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**Veterinary
Services**

Part I: Reference of Swine Health and Management in the United States, 2000

National Animal Health Monitoring System **August 2001**

Acknowledgments

This report was prepared from material received and analyzed by the U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), and Veterinary Services (VS) during a study of management and animal health on swine operations.

The Swine 2000 study was a cooperative effort between State and Federal agricultural statisticians, animal health officials, university researchers, extension personnel, and pork producers. We want to thank the hundreds of industry members who helped determine the direction and objectives of this study by participating in focus groups.

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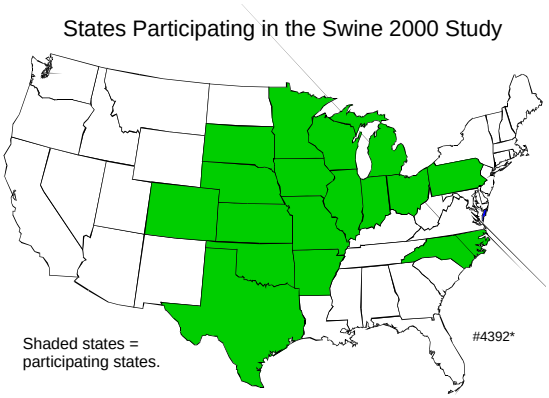
Introduction

As part of the National Animal Health Monitoring System (NAHMS), the USDA:APHIS: Veterinary Services (VS) conducted its first national study of the swine industry with the 1990 National Swine Survey. Study results provided an overview of swine health, productivity, and management for 95 percent of the U.S. swine herd, the population represented by the 1,661 participating producers. The 1990 National Swine Survey focused on farrowing sows and preweaning piglets.

NAHMS' second national swine study, Swine '95, was designed to provide both participants and the industry with information on over 90 percent of the U.S. swine herd. It focused on the grower/finisher phase.

Part I: Reference of Swine Health and Management in the United States, 2000 is the first of a series of reports containing national information resulting from NAHMS' third national swine project, the Swine 2000 study. Swine 2000 was designed to provide both participants and the industry with information on nearly 94 percent of the U.S. swine herd on operations with 100 or more pigs. Data for Part I were collected from 2,499 swine production sites from 2,328 operations. The USDA's National Agricultural Statistics Service (NASS) collaborated with VS to select a producer sample statistically designed to provide inferences to the nation's swine population of operations with 100 or more pigs. Included in the study were 17 of the major pork-producing states (see map) that accounted for 94 percent of the U.S. pig inventory and 92 percent of U.S. pork producers with 100 or more pigs. NASS interviewers contacted producers from June 1 through July 14, 2000.



Methodology and number of respondents can be found at the end of this report.

Data for subsequent reports were collected by State and Federal Veterinary Medical Officers (VMOs) and Animal Health Technicians (AHTs) from August 21, 2000, through November 3, 2000, and December 1, 2000, through February 28, 2001.

Further information on NAHMS studies and reports are available online at:

www.aphis.usda.gov/vs/ceah/cahm

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* Identification numbers are assigned to each graph of this report for public reference.

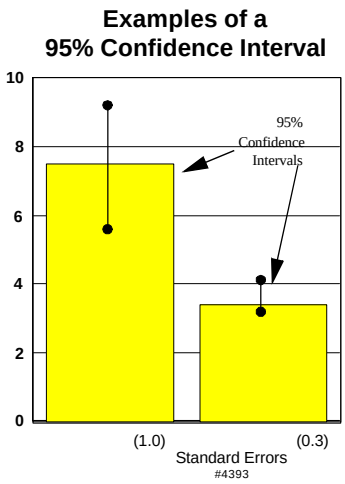
Terms Used in This Report

N/A: Not applicable.

Percent animals: The number of animals on sites with a certain attribute divided by the total number of animals on all sites. In some cases, it is assumed the attribute applies to all animals on the site. The animal type is defined in each table and may include total inventory, sow inventory, number of pigs that entered the nursery, or other specific pig groups. The "percent animals" estimates reflect the larger sites which have the majority of pigs.

Percent sites: The number of sites with a certain attribute divided by the total number of sites. Percentages will sum to 100 where the attributes are mutually exclusive (i.e., percentage of sites located within each region). Percentages will ***not*** sum to 100 where the attributes are not mutually exclusive (i.e., the percentage of sites using treatment methods where sites may have used more than one method). The "percent-sites" estimates reflect the smaller producers, since they make up the majority of operations.

Population estimates: Estimates in this report are provided with a measure of precision called the ***standard error***. A 95 percent confidence interval can be created with bounds equal to the estimate, plus or minus two standard errors. If the only error is sampling error, then confidence intervals created in this manner will contain the true population mean 95 out of 100 times. In the example at right, an estimate of 7.5 with a standard error of 1.0 results in limits of 5.5 to 9.5 (two times the standard error above and below the estimate). The second estimate of 3.4 shows a standard error of 0.3 and results in limits of 2.8 and 4.0. Alternatively, the 90 percent confidence interval would be created by multiplying the standard error by 1.65 instead of two. Most estimates in this report are rounded to the nearest tenth. If rounded to 0, the standard error was reported. If there were no reports of the event, no standard error was reported.



Regions:

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

Sample profile: Information that describes characteristics of the sites from which Swine 2000 data were collected.

Site: Distinct geographic locations or premises designated as a production site for commercial swine. Multiple premises were considered to be one site if a single farm manager was involved in the day-to-day activities at all locations. (See operation selection in methodology section for details on site selection within operations.)

Total inventory: All swine present on the site on June 1, 2000.

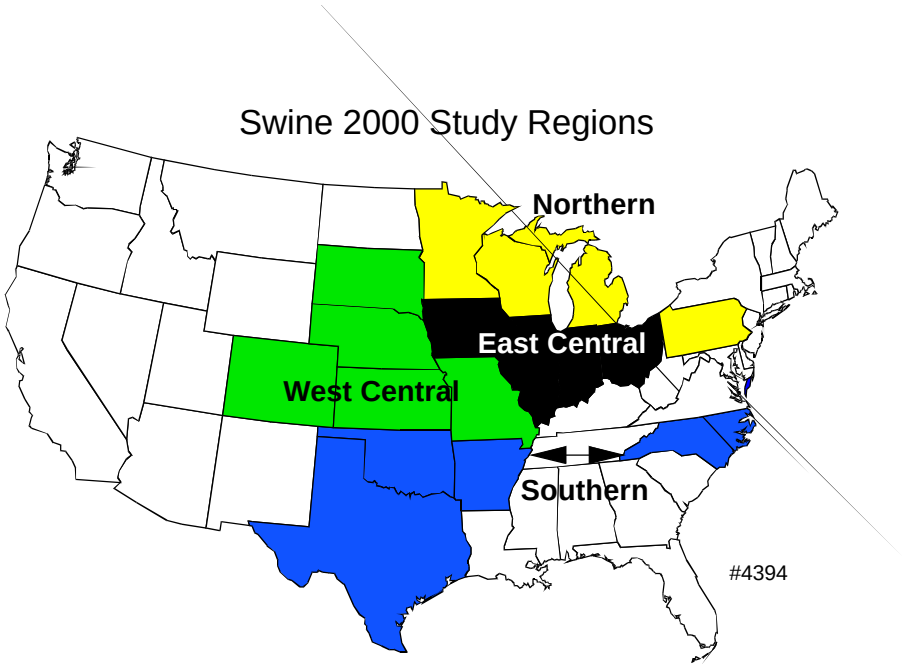
Section I: Population Estimates

A. Sow and Gilt Management

1. Production phases

a. Percent of sites with the following production phases by region:

	Percent Sites									
	Region									
	Northern		West Central		East Central		Southern		All Sites	
Production Phase	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error
Gestation	50.2	(3.5)	65.9	(3.1)	50.5	(2.5)	42.6	(2.7)	52.6	(1.7)
Farrowing	50.1	(3.5)	66.2	(3.1)	50.6	(2.5)	43.5	(2.7)	52.8	(1.7)



2. Mating techniques

A service is one or more matings in the same heat cycle/estrous period. Approximately three-fourths (76.4 percent) of sows were mated two or more times per service. Sows on larger sites tended to be mated more frequently per service than sows on smaller sites. In addition, 17.1 percent of sows were pen mated.

a. Sows

i. Percent of sows serviced in the previous 3 months, by number of matings per service (regardless of technique) and by size of site:

	Percent Sows							
	Size of Site (Sow and Gilt Inventory)							
	Small (Less than 250)		Medium (250-499)		Large (500 or More)		All Sites	
Number Matings	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
Unknown (Pen-mating)	64.9	(2.8)	11.2	(1.9)	0.6	(0.2)	17.1	(1.5)
One	5.5	(1.4)	7.9	(1.3)	6.7	(1.1)	6.5	(0.8)
Two	26.7	(2.3)	66.9	(3.5)	57.1	(5.0)	50.9	(3.2)
Three or more	2.9	(0.5)	14.0	(3.4)	35.6	(5.5)	25.5	(4.0)
Total	100.0		100.0		100.0		100.0	

Artificial insemination was the most frequently utilized mating method for breeding females. Overall, 68.6 percent of sows were mated by artificial insemination as the predominant mating technique used on the site for the first mating, and 72.3 percent of sows were mated by artificial insemination as the predominant mating technique used on the site for the second mating.

ii. Percent of sows serviced by predominant mating technique used on the site for the first and second mating:

	Percent Sows			
	1st Mating		2nd Mating	
Mating Technique	Percent	Standard Error	Percent	Standard Error
Artificial insemination	68.6	(3.1)	72.3	(2.4)
Individually hand-mated (natural insemination)	12.9	(2.9)	6.4	(0.9)
Pen-mated with multiple females and one or more boars	18.5	(1.6)	6.2	(1.2)
No second mating	N/A	(--)	15.1	(1.5)
Total	100.0		100.0	

Almost two-thirds (64.8 percent) of sows in the U.S. are on sites where the predominant first and second mating type is artificial insemination.

iii. Percent of sows serviced by predominant mating technique used on the site for the first and second mating and by size of site:

Mating Combinations		Percent Sows: Size of Site (Sow and Gilt Inventory) Small (Less than 250)		Medium (250-499)		Large (500 or More)		All Sites	
1st Mating	2nd Mating	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
Artificial insemination	Artificial insemination	14.9	(2.2)	51.3	(5.1)	85.3	(4.4)	64.8	(3.3)
Hand-mating	Artificial insemination	1.5	(0.5)	6.8	(2.2)	9.4	(4.3)	7.2	(2.9)
Hand-mating	Hand-mating	9.4	(1.9)	16.9	(4.2)	1.8	(0.5)	5.3	(0.8)
Pen-mating	Any technique	69.1	(2.9)	12.9	(2.2)	0.9	(0.3)	18.5	(1.6)
Other 1st and 2nd mating techniques		5.1	(1.4)	12.1	(4.3)	2.6	(1.2)	4.2	(1.0)
Total		100.0		100.0		100.0		100.0	

Gilts were generally mated more than once during a service. Larger sites tended to mate gilts more frequently per service than smaller sites.

b. Gilts

i. Percent of gilts serviced in the previous 3 months, by number of matings per service (regardless of technique) and by size of site:

	Percent Gilts: Size of Site (Sow and Gilt Inventory) Small (Less than 250)		Medium (250-499)		Large (500 or More)		All Sites	
Number Matings	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
Unkown (Pen-mating)	57.0	(5.7)	19.3	(3.9)	1.0	(0.3)	17.9	(2.1)
One	3.7	(1.1)	10.6	(2.3)	7.8	(1.2)	7.1	(0.9)
Two	22.1	(3.0)	56.7	(4.9)	56.3	(5.3)	47.3	(3.7)
Three or more	17.2	(6.6)	13.4	(3.5)	34.9	(6.1)	27.7	(4.2)
Total	100.0		100.0		100.0		100.0	

Pen-mating was used more often with gilts than sows for the predominant mating technique used on the site. For the first mating, 24.0 percent of gilts were pen-mated compared to 18.5 percent of sows.

ii. Percent of gilts serviced by predominant mating technique used on the site for the first and second mating:

	Percent Gilts			
	1st Mating		2nd Mating	
Mating Technique	Percent	Standard Error	Percent	Standard Error
Artificial insemination	64.5	(3.7)	65.7	(3.7)
Individually hand-mated naturally	11.5	(1.8)	7.3	(1.3)
Pen-mated with multiple females and one or more boars	24.0	(2.8)	11.7	(2.9)
No second mating	N/A	(--)	15.3	(1.9)
Total	100.0		100.0	

iii. Percent of gilts serviced by predominant mating technique used on the site for the first and second mating, by size of site:

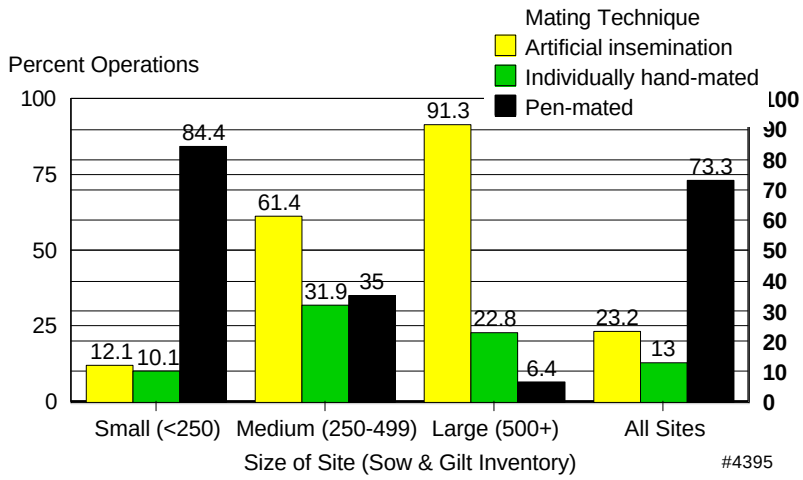
		Percent Gilts							
		Size of Site (Sow and Gilt Inventory)							
Mating Combinations		Small (Less than 250)		Medium (250-499)		Large (500 or More)		All Sites	
1st Mating	2nd Mating	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
Artificial insemination	Artificial insemination	13.1	(2.7)	41.6	(6.8)	84.8	(3.9)	60.9	(4.0)
Hand-mating	Artificial insemination	0.8	(0.3)	3.6	(1.5)	6.0	(2.0)	4.3	(1.2)
Hand-mating	Hand-mating	8.6	(2.1)	17.8	(6.0)	3.8	(1.2)	6.6	(1.3)
Pen-mating	Any technique	76.3	(3.4)	34.7	(6.3)	5.0	(3.1)	27.3	(3.3)
Other 1st and 2nd mating techniques		1.2	(0.4)	2.3	(0.8)	0.4	(0.2)	0.9	(0.2)
Total		100.0		100.0		100.0		100.0	

More of the larger sites used artificial insemination than did the smaller sites.

c. Percent of sites using various mating techniques in sows or gilts, by size of site:

	Percent Sites							
	Size of Site (Sow and Gilt Inventory)							
	Small (Less than 250)		Medium (250-499)		Large (500 or More)		All Sites	
Mating Technique	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
Artificial insemination	12.1	(1.7)	61.4	(4.3)	91.3	(1.6)	23.2	(1.7)
Individually hand-mated naturally	10.1	(1.3)	31.9	(4.2)	22.8	(4.0)	13.0	(1.3)
Pen-mated with multiple females and one or more boars	84.4	(1.8)	35.0	(4.3)	6.4	(1.8)	73.3	(1.8)

Percent of Sites Using Various Mating Techniques in Sows or Gilts by Size of Site



d. Of those sites using artificial insemination, percent of sites by source of semen:

Semen Source	Percent Sites	Standard Error
Purchased semen	72.9	(3.1)
Collected on site	17.1	(2.6)
Collected off site (owner boar-stud)	20.8	(2.4)

3. Culling and death loss

Culling and death loss rates are calculated below for a 6-month period. An annualized rate could be approximated by doubling these numbers (assuming no seasonal differences and no change in management practices). Average sow and gilt death loss ranged from 2.5 to 3.7 percent depending on herd size during the 6-month period from December 1, 1999, through May 31, 2000. Nearly 18 percent of sows and gilts were culled from herds during the same period. The total annual removal rate, including death loss and culling, was 41.6 percent.

a. Breeding-age females died or culled from December 1, 1999, through May 31, 2000, as a percent of June 1, 2000, sow and gilt inventory, by size of site:

	Percent Breeding Females							
	Size of Site (Sow and Gilt Inventory)							
	Small (Less than 250)		Medium (250-499)		Large (500 or More)		All Sites	
Reason Removed	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
Died	2.5	(0.2)	3.0	(0.2)	3.7	(0.2)	3.3	(0.1)
Culled	15.0	(1.0)	20.3	(2.0)	18.1	(0.9)	17.5	(0.7)

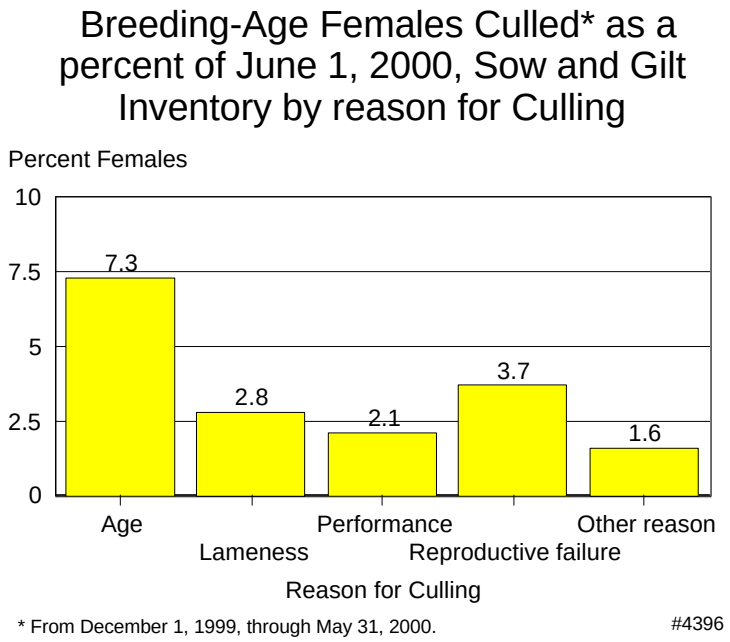
Reasons for culling due to performance included small litter size, high pre-weaning mortality, and low birth rate. Animals were culled from the breeding herd for several reasons, but the primary reason was age (41.9 percent). Large percentages of culled sows and gilts were culled because of reproductive failure and lameness (21.3 and 16.0 percent, respectively). Other reasons included upgrading genetics, poor body condition, and liquidation of the breeding herd.

b. Percent of culled breeding-age females by reason culled from December 1, 1999, through May 31, 2000:

Reason Culled	Percent Culled Females	Standard Error
Age	41.9	(1.8)
Lameness	16.0	(1.2)
Performance	12.0	(0.7)
Reproductive failure	21.3	(1.3)
Other reason	8.8	(1.6)
Total	100.0	

c. Breeding-age females culled from December 1, 1999, through May 31, 2000, as a percent of June 1, 2000, sow and gilt inventory, by reason culled:

Reason Culled	Percent Females	Standard Error
Age	7.3	(0.4)
Lameness	2.8	(0.3)
Performance	2.1	(0.1)
Reproductive failure	3.7	(0.2)
Other reason	1.6	(0.3)
Total	17.5	

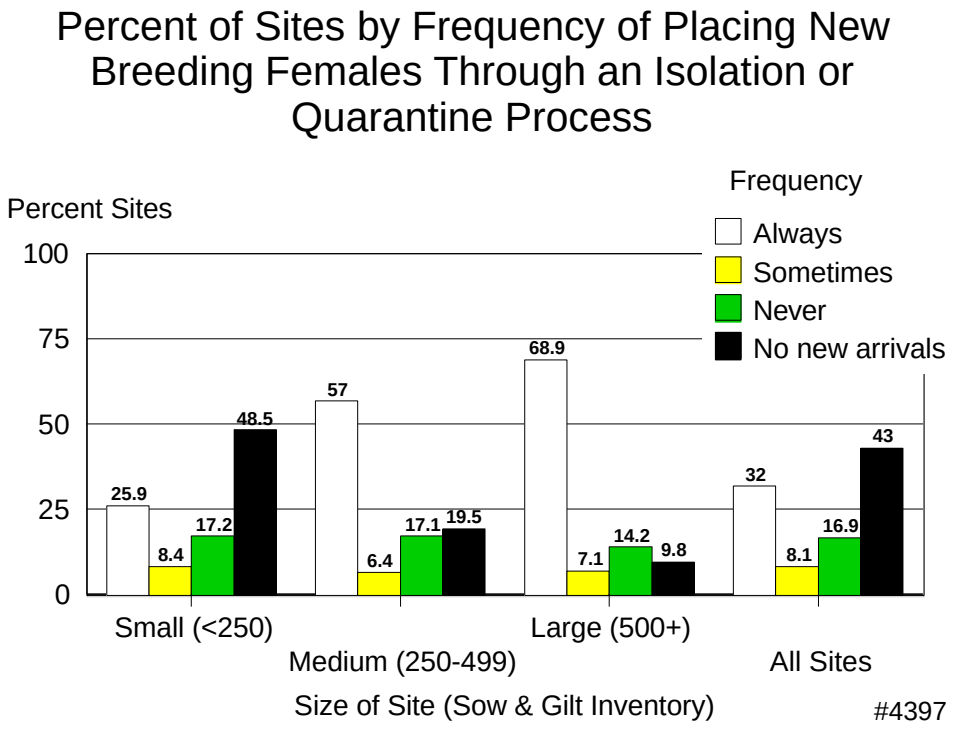


4. Introduction of gilts and breeding males

Proper gilt introduction is critical to herd biosecurity. Small herds were most often closed herds (48.5 percent). Larger sites were more likely than smaller sites to always isolate their animals prior to introduction to the herd.

a. Percent of sites by frequency of placing new breeding ***females*** through an isolation or quarantine process:

	Percent Sites							
	Size of Site (Sow and Gilt Inventory)							
	Small (Less than 250)		Medium (250-499)		Large (500 or More)		All Sites	
Frequency	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
Always	25.9	(2.5)	57.0	(4.3)	68.9	(3.2)	32.0	(2.2)
Sometimes	8.4	(1.7)	6.4	(2.0)	7.1	(2.4)	8.1	(1.4)
Never	17.2	(2.2)	17.1	(2.5)	14.2	(1.8)	16.9	(1.8)
No new arrivals	48.5	(2.9)	19.5	(3.1)	9.8	(1.5)	43.0	(2.4)
Total	100.0		100.0		100.0		100.0	



Few sites were closed to new breeding males, regardless of site size. Although more than half the sites always isolated new boars, approximately 20 percent of sites with fewer than 500 sows never isolated boars.

b. Percent of sites by frequency of placing new breeding ***males*** through an isolation or quarantine process:

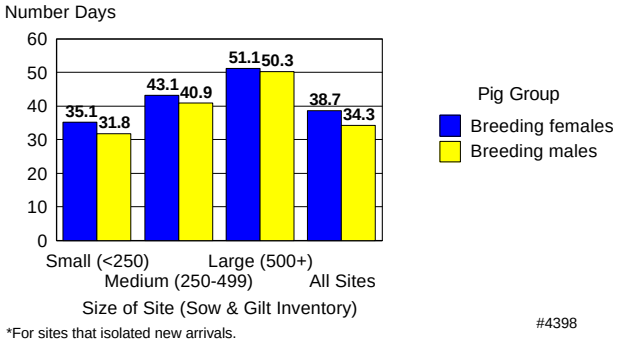
	Percent Sites							
	Size of Site (Sow and Gilt Inventory)							
	Small (Less than 250)		Medium (250-499)		Large (500 or More)		All Sites	
Frequency	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
Always	52.9	(2.8)	62.4	(4.1)	66.8	(3.3)	54.8	(2.4)
Sometimes	12.1	(1.9)	8.5	(2.6)	5.4	(1.8)	11.3	(1.6)
Never	21.0	(2.3)	19.1	(2.7)	13.0	(1.7)	20.2	(2.0)
No new arrivals	14.0	(1.8)	10.0	(2.4)	14.8	(2.4)	13.7	(1.5)
Total	100.0		100.0		100.0		100.0	

Larger sites tended to isolate their new arrivals for longer periods than smaller sites. There was no significant difference between the length of time breeding females and males were isolated.

c. For sites that isolated or quarantined new arrivals, average number of days new arrivals were in isolation or quarantine, by size of site and by pig group:

	Average Number of Days							
	Size of Site (Sow and Gilt Inventory)							
	Small (Less than 250)		Medium (250-499)		Large (500 or More)		All Sites	
Pig Group	Average Days	Standard Error	Average Days	Standard Error	Average Days	Standard Error	Average Days	Standard Error
Breeding females	35.1	(2.0)	43.1	(1.4)	51.1	(3.2)	38.7	(1.5)
Breeding males	31.8	(1.1)	40.9	(1.3)	50.3	(3.0)	34.3	(0.9)

Average Number of Days New Arrivals Were in Isolation or Quarantine by Size of Site and by Pig Group*



*For sites that isolated new arrivals.

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Depending on the risk involved, breeding stock should be tested for a variety of diseases. More sites tended to test all introduced boars, compared to testing all introduced female breeding stock.

d. Proportion of animals tested for disease:

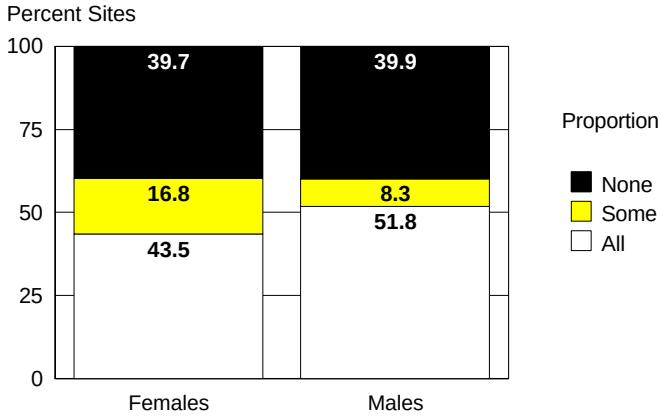
i. For sites that isolated or quarantined new breeding ***females***, percent of sites testing new breeding ***females,*** either before or after isolation, by proportion of animals tested:

	Percent Sites							
	Size of Site (Sow and Gilt Inventory)							
	Small (Less than 250)		Medium (250-499)		Large (500 or More)		All Sites	
Proportion of Females	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
All	44.6	(4.9)	45.7	(6.2)	37.1	(4.4)	43.5	(3.7)
Some	11.4	(2.7)	13.2	(3.6)	42.6	(5.4)	16.8	(2.4)
None	44.0	(5.0)	41.1	(6.9)	20.3	(3.6)	39.7	(3.8)
Total	100.0		100.0		100.0		100.0	

ii. For sites that isolated or quarantined new breeding ***males***, percent of sites testing new breeding ***males,*** either before or after isolation, by proportion of animals tested:

	Percent Sites							
	Size of Site (Sow and Gilt Inventory)							
	Small (Less than 250)		Medium (250-499)		Large (500 or More)		All Sites	
Proportion of Males	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
All	50.2	(3.7)	56.0	(6.2)	61.6	(4.7)	51.8	(3.1)
Some	6.8	(1.5)	9.5	(3.9)	20.2	(3.5)	8.3	(1.4)
None	43.0	(3.7)	34.5	(6.4)	18.2	(3.6)	39.9	(3.2)
Total	100.0		100.0		100.0		100.0	

Percent of Sites* Testing New Breeding Animals, Either Before or After Isolation, by Proportion of Animals Tested



* For sites that isolated or quarantined new breeding females/males.

#4399

Acclimatization is a method of introducing new breeding stock to viral and bacterial diseases present on the receiving farm. Prior to the use of new animals for reproduction, new breeding stock may be vaccinated against diseases at risk, exposed to material from likely infected animals or the animals themselves, or a combination of the above.

e. For sites that isolated or quarantined new breeding females, percent of sites that used the following methods to acclimate new arrivals during isolation or quarantine:

	Percent Sites							
	Size of Site (Sow and Gilt Inventory)							
	Small (Less than 250)		Medium (250-499)		Large (500 or More)		All Sites	
Method	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
Feedback of feces from other swine	20.3	(3.5)	34.9	(7.2)	39.0	(4.8)	25.1	(2.8)
Feedback of mummies, placentas, or stillborn pigs	6.3	(2.1)	15.4	(4.2)	29.7	(5.0)	11.3	(1.9)
Exposure to cull females (sows and gilts)	42.7	(5.0)	58.4	(6.2)	69.4	(5.1)	49.0	(3.7)
Exposure to sick pigs	3.1	(1.5)	13.8	(4.0)	22.7	(4.5)	7.7	(1.5)
Administer vaccinations	81.6	(3.7)	91.8	(3.5)	89.3	(2.5)	84.1	(2.7)
Other	1.7	(1.0)	9.1	(7.3)	2.2	(0.7)	2.6	(1.2)

B. Farrowing and Weaning Productivity

1. Farrowing productivity and death loss

The number of pigs born alive is a measure of reproductive performance of the breeding herd. Stillbirths and mummies are an indication of possible reproductive problems. The number of pigs weaned per litter is a measurement for farrowing management and reproductive efficiency. Overall, 10.9 pigs were born per litter, of which 10.0 were born alive and 8.9 were weaned.

a. Average per litter productivity for six-month period (December 1999 - May 2000):

i. Overall

Average Per Litter Productivity
December 1999 - May 2000

Measure	Number	Standard Error	Percent	Standard Error
Stillbirths and mummies per litter	0.9	(0.0)	8.0	(0.2)
Born alive per litter	10.0	(0.0)	92.0	(0.2)
Total born per litter	10.9	(0.0)	100.0	
Preweaning deaths per litter	1.1	(0.0)	11.0	(0.3)
Weaned per litter	8.9	(0.0)	89.0	(0.3)
Total born alive per litter	10.0	(0.0)	100.0	

ii. By sow herd size:

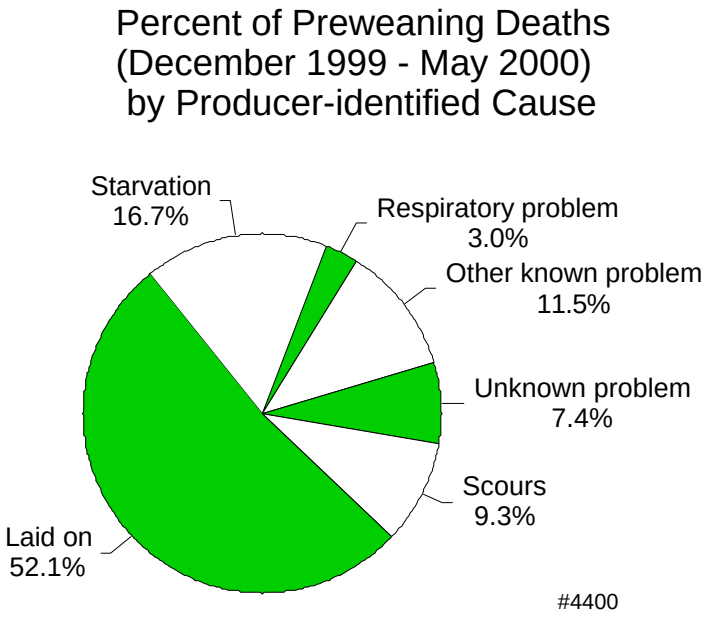
Average Per Litter Productivity

	Size of Site (Sow and Gilt Inventory)											
	Small (Less than 250)				Medium (250-499)				Large (500 or More)			
Measure	Number	Std. error	Percent	Std. error	Number	Std. error	Percent	Std. error	Number	Std. error	Percent	Std. error
Stillbirths	0.9	(0.0)	8.4	(0.5)	0.9	(0.0)	7.9	(0.4)	0.9	(0.0)	7.8	(0.3)
Born Alive	9.3	(0.1)	91.6	(0.5)	10.0	(0.1)	92.1	(0.4)	10.2	(0.0)	92.2	(0.3)
Total Born	10.2	(0.1)	100.0		10.9	(0.1)	100.0		11.1	(0.1)	100.0	
Preweaning deaths	0.8	(0.0)	9.0	(0.3)	1.1	(0.1)	11.1	(0.5)	1.2	(0.0)	11.6	(0.4)
Weaned	8.5	(0.1)	91.0	(0.3)	8.9	(0.1)	88.9	(0.5)	9.0	(0.0)	88.4	(0.4)
Total	9.3		100.0		10.0		100.0		10.2		100.0	

Preweaning mortality indicates gilt/sow mothering ability and/or farrowing facility management. Laid-on and starvation were the most common causes of preweaning death losses, together accounting for over two-thirds of preweaning deaths. Cause of death did not vary over the time periods. Most other known problems were listed as low viability pigs (poor-doers, runts, etc.).

b. Percent of preweaning deaths by producer-identified cause, quarter, and by time period:

	Percent Preweaning Deaths					
	Time Period					
	December 1999 - February 2000		March 2000 - May 2000		December 1999 - May 2000	
Producer Identified Cause	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
Scours	9.5	(1.4)	9.2	(1.3)	9.3	(1.4)
Laid on	51.6	(2.0)	52.6	(1.9)	52.1	(2.0)
Starvation	16.9	(2.2)	16.6	(2.0)	16.7	(2.1)
Respiratory problem	3.1	(0.5)	2.8	(0.4)	3.0	(0.5)
Other known problem	11.2	(1.6)	11.7	(1.6)	11.5	(1.6)
Unknown problem	7.7	(0.9)	7.1	(0.9)	7.4	(0.9)
Total	100.0		100.0		100.0	



2. Weaning

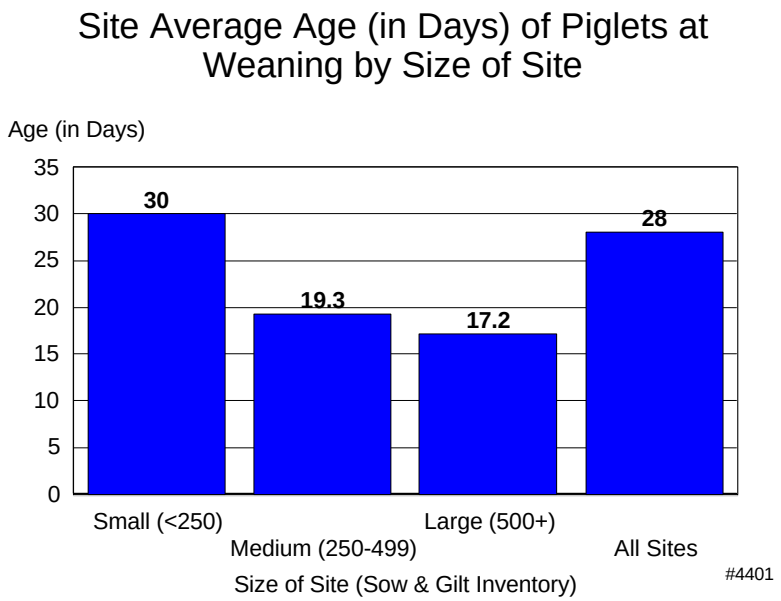
The pig average weaning age and site average weaning age differed, 19.3 days and 28.0 days respectively. Larger sites, which weaned earlier (17.2 days) accounted for the majority of pigs, whereas smaller sites, which weaned later (30 days), accounted for the majority of sites. Generally, larger sites weaned pigs at a younger age than smaller sites, which is why the overall pig average weaning age was younger than the site average age.

a. Pig average age (in days) of piglets at weaning:

Pig Average Age (In Days)	Standard Error
19.3	(0.2)

b. Site average age (in days) of piglets at weaning by size of site:

Average Age (in Days)							
Size of Site (Sow and Gilt Inventory)							
Small (Less than 250)		Medium (250-499)		Large (500 or More)		All Sites	
Average Age	Standard Error	Average Age	Standard Error	Average Age	Standard Error	Average Age	Standard Error
30.0	(0.6)	19.3	(0.3)	17.2	(0.2)	28.0	(0.5)



Larger sites weaned pigs at an earlier age than smaller sites. Over 92 percent of large sites weaned at less than 21 days, whereas only 13.5 percent of small sites weaned by 21 days.

c. Percent of sites that weaned pigs at the following ages, by size of site:

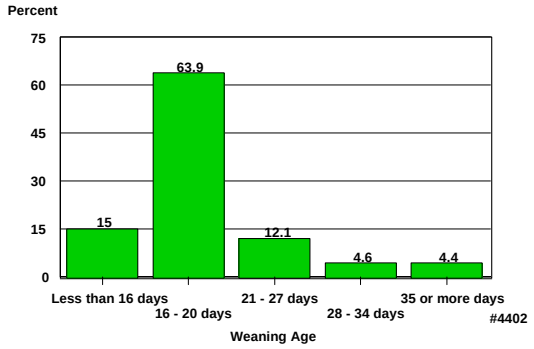
	Percent Sites							
	Size of Site (Sow and Gilt Inventory)							
	Small (Less than 250)		Medium (250-499)		Large (500 or More)		All Sites	
Weaning Age (In Days)	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
Less than 16	2.3	(1.0)	8.8	(2.4)	25.5	(4.6)	4.9	(1.0)
16 - 20	11.2	(1.7)	65.3	(4.0)	67.0	(4.4)	20.3	(1.6)
21 - 27	30.1	(2.7)	20.7	(3.3)	6.3	(1.3)	27.3	(2.2)
28 - 34	22.3	(2.4)	3.3	(1.0)	0.6	(0.3)	18.9	(2.0)
35 or more	34.1	(2.9)	1.9	(0.8)	0.6	(0.4)	28.6	(2.4)
Total	100.0		100.0		100.0		100.0	

Approximately two-thirds of pigs were weaned from 16 to 20 days of age. The second most common weaning age was less than 16 days. Early weaned pigs require excellent facilities and management, but early weaning can enhance productivity and disease control.

d. Percent of weaned pigs by weaning age category:

Weaning Age (In Days)	Percent Pigs	Standard Error
Less than 16	15.0	(2.8)
16 - 20	63.9	(3.1)
21 - 27	12.1	(1.2)
28 - 34	4.6	(0.6)
35 or more	4.4	(0.6)
Total	100.0	

Percent of Weaned Pigs by Weaning Age Category



C. Nursery Productivity

1. Production phase

a. Percent of sites with a nursery phase, by region:

Percent Sites									
Region									
Northern		West Central		East Central		Southern		All Sites	
Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
48.5	(3.5)	59.7	(3.3)	49.3	(2.5)	40.5	(2.7)	50.4	(1.7)

2. Nursery death loss

Nursery mortality is an indication of facility management and/or disease problems.

a. Percent of nursery pigs that died in the nursery phase from December 1999, through May 2000, by size of site[1]:

Percent Nursery Pigs							
Size of Site (Total Inventory)							
Small (Less than 2,000)		Medium (2,000-9,999)		Large (10,000 or More)		All Sites	
Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
2.5	(0.1)	2.6	(0.2)	3.0	(0.3)	2.6	(0.1)

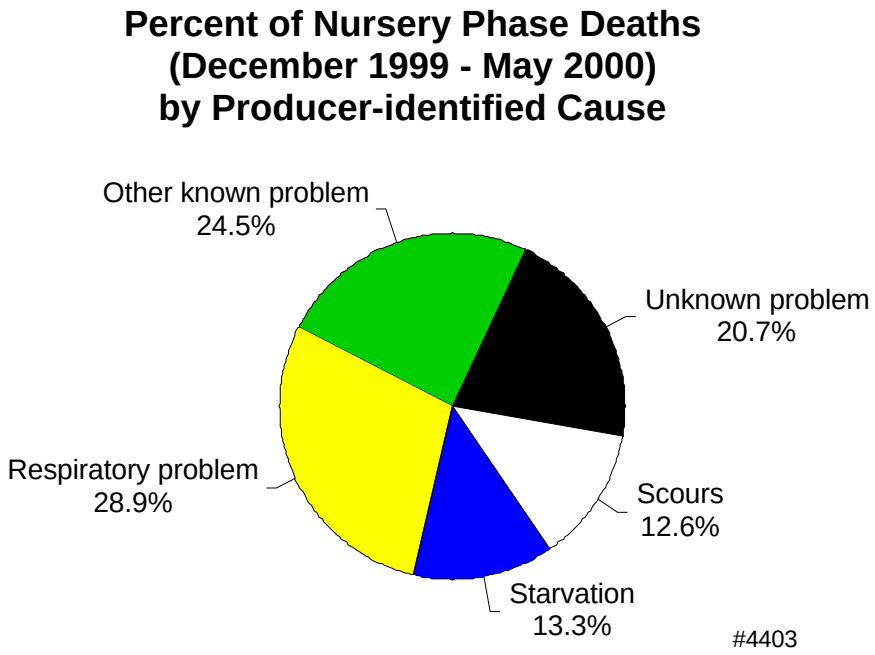
[1] As a percentage of pigs that entered the nursery phase during that time frame

Respiratory disease was the greatest cause of nursery mortality. Scours and starvation were also significant causes of deaths. The majority of other known problems were attributed to *Streptococcus suis* and other conditions, such as poor-doers, fighting, and ruptures/hernias. Causes of death did not vary appreciably by season.

b. Percent of nursery-phase deaths by producer-identified cause, and by time period:

i. Overall.

	Percent Nursery Deaths					
	Time Period					
	December 1999 - February 2000		March 2000 - May 2000		December 1999 - May 2000	
Producer-Identified Cause	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
Scours	12.8	(1.3)	12.3	(1.2)	12.6	(1.2)
Starvation	13.4	(1.2)	13.3	(1.1)	13.3	(1.1)
Respiratory problem	28.9	(1.8)	28.6	(1.6)	28.9	(1.7)
Other known problem	23.2	(3.2)	26.0	(3.6)	24.5	(3.4)
Unknown problem	21.7	(3.8)	19.8	(3.2)	20.7	(3.5)
Total	100.0		100.0		100.0	



ii. Percent of nursery-phase deaths by producer-identified cause and by size of site for the six-month period (December 1999-May 2000):

	Percent Nursery Deaths by size of Site							
	Size of Site (Total Inventory)							
	Small (Less than 2,000)		Medium (2,000-9,999)		Large (10,000 or More)		All Sites	
Producer-identified Cause	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
Scours	14.8	(2.0)	14.1	(1.9)	7.6	(1.9)	12.6	(1.2)
Starvation	12.9	(1.7)	15.4	(1.4)	9.3	(2.8)	13.3	(1.1)
Respiratory problem	30.9	(2.7)	31.1	(1.9)	22.8	(4.4)	28.9	(1.7)
Other known problem	22.1	(2.5)	21.1	(2.1)	33.5	(12.5)	24.5	(3.4)
Unkown problem	19.3	(2.1)	18.3	(2.4)	26.8	(14.3)	20.7	(3.5)
Total	100.0		100.0		100.0		100.0	

3. Age leaving the nursery

The age of pigs leaving the nursery varied depending on type of nursery, climate, other facilities available, and the management plan of the site. Although weaning age decreased as size of site increased (see table I.B.2.b), the age of pigs leaving the nursery was similar across size groups.

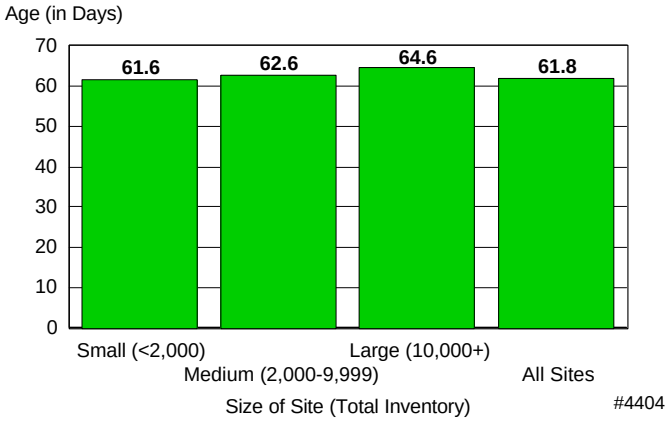
a. Pig average age (in days) of pigs leaving the nursery:

Pig Average Age (In Days)	Standard Error
63.3	(0.5)

b. Site average age (in days) of pigs leaving the nursery by size of site:

Average Age (in Days)							
Size of Site (Total Inventory)							
Small (Less than 2,000)		Medium (2.000-9,999)		Large (10,000 or More)		All Sites	
Average Age	Standard Error	Average Age	Standard Error	Average Age	Standard Error	Average Age	Standard Error
61.6	(0.7)	62.6	(0.5)	64.6	(0.8)	61.8	(0.6)

Site Average Age (in Days) of Pigs Leaving the Nursery by Size of Site



c. Site average of number of days in the nursery by size of site:

Average Days							
Size of Site (Total Inventory)							
Small (Less than 2,000)		Medium (2.000-9,999)		Large (10,000 or More)		All Sites	
Number of Days	Standard Error	Number of Days	Standard Error	Number of Days	Standard Error	Number of Days	Standard Error
36.2	(0.8)	44.2	(0.5)	45.9	(1.2)	37.6	(0.6)

D. Grower/finisher Productivity

1. Production phase

a. Percent of sites with a grower/finisher phase by region:

Percent Sites									
Region									
Northern		West Central		East Central		Southern		All Sites	
Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
83.8	(2.6)	84.4	(2.4)	89.4	(1.4)	63.3	(2.6)	85.5	(1.1)

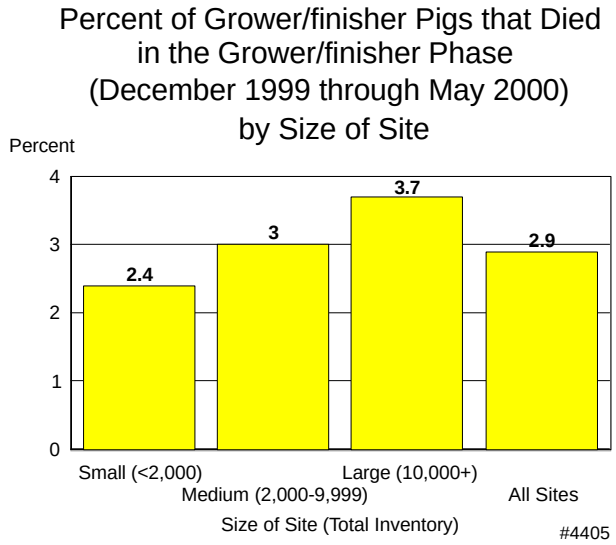
2. Grower/finisher death loss

Mortality in the grower/finisher phase of production can contribute to a serious economic loss to the site, due to feed costs incurred in older, larger pigs. During the period from December 1, 1999, through May 31, 2000, 2.9 percent of pigs died in the grower/finisher units, a similar death rate as for nursery pigs (2.6 percent). Percent of death losses increased with site size.

a. Percent of grower/finisher pigs that died in the grower/finisher phase from December 1, 1999, through May 31, 2000, by size of site[1]:

Percent Grower/finisher Pigs							
Size of Site (Total Inventory)							
Small (Less than 2,000)		Medium (2.000-9,999)		Large (10,000 or More)		All Sites	
Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
2.4	(0.1)	3.0	(0.1)	3.7	(0.2)	2.9	(0.1)

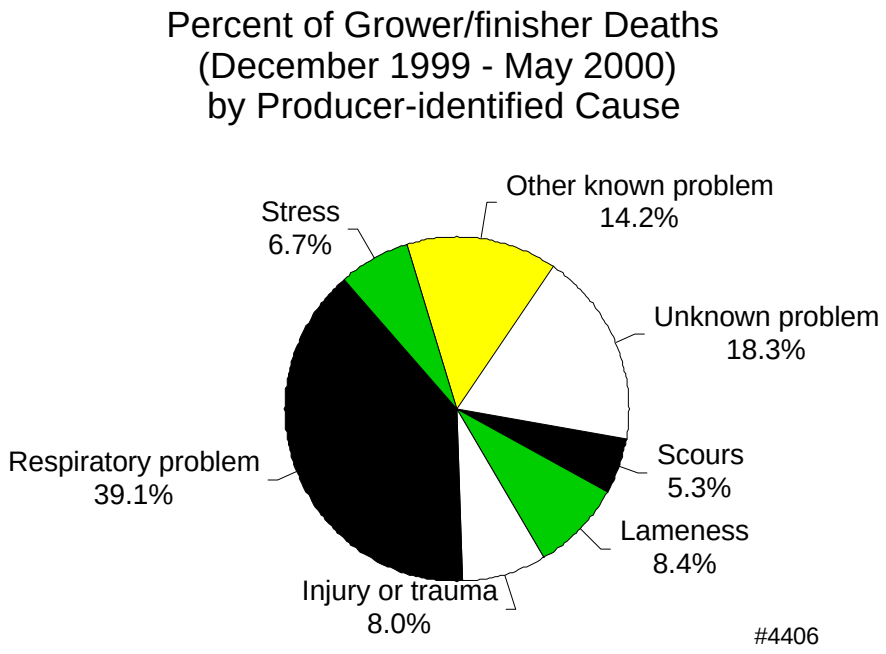
[1]As a percentage of pigs that entered the grower/finisher phase during that time frame.



Respiratory problems were the most common cause of death in grower/finisher units (39.1 percent) from December 1999, through May 2000. During that time, 18.3 percent of grower/finisher pigs died from unknown problems. Other known problems were attributed to hemmorrhagic bowel syndrome, ilietis, prolapses and ulcers.

b. Percent of grower/finisher deaths by producer-identified cause from December 1, 1999, through May 31, 2000:

Producer-identified Cause	Percent	Standard Error
Scours	5.3	(2.0)
Lameness	8.4	(0.8)
Injury or trauma	8.0	(0.5)
Respiratory problem	39.1	(2.0)
Stress	6.7	(0.6)
Other known problem	14.2	(1.5)
Unknown problem	18.3	(1.4)
Total	100.0	



3. Days to market

Days to market are a measure of growth rate, feed efficiency, and target market weights (Market-weight data were not collected in this study). Sites varied in average time to market, with the most common times ranging from 166 to 180 days. The largest percentage of grower/finisher pigs was on sites that marketed at 181 to 209 days. However, time to market may vary among pigs on the same farm.

a. Pig average age (in days) of all pigs leaving the grower/finisher unit:

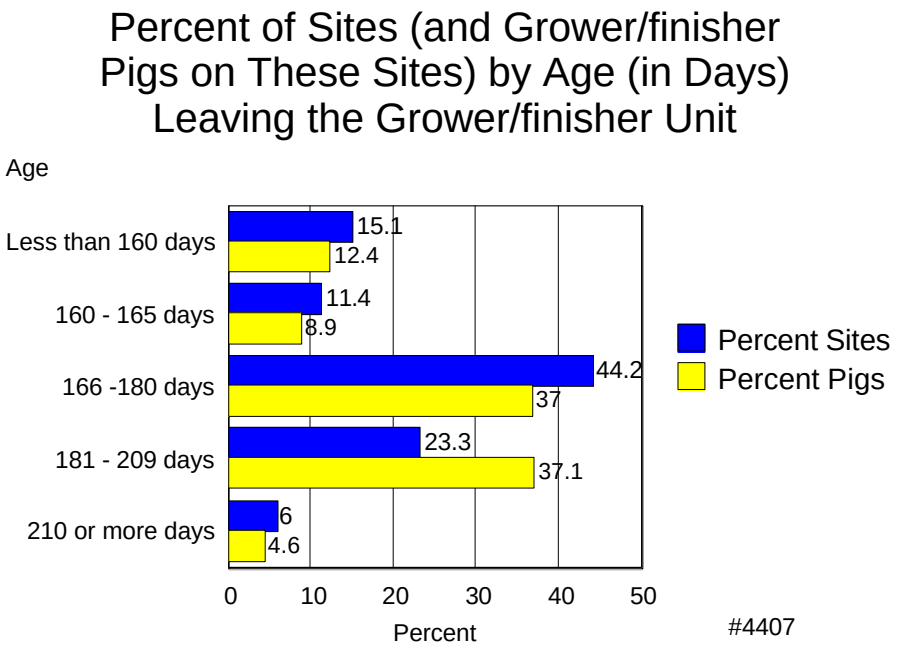
Pig Average Age (in Days)	Standard Error
177.6	(1.1)

b. Site average age (in days) of pigs leaving the grower/finisher unit, by size of site:

Average Age (in Days)							
Size of Site (Total Inventory)							
Small (Less than 2,000)		Medium (2.000-9,999)		Large (10,000 or More)		All Sites	
Average Age	Standard Error	Average Age	Standard Error	Average Age	Standard Error	Average Age	Standard Error
175.8	(1.0)	176.2	(1.0)	187.0	(1.9)	176.0	(0.8)

c. Percent of sites (and grower/finisher pigs on these sites) by age (in days) leaving the grower/finisher unit:

Age (in Days)	Percent Sites	Standard Error	Percent Pigs	Standard Errors
Less than 160	15.1	(1.5)	12.4	(1.4)
160-165	11.4	(1.1)	8.9	(0.9)
166-180	44.2	(2.0)	37.0	(2.1)
181-209	23.3	(1.7)	37.1	(2.4)
210 or more	6.0	(1.0)	4.6	(0.8)
Total	100.0		100.0	

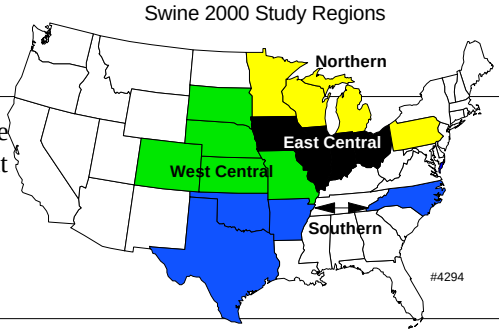


E. Facility Management - All Phases

1. Production Phases

Swine sites varied in their production phases, with some doing all (farrow through finish) and others carrying out a single phase of production, such as farrowing or grower/finisher only. Swine production sites in the Southern region were more segmented/specialized.

Swine 2000 Study Regions



a. Percent of sites with the following production phases, by region:

	Percent Sites									
	Region									
	Northern		West Central		East Central		Southern		All Sites	
Production Phase	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error
Gestation	50.2	(3.5)	65.9	(3.1)	50.5	(2.5)	42.6	(2.7)	52.6	(1.7)
Farrowing	50.1	(3.5)	66.2	(3.1)	50.6	(2.5)	43.5	(2.7)	52.8	(1.7)
Nursery	48.5	(3.5)	59.7	(3.3)	49.3	(2.5)	40.5	(2.7)	50.4	(1.7)
Grower/finisher	83.8	(2.6)	84.4	(2.4)	89.4	(1.4)	63.3	(2.6)	85.5	(1.1)

b. Percent of sites with the following combinations of production phases, by region:

	Percent Sites									
	Region									
	Northern		West Central		East Central		Southern		All Sites	
Production Phase	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error
All four phases	31.4	(3.3)	43.1	(3.4)	34.7	(2.5)	18.4	(2.8)	34.4	(1.6)
Gestation, farrowing, and nursery	7.1	(2.1)	4.2	(1.6)	3.3	(0.7)	7.2	(2.0)	4.5	(0.7)
Nursery and grower/finisher	5.3	(1.2)	7.3	(1.5)	8.1	(1.0)	0.2	(0.2)	6.8	(0.6)
Gestation and farrowing	4.6	(1.5)	6.5	(1.6)	3.7	(1.0)	14.2	(1.5)	5.1	(0.7)
Nursery only	4.2	(1.1)	3.7	(0.7)	2.8	(0.7)	14.4	(1.6)	4.1	(0.5)
Grower/finisher only	39.9	(3.5)	21.5	(2.9)	37.5	(2.5)	41.9	(2.4)	35.5	(1.6)
Other combination	7.5	(3.0)	13.7	(3.0)	9.9	(1.9)	3.7	(0.6)	9.6	(1.3)
Total	100.0		100.0		100.0		100.0		100.0	

2. Facility type

Total confinement was the most common type of facility for all phases, except gestation. Nearly 65 percent of farrowing sites had total confinement units, and 75.9 percent of nurseries had total confinement facilities.

a. For sites that had the specified production phases, percent of ***sites*** by type of facility used most in the following phases:

	Percent Sites							
	Production Phase							
	Gestation		Farrowing		Nursery		Grower/finisher	
Facility Type	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
Total confinement (mechanical ventilation)	22.4	(1.6)	64.8	(2.5)	75.9	(2.1)	42.9	(1.8)
Open building with no outside access	13.9	(1.9)	12.2	(1.8)	8.2	(1.3)	18.2	(1.4)
Open building with outside access	45.2	(2.5)	17.0	(2.2)	12.3	(1.7)	33.2	(2.0)
Lot with hut or no building	10.3	(1.4)	3.4	(0.9)	1.7	(0.5)	4.4	(0.8)
Pasture with hut or no building	8.2	(1.4)	2.6	(0.9)	1.9	(0.9)	1.3	(0.5)
Total	100.0		100.0		100.0		100.0	

Large percentages of sows were farrowed in total confinement facilities (83.4 percent), while 81.8 percent of pigs were placed in total confinement nurseries. Only 1.3 percent of sows were farrowed outside from December 1999, through May 2000.

b. For sites that had the specified production phases, percent of ***pigs*** by type of facility used most in the following phases:

	Percent Pigs							
	Production Phase							
	Gestation[1]		Farrowing[1]		Nursery[2]		Grower/finisher[3]	
Facility Type	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
Total confinement	64.2	(3.9)	83.4	(4.0)	81.8	(4.5)	69.9	(2.0)
Open building with no outside access	16.4	(4.1)	12.4	(4.1)	15.9	(4.5)	19.7	(1.7)
Open building with outside access	14.7	(1.6)	2.9	(0.5)	1.7	(0.3)	9.2	(0.8)
Lot with hut or no building	2.8	(0.4)	0.6	(0.2)	0.3	(0.1)	0.8	(0.2)
Pasture with hut or no building	1.9	(0.4)	0.7	(0.3)	0.3	(0.2)	0.4	(0.2)
Total	100.0		100.0		100.0		100.0	

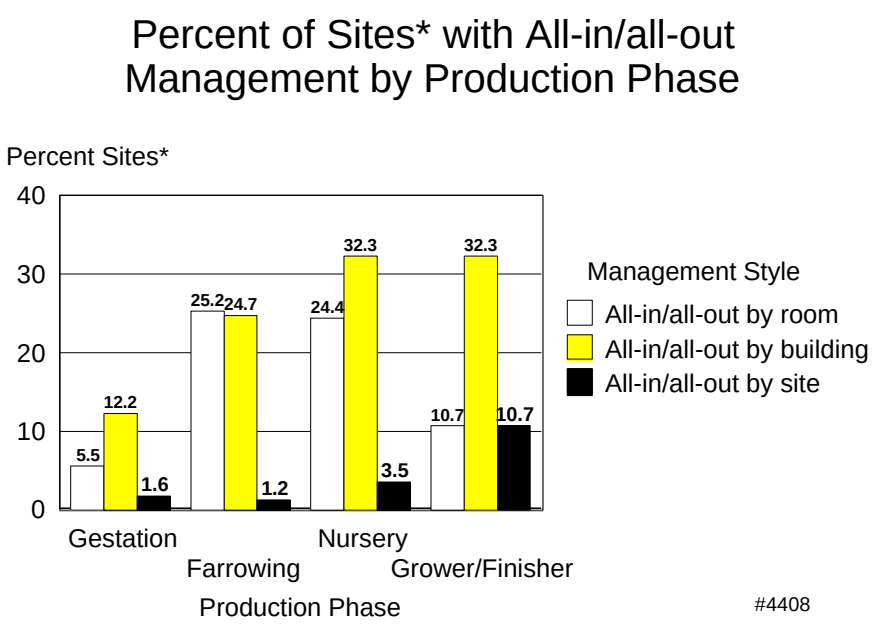
1 Percent sows/gilts farrowed from December 1999 - May 2000.
2 Percent pigs entering nursery from December 1999 - May 2000.
3 Percent pigs entering grower/finisher phase from December 1999 - May 2000.

3. Pig flow

All-in/all-out and continuous flow are two management methods of pig flow on swine sites. All-in/all-out management means that ***every*** animal is ***removed*** from a room, building, or site that is cleaned and disinfected prior to placing new animals in the facility. For nursery units, all-in/all-out management was practiced most often by building or room.

a. For sites that had the specified production phase, percent of ***sites*** that managed pig flow by management style and production phase:

	Percent Sites							
	Production Phase							
	Gestation		Farrowing		Nursery		Grower/finisher	
Management Style	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
Continuous flow	71.4	(2.2)	38.7	(2.5)	32.3	(2.3)	40.5	(2.0)
All swine removed without cleaning and disinfecting	4.2	(1.0)	5.8	(1.4)	3.9	(1.2)	3.2	(0.7)
All-in/all-out management by room	5.5	(0.7)	25.2	(1.7)	24.4	(1.6)	10.7	(0.9)
All-in/all-out management by building	12.2	(1.8)	24.7	(2.2)	32.3	(2.1)	32.3	(1.7)
All-in/all-out management by site	1.6	(0.6)	1.2	(0.5)	3.5	(0.7)	10.7	(1.1)
Not applicable	5.1	(1.0)	4.4	(1.2)	3.6	(1.1)	2.6	(0.7)
Total	100.0		100.0		100.0		100.0	



*For sites with the specified production phase

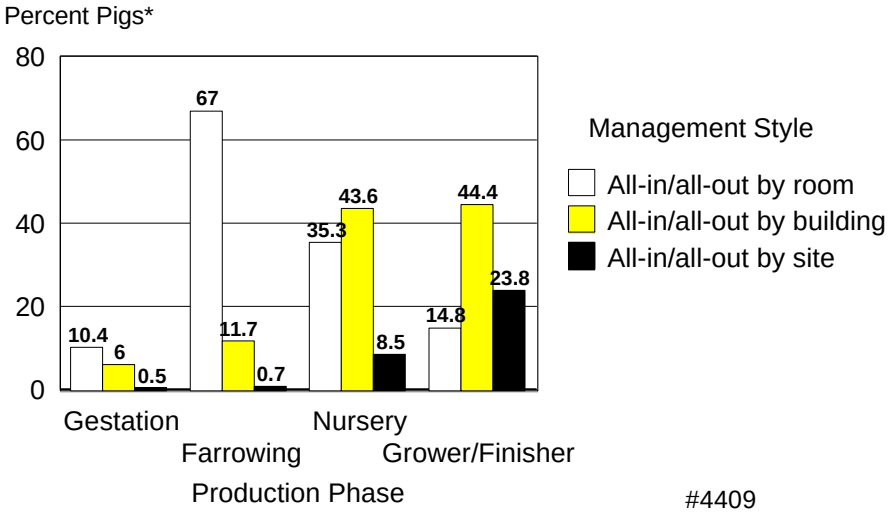
The majority of pigs were finished in all-in/all-out facilities. Nearly one-fourth (23.8 percent) of finishing pigs were managed all-in/all-out by site.

b. For sites that had the specified production phase, percent of ***pigs*** on sites that managed pig flow by management style and production phase:

	Percent Pigs							
	Production Phase							
	Gestation[1]		Farrowing[1]		Nursery[2]		Grower/finisher[3]	
Management Style	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
Continuous flow	81.0	(2.0)	17.6	(1.9)	11.1	(1.4)	14.9	(1.1)
All swine removed without cleaning and disinfecting	1.1	(0.2)	2.1	(0.6)	0.8	(0.2)	1.5	(0.3)
All-in/all-out management by room	10.4	(1.5)	67.0	(2.7)	35.3	(4.0)	14.8	(1.4)
All-in/all-out management by building	6.0	(1.0)	11.7	(1.4)	43.6	(4.5)	44.4	(3.0)
All-in/all-out management by site	0.5	(0.2)	0.7	(0.2)	8.5	(1.8)	23.8	(2.3)
Not applicable	1.0	(0.3)	0.9	(0.3)	0.7	(0.3)	0.6	(0.2)
Total	100.0		100.0		100.0		100.0	

1 Percent sows/gilts farrowed from December 1999 - May 2000.
2 Percent pigs entering nursery from December1999 - May 2000.
3 Percent pigs entering grower/finisher phase from December 1999 - May 2000.

Percent of Pigs on Sites* with All-in/all-out Management by Production Phase



*For sites that had the specified production phase

c. Multiple site production

Multiple site production involves moving pigs to a separate site/location between three phases of production: farrowing, nursery, and grower/finisher.

i. For sites that had the specified production phase(s), percent of sites that removed pigs from the following phases to a separate site, by size of site:

	Percent Sites							
	Size of Site (Total Inventory)							
	Small (Less than 2,000)		Medium (2,000-9,999)		Large (10,000 or More)		All Sites	
Phase	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
From farrowing to separate nursery site	35.1	(2.6)	45.3	(3.1)	74.9	(4.9)	36.4	(2.4)
From nursery to separate grower/finisher site	48.3	(2.7)	57.1	(2.4)	77.8	(4.1)	50.0	(2.3)
Both from farrowing to separated nursery and from nursery to separate grower/finisher site	38.4	(3.4)	39.0	(3.7)	81.1	(4.5)	39.0	(3.0)

Segregated early weaning (SEW) is a disease control management strategy that includes moving early-weaned pigs (20 days or less) to a separate site. Larger sites were more likely to practice SEW than smaller sites.

ii. For sites with a farrowing phase, percent of sites (and pigs weaned on these sites) that both weaned pigs at an *average* age of 20 days or less, and removed pigs to a separate site nursery, by size of site:

	Size of Site (Total Inventory)							
	Small (Less than 2,000)		Medium (2,000-9,999)		Large (10,000 or More)		All Sites	
Measure	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
Sites	9.3	(1.4)	38.0	(3.1)	68.2	(5.6)	12.7	(1.3)
Pigs Weaned	28.8	(3.4)	64.1	(4.4)	86.7	(5.1)	55.7	(3.5)

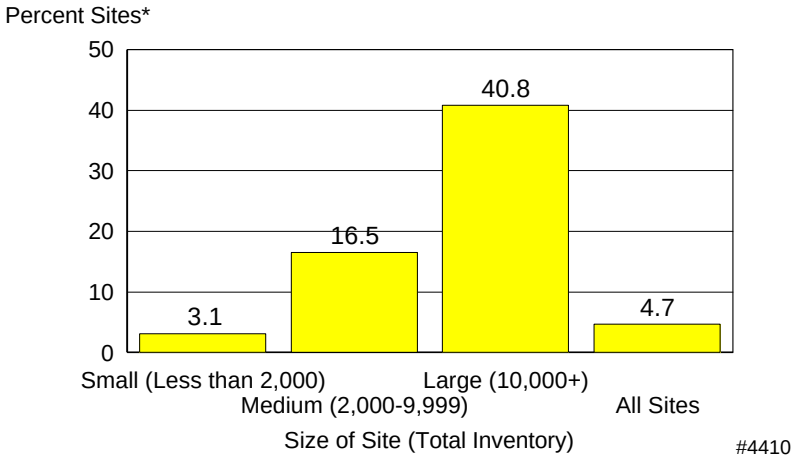
iii. For sites with a farrowing phase, percent of sites (and pigs weaned at these sites) where the ***maximum***

> For SEW to be an effective disease control tool, there must be strict adherence to specific principles, such as weaning at an early age when protective antibodies are still present. Defining SEW sites by maximum weaning age may provide a more realistic disease control picture than estimates by overall weaning age.

age of weaning was 20 days or less and pigs were removed to a separate site nursery, by size of site:

	Size of Site (Total Inventory)							
	Small (Less than 2,000)		Medium (2,000-9,999)		Large (10,000 or More)		All Sites	
Measure	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
Sites	3.1	(0.7)	16.5	(2.4)	40.8	(8.6)	4.7	(0.7)
Pigs Weaned	12.1	(2.5)	24.9	(5.3)	30.9	(11.8)	21.4	(3.5)

Percent of Sites* Where the Maximum Age of Weaning was 20 Days or Less of Age and Pigs Were Removed to a Separate Site Nursery by Size of Site



* For sites with a farrowing phase.

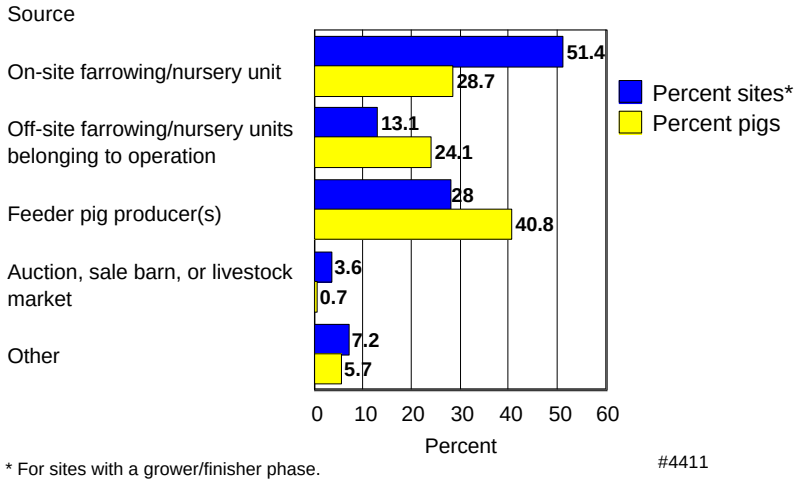
4. Sources of pigs entering the grower/finisher phase

Pigs enter the grower/finisher phase of production from several sources. Overall, on-site farrowing or nursery units were the most common sources of pigs for grower/finisher units (51.4 percent). Medium-sized sites relied most heavily on feeder pig producers. Larger sites utilized off-site farrowing or nursery units more than smaller sites. Sow cooperatives and various other arrangements accounted for other sources of pigs.

a. For sites with a grower/finisher phase, percent of ***sites*** that brought any pigs into the grower/finisher phase during the previous 6 months that originated from the following sources, by size of site:

	Percent Sites							
	Size of Site (Total Inventory)							
	Less than 2,000		2,000-9,999		10,000 or More		All Sites	
Source	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
On-site farrowing or nursery units	54.8	(2.2)	32.4	(2.0)	34.8	(5.7)	51.4	(1.9)
Off-site farrowing or nursery units belonging to this operation	11.8	(1.5)	18.2	(1.8)	40.9	(6.9)	13.1	(1.3)
Feeder pig producer(s) (both contract & noncontract)	24.8	(1.8)	47.1	(2.3)	27.0	(4.4)	28.0	(1.6)
Auction, sale barn, or livestock market	4.2	(1.0)	0.4	(0.2)	0.0	(--)	3.6	(0.9)
Other	7.5	(1.4)	6.3	(1.3)	0.9	(0.8)	7.2	

Percent of Sites* (and Percent of Pigs Entering the Grower/finisher Units) that Brought any Pigs into the Grower/finisher Phase During the Previous 6 Months that Originated from the Following Sources



* For sites with a grower/finisher phase.

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Feeder pig producers, both contract and noncontract, provided 40.8 percent of pigs for the grower/finisher units. Off-site farrowing and nursery units accounted for over half (54.0 percent) of pigs placed on larger sites.

b. Percent of ***pigs*** that entered the grower/finisher phase during the previous 6 months that originated from the following sources, by size of site:

	Percent Pigs							
	Size of Site (Total Inventory)							
	Less than 2,000		2,000-9,999		10,000 or More		All Pigs	
Source	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
On-site farrowing or nursery units	41.4	(2.0)	24.0	(3.0)	18.9	(4.4)	28.7	(2.0)
Off-site farrowing or nursery units belonging to this operation	12.3	(1.4)	18.6	(3.0)	54.0	(8.7)	24.1	(3.3)
Feeder pig producer(s) (both contract & noncontract)	35.2	(2.1)	51.8	(3.1)	26.1	(5.7)	40.8	(2.2)
Auction, sale barn, or livestock market	2.0	(0.6)	0.1	(0.0)	0.0	(--)	0.7	(0.2)
Other	9.1	(1.6)	5.5	(1.1)	1.0	(0.9)	5.7	(0.8)
Total	100.0		100.0		100.0		100.0	

Many sites utilized more than one source to obtain pigs to place in grower/finisher units. This practice varied with size of site. Using different sources can present a disease risk, particularly when pigs are commingled.

c. For sites that obtained pigs from off-site units or feeder pig producers, percent of sites by reported number of sources and by size of site:

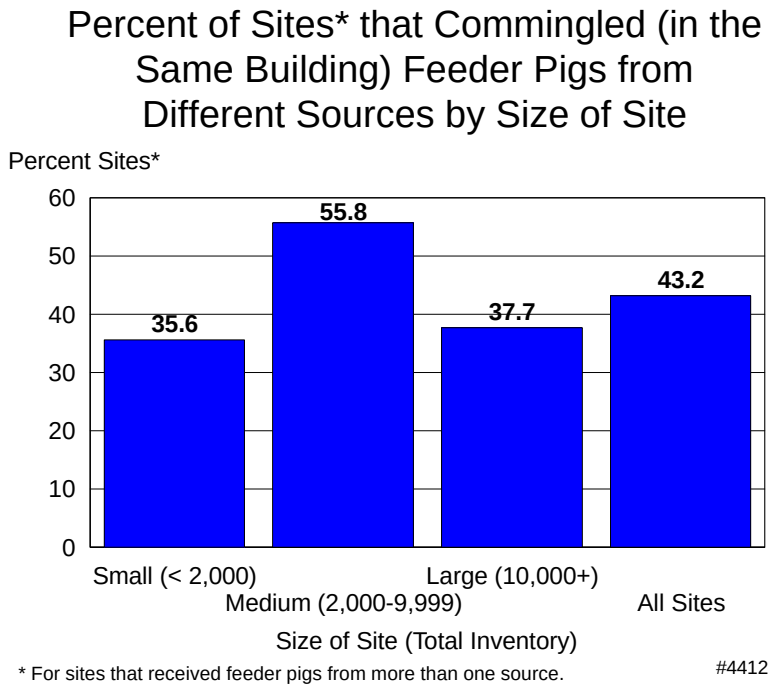
	Percent Sites							
	Size of Site (Total Inventory)							
	Small (Less than 2,000)		Medium (2,000-9,999)		Large (10,000 or More)		All Sites	
Number of Sources	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
1	81.7	(2.6)	60.9	(2.8)	39.6	(7.8)	76.1	(2.1)
2	13.3	(2.2)	24.1	(2.2)	38.3	(9.3)	16.3	(1.8)
3	3.3	(1.2)	10.4	(1.8)	14.6	(4.8)	5.1	(1.0)
4 - 5	0.9	(0.5)	2.6	(0.7)	5.8	(4.2)	1.4	(0.4)
6 or more	0.8	(0.7)	2.0	(0.5)	1.7	(0.8)	1.1	(0.6)
Total	100.0		100.0		100.0		100.0	

d. For sites that obtained pigs from off-site units or feeder pig producers, average number of sources, by size of site:

Average Number of Sources							
Size of Site (Total Inventory)							
Less than 2,000		2,000-9,999		10,000 or More		All Sites	
Number	Standard Error	Number	Standard Error	Number	Standard Error	Number	Standard Error
1.3	(0.1)	1.7	(0.1)	2.0	(0.1)	1.4	(0.0)

e. For sites that received feeder pigs from more than one source (off-site units or feeder pig producers), percent of sites that commingled pigs from different sources in the same building, by size of site:

Percent Sites							
Size of Site (Total Inventory)							
Small (Less than 2,000)		Medium (2,000-9,999)		Large (10,000 or More)		All Sites	
Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
35.6	(7.2)	55.8	(4.1)	37.7	(10.3)	43.2	(4.5)

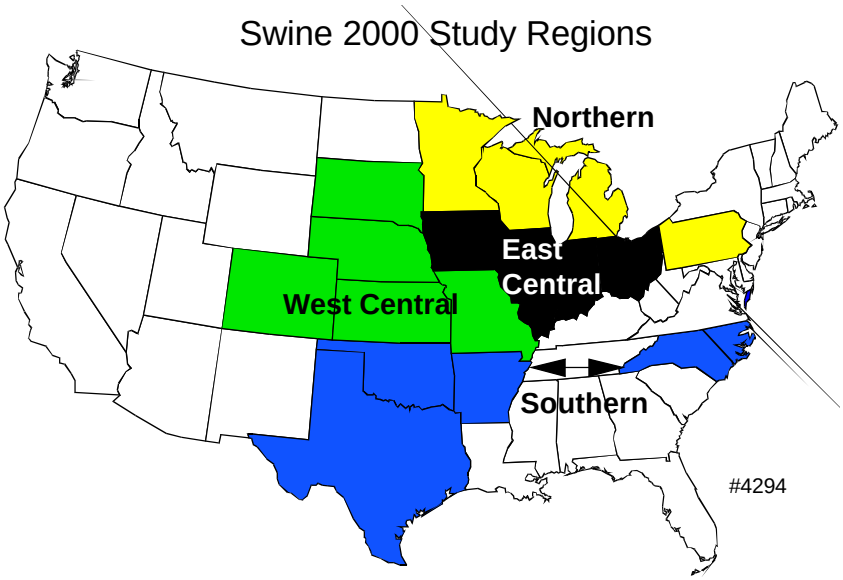


5. Waste management

Types of waste management varied among regions. Overall, a mechanical scraper was the most common method used during the gestation phase (32.5 percent of sites), particularly in the Northern and East Central regions, where half the sites used open buildings with outside access for gestation. On several sites, particularly in the Western and Southern regions, no waste management method was used during the gestation phase, as gestation facilities were located on a lot or pasture. The pit-recharge system (shallow pits, pit plugs) was the most frequent "other" waste management system cited.

a. For sites that had a ***gestation*** phase, percent of sites by type of waste management system used most in the gestation facility, by region:

	Percent Sites									
	Region									
	Northern		West Central		East Central		Southern		All Sites	
Waste Management System	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error
Pit-holding	23.9	(4.1)	14.6	(2.8)	20.3	(2.3)	14.6	(2.4)	19.4	(1.6)
Mechanical scraper/tractor	41.3	(5.8)	10.1	(2.1)	41.9	(3.9)	3.7	(0.8)	32.5	(2.6)
Hand cleaned	14.6	(3.3)	20.0	(3.8)	21.2	(3.4)	12.0	(4.3)	19.1	(2.1)
Flush-under slats	3.9	(1.0)	5.8	(1.0)	3.3	(0.6)	37.2	(4.3)	5.9	(0.5)
Flush-open gutter	1.7	(1.3)	3.0	(0.9)	0.7	(0.3)	7.8	(1.4)	1.8	(0.4)
Other	5.3	(2.9)	12.4	(3.2)	6.1	(1.7)	2.7	(0.6)	7.2	(1.3)
None	9.3	(2.8)	34.1	(4.2)	6.5	(1.5)	22.0	(5.9)	14.1	(1.5)
Total	100.0		100.0		100.0		100.0		100.0	



For the farrowing phase, a holding pit and hand cleaning were commonly used waste management systems. In Southern states, flush under slats predominated.

b. For sites that had a ***farrowing*** phase, percent of sites by type of waste management system used most in the farrowing facility, by region:

	Percent Sites									
	Region									
	Northern		West Central		East Central		Southern		All Sites	
Waste Management System	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error
Pit-holding	37.3	(5.1)	22.6	(3.2)	40.9	(3.5)	16.0	(2.4)	34.7	(2.2)
Mechanical scraper/tractor	19.9	(5.8)	6.5	(1.7)	14.2	(3.1)	3.3	(0.8)	13.0	(2.1)
Hand cleaned	26.2	(5.1)	30.7	(4.3)	21.0	(3.6)	10.1	(3.0)	23.6	(2.3)
Flush-under slats	10.5	(2.5)	17.8	(3.0)	12.7	(2.1)	45.9	(4.9)	15.3	(1.4)
Flush-open gutter	4.2	(1.7)	4.2	(1.8)	4.6	(1.9)	4.6	(1.1)	4.4	(1.1)
Other	0.4	(0.3)	6.6	(2.6)	3.7	(1.3)	1.7	(0.5)	3.6	(0.9)
None	1.5	(0.8)	11.6	(2.8)	2.9	(1.5)	18.4	(5.9)	5.4	(1.1)
Total	100.0		100.0		100.0		100.0		100.0	

A holding pit was the predominant waste management system used for the nursery phase in all but the Southern region, where flush under slats was the most commonly used method.

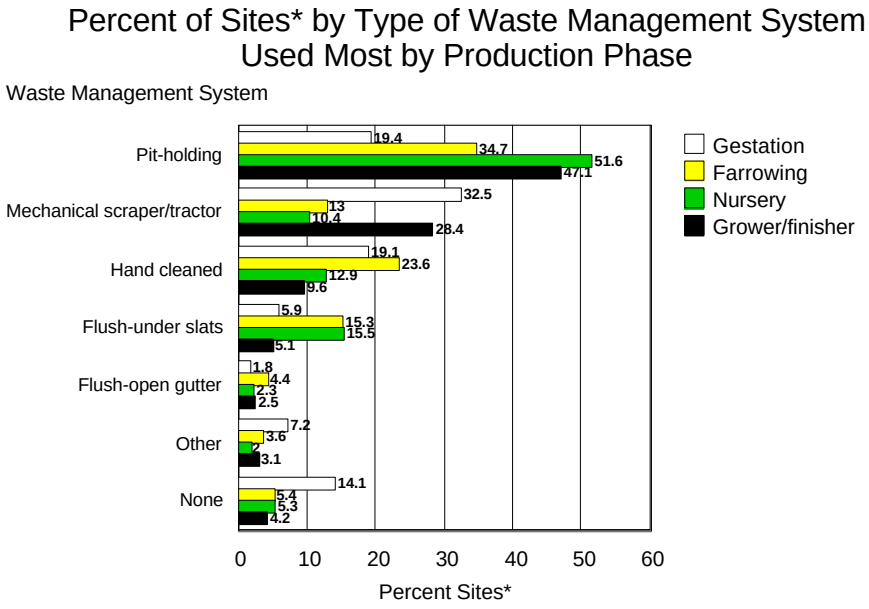
c. For sites that had a ***nursery*** phase, percent of sites by type of waste management system used most in the nursery facility, by region:

	Percent Sites									
	Region									
	Northern		West Central		East Central		Southern		All Sites	
Waste Management System	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error
Pit-holding	53.2	(4.8)	31.2	(3.7)	62.3	(3.5)	18.7	(2.6)	51.6	(2.3)
Mechanical scraper/tractor	13.7	(3.8)	10.4	(2.5)	9.9	(2.4)	2.4	(0.7)	10.4	(1.6)
Hand cleaned	17.3	(4.3)	21.9	(4.2)	8.0	(2.5)	10.5	(4.5)	12.9	(1.8)
Flush-under slats	9.8	(2.0)	21.2	(2.9)	12.2	(1.9)	46.6	(5.1)	15.5	(1.3)
Flush-open gutter	4.4	(1.8)	3.6	(1.8)	0.8	(0.3)	3.3	(0.9)	2.3	(0.6)
Other	0.6	(0.3)	4.8	(2.4)	1.6	(0.8)	1.7	(0.4)	2.0	(0.7)
None	1.0	(0.6)	6.9	(2.2)	5.2	(1.9)	16.8	(6.4)	5.3	(1.2)
Total	100.0		100.0		100.0		100.0		100.0	

For the grower/finisher phase, the most common waste management system used was pit-holding (47.1 percent of sites). Just over 4 percent of sites with a grower/finisher phase used no waste management methods.

d. For sites that had a ***grower/finisher*** phase, percent of sites by type of waste management system used most, by region:

	Percent Sites									
	Region									
	Northern		West Central		East Central		Southern		All Sites	
Waste Management System	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error
Pit-holding	59.9	(4.2)	33.6	(3.4)	48.3	(2.8)	27.7	(2.5)	47.1	(1.9)
Mechanical scraper/tractor	28.0	(4.3)	18.5	(2.9)	33.7	(2.9)	4.1	(0.7)	28.4	(2.0)
Hand cleaned	5.6	(1.7)	14.2	(3.1)	9.9	(2.0)	6.6	(2.9)	9.6	(1.3)
Flush-under slats	2.2	(0.5)	6.9	(1.2)	2.2	(0.4)	44.5	(3.4)	5.1	(0.4)
Flush-open gutter	0.5	(0.2)	7.7	(1.7)	1.4	(0.8)	4.4	(1.1)	2.5	(0.5)
Other	1.8	(0.9)	8.2	(2.3)	2.2	(0.8)	1.7	(0.4)	3.1	(0.6)
None	2.0	(1.0)	10.9	(2.5)	2.3	(1.0)	11.0	(3.5)	4.2	(0.8)
Total	100.0		100.0		100.0		100.0		100.0	



* For sites with the specified production phase.

F. Disease Prevention and Vaccination - All Phases

1. Disease prevention

Nearly all swine sites practiced some type of disease prevention strategy. The most common preventive measure taken for piglets was to administer iron, though this was less likely to be done on smaller operations or where pigs farrow outside. For weaned, growing pigs, antibiotics in the feed and deworming were the primary treatments.

a. For sites with the specified pig type, percent of sites reporting regular use of preventive practices from December 1, 1999, through May 31, 2000, by pig type:

	Percent Sites							
	Pig Type							
	Piglets Before or at Weaning		Pigs from Weaning to Market		Sows/Gilts		Boars	
Practice	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
Deworm	31.8	(2.3)	56.3	(1.7)	83.0	(1.9)	76.8	(2.1)
Mange/lice treatment	29.0	(2.2)	37.5	(1.8)	67.9	(2.3)	65.0	(2.3)
Iron (oral or injection)	75.4	(2.2)	N/A	(--)	N/A	(--)	N/A	(--)
Antibiotics (injection)	44.2	(2.3)	44.3	(1.8)	38.5	(2.4)	25.6	(2.0)
Antibiotics in feed	56.1	(2.4)	80.1	(1.5)	43.5	(2.5)	33.6	(2.4)
Antibiotics in water	10.7	(1.3)	26.6	(1.4)	2.5	(0.6)	2.5	(0.6)
Antibiotics (oral)	14.6	(1.7)	6.6	(1.0)	3.2	(0.8)	1.9	(0.6)

b. Percent of animals on sites reporting regular use of preventative practices from December 1, 1999, through May 31, 2000, by pig type:

Percent Pigs

	Pig Type							
	Piglets[1.]		Pigs[2.]		Sows/Gilts[3.]		Boars[4.]	
Practice	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
Deworm	13.7	(1.6)	28.4	(1.8)	83.1	(2.3)	70.3	(8.0)
Mange/lice treatment	12.0	(1.4)	15.5	(1.3)	36.9	(2.9)	46.6	(5.8)
Iron (oral or injection)	90.6	(2.2)	N/A	(--)	N/A	(--)	N/A	(--)
Antibiotics in feed	37.6	(3.4)	87.6	(1.5)	51.3	(3.7)	28.0	(3.9)
Antibiotics in water	18.1	(4.3)	61.5	(2.2)	3.0	(0.7)	1.9	(0.6)
Antibiotics (oral)	25.1	(4.1)	8.6	(1.1)	2.4	(0.6)	1.7	(0.6)
Antibiotics (injection)	69.1	(2.8)	69.7	(1.9)	62.8	(3.2)	43.6	(6.8)

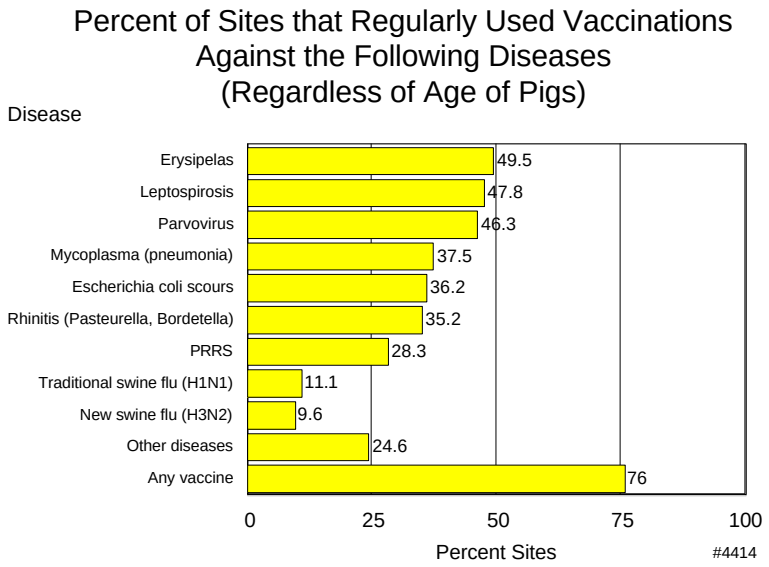
1. Percent of pigs weaned December 1999-May 2000
2. Percent of June 1, 2000, market pig inventory
3. Percent of June 1, 2000, sow and gilt inventory
4. Percent of June 1, 2000, boar inventory

2. Vaccination

About three-fourths of sites routinely administered one or more vaccines against the common diseases of swine. Mycoplasma vaccine was the most frequently used vaccine in large and medium sites. Over 28 percent of all sites regularly administered vaccines against porcine reproductive and respiratory virus (PRRS). The use of swine influenza virus (SIV) vaccine was underestimated because over 7 percent of respondents did not know the specific type of SIV vaccine used. Pseudorabies was the most commonly cited "other" disease for which vaccine was used. Streptococcus and salmonella were also mentioned.

a. Percent of sites that regularly used vaccinations against the following diseases, regardless of age of pigs, by size of site:

	Percent Sites							
	Size of Site (Total Inventory)							
	Small Less than 2,000		Medium 2,000-9,999		Large 10,000 or More		All Sites	
Disease	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
Porcine reproductive and respiratory syndrome (PRRS)	27.3	(1.8)	33.5	(1.9)	31.7	(4.4)	28.3	(1.6)
Erysipelas	51.1	(2.1)	42.1	(2.0)	37.5	(5.0)	49.5	(1.8)
Escherichia coli scours	36.7	(2.1)	33.7	(1.8)	33.4	(4.8)	36.2	(1.8)
Parvovirus	48.1	(2.1)	37.5	(1.9)	38.3	(5.3)	46.3	(1.8)
Leptospirosis	49.7	(2.1)	37.9	(1.9)	42.0	(5.2)	47.8	(1.8)
New swine influenza (H3N2)	6.0	(0.8)	26.0	(1.9)	37.7	(7.1)	9.6	(0.8)
Traditional swine influenza (H1N1)	8.0	(1.1)	25.2	(1.9)	40.5	(6.8)	11.1	(1.0)
Rhinitis (Pasteurella, Bordetella)	37.5	(2.1)	25.0	(1.6)	13.9	(3.1)	35.2	(1.7)
Mycoplasma (pneumonia)	33.0	(1.9)	59.1	(2.0)	62.9	(5.2)	37.5	(1.6)
Other diseases	23.2	(1.8)	32.8	(2.0)	15.3	(3.3)	24.6	(1.5)
Any vaccine	74.8	(1.8)	81.9	(1.6)	86.3	(3.3)	76.0	(1.5)



3. Use of a veterinarian

Over 78 percent of sites were visited by a veterinarian for some purpose during the year prior to the Swine 2000 study. Larger sites commonly used an on-staff veterinarian, followed by a local practitioner. Smaller sites used a local practitioner or none at all. During the previous year, 7.6 percent of sites were visited by a state or federal Veterinary Medical Officer (VMO). VMOs visited a higher proportion of larger sites than smaller sites.

a. Percent of sites where a veterinarian visited for any purpose during the previous 12 months, by type of veterinarian and by size of site:

	Percent Sites							
	Size of Site (Total Inventory)							
	Small Less than 2,000		Medium 2,000-9,999		Large 10,000 or More		All Sites	
Type of Veterinarian	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
Local practitioner	69.2	(1.8)	57.5	(1.9)	37.3	(5.3)	66.9	(1.5)
Consulting practitioner	8.3	(1.0)	21.0	(1.6)	24.5	(4.4)	10.5	(0.9)
On-staff veterinarian	4.7	(0.8)	33.4	(1.8)	62.9	(5.9)	9.9	(0.8)
State or Federal veterinarian	6.5	(1.2)	12.0	(1.2)	20.7	(5.4)	7.6	(1.0)
Other	1.2	(0.4)	4.0	(1.0)	12.3	(7.0)	1.8	(0.4)
Any	75.4	(1.6)	90.7	(0.8)	97.9	(0.8)	78.1	(1.3)

Over one-third (34.5 percent) of sites had a local practitioner visit at least three times a year.

b. Percent of sites where a veterinarian visited for any purpose, by number of visits made during the previous 12 months and by type of veterinarian:

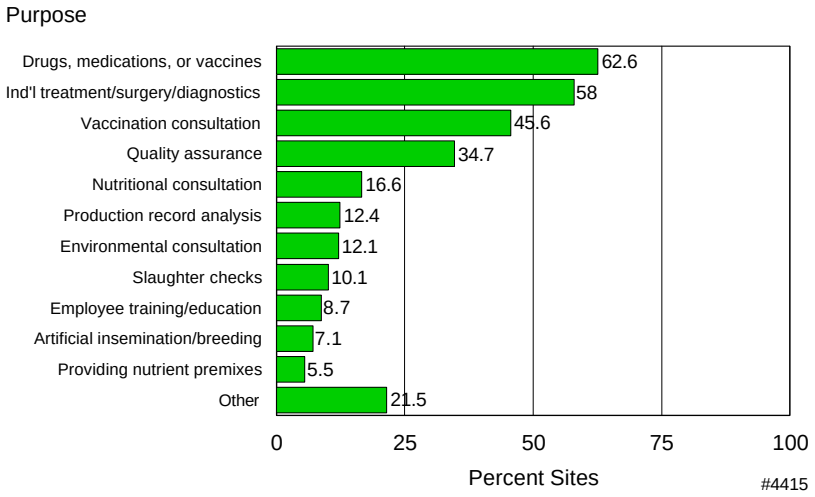
	Percent Sites												
	Number Visits												
	0		1		2		3-4		5-6		7 or More		Total
Type of Veterinarian	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error	Percent
Local practitioner	33.1	(1.5)	19.1	(1.6)	13.3	(1.2)	10.6	(1.1)	11.0	(1.3)	12.9	(1.1)	100.0
Consulting practitioner	89.5	(0.9)	3.6	(0.6)	2.3	(0.4)	2.2	(0.3)	0.7	(0.2)	1.7	(0.3)	100.0
On-staff veterinarian	90.0	(0.8)	4.3	(0.5)	1.5	(0.3)	1.7	(0.3)	0.6	(0.1)	1.9	(0.4)	100.0
State or Federal veterinarian	92.4	(1.0)	4.8	(0.9)	1.5	(0.4)	0.6	(0.2)	0.2	(0.1)	0.5	(0.1)	100.0
Other	98.2	(0.4)	0.4	(0.2)	0.1	(0.1)	0.5	(0.2)	0.1	(0.0)	0.7	(0.3)	100.0
Any veterinarians	21.9	(1.3)	19.5	(1.5)	15.7	(1.3)	12.4	(1.1)	11.1	(1.2)	19.4	(1.3)	100.0

The service most often furnished by veterinarians was traditional medical care, such as providing drugs, vaccines, diagnostic assistance, and treatment. Non-traditional veterinary services, such as production record analysis, quality assurance, and environmental consultation were also utilized. Blood testing was the most commonly reported "other service."

c. For sites that had at least one veterinary visit during the previous 12 months, percent of sites that used a veterinarian's services for the following purposes:

	Percent Sites							
	Size of Site (Total Inventory)							
	Small Less than 2,000		Medium 2,000-9,999		Large 10,000 or More		All Sites	
Purpose	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
Individual pig treatment or surgery, including diagnostic services	57.0	(2.5)	62.3	(2.0)	62.6	(5.2)	58.0	(2.1)
Nutritional consultation	14.9	(1.7)	22.6	(1.9)	28.8	(4.7)	16.6	(1.4)
Vaccination consultation	42.9	(2.4)	55.8	(2.1)	68.3	(4.8)	45.6	(2.0)
Environmental consultation	9.9	(1.4)	20.0	(1.9)	30.6	(5.5)	12.1	(1.2)
Providing drugs, medications, or vaccines	60.7	(2.5)	68.6	(2.2)	87.6	(2.5)	62.6	(2.0)
Providing nutrient premixes	5.0	(1.0)	7.3	(0.9)	7.4	(2.1)	5.5	(0.8)
Slaughter checks	6.6	(1.0)	23.3	(1.6)	34.3	(4.9)	10.1	(0.9)
Artificial insemination, breeding evaluations	5.4	(1.0)	12.8	(1.4)	22.5	(6.3)	7.1	(0.9)
Production record analysis	7.6	(1.2)	30.0	(1.9)	54.2	(5.6)	12.4	(1.1)
Employee training/education	5.0	(1.0)	21.0	(1.7)	51.4	(5.9)	8.7	(0.9)
Quality assurance	28.9	(2.2)	55.2	(2.2)	87.2	(2.8)	34.7	(1.8)
Other	23.1	(2.3)	15.5	(1.5)	6.4	(1.6)	21.5	(1.9)

Percent of Sites that Used a Veterinarian's Services for the Following Purposes



G. Biosecurity

1. Restrictions for entry

Biosecurity to prevent introduction of disease into a swine site is an effective management practice. About two-thirds of sites restricted entry to the premises to employees only. Smaller sites generally were more restrictive regarding entry by visitors than larger sites.

a. Percent of sites where entry to swine facilities was restricted to employees only, by size of site:

Percent Sites							
Size of Site (Total Inventory)							
Small Less than 2,000		Medium 2,000-9,999		Large 10,000 or More		All Sites	
Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
65.8	(2.0)	65.0	(1.7)	46.4	(6.1)	65.5	(1.7)

Although larger sites were more apt to allow non-employees on site, they were nevertheless more likely to require special sanitation procedures prior to entry. Overall, 52.1 percent of sites required clean boots and coveralls, and 23.6 percent required a 24-hour “no-swine-contact” period prior to entering the premises. Only 9.3 percent of sites required showers prior to entry.

b. For sites that did not restrict entry to employees only, percent of sites where visitors were required to take the following measures, by size of site:

	Percent Sites							
	Size of Site (Total Inventory)							
	Small Less than 2,000		Medium 2,000-9,999		Large 10,000 or More		All Sites	
Preventive Measure	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
Shower before entering site	4.1	(1.1)	30.0	(2.7)	57.7	(7.4)	9.3	(1.2)
Change to clean boots and coveralls	43.2	(3.5)	92.3	(1.2)	98.3	(1.3)	52.1	(3.0)
Wait 24 hours or longer after visiting another swine site	15.3	(2.0)	60.5	(2.8)	71.8	(6.8)	23.6	(1.9)

2. Trucking

Outside trucks entering the site can be a serious biosecurity risk. Overall, 56.8 percent of sites allowed trucks to enter the site perimeter. Smaller sites were more restrictive than larger sites.

a. Percent of sites that allowed trucks or trailers transporting livestock to enter the pig site, by size of site:

Percent Sites							
Size of Site (Total Inventory)							
Small Less than 2,000		Medium 2,000-9,999		Large 10,000 or More		All Sites	
Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
52.0	(2.2)	79.6	(1.5)	86.8	(2.5)	56.8	(1.8)

The biosecurity risk presented by trucks can be reduced by thoroughly cleaning and disinfecting the vehicles. Most sites cleaned trucks before they entered the pig site, particularly the inside of trailers. However, fewer sites disinfected trucks. For sites that allowed trucks on the premises, smaller sites were less likely than larger sites to clean or disinfect trucks.

b. For sites that allowed trucks or trailers transporting livestock into the pig site, percent of sites that required the following cleaning and disinfecting practices for livestock trucks or trailers before entry to the pig site, by size of site:

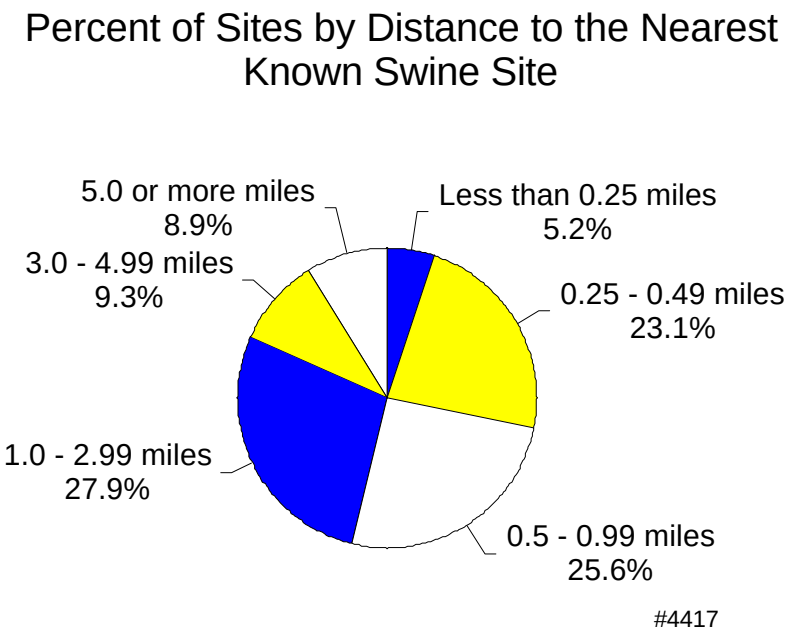
	Percent Sites							
	Size of Site (Total Inventory)							
	Small Less than 2,000		Medium 2,000-9,999		Large 10,000 or More		All Sites	
Required Practices	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
Animal area inside truck be cleaned	58.2	(3.0)	87.7	(1.3)	96.3	(1.5)	65.4	(2.4)
Animal area inside truck be disinfected	37.2	(2.8)	77.1	(1.7)	90.5	(2.9)	47.0	(2.3)
Outside of truck be cleaned	46.9	(3.0)	77.0	(1.8)	91.4	(2.3)	54.4	(2.3)
Outside of truck be disinfected	25.6	(2.5)	59.2	(2.2)	68.9	(7.0)	33.8	(2.0)

3. Proximity to other swine sites

Increased distance between swine sites reduces the risk of disease spread between locations. More than half (53.9 percent) of sites were within one mile of the nearest swine site. Only 18.2 percent were at least three miles from the nearest swine site.

a. Percent of sites by distance in miles to the nearest known swine site:

	Percent Sites									
	Region									
	Northern		West Central		East Central		Southern		All Sites	
Distance (in Miles)	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error
Less than 0.25	7.5	(2.0)	2.2	(0.9)	5.5	(1.2)	3.0	(0.6)	5.2	(0.8)
0.25 - 0.49	18.1	(3.4)	17.7	(2.9)	24.1	(2.3)	44.7	(2.7)	23.1	(1.5)
0.5 - 0.99	26.9	(3.2)	17.7	(2.7)	29.8	(2.5)	9.2	(1.4)	25.6	(1.6)
1.0 - 2.99	24.1	(2.9)	33.0	(3.1)	28.9	(2.4)	18.4	(2.2)	27.9	(1.5)
3.0 - 4.99	10.4	(2.1)	17.2	(2.5)	6.4	(1.2)	8.7	(2.0)	9.3	(0.9)
5.0 or more	13.0	(2.4)	12.2	(1.9)	5.3	(1.1)	16.0	(1.7)	8.9	(0.9)
Total	100.0		100.0		100.0		100.0		100.0	



4. Rodent control

Rodents are frequently associated with disease spread. Almost all farms regularly used some type of rodent control. Baits or poison were the most common methods (88.5 percent of sites). Although cats are also associated with disease spread, they were nevertheless used for rodent control at 68.0 percent of smaller sites.

a. Percent of sites that regularly used the following rodent control methods, by size of site:

	Percent Sites							
	Size of Site (Total Inventory)							
	Small (Less than 2,000)		Medium (2,000-9,999)		Large (10,000 or More)		All Sites	
Method	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
Cats	68.0	(1.9)	25.9	(1.7)	5.2	(1.6)	60.6	(1.7)
Dogs	38.3	(2.1)	13.5	(1.4)	0.0	(--)	33.9	(1.8)
Traps	19.3	(1.7)	20.9	(1.6)	20.9	(4.3)	19.6	(1.5)
Bait or poison	86.9	(1.5)	96.1	(0.7)	98.6	(0.8)	88.5	(1.2)
Professional exterminator	3.2	(0.6)	9.7	(1.1)	16.8	(4.0)	4.4	(0.5)
Cats and bait or poison	57.0	(2.1)	25.1	(1.7)	5.2	(1.6)	51.4	(1.8)
Other	2.8	(1.1)	1.6	(0.3)	1.9	(0.8)	2.6	(0.9)
None	1.0	(0.4)	0.7	(0.2)	0.9	(0.8)	1.0	(0.3)

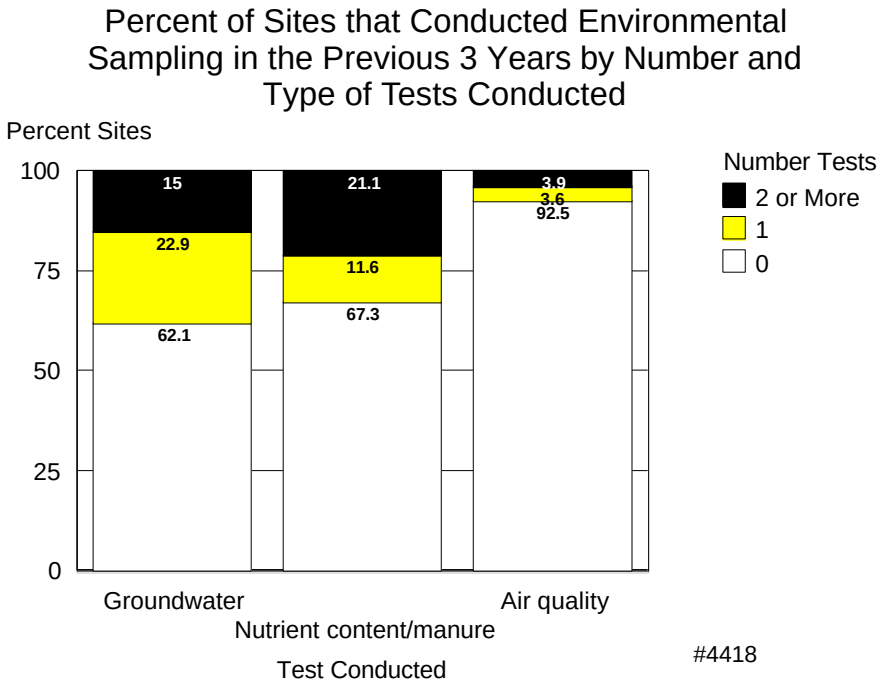
H. General Management

1. Environmental testing

Some sites conducted environmental monitoring during the previous 3 years to assess environmental quality, most often for ground water contaminants (37.9 percent of sites) and nutrient content of manure (32.7 percent). Just over 21 percent of sites tested for nutrient content of manure more than once in 3 years.

a. Percent of sites that conducted environmental sampling in the previous 3 years, by number and type of tests conducted:

	Percent Sites										
	Number of Tests Conducted										
	0		1		2		3		4 or More		Total
Test Conducted	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error	Percent	Stan. Error	Percent
Groundwater (for nitrates or bacteria)	62.1	(1.7)	22.9	(1.6)	5.6	(0.8)	7.8	(0.7)	1.6	(0.3)	100.0
Nutrient content of manure	67.3	(1.6)	11.6	(1.2)	4.6	(0.5)	10.1	(0.9)	6.4	(0.5)	100.0
Air quality (such as ammonia or hydrogen sulfide)	92.5	(0.8)	3.6	(0.6)	0.8	(0.2)	2.4	(0.5)	0.7	(0.2)	100.0



2. Carcass disposal

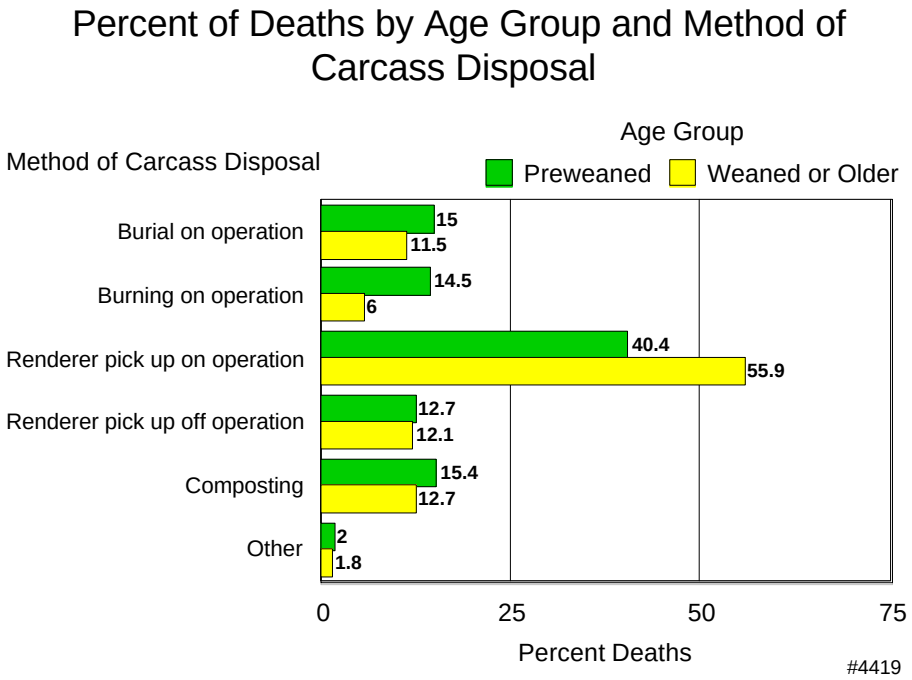
Death losses in preweaned or grower/finisher pigs can create a logistics problem as well as a disease risk for swine operations. Nearly one-fourth (23.2 percent) of sites composted dead preweaned pigs. Burial (37.8 percent) and rendering (45.5 percent) were the most common methods of carcass disposal for larger pigs (see Table I.H.2.b).

a. For sites that specified at least one preweaned piglet had died from December 1, 1999, through May 31, 2000, percent of sites (and percent of ***preweaned deaths*** on these sites) that used each method of carcass disposal:

	Percent			
	Measure			
	Sites with at Least One Preweaned Death		Preweaned Deaths	
Method of Carcass Disposal	Percent	Standard Error	Percent	Standard Error
Burial on operation	45.3	(2.6)	15.0	(2.3)
Burning on operation	15.4	(1.7)	14.5	(2.3)
Renderer pick up on operation	17.2	(2.0)	40.4	(5.6)
Renderer pick up outside of operation	4.8	(0.8)	12.7	(3.4)
Composting	23.2	(2.1)	15.4	(2.1)
Other	4.4	(1.1)	2.0	(0.6)
Total	--		100.0	

b. For sites that specified at least one weaned or older pig that died from December 1, 1999, through May 31, 2000, percent of sites (and percent of ***weaned or older pig deaths*** on these sites) that used each method of carcass disposal:

	Percent			
	Measure			
	Sites with at Least One Weaned Pig Death		Weaned Pig Deaths	
Method of Carcass Disposal	Percent	Standard Error	Percent	Standard Error
Burial on operation	37.8	(1.8)	11.5	(1.1)
Burning on operation	11.6	(1.2)	6.0	(0.8)
Renderer pick up on operation	34.4	(1.7)	55.9	(3.0)
Renderer pick up outside of operation	11.1	(1.1)	12.1	(1.8)
Composting	18.0	(1.3)	12.7	(1.2)
Other	2.5	(0.5)	1.8	(0.7)
Total	--		100.0	



3. Records

Several types of records can be maintained on swine sites. Most sites kept records measuring breeding productivity, feed intake, and drug usage. Approximately one-third of sites did not have breeding animals. Of those sites with breeding animals, 76.2 percent kept breeding records.

a. Percent of sites that kept records by topic:

	Percent Sites							
	Size of Site (Total Inventory)							
	Small Less than 250		Medium 250-499		Large 500 or more		All Sites	
Topic	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
Feed intake	50.0	(2.1)	76.0	(1.5)	73.7	(4.4)	54.4	(1.8)
Drug usage	63.6	(2.1)	89.3	(1.0)	98.6	(0.8)	68.1	(1.8)
Breeding[1]	72.2	(2.6)	96.3	(1.1)	96.8	(1.2)	76.2	(2.2)
Waste disposal	29.3	(1.8)	79.9	(1.5)	87.4	(4.0)	38.0	(1.6)
Feed equipment maintenance	18.7	(1.6)	33.5	(2.0)	46.5	(6.1)	21.4	(1.4)
Rodent control	11.5	(1.4)	26.7	(1.9)	49.0	(5.9)	14.3	(1.2)

[1] For sites with gestation or farrowing phases

4. Marketing

Pork producers utilized a variety of business arrangements to market their pigs. Few sites (2.3 percent) marketed their pigs via a cooperative. Most sites operated either independently (74.7 percent) or under contract (22.1 percent).

a. Percent of sites (and percent of total inventory on those sites) by business and marketing arrangement:

Business and Marketing Arrangement	Percent Sites	Standard Error	Percent Total Inventory	Standard Error
Contract producer - site is contractor or contractee	22.1	(1.2)	41.8	(1.9)
Independent producer - marketing on their own	74.7	(1.3)	52.3	(2.2)
Independent producer - marketing through a cooperative	2.3	(0.3)	3.4	(0.9)
Other	0.9	(0.3)	2.5	(1.0)
Total	100.0		100.0	

b. Percent of sites that sold or moved at least one pig off-site between December 1, 1999, through May 31, 2000:

Percent Sites	Standard Error
97.3	(0.6)

Pigs were sold or moved off-site at different ages or stages of production for several purposes.

i. For sites that sold or moved at least one pig off-site, percent of sites (and percent of pigs sold or moved off-site from December 1, 1999, through May 31, 2000) by type of pigs sold or moved:

Type	Percent Sites	Standard Error	Percent Pigs Sold or Moved	Standard Error
Slaughter market pigs	86.2	(1.0)	57.1	(2.3)
Feeder pigs	18.1	(1.1)	37.5	(2.4)
Replacement stock	4.0	(0.5)	1.1	(0.2)
Culled breeding stock	34.3	(1.6)	1.0	(0.1)
Other	5.2	(0.7)	3.3	(0.5)
Total	--		100.0	

Section II: Methodology

A. Needs Assessment

Objectives were developed for the Swine 2000 study from input obtained over a period of several months, via a number of focus groups and individual contacts. Participants included representatives of producer and veterinary organizations, academia, state and federal government and private business. Topics identified for the Swine 2000 study were:

1) Research respiratory diseases such as porcine reproduction and respiratory syndrome (PRRS), Mycoplasma, and swine influenza virus (SIV).

2) Add to a national swine serum bank established through NAHMS' 1990 National Swine Survey and Swine '95 study to ensure this resource is available for future research on domestic swine diseases and emerging pathogens.

3) Collect on-farm information about food-borne pathogens, such as Salmonella, Toxoplasma, and Yersinia.

4) Describe the adoption level of good production practices and provide information on the decision-making process related to antibiotics.

5) Assess industry progress on environmental practices and target future efforts for developing guidelines and educational programs for producers.

B. Sampling and Estimation

1. State selection

Initial selection of states to be included in the study was done in February 1999, using the National Agricultural Statistics Service (NASS) December 1, 1998, Hog and Pig Report. A goal for NAHMS' national studies is to include states that account for at least 70 percent of the animal and producer population in the U.S. The NASS hog and pig estimation program collects data quarterly from producers in 17 states and annually in all states. The 17 states accounted for 92.6 percent of the December 1, 1998, swine inventory in the U.S. and 73.7 percent of operations with swine in the U.S.

A workload memo identifying the 17 states in relation to all states in terms of size (inventory and operations) was provided to the USDA:APHIS:VS Regional Directors. Each Regional Director sought input from their respective states about being included or excluded from the study. By midyear 1999, 17 states were chosen: Arkansas, Colorado, Iowa, Illinois, Indiana, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Carolina, Ohio, Oklahoma, Pennsylvania, South Dakota, Texas, and Wisconsin. These states coincided with the states in the NASS quarterly reporting program, which now included the western states of Colorado, Oklahoma, and Texas, and excluded the southeastern states of Georgia, Tennessee, and Kentucky. The western states were undergoing rapid growth, whereas in many of the southeastern states populations of pigs and producers were declining. As of December 1, 2000, the 17 states accounted for 93.6 percent (56,035,000 head) of pigs in the U.S. and 76.4 percent (65,500) of the operations in the U.S. (See Appendix II for respective data on individual states.)

2. Operation Selection

An evaluation of the total inventory and number of operations showed that the 1-99 size group (in 15 of the 17 states where estimates were available) contained 41.0 percent of the operations but only 1.5 percent of the inventory. Therefore, operations

with fewer than 100 pigs were declared ineligible for the study so that the number of participants could be concentrated in the larger size groups.

Due to the rapid decline in number of producers in the U.S., and therefore the likelihood that many randomly selected producers would be out of the swine business, a large screening sample was selected. NASS chose a stratified random sample, with stratification based on state and herd size, of 13,000 operations from a list of individual and corporate producers as well as contractors. Contractor-only arrangements (contractors who did not own any pigs) were not eligible for selection. Operations identified via the screening process that had 100 or more pigs were eligible to be contacted for an on-site interview. A randomly selected sample of these eligible operations was chosen for participation in the on-site interview. At the first interview, if operations had multiple production sites under different day-to-day management, a maximum of three sites were randomly selected (1 with breeding animals and 2 with weaned pigs).

3. Population Inferences

Inferences cover the population of swine operations with 100 or more total pigs in the 17 states, since these operations were the only ones eligible for sample selection. These states accounted for 92.3 percent of operations with 100 or more pigs in the U.S. and 93.6 percent of the U.S. pig inventory as of December 1, 2000. *All respondent data were statistically weighted to reflect the population from which it was selected.* The inverse of probability of selection for each operation was the initial selection weight. This selection weight was adjusted for non-response within each state and size group to allow for inferences back to the original population from which the sample was selected.

C. Data Collection

1. General Swine Farm Report - Screening, April - May 2000

NASS' telephone interviewers administered the screening questions, which took approximately 10 minutes. Participation in this interview is summarized in Table 2 in the Response Rate section.

2. General Swine Farm Report, June 1 - July 14, 2000

NASS' enumerators administered the General Swine Farm Report in person to each selected producer. The interview took approximately 1 hour. NASS' enumerators asked permission for Veterinary Medical Officers (VMOs) to contact the producer and discuss additional phases of data collection (results to be reported in subsequent reports).

D. Data Analysis

1. Validation and estimation

Initial data entry and validation for both the General Swine Farm Report screening form and General Swine Farm Report (results reported in Swine 2000 Part I) were performed in individual NASS state offices. Data were entered into a SAS data set. NAHMS national staff performed additional data validation on the entire data set after data from all states were combined.

2. Response rates

a. General Swine Farm Report - Screening questionnaire.

A total of 11,138 operations (85.8 percent) completed the screening survey. Of these, 7,156 operations had 100 or more total pigs and, thus, were eligible for the next phase of data collection. The next survey, the General Swine Farm Report (GSFR) was completed approximately 2 months later via personal interview.

Response Category	Number Operations	Percent Operations
Eligible	7,156	55.1
Not eligible	3,189	24.6
Out of business	537	4.1
Out of scope (prison farms, research farms, etc.)	256	2.0
Refusal	1,040	8.0
Inaccessible	810	6.2
Total	12,988	100.0

Given an expected response rate of 60 percent, the 7,156 eligible operations would result in more than the 2,500 planned respondents. Therefore, 2,407 names were dropped (via random selection) from the respondent list in each state. The final number of operations eligible for the GSFR was 4,749.

Most operations were independent, single-site enterprises, or contract nursery or finisher sites. For larger operations with multiple production sites, up to three production sites were randomly selected to complete the GSFR (one site with sows and two without sows).

b. General Swine Farm Report

Response Category	Number Operations	Percent Operations	Number Sites	Percent Sites
Survey complete and VMO consent	1,208	25.4	1,316	26.7
Survey complete, refused VMO consent	1,120	23.6	1,183	24.0
No pigs on June 1, 2000	181	3.8	181	3.7
Out of business	67	1.4	67	1.4
Out of scope (prison and research farms, etc.)	29	0.6	29	0.6
Refusal	1,736	36.6	1,736	35.3
Inaccessible	408	8.6	408	8.3
Total	4,749	100.0	4,920	100.0

Appendix I: Sample Profile

A. Responding Sites

1a. Total inventory

Size of Site (Total Inventory)	Number Responding Sites
Less than 2,000	1,378
2,000 - 9,999	1,019
10,000 or more	102
Total	2,499

1b. Sow Inventory

Size of Site (Total Sows and Gilts on Operation)	Number Responding Sites
Less than 250	1948
250 - 499	227
500 or more	324
Total	2499

2. Type of site

Type of Site	Number Responding Sites
Contract producer	994
Independent-market own pigs	1,381
Independent - market through cooperative	94
Other	30
Total	2,499

3. Number of responding sites by region:

Region	Number Responding Sites
Northern	507
West Central	544
East Central	901
Southern	547
Total	2499

4. Number of responding sites with the following production phases:

Production Phase	Number Responding Sites
Farrow to finish	786
Feeder pig producer	124
Weaned pig producer	176
Nursery site	202
Finisher site	914
Nursery and finisher site	187
Other phase	110
Total	2,499

Appendix II: U.S. Population & Operations

Number of Pigs on December 1, 2000, and Number of Operations in 1999[1]

Region	State	Number Pigs (Thousand Head)		Number Operations in 1999	
		All Operations	Operations with 100 or More Head	All Operations	Operations with 100 or More Head
East Central	Illinois	4,200	4,158	5,100	3,300
	Indiana	3,400	3,366	4,400	2,700
	Iowa	15,400	15,369	12,300	10,400
	Ohio	1,510	1,435	5,200	2,200
	Total	24,510	24,328	27,000	18,600
Northern	Michigan	950	936	2,200	800
	Minnesota	5,800	5,742	7,300	5,300
	Pennsylvania	1,040	1,009	3,000	900
	Wisconsin	620	577	2,700	800
	Total	8,410	8,264	15,200	7,800
West Central	Colorado	840	836	500	90
	Kansas	1,570	1,554	1,600	720
	Missouri	2,900	2,871	3,600	1,800
	Nebraska	3,100	3,053	4,000	2,600
	South Dakota	1,360	1,333	1,900	1,100
	Total	9,770	9,647	11,600	6,310
Southern	Arkansas	685	671	1,100	440
	North Carolina	9,400	9,372	3,600	1,700
	Oklahoma	2,340	2,305	2,700	300
	Texas	920	874	4,300	110
	Total	13,345	13,222	11,700	2,550
Total (17 states)		56,035 (93.6% of U.S.)	55,461 (93.6% of U.S.)	65,500 (76.4% of U.S.)	35,260 (92.3% of U.S.)
Total U.S. (50 states)		59,848	59,250	85,760	38,200

1 Source: NASS Hogs and Pigs, December 28, 2000. An operation was any place having one or more head of pigs on hand at any time during the year.

Swine 2000 Study Objectives and Related Outputs

1) Research respiratory diseases such as porcine reproduction and respiratory syndrome (PRRS), *Mycoplasma*, and swine influenza virus (SIV).

- Info sheets and interpretive reports, expected Fall 2001- 2002

2) Add to a swine serum bank established through NAHMS 1990 National Swine Survey and Swine '95 study to ensure this resource is available for future national research on domestic swine diseases and emerging pathogens.

- Collected sera banked July, 2001

3) Collect on-farm information about food-borne pathogens, such as Salmonella, Toxoplasma, and Yersinia.

- **Part I: Reference of Swine Health and Management in the United States, 2000, August 2001**

- Part II: Reference of Swine Health and Health Management in the United States, 2000, expected Winter 2001

- Info sheets and interpretive reports, expected 2001-2002

4) Describe the adoption level of good production practices and provide information on the decision-making process related to antibiotics.

- Part II: Reference of Swine Health and Health Management in the United States, 2000, expected Winter 2001

- Changes in the U.S. Pork Industry, 1990-2000, expected Spring 2002

- Info sheets, expected Fall 2001

5) Assess industry progress on environmental issues and target future efforts for developing guidelines and educational programs for producers.

- **Part I: Reference of Swine Health and Management in the United States, 2000, August 2001**
- Part II: Reference of Swine Health and Health Management in the United States, 2000, expected Winter 2001
- Part III expected Winter 2002
- Changes in the U.S. Pork Industry, 1990-2000, expected Spring 2002
- Info sheets, expected Winter 2002

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