.87	5.24	157	209	262
Oklahoma	2297	25,310	5.60	3.67	4.44	133	178	222
Illinois	1288	35,772	3.14	5.19	4.37	131	175	218
Michigan	1626	25,911	3.96	3.76	3.84	115	154	192
Nebraska	961	31,437	2.34	4.56	3.67	110	147	184
Florida	1416	20,048	3.45	2.91	3.13	94	125	156
Tennessee	1302	17,670	3.17	2.56	2.81	84	112	140
New York	1458	15,612	3.55	2.27	2.78	83	111	139
California	1426	15,886	3.47	2.31	2.77	83	111	139
Kansas	1077	18,399	2.62	2.67	2.65	80	106	133
Georgia	900	17,885	2.19	2.60	2.43	73	97	122
N. Carolina	959	15,237	2.34	2.21	2.26	68	90	113
S. Dakota	581	19,181	1.42	2.78	2.24	67	89	112
S. Carolina	765	13,867	1.86	2.01	1.95	59	78	98
Colorado	791	10,439	1.93	1.51	1.68	50	67	84
Washington	911	7,739	2.22	1.12	1.56	47	62	78
Arkansas	683	9,746	1.66	1.41	1.51	45	61	76
Louisiana[13]	651	7,501	1.59	1.09	1.29	39	52	64
Mississippi	628	6,541	1.53	0.95	1.18	35	47	59
Alabama	491	6,434	1.20	0.93	1.04	31	42	52
New Jersey[1]	332	2,928	0.81	0.42	0.58	17	23	29
Nw.Mexico[1]	337	2,274	0.82	0.33	0.53	16	21	26
Hawaii	154	3,027	0.38	0.44	0.41	12	17	21
Arizona[1]	202	2,147	0.49	0.31	0.38	12	15	19
Totals	**41,043**	**689,126**	**100.00**	**100.00**	**100.00**	**3,000**	**4,000**	**5,000**

[31]These States had missing data in the NASS Hogs and Pigs category in the 50 -99 substrata because they were afraid that individual farms could be identified. APHIS approximated the inventory by taking the total Hogs and Pigs category for the 50-99 category given it and dividing by the total number of farms in all other States in that category to give an average number of hogs for all other States in that category and multiplying that number by the number of farms in the each of the missing States in that category.

Appendix E: Sample Allocation to States

Strata	States (with calculation for weight)	State & Weight Totals			Sample = 4,000		Sample = 5,000	
		States/ Grp.	Wtd. Sum	Adj. Wtd Sum	Sample	Good (70%)	Sample	Good (70%)
1.	**OH TX** Hogs = 7.8 + 7.6 = 15.4% Farms = 7.1 + 10.8 = 17.9% Wtd. sum = **16.5 %**	2	16.5	14.5	580 (290)	203	724 (362)	253
2.	**IA IN PA MN MO WI** Hogs = 7.0 + 5.9 + 5.7 + 6.0 + 6.3 + 5.7=36.6% Farms = 3.8 + 4.3 + 7.2 + 4.7 + 4.9 + 5.5=30.4 % Wtd. sum = **34.0 %**	6	34.0	32.5	1,302 (217)	152	1,620 (270)	199
3.	**IL MI NE OK** Hogs = 5.2 + 3.8 + 4.6 + 3.7 = 17.3 % Farms = 3.1 + 4.0 + 2.3 + 5.6 = 15.0 % Wtd. sum = **16.3 %**	4	16.3	16.0	640 (160)	112	800 (200)	140
4.	**CA FL GA KS NC NY SD SC TN** Hogs = 2.3+2.9+2.6+2.7+2.2+2.3+2.8+2.0+2.6=22.4% Farms = 3.5+3.4+2.2+2.6+2.3+3.6+1.4+1.9+3.2=24.1 % Wtd. Sum = **23.0 %**	9	23.0	23.0	918 (102)	71	1,152 (128)	90
5.	**AL AR CO LA MS WA** Hogs = 0.9 + 1.4 + 1.5 + 1.1 + 0.9 + 1.1 = 6.9% Farms = 1.2 + 1.7 + 1.9 + 1.6 + 1.5 + 2.2 = 10.1% Wtd. Sum = **8.3%**	6	8.3	10.2	408 (68)	48	510 (85)	47
6.	**AZ HI NJ NM** Hogs = 0.3 + 0.4 + 0.4 + 0.3 = 1.4% Farms = 0.5 + 0.4 + 0.8 + 0.8 = 2.5% Wtd. Sum.= **1.9%**	4	1.9	4.0	160 (40)	28	160 (40)	34
	Total (group total in state columns)	31	100.0	100.0	4,008	2,806	4,966	3,476

The on-going NASS swine estimation program publishes size group estimates (inventory and operations) only for the 17 largest swine producing States. Therefore, the basis for this sample allocation is inventory and farms published in the 2002 Census of Agriculture.

The 2002 Census reports 60,405,103 hogs and pigs from 78,895 farms. Farms with 1-99 head totaled 48,635 or 61.6% of all farms with hogs but these farms only had 775,157 head of hogs or 1.3% of all hogs in the U.S.

The 31 States have 41,043 farms with 1-99 hogs or 84.4% of the U.S. farms with 1-99 head. Likewise on farms with 1-99 head in the 31 States, the inventory totaled 689,126 head or 88.9% of the 1-99 U.S. inventory.

Note: In the table above, States are grouped according to their size. All percentages provided in the table are for farms with 1-99 hogs. The number of hogs and number of farms for each State are shown as a percent of the 31 State total. These percents are shown in the table below each State name. The percent contribution of each size group was calculated as a weighted percent with the weighted percent of hogs (weight=.6) and the percent of farms (weight=.4). The adjusted percent shown was used to trim some samples from the larger size groups and move additional samples to the smallest size group.

Appendix F: Number of farms and hogs in the 31 selected States and the selection category (NASS, classical swine fever, pseudorabies, any of the 3 reasons).

State	Number of farms	Number of hogs	Farms: Percent of US Total	Hogs: Percent of US Total	NASS	CSF	PRV	ANY
Alabama	491	6434	1.01	0.83			X	X
Arizona	202	2147	0.42	0.00		X	X	X
Arkansas	683	9746	1.40	1.26	X		X	X
California	1426	15886	2.93	2.05		X	X	X
Colorado	791	10439	1.63	1.35	X			X
Florida	1416	20048	2.91	2.59		X	X	X
Georgia	900	17885	1.85	2.31		X	X	X
Hawaii	154	3027	0.32	0.39		X	X	X
Illinois	1288	35772	2.65	4.61	X	X		X
Indiana	1758	40470	3.61	5.22	X	X		X
Iowa	1550	47933	3.19	6.18	X	X		X
Kansas	1077	18399	2.21	2.37	X	X		X
Louisiana	651	7501	1.34	0.00			X	X
Michigan	1626	25911	3.34	3.34	X			X
Minnesota	1934	40987	3.98	5.29	X	X		X

Mississippi	628	6541	1.29	0.84			X	X
Missouri	1997	43488	4.11	5.61	X		X	X
Nebraska	961	31437	1.98	4.06	X	X		X
New Jersey	332	2928	0.68	0.00		X		X
New Mexico	337	2275	0.69	0.00		X	X	X
New York	1458	15612	3.00	2.01		X		X
North Carolina	959	15237	1.97	1.97	X	X	X	X
Ohio	2921	53992	6.01	6.97	X		X	X
Oklahoma	2297	25310	4.72	3.27	X	X	X	X
Pennsylvania	2938	39576	6.04	5.11	X			X
South Carolina	765	13867	1.57	1.79			X	X
South Dakota	581	19181	1.19	2.47	X			X
Tennessee	1302	17670	2.68	2.28			X	X
Texas	4457	52577	9.16	6.78	X	X	X	X
Washington	911	7739	1.87	1.00		X		X