THE USDA'S NATIONAL ANIMAL HEALTH MONITORING SYSTEM

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ABSTRACT

The USDA's National Animal Health Monitoring System was established in 1983 and began as a state level pilot program. Roughly every five years NAHMS in cooperation with the National Agricultural Statistics Service (NASS), the National Veterinary Services Laboratories (NVSL) and the Agricultural Research Service (ARS), conducts a study of the national swine herd and collects information on production measures, management techniques, and swine health data. A NAHMS commodity survey consists of 5 phases that take approximately three to four years to complete. These steps are: Needs Assessment, Study Design, Study Implementation, Study Analysis and Information Dissemination. In general, descriptive and inferential statistical estimates are generated after validation, editing and weighting of individual observations in datasets that are created from all questionnaires and biological sampling results. We are currently in the Study Analysis Phase and the Information Dissemination Phase for the latest swine study, Swine 2006. Selected results from Swine 2006 are presented in these proceedings to provide data in four information areas: frequency of diseases and disease agents, management practices, disease modeling and support of surveillance systems.

NAHMS HISTORY

The United States Department of Agriculture's (USDA) National Animal Health Monitoring System (NAHMS) is one of three centers within the Centers for Epidemiology and Animal Health (CEAH) in Fort Collins, Colorado. In 1862 President Lincoln signed into law the Agricultural Act that established the USDA. About 20 years later, in 1883 the USDA's Commissioner established the Veterinary Division which changed its name a year later to the Bureau of Animal Industry (BAI). In that same year (1884) the Animal Industry Act charged the BAI "to investigate and report the condition of the domestic animals and live poultry in the United States …. and to collect such information on these subjects as shall be valuable to the agricultural and commercial interests of the country." From 1884 to 1953 the BAI grew into roles such as animal disease research, enforcement of animal import regulations and regulation of interstate animal movement.

In 1953 the BAI and several other existing bureaus (Bureau of Plant Industry, Soils and Agricultural Engineering and the Bureau of Entomology and Plant Quarantine) became part of the USDA's Agricultural Research Service (ARS) as part of the Reorganization Plan Number Two. In another USDA reorganization in 1961, two separate divisions of the USDA, the Division of Statistics and the Crop Reporting Board were merged into the National Agricultural

Statistics Service (NASS). This sister division of the USDA provides the list or area frame from which samples are selected for NAHMS studies In 1971 the ARS plant and animal regulatory functions separated from ARS, and briefly became the animal and plant health services (APHS). A year later the Consumer and Marketing Service (now known as the Agricultural Marketing Service - which oversees the operations of the National Pork Board) became part of APHS making it APHIS.

NAHMS traces its roots to two reports from the National Academy of Sciences (NAS). In 1966 NAS released "A Historical Survey of Animal Disease Morbidity and Mortality Reporting" that summarized past efforts to build systems of animal disease reporting (morbidity and mortality) and animal disease nomenclature. This report called for the development of a new framework in which to report animal morbidity and mortality and this framework was proposed in the 1974 report by the NAS "A Nationwide System for Animal Health Surveillance."

In 1985, the National Center for Animal Health Information Systems (NCAHIS) was created in Fort Collins, Colorado to assist in management of animal health events using computer technology and NAHMS staff followed in 1987. In 1988, the management team in Fort Collins began a conceptual plan that eventually created CEAH. Different methodologies were piloted as State-level programs in 1983 to test the paradigm of federal veterinarians collecting data on national animal health. This collection began at the state level under a pilot program administered by the states. The results were successful enough so that in 1989 there was a transition from a state to a federal level program. Originally NAHMS was created to monitor changes and trends in animal health and management in selected commodities through periodic snapshots (roughly every five years) of U.S. food animal industries. NAHMS has since grown in scope to include other types of studies in response to stakeholder needs.

There have been four swine commodity studies: 1990, 1995, 2000 and 2006. For a synopsis of the development, scope and products available from each of these studies please see page 1 of our latest report " Swine 2006, Part IV: Changes in the U.S. Pork Industry, 1990-2006 (http://www.aphis.usda.gov/vs/ceah/ncahs/nahms/swine/swine2006/Swine2006_PartIV.pdf)

NAHMS COMMODITY STUDY PROCESS (USING SWINE 2006 AS A TEMPLATE)

A NAHMS commodity study consists of 5 phases that take approximately three to four years to complete and are roughly sequential in time. These steps are: Needs Assessment, Study Design, Study Implementation, Study Analysis and Information Dissemination.

Needs Assessment Phase

The Needs Assessment Phase reaches out to various stakeholders in the commodity industry through a series of focus groups and usually a survey soliciting opinion as to which areas of interest to investigate (e.g., management practices, specific health issues, etc.). In the case of Swine 2006 a questionnaire was given through trade magazines and was also available online. Results from input sources generate objectives for the studies. An example of an objective from

Swine 2006 was, "Establish national prevalence of select grower/finisher respiratory diseases." More specific results of this stage are available upon request.

Study Design Phase

In the Study Design Phase participating States are selected and a sampling plan and data collection instruments are constructed. The sample size in Swine 2006 was influenced by an assumed prevalence, desired precision, expected response rate and budget. A goal for NAHMS national studies is to represent at least 70 percent of the animal and producer populations in the United States. Our original sample size in Swine 2006 was 5,000 sites with an inventory of 100 or more hogs which was then allocated to each of 17 participating states. This sample represented approximately 94% of U.S. hogs and sites with over 100 hogs. Biological specimens collected in Swine 2006 included blood from grower/finisher pigs 20 weeks and older and fecal samples from their pens. Blood was tested for PRRS, Swine Influenza, Porcine Circovirus, Toxoplasma and Trichinae. Fecal samples were cultured for Salmonella, Campylobacter, E. coli and Enterococcus and antimicrobial susceptibility was determined for isolates obtained.

Study Implementation Phase

The Study Implementation Phase involves mapping out the logistics of the study and executing them. Foremost is the designing of the content and timing of each stage of the study such as personnel training, printing the data collection instruments and promoting the study. In Swine 2006 there were two stages: the NASS component and the Veterinary Medical Officer (VMO) component. The former involved a single face-to-face interview while the latter involved two interviews and the collection of biological specimens.

In the NASS component, the General Swine Farm Report (GSFR) was completed during NASS interviews between July 17 and Sept. 15, 2006. At the end of the interview NASS enumerators asked producers if they would consent to have their names turned over to VS to participate in the VMO component of Swine 2006 study. Consenting producer names turned over to VS were then contacted by coordinators in each participating state to schedule subsequent site visits by VMOs. Responses from completed GSFR's was entered into a dataset by NASS state offices which then conducted preliminary validation and editing before sending the GSFR dataset to NAHMS for additional validation and editing.

For the VMO component of Swine 2006, NAHMS staff trained NAHMS coordinators from each state on how to administer the two questionnaires and collect biologic specimens during up to two VS farm visits. Subsequently, NAHMS coordinators trained the VMOs in their state and assigned names of producers turned over from the NASS component to VMOS for scheduling of farm visits. The Initial VS Visit and Second VS Visit interviews occurred between September 5, 2006 and March 15, 2007. Biological specimens were collected during either of the two visits. Data entry was conducted by NAHMS staff along with validation and editing. Blood and fecal samples were sent to the National Veterinary Services Laboratories (NVSL) and to the Agricultural Research Service (ARS), respectively. PRRS and Swine Influenza ELISAs were performed at NVSL while aliquots were sent to the University of Minnesota and the Beltsville Agricultural Research Center (BARC) for Porcine Circovirus and Toxoplasma/Trichinae testing, respectively. All fecal culturing and antibiotic resistance testing was done at ARS while Salmonella serotyping was done at NVSL. All results were sent back to NAHMS and linked with questionnaire data on management practices.

For each validated and edited dataset, expansion weights are calculated based on the farms selection probability and response rates among similar farms. This value tells how many farms in the original national sampling frame this participating farm represents. These weights are used to generate summary estimates that allow inference back to the original population in a statistically valid manner that reduces non response bias.

Study Analysis Phase

The Study Analysis Phase involves generating descriptive estimates (e.g., means, proportions, rates) and inferential estimates (e.g., association and strength of association measures between a farm level factor and incidence of disease). Descriptive estimates are generated first as part of standard descriptive reports, usually one report for each survey done. For example, the GSFR questionnaire's dataset became the basis for Descriptive Report Part I: Reference of Swine Health and Management Practices in the United States, 2006 in Swine 2006. We recently released Descriptive Report Part IV: Changes in the U.S. Pork Industry, 1990-2006 (January 2009) which is a compilation of select estimates from all four national swine studies. Inferential estimates involve more complex analysis, are often done in collaboration with outside researchers, and are usually published as proceedings papers or peer-reviewed scientific articles.

Information Dissemination Phase

The London Swine Conference is a part of the Information Dissemination Phase for Swine 2006. This phase includes the distribution of the aforementioned reports as well as shorter information sheets and presentations like this one. It also includes fielding inquiries and receiving input about our products. All our swine reports and information sheets are available at our website (http://www.aphis.usda.gov/vs/ceah/ncahs/nahms/swine/index.htm).

NAHMS SWINE 2006 SELECTED RESULTS

In Swine 2006 our original sample size selected by NASS was 5,157 sites. In the NASS component: 2,230 completed the GSFR and 1,005 consented to be contacted by VS. For the VMO component: 514 sites were surveyed for the Initial VS Visit Questionnaire and 435 sites were surveyed for the Second VS Visit Questionnaire. For biological sampling, 185 sites allowed blood sampling from their grower/finishers and 135 sites allowed fecal sampling from their grower/finisher pens.

The following selected results provide data in four information areas commonly addressed by NAHMS commodity studies: Baselines for diseases and disease agents, Management practices, Disease modeling and Support of surveillance systems (e.g., simulation modeling). Two other information areas that our commodity studies attempt to address are not presented here: design support of observational or experimental studies and hypothesis generation.

Baselines for Diseases and Disease Agents

A major concern of the pork industry in both of our countries has been in characterizing Porcine Circovirus Associated Disease (PCVAD) in terms of pathogenesis and more basic measures such as national incidence. In the Swine 2006 and Swine 2000 national studies producers reported whether or not PCVAD had occurred in nursery-age pigs and/or grower/finisher pigs during the previous 12 months. Table 1 shows that nationally, nearly 60% of large sites and over 30% of all sites with grower/finisher pigs experienced difficulties with PCVAD in 2006. The percentage of sites reporting PCVAD in either type of pig has increased by as much as ten fold between the two study years.

Table 1. Percentage of sites with PCVAD by production phase and by size of site and by year.

PCVAD in last 12 months.	Percent Sites by Size of Site[1] (Total Inventory)							
	Small		Medium		Large		All Sites	
	2000	2006	2000	2006	2000	2006	2000	2006
Nursery	4.4	21.5	9.1	12.5	16.6	39.6	5.7	22.3
Grower/finisher	2.3	25.0	7.9	35.4	12.2	59.9	3.6	31.3

[1]Small (Fewer than 2,000), Medium (2,000-4,999), Large (5,000 or More) total inventory

Additionally in 2000, 29.6% of those who reported PCVAD in nursery pigs indicated it was diagnosed by a veterinarian or laboratory compared to 58.1% in 2006. In 2000, 53.9% of those who reported PCVAD in grower/finisher pigs indicated it was diagnosed by a veterinarian or laboratory compared to 69.7% in 2006.

In response to the Needs Assessment survey we asked more in-depth questions on PCVAD in Swine 2006. Table 2 shows that for sites that had one or more weaned market pigs with PCVAD during the previous 12 months, 19.8% of weaned pigs on large sites were affected. The earliest and latest average age of onset in these pigs was 8.9 weeks (SE 0.6) and 16.3 weeks (SE 0.6), respectively.

Table 2. Percentage of pigs with PCVAD on sites with PCVAD by size of site.

PCVAD in last 12 months.	Percent Weaned Pigs by Size of Site[1] (Total Inventory)							
	Small		Medium		Large		All Sites	
	Pct.	SE	Pct.	SE	Pct.	SE	Pct.	SE
Percent Pigs[2]	7.7	(1.5)	13.7	(5.2)	19.8	(6.0)	15.4	(3.4)

[1]Small (Fewer than 2,000), Medium (2,000-4,999), Large (5,000 or More) total inventory
[2]As a percentage of weaned pig inventory on day of interview.

The preceding summary data was weighted to extrapolate back to the original population (e.g., 94% of operations with 100 or more pigs on site) however the following biological results are not weighted.

The serology results from NVSL are presented in Table 3 for the prevalence of antibodies to the PRRS virus, two types of Swine Influenza Virus (SIV) and either type of SIV at the sample and farm level with the latter also broken out by geographic region. For each virus, the results were summarized from farms that did not vaccinate the sampled pigs for that virus (e.g., for PRRS, did not vaccinate for PRRS, for either type of SIV did not vaccinate for either type of SIV). Nearly 50% of samples were positive for PRRS antibodies. Over 71% of sites had one or more positive samples for PRRS antibodies or either type of Swine Influenza Virus (SIV). Numerically, the East Central region had the highest percentage of sites with one or more positive samples for any of the three viruses.

Table 3. Percentage of samples and percentage of sites with one or more samples positive for PRRS, two types of Swine Influenza and either type of Swine Influenza and by region.

Antibody[1]	Prevalence (Percent of samples or sites)					
			Region[2]			
	Sample	Site	North	West Central	East Central	South
PRRS virus[3]	49.8	71.1	56.8	70.5	77.1	69.6
SIV H1N1[4]	25.5	58.2	48.7	54.6	66.7	57.1
SIV H3N2[4]	26.1	57.6	48.7	50.0	71.4	42.9
Either type of SIV[4]	38.6	71.5	62.2	65.9	81.0	71.4

[1]Unvaccinated Animals

[2]North: Michigan, Minnesota, Pennsylvania, and Wisconsin
West Central: Colorado, Kansas, Missouri, Nebraska and South Dakota
East Central: Illinois, Indiana, Iowa, and Ohio
South: Arkansas, North Carolina, Oklahoma, and Texas

[3]For PRRS: Of the 6,234 samples on 185 sites tested for PRRS antibodies, 5,793 (92.9 percent) were from 173 sites that did not vaccinate grower/finisher pigs for PRRS virus. These 173 sites were used in all subsequent calculations.

[4] For SI: Of the 6,235 samples on 185 sites tested for swine influenza antibodies, 5,307 were from 158 sites that did not vaccinate grower/finisher pigs for H1N1 or H3N2 virus. These 158 sites were used in all subsequent calculations.

The Salmonella serotype results from NVSL (originally cultured by ARS) presented in Table 4 show the ten most frequent Salmonella serotypes identified in the past three swine studies. The top three serotypes were the same in all three studies.

For Swine 2006, up to 60 fecal samples were collected from up to ten pens containing grower/finisher pigs on 135 sites from September 5, 2006, through March 15, 2007. A total of 7,788 samples were cultured for Salmonella. Overall, at least one sample was found culture-positive for Salmonella on 52.6% of sites, 43.5 percent of barns, and 18.4 percent of pens. Of the fecal samples cultured, 564 (7.2 percent) were positive for Salmonella. From these samples, 584 isolates were recovered (20 samples had 2 isolates). Twenty-seven different serotypes were identified; however, the top four serotypes in Table 4 accounted for 70.5 percent of isolates.

Table 4. Rank of Salmonella serotypes over the last three studies.

Rank	1995	2000	2006
1	Derby	Derby	Derby
2	Agona	Agona	Typhi. Copenhagen
3	Typhi. Copenhagen	Typhi. Copenhagen	Agona
4	Brandenberg	Heidelberg/	Anatum
5	Mbandaka/	Brandenberg (tie)	Mbandaka/
6	Typhimurium (tie)	Anatum	Typhimurium (tie)
7	Heidelberg/	Typhimurium/	Worthington
8	Anatum (tie)	Worthington (tie)	Barranquilla/
9	Enteriditis	Infantis	Johannesburg (tie)
10	Worthington	Uganda	Muenchen

Management Practices

Regarding basic management practices, Table 5 shows the percentage of sites that have a gestation or farrowing phase on site, broken out by inventory size. Nearly 40 percent of all sites had gestation and farrowing production phases. The estimates for gestation and farrowing in each inventory size are not statistically different. Also, a smaller percentage of medium sites had these production phases than their small and large counterparts nationally. Note: Tables 5 and 6 do not imply that each production phase excludes the presence of others (e.g., 39.8% of all sites have a gestation phase but they might also have a farrowing or nursery or grower/finisher phase).

Table 5. Percentage of sites by production phase and by size of site.

Production Phase	Percent Sites by Size of Site[1] (Total Inventory)							
	Small		Medium		Large		All Sites	
	Pct.	SE	Pct.	SE	Pct.	SE	Pct.	SE
Gestation	47.3	(1.7)	19.0	(1.8)	32.4	(2.9)	39.8	(1.2)
Farrowing	46.1	(1.7)	18.9	(1.8)	32.2	(2.9)	39.0	(1.2)

[1]Small (Fewer than 2,000), Medium (2,000-4,999), Large (5,000 or More) total inventory

Table 6 compares the percentage of sites that had a gestation or farrowing phase on site in the Swine 2000 and 2006 studies, broken out by region. Note the numeric decline across all regions in 2006 in the percentage of sites that contained a gestation or farrowing facility compared to 2000, with the largest drop in the West Central states. To validate this unusual finding we asked NASS to confirm this using population data in a special run and it was confirmed. This decrease may reflect the continued increase in sow productivity and the increase in size of sow farms. Therefore, much fewer sites with breeding sows are needed than before.

Table 7 compares 2000 and 2006 estimates on how pigs were housed, specifically the percentage of pigs on sites with the specified production phases that were housed (Facility Type) in each of five ways. Fewer gestating sows and gilts were housed in an open building with outside access in 2006 (5.6 percent) compared to 2000 (14.7 percent).

Table 6. Percentage of sites by production phase and by region.

Production Phase	Percent Sites by Region[1]							
	North		West Central		East Central		South	
	2000	2006	2000	2006	2000	2006	2000	2006
Gestation	50.2	39.3	65.9	48.8	50.5	38.0	42.6	33.9
Farrowing	50.1	37.7	66.2	47.4	50.6	37.6	43.5	33.7

[1]North: Michigan, Minnesota, Pennsylvania, and Wisconsin
West Central: Colorado, Kansas, Missouri, Nebraska and South Dakota
East Central: Illinois, Indiana, Iowa, and Ohio
South: Arkansas, North Carolina, Oklahoma, and Texas

Table 7. For sites with the specified production phases, percentage of pigs on these sites by facility type used most in Swine 2000 and 2006.

Facility Type	Percent Pigs by Production Phase							
	Gestation[1]		Farrowing[1]		Nursery[2]		Grow/finish[3]	
	2000	2006	2000	2006	2000	2006	2000	2006
Total Confinement	64.2	79.7	83.4	87.8	81.8	90.4	69.9	81.0
Open building no outside access	16.4	12.8	12.4	10.1	15.9	8.0	19.7	13.5
Open building with outside access	14.7	5.6	2.9	1.4	1.7	1.0	9.2	5.1
Lot with hut or no building	2.8	1.1	0.6	0.3	0.3	0.1	0.8	0.2
Pasture (w/hut or no building)	1.9	0.8	0.7	0.4	0.3	0.5	0.4	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[1]As a percentage of sows and gilts that farrowed.
[2]As a percentage of pigs entering the nursery phase.
[3]As a percentage of pigs entering the grower/finisher phase.

As a final example, Table 8 shows the average per litter productivity in 2000 and 2006 for a six month period (December to May). Total born per litter has increased by over half a piglet (10.9 in 2000 to 11.5 in 2006) on average and the number weaned per litter has increased on average by half a pig (8.9 in 2000 to 9.4 in 2006).

Table 8. Average per litter productivity in 2000 and 2006 (6 month period-December to May).

Measure	2000	2006
Stillbirths and mummies per litter	0.9	1.0
Born alive per litter	10.0	10.5
Total born per litter	10.9	11.5
Preweaning deaths per litter	1.1	1.1
Weaned per litter	8.9	9.4

Disease Modeling

Another application of data collected in the NAHMS Swine 2006 is to construct statistical models to identify factors associated with some outcome of interest. Because of the current interest in PCVAD a weighted, clustered logistic regression model was developed to shed light on the relationship between PCVAD and other concurrent respiratory disease in pigs or their vaccination status. Table 9 shows the final results of the model with the event of interest being whether or not weaned pigs on a site experienced PCVAD in the last 12 months and the factors of interest being the number of respiratory diseases the grower/finisher pigs on that site experienced in the same time period.

Table 9. Variable significant at P<=0.05 using the binomial distributions with weighted logistic regression and 2 levels of clustering.

Variable	Value	Odds Ratio	Lower 95% CI	Upper 95% CI	Overall P value	Individual value P value
Intercept	N/A	0.058	0.013	0.251	<0.001	N/A
Number of	0[1]	1.00	1.00	1.00	<0.001	N/A
Respiratory	1	4.39	1.66	11.63		0.003
diseases	2	18.35	7.50	44.90		<0.001

[1]Referent level

The most important factor associated with PCVAD in weaned pigs from this model is the history of respiratory disease in the grower/finisher pigs. If the site reported one respiratory disease problem (e.g., Actinobacillus pleuropneumoniae (APP), Mycoplasma, Influenza or PRRS) in grower/finisher pigs during the previous 12 months then the odds of PCVAD being reported on the site is over four times greater than sites not having any of these respiratory diseases in grower/finisher pigs during the previous 12 months. If more than one of these respiratory diseases is reported the odds of seeing PCVAD on the site went up over eighteen times (18.4) compared to not having any of these respiratory diseases. Is PCVAD the chicken or the egg when comparing it to a history of respiratory disease?

Over 92 percent of farms that had grower/finisher pigs and experienced one or more of the following respiratory diseases: APP, Glasser's disease, Mycoplasma pneumonia, Influenza or PRRS over the last 12 months also had an episode of PCVAD in the last 12 months in their weaned pigs.

Dr. Mike Murtaugh at the University of Minnesota developed a capsid protein ELISA to test for the presence of PCV2. There is no accepted gold standard test for measuring PCV2 exposure so to determine the accuracy of this test and that of a TaqMan real time PCR a Bayesian analysis was conducted. A Bayesian analysis can determine the sensitivity (Se) and specificity (Sp) of the ELISA and the PCR despite the absence of a gold standard. This type of analysis evaluated not only the Se and Sp as a measure of accuracy of the two tests, but the ranges of prevalence for exposure to this virus in potentially exposed and unexposed populations of pigs. This last is absent from previous literature. Of the 6,238 blood samples collected in the Swine 2006 survey 6,046 were tested by his lab for the presence of PCV2 antibodies while 4,147 of these samples were tested for the presence of PCV2 DNA using a TaqMan real time PCR. At an ELISA cutoff of > 0.4 optical density the new ELISA test had a mean Se of 81% and a mean Sp of 74%. The PCR test had a mean Se of 85% and a mean Sp of 94%. The population prevalence for PCV2 was estimated to be 96-99%.

Survival analysis is a common technique used to estimate the factors that influence time until an event occurs, such as death. Dr. Francisco Olea-Popelka of Colorado State University is applying this analysis method to Swine 2006 data to determine how farm level factors influence the concentration of antimicrobials necessary to inhibit Salmonella.

Support of Surveillance Systems (e.g., simulation modeling)

Within CEAH there are a variety of researchers that collaborate with academia in devising models to predict the spread of a foreign animal disease in national commodity herds. These researchers are hampered (some say blessed) by the fact that such an event rarely occurs in the U.S. so there is little real data that is useful in assisting their efforts and they must often rely on "best guess" parameter estimates. Among parameter estimates that would be useful in modeling spread of disease are the shipping practices of farms in the U.S. In Swine 2006 a series of questions on the GSFR enabled summary statistics as to the nature of pig shipments in this country. Table 10 shows an example of this with national percentages of shipments by destination for sites that sold or shipped at least one pig off-site from December 2005 through May 2006. Nearly two-thirds of shipments (62.7 percent) went directly to slaughter.

Table 10. Percentage of shipments by destination.

Destination	Percent Shipments
Directly to slaughter	62.7
Sale/auction	5.3
Dealer	3.0
Show/fair	2.2
Feedlot/feed yard	1.3
Another operation	15.7
Another site-part of op.	9.8
Total	100.0

SWINE 2007 – SMALL ENTERPRISE STUDY

The 2007 Small Enterprise Swine study was conducted in cooperation with the National Surveillance Unit at CEAH to provide production and management population estimates for a previously unsurveyed segment of the swine industry, operations with fewer than 100 pigs. It was also done to describe risks related to feral swine, including the reintroduction of pseudorabies and classical swine fever (CSF) into the overall national herd. Pseudorabies and CSF have many common risk factors, and exposure of small enterprise herds to feral swine is an undocumented risk for reintroduction and transmission of these two diseases and possibly other foreign animal diseases.

Thirty-one States representing 84.4 percent of the total number of operations with 99 or fewer hogs nationally and 88.3 percent of the U.S. pig inventory on operations with fewer than 100 pigs at the time of the 2002 Census were selected. These States were included primarily because of their geographic location, as well as potential risk for pseudorabies and CSF.

Selected operations were mailed a prescreening questionnaire in 2007 (May 14, first mailing; May 29, second mailing) to determine if they had any pigs from June 1, 2006, through May 31, 2007. Those who did not respond to this prescreening questionnaire received a computer-assisted telephone interview (CATI) followup call (June 11 to 29, 2007) to obtain the relevant inventory information.

Operations from the prescreening questionnaire with fewer than 100 pigs from June 1, 2006, through May 31, 2007, were eligible to be mailed a GSFR questionnaire. Respondents filled out the GSFR and mailed it back to NASS State offices, or NASS enumerators administered the GSFR questionnaire via CATI with each selected producer. The first mailing was sent on August 2 and the second on August 16, 2007. Phone followup was conducted August 30 through September 18, 2007.

NASS performed initial data entry and validation. Data from mail-ins and CATI administration were entered into a dataset, and the edit and validation programs were executed. NAHMS staff performed additional data validation on the entire data set after data from all States were combined. Results for this study are available at the NAHMS website

CONSIDERATIONS IN A VOLUNTARY FIELD BASED APPROACH

Problems associated with voluntary commodity studies fall into roughly two categories: Commodity Structure and Logistics. In the case of the pork industry in the U.S. the commodity business structure increasingly consists of contractors and contractees rather than sole owners of the pigs and facilities. Assisting the enumerators and VMOs in finding the people who can answer the questions on the surveys most accurately is a challenge. Often in this type of relationship the person at the facility cannot answer health questions because the company that owns the pigs has their own veterinary staff. Also, the owners of the pigs may forbid the site person from answering any questions about their pigs.

In addition to newly predominating business structures such as the contractors/contractees relationship, the agencies of the federal government such as the Office of Management and Budget (OMB) increasingly mandate that we burden the public as little as possible in our studies. Many producers have "survey fatigue" in which they are constantly pressured to answer questions about their business through mail and phone. In the spirit of this and for statistical reasons as well NAHMS may also have to develop alternate sampling strategies to reflect that most of the pigs are in the hands of a few companies nationally.

In studies of this type the logistics of a successful completion of the study are huge. In Swine 2006 there needed to be communication ongoing between NASS, NVSL, ARS, VMO field offices, pork industry representatives and state agencies to name a few. Diminishing budgets mean a crimp on resources at all levels involved in a national commodity survey in terms of funding, lab capacity and field personnel. These considerations are by no means an exhaustive list.

OTHER SURVEILLANCE CENTERS AT CEAH

CEAH is currently comprised of three Centers: the Center for Emerging Issues, the National Animal Health Monitoring System and the National Surveillance Unit. One of these, the National Surveillance Unit (NSU) was established by Veterinary Services in 2003 and is the first unit within VS devoted solely to surveillance and surveillance enhancement. Specific responsibilities of NSU include: coordinating and integrating surveillance activities, leading the planning and design of surveillance strategies and make recommendations to implement these strategies, working with the National Center for Animal Health Programs (NCAHP) and CEAH to enhance surveillance of program diseases (Brucellosis and pseudorabies virus (PRV)), foreign animal diseases, and emerging animal diseases.

The other center, The Center for Emerging Issues (CEI) was formed in the early 1990s to address emerging animal health issues. CEI is composed of three units: The Business Intelligence Team The Spatial Epidemiology Team (SET) and the Emerging Disease Tracking Analysis and Forecasting Team (TAF). The Business Intelligence Team (BEI) promotes innovative, systematic thinking processes that identify broad change drivers that have the potential to shape Veterinary Service's future operating environment. The Spatial Epidemiology Team (SET) supports Veterinary Services' spatial analysis and modeling needs in animal health surveillance, incident management, and epidemiological analysis. The Emerging Disease Tracking, Analysis, and Forecasting team (TAF) works to identify potential emerging animal health issues, assess and analyze emerging animal health issues, and forecast disease emergence.