United States
Department
of Agriculture

Animal and
Plant Health
Inspection
Service

**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.

Thanks to the National Agricultural Statistics Service (NASS) enumerators, State and Federal Veterinary Medical Officers (VMOs), and Animal Health Technicians (AHTs)Call of whom visited the operations and collected the dataCfor their hard work and dedication to the National Animal Health Monitoring System (NAHMS). The roles of the producer, Area Veterinarian in Charge (AVIC), NAHMS Coordinator, VMO, AHT and NASS enumerators were critical in providing quality data for Swine 2000 reports. Special recognition goes to Dr. LeRoy Biehl, University of Illinois, for his contribution to the design and implementation of the Swine 2000 study, and analysis and interpretation of these data. Thanks also to the personnel at the Centers for Epidemiology and Animal Health (CEAH) for their efforts in generating and distributing valuable reports from Swine 2000 data.

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- University of Wisconsin - Madison, School of Veterinary Medicine
- Iowa State University
- The Ohio State University
- Pfizer
- Schering-Plough
- University of Tennessee
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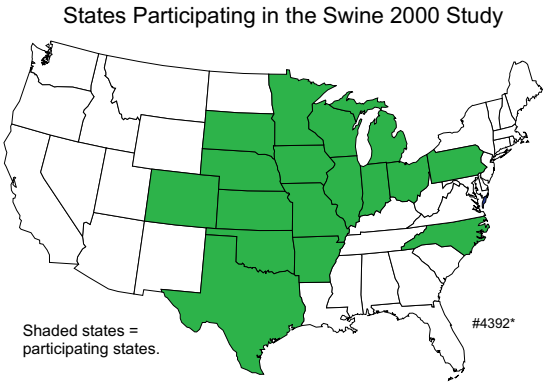
# Introduction

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.

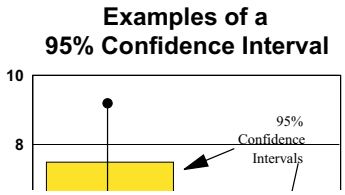
## Terms Used in This Report

**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. 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:

Percent Sows

| Mating Combinations | | 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:

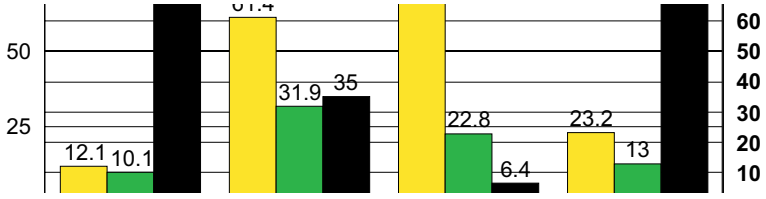
| | Percent Gilts | | | |
|---|---|---|---|---|
| | 1st Mating | | 2nd Mating | |
| Mating Technique | Percent | Standard Error | Percent | Standard Error |
| Artificial insemination | 64.5 | (3.7) | 65.7 | (3.7) |
| Individually hand-mated naturally | 11.5 | (1.8) | 7.3 | (1.3) |
| Pen-mated with multiple 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 | |

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) |




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 percentCdepending on herd sizeCduring 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) |

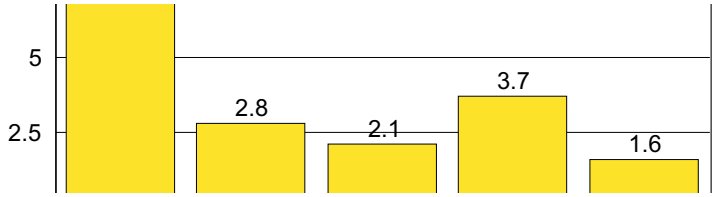
Reasons for culling due to performance included small litter size, high pre-weaning mortality, and low birth rate. Animals were culled from the breeding herd for several reasons, but the primary reason was age (41.9 percent). Large percentages of culled sows and gilts were culled because of reproductive 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 | |

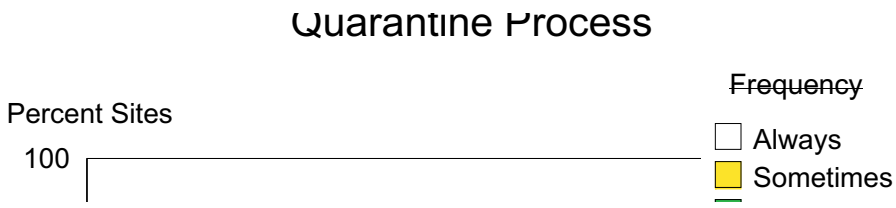


## 4. Introduction of gilts and breeding males

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) |

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

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:

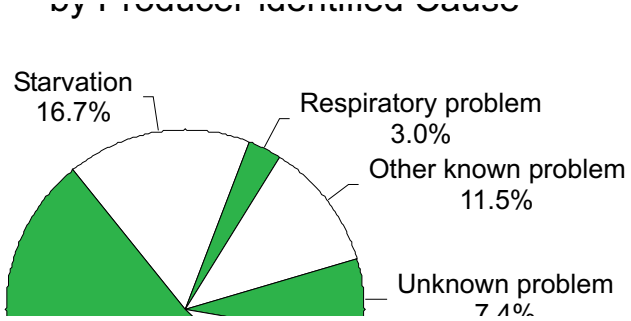
Average Per Litter Productivity

| | 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

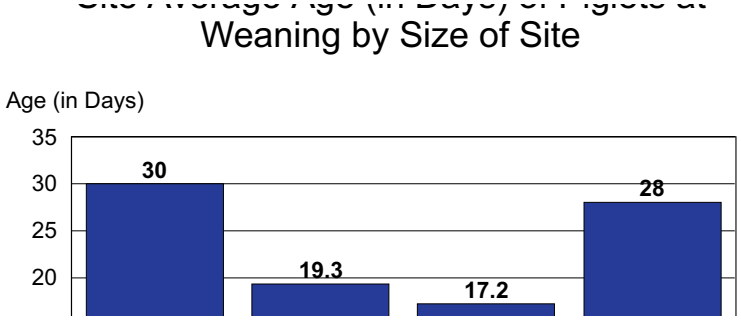
The pig average weaning age and site average weaning age differed, 19.3 days and 28.0 days respectively. Larger sites, which weaned earlier (17.2 days) accounted for the majority of pigs, whereas smaller sites, which weaned later (30 days), accounted for the majority of sites. Generally, larger sites 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) |



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 | |

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 | |

# C. Nursery Productivity

## 1. Production phase

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

Percent Sites

| Region | | | | | | | | All Sites | |
|---|---|---|---|---|---|---|---|---|---|
| Northern | | West Central | | East Central | | Southern | | | |
| 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

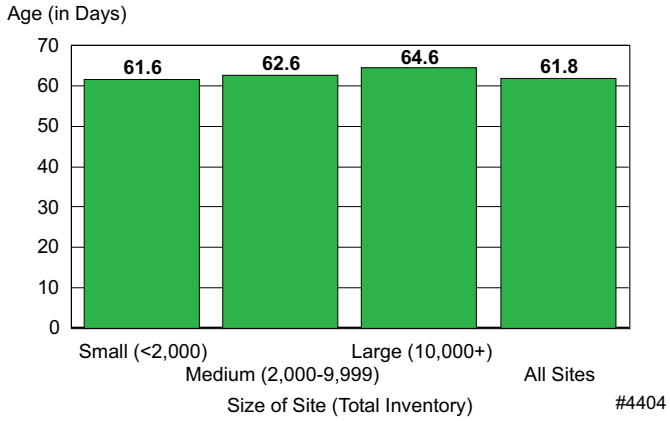
The age of pigs leaving the nursery varied depending on type of nursery, climate, other facilities available, and the management plan of the site. Although weaning age decreased as size of site increased (see table I.B.2.b), the age of pigs leaving the nursery was similar across size groups.

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) |




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) |

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.

Percent of Grower/finisher Pigs that Died in the Grower/finisher Phase (December 1999 through May 2000) by Size of Site

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.

# D. Grower/finisher Productivity

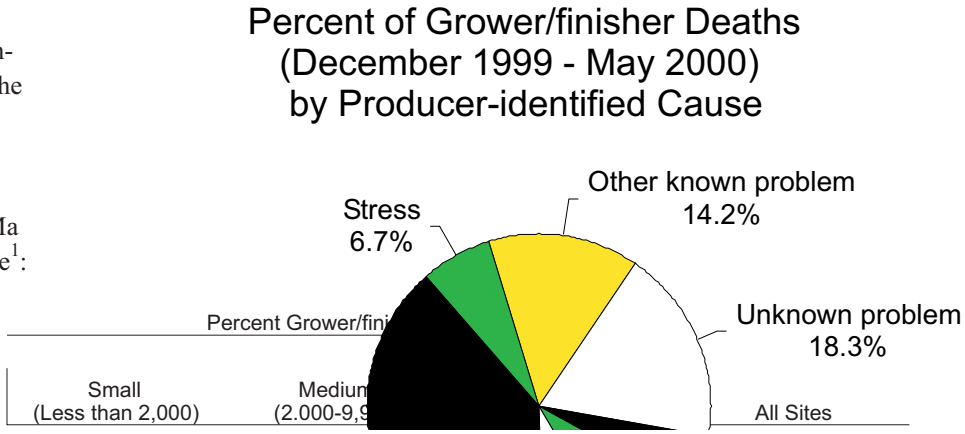
## 1. Production phase

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

of grower/fin- that died in the isher phase cember 1, through Ma by size of site[1]:




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.4 | (0.1) | 3.0 | (0.1) | 3.7 | (0.2) | 2.9 | (0.1) |

a. Percent isher pigs grower/fin- from De- 1999,

y 31, 2000,

| Size of | | |
|---|---|---|
| Percent | Standard Error | Per |

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

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.

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

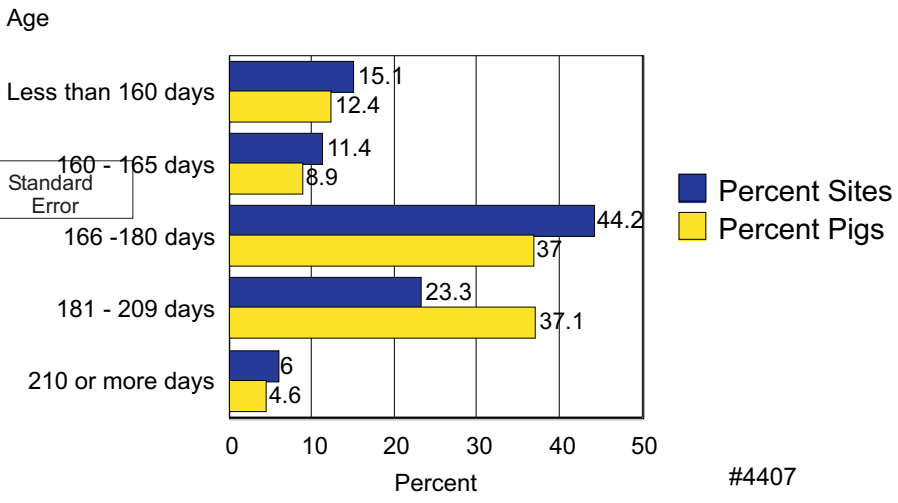
| Producer-identified Cause | Percent | Standard Error |
|---|---|---|
| Scours | 5.3 | (2.0) |
| Lameness | 8.4 | (0.8) |
| Injury or trauma | 8.0 | (0.5) |
| Respiratory problem | 39.1 | (2.0) |
| Stress | 6.7 | (0.6) |
| Other known problem | 14.2 | (1.5) |
| Unknown problem | 18.3 | (1.4) |
| Total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

### 3. Days to market

a. Pig age (in all pigs the inisher

average days) of leaving grower/f unit:

| Pig Average Age (in Days) | Standard Error |
|---|---|
| 177.6 | (1. |




b. Site age (in pigs the inisher size of

average days) of leaving grower/f unit, by 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 | |

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.

## E. Facility Management - All Phases

### 1. Production Phases

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.

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.

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

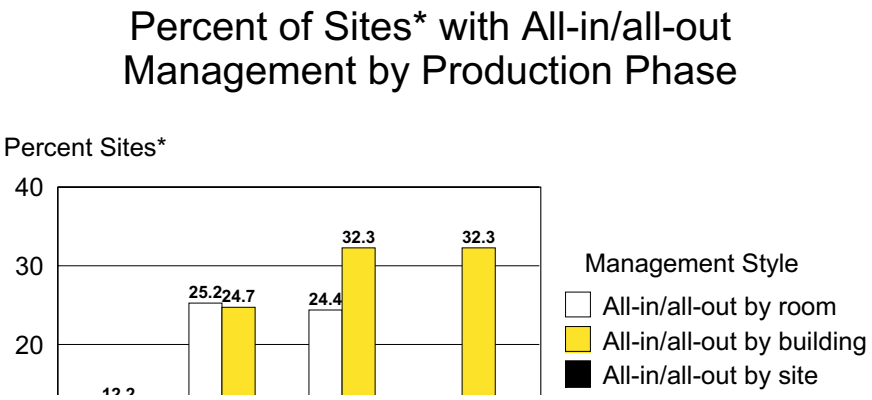
Percent Sites

| | 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

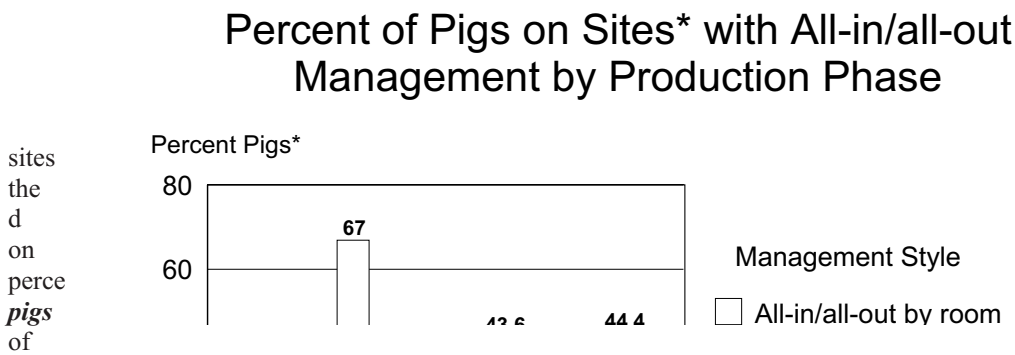
| | Region | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Northern | | West Central | | East Central | | Southern | | All Sites | |
| Production Phase | Percent | Stan. Error | Percent | Stan. Error | Percent | Stan. Error | Percent | Stan. Error | Percent | Stan. Error |
| All 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

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 | |




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

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

| | 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.

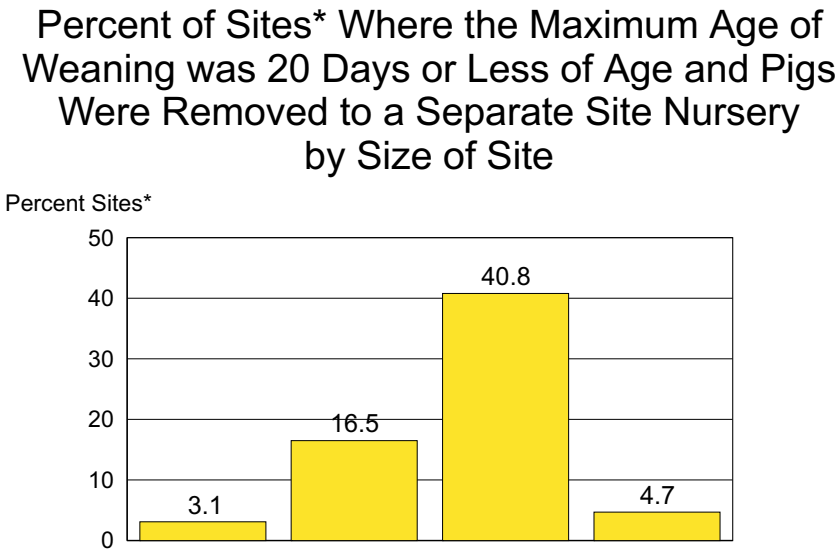
Segregated early weaning (SEW) is a disease control management strategy that includes moving early-weaned pigs (20 days or less) to a separate site. Larger sites were more likely to practice SEW than smaller sites.

## 3. Pig flow

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.

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.

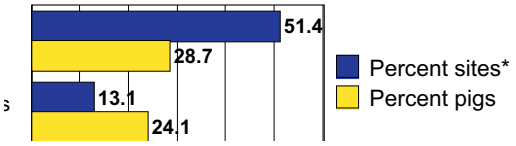
a. For sites that had the specified production phase, percent of ***sites*** that managed pig flow by management style and production phase:



Percent Sites

| Management Style | Production Phase: Gestation Percent | Gestation Standard Error | Farrowing Percent | Farrowing Standard Error | Nursery Percent | Nursery Standard Error | Grower/finisher Percent | Grower/finisher 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 | |

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



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. 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

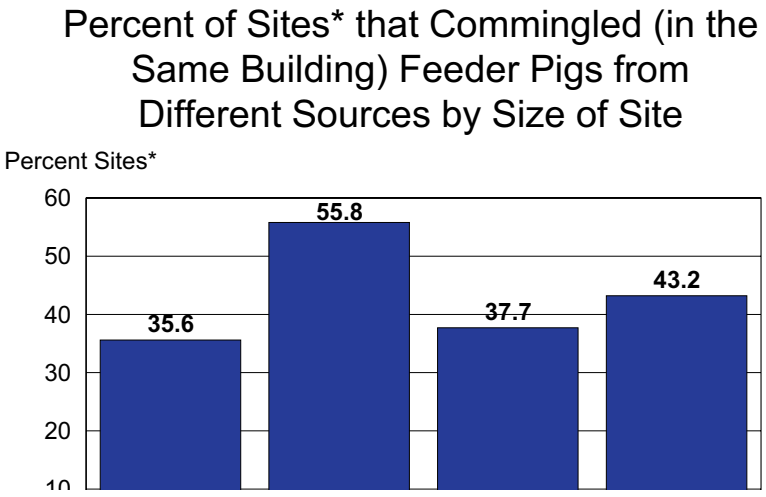
| | Production Phase | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Gestation[1] | | Farrowing[1] | | Nursery[2] | | Grower/finisher[3] | |
| Management Style | Percent | Standard Error | Percent | Standard Error | Percent | Standard Error | Percent | Standard Error |
| Continuous flow | 81.0 | (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 | |

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.

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.

c. Multiple site production

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

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.

| | 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) |

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*** 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) |
|---|

| Measure | 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 |
| 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) |

## 4. Sources of pigs entering the grower/finisher phase

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.

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 | |

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 | |

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:

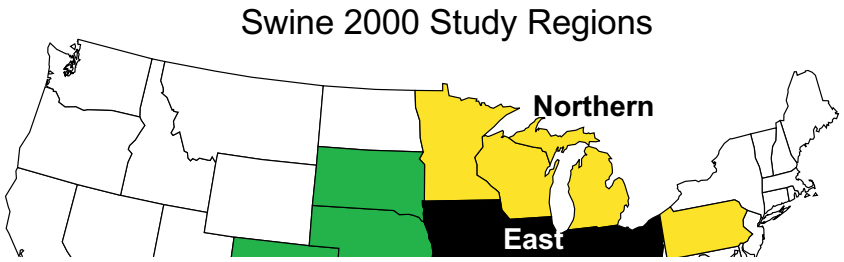
Percent Sites

| 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

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

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.

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 | | | | | | | | All Sites | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Northern | | West Central | | East Central | | Southern | | | |
| 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) |

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

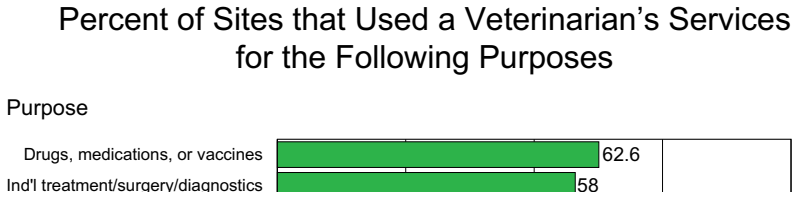
| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Other | 0.4 | (0.3) | 6.6 | (2.6) | 3.7 | (1.3) | 1.7 | (0.5) | 3.6 | (0.9) |
| None | 1.5 | (0.8) | 11.6 | (2.8) | 2.9 | (1.5) | 18.4 | (5.9) | 5.4 | (1.1) |
| Total | 100.0 | | 100.0 | | 100.0 | | 100.0 | | 100.0 | |

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 | |



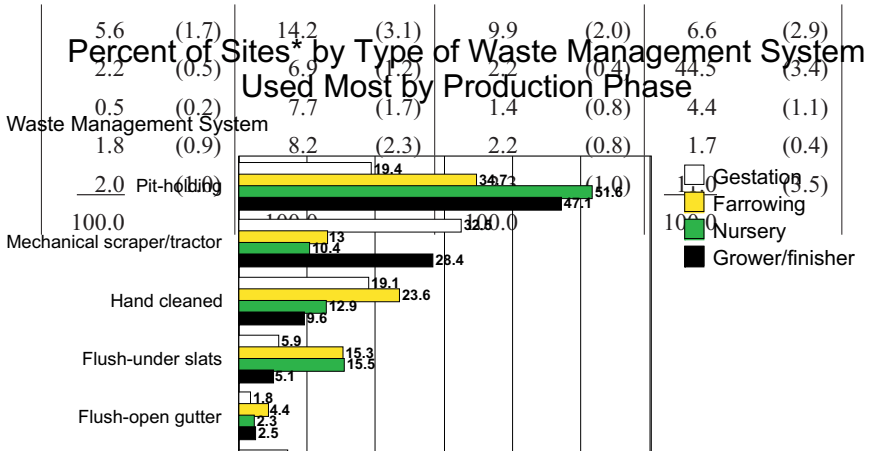
Biosecurity to prevent introduction of disease into a swine site is an effective management practice. About two-thirds of sites restricted entry to the premises to employees only. Smaller sites generally were more restrictive regarding entry by visitors than larger sites.

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) | 11.0 | (2.5) | 2.2 | (1.0) | 11.0 | (3.5) | 4.2 | (0.8) |
| Total | 100.0 | | 100.0 | | 100.0 | | 100.0 | | 100.0 | |

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.



# 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:

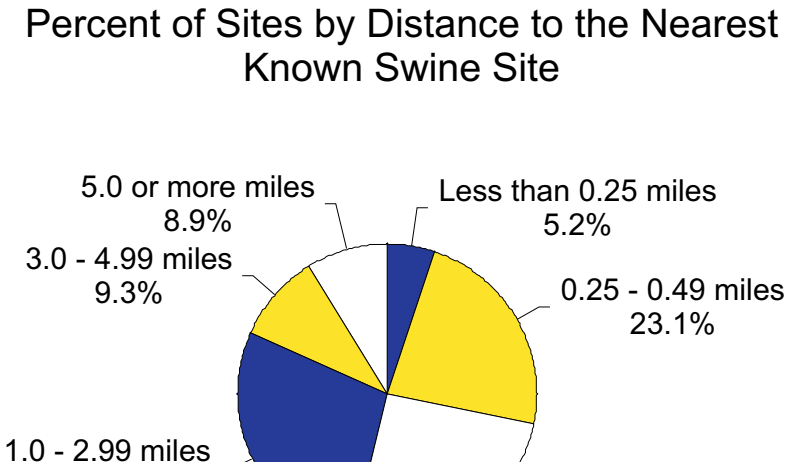
| | Percent Sites | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Pig Type | | | | | | | |
| | Piglets Before or at Weaning | | Pigs from Weaning to Market | | Sows/Gilts | | Boars | |
| Practice | Percent | Standard Error | Percent | Standard Error | Percent | Standard Error | Percent | Standard 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



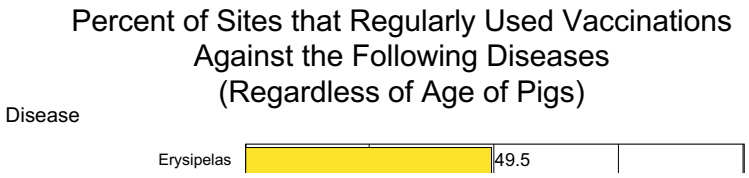
## 2. Vaccination

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) |

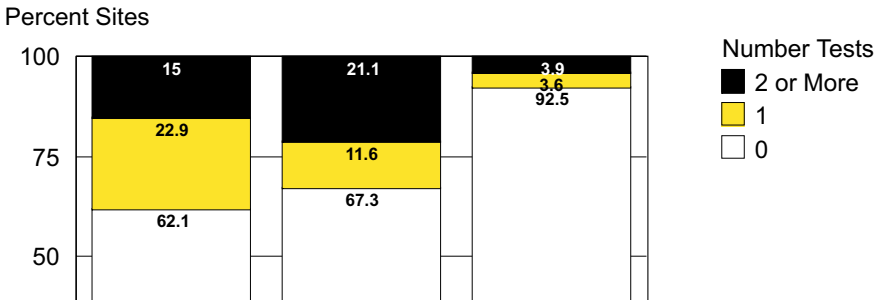


### 3. Use of a veterinarian

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) |

Percent Sites that Conducted Environmental Sampling in the Previous 3 Years by Number and Type of Tests Conducted




Percent where a rian for any by of visits during

s 12 and by veterinari

b. of sites veterina visited purpose, number made the previou months type of an:

Percent Sites

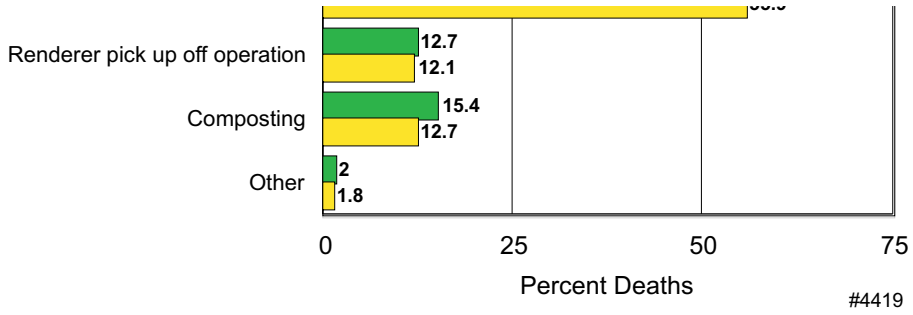
| Type of Veterinarian | Number Visits: 0 Percent | 0 Stan. Error | 1 Percent | 1 Stan. Error | 2 Percent | 2 Stan. Error | 3-4 Percent | 3-4 Stan. Error | 5-6 Percent | 5-6 Stan. Error | 7 or More Percent | 7 or More Stan. Error | Total Percent |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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

| Purpose | Size of Site (Total Inventory): Small Less than 2,000 Percent | Small Standard Error | Medium 2,000-9,999 Percent | Medium Standard Error | Large 10,000 or More Percent | Large Standard Error | All Sites Percent | All Sites 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) |




## G. Biosecurity

### 1. Restrictions for entry

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 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) |

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

| Preventive Measure | Size of Site (Total Inventory) Small Less than 2,000 Percent | Standard Error | Medium 2,000-9,999 Percent | Standard Error | Large 10,000 or More Percent | Standard Error | All Sites 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

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:

| | | Percent Pigs Sold or | Standard Error |
|---|---|---|---|
| Slaughter | | | (2.3) |
| Feeder pi | | | (2.4) |
| Replacem | | | (0.2) |
| Culled br | | | (0.1) |
| Other | | | (0.5) |
| Total | | | |

# 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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#N338.0801

INFO SHEET
Veterinary Services
APHIS
United States Department of Agriculture
Animal and Plant Health Inspection Service
March 2002

# Preventive Practices in Swine: Administration of Iron and Antibiotics

Almost all swine operations have some type of disease prevention program, which often includes administration of iron to baby pigs and/or the administration of antibiotics to swine during various stages of the production cycle.

The USDA's National Animal Health Monitoring System (NAHMS) collected data on swine health and management practices from a random sample of swine production sites in 17 states[1] as part of the Swine 2000 study. These sites represented 94 percent of the U.S. pig inventory and 92 percent of U.S. pork producers with 100 or more pigs. Overall, 2,499 swine production sites participated in the study's first interview from June 1, 2000, through July 14, 2000. A second interview was completed by 895 of these sites between August 21, 2000, and November 3, 2000. For estimates in this report, small, medium, and large sites refer to sites with less than 2,000, 2,000 to 9,999, and 10,000 or more pigs in total inventory, respectively, unless otherwise specified. Animal-level estimates reported here are based on a June 1, 2000, inventory.

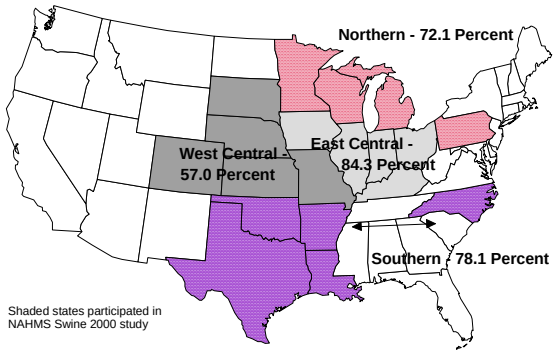
## Iron

Swine 2000 results indicated that the administration of iron (to prevent anemia) was the most common preventive measure used for piglets. For swine raised in confinement facilities, the standard practice is to inject pigs with 100 to 200 mg of iron dextran within 3 days after birth. The study indicated that iron was given either orally or by injection on 75.4 percent of sites, which accounted for 90.6 percent of all piglets. For sites with indoor farrowing facilities, 83.7 percent administered iron to pigs, compared to only 36.7 percent of sites with pasture farrowing. On sites that used a pasture for farrowing young pigs may have obtained their required iron from the soil. The percentage of sites that administered iron to piglets was lower in the west central region than in other regions of the U.S. (Figure 1).

The percentage of sites that administered iron to piglets was lower for sites with less than 250 breeding females (72.2 percent) than on sites with 250 to 499 (91.1 percent) or 500 or more breeding females (94.0 percent). Both the percentage of sites that administered iron to piglets and the percentage of piglets that received iron were similar to that found in the NAHMS Swine '95 study.

Figure 1.

**Percent Sites Administering Iron to Piglets, by Region**




## Antibiotics

Antibiotics are frequently given to swine in one or more stages of production for disease prevention and growth promotion. Most sites (92.0 percent) indicated that some swine were given antibiotics during the 6-month period of December 1, 1999, through May 31, 2000. Overall, more sites used feed rather than drinking water or injection as the method of antibiotic delivery.

Antibiotics were given to **grower/finisher pigs** in feed on 88.5 percent of sites. These sites accounted for 95.9 percent of all grower/finisher pigs. Sites in the southern region were more likely to administer antibiotics to pigs **from weaning through market age** in water, orally, or by injection than were sites in other regions. More large sites (10,000 or more pigs) gave antibiotics in feed, by injection, or in water to weaning through market age pigs than did sites with less than 10,000 pigs (Table 1).

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

**Table 1.**

**Percent Sites that Gave Antibiotics to Weaned Pigs as a Preventive Practice from December 1, 1999, Through May 31, 2000, by Route of Administration and Size of Site**

Percent Sites

| | Size of Site (Total Inventory) | | | |
|---|---|---|---|---|
| Route | Small (Less than 2,000) | Medium (2,000-9,999) | Large (10,000 or more) | All Sites |
| Feed | 78.4 | 87.6 | 94.1 | 80.1 |
| Injection | 38.7 | 69.8 | 82.9 | 44.3 |
| Water | 18.8 | 62.5 | 81.3 | 26.6 |
| Orally | 5.9 | 10.2 | 7.1 | 6.6 |

Participants were asked specifically about antibiotic use for growth promotion in nursery pigs. Responses indicated that 82.7 percent of sites with nursery pigs fed antibiotics for growth promotion, with chlortetracycline the most common antibiotic given on 30.1 percent of sites. The next most common antibiotics given in feed to nursery pigs for growth promotion were tylosin (23.2 percent of sites), carbadox (22.8 percent of sites), tiamulin (14.6 percent of sites), and a chlortetracylcine/sulfamethiazole/penicillin combination (11.5 percent sites).

Participants were asked what was the primary reason for giving antibiotics to **grower/finisher pigs** by various routes. Responses indicated that the most common reason for giving antibiotics to grower/finisher pigs in feed was growth promotion, followed by disease prevention. The most common reason for giving antibiotics to grower/finisher pigs in water or by injection was to treat respiratory disease (Table 2).

**Table 2.**

**Percent Sites That Gave Antibiotics or other Feed Additives to Grower/Finisher Pigs, by Primary Reason and Route of Administration**

Percent Sites

| | Route of Administration | | | |
|---|---|---|---|---|
| Primary Reason | Feed | Water | Injection | Any Route |
| Growth promotion | 63.7 | 0.0 | 0.0 | 63.7 |
| Treat respiratory disease | 27.4 | 25.2 | 57.2 | 61.9 |
| Disease prevention | 37.9 | 4.0 | 6.4 | 42.8 |
| Treat enteric disease | 15.2 | 7.5 | 15.4 | 27.5 |
| Treat other disease | 0.2 | 1.0 | 14.1 | 14.7 |
| Any reason | 88.5 | 31.2 | 64.5 | 92.6 |

The most common antibiotics given to **grower/finisher pigs** in feed, water, and by injection (for any reason) were tylosin, oxytetracycline, and procaine penicillin G, respectively (Table 3).

**Table 3.**

**The Five Most Common Antibiotics Given to Grower/Finisher Pigs In Feed, by Injection, and in Water**

| Feed | | Injection | | Water | |
|---|---|---|---|---|---|
| Antibiotic | Percent Sites | Antibiotic | Percent Sites | Antibiotic | Percent Sites |
| Tylosin | 56.3 | Procaine Penicillin G | 40.0 | Oxy-tetracycline | 8.8 |
| Chlor-tetracycline | 48.0 | Tylosin | 30.7 | Chlor-tetracycline | 6.7 |
| Bacitracin | 35.0 | Ceftiofur | 18.2 | Sulfadime-thoxine | 5.6 |
| Lincomycin | 8.6 | Oxy-tetracylcine | 18.1 | Neomycin | 4.3 |
| Carbadox | 6.3 | Penicillin | 15.5 | Tylosin | 4.1 |

Maintaining good antibiotic-use records is important to help prevent drug residues and to produce quality pork. More large and medium sites maintained antibiotic treatment records than small sites. Seventy-eight percent of large sites recorded drug name and date of treatment for antibiotics given to **grower/finisher pigs**, compared to just over 40 percent of small sites.

About 15 percent of respondents reported that veterinarians were the primary decision-makers regarding which antibiotics to use in weaned market pigs. However, veterinarians were the primary decision-makers on a greater percentage of large herds (over two-thirds of sites with a total inventory of 10,000 or more)[1]. For sites with less than 2,000 swine, operation owners were the primary decision-makers when choosing which antibiotics were used for growth promotion or to treat sick weaned market pigs.

[1] See Swine 2000 Part II for more specific estimates regarding nonowner decision-makers.

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**[1]Begining May 20, 2002, our new address and phone number will be: 2150 Centre Ave. Bldg. B., Fort Collins, CO 80526 -- (970) 494-7400**

N349.0302

INFO SHEET

Veterinary Services

APHIS

United States Department of Agriculture

Animal and Plant Health Inspection Service

March 2000

# Topics Identified for NAHMS Swine 2000


The USDA's National Animal Health Monitoring System (NAHMS) plans national studies of U.S. animal populations around key information gaps identified by people working in various aspects of the targeted industry.

NAHMS is a nonregulatory program that seeks to meet the needs of various livestock and poultry groups for animal health information at the national level. NAHMS obtained national snapshots of the U.S. pork industry through the 1990 National Swine Survey and the Swine '95 study. For a third study, the Swine 2000, representatives of producer and veterinary organizations, academia, state and federal government and private business participated in interviews and various focus groups to identify the topics of interest for the study. Since NAHMS is a ***voluntary*** program that relies on producers to provide data, concerns of individual producers, and of producers collectively, were carefully considered to ensure they have incentives to participate in the NAHMS Swine 2000 study.

## PRRS Mycoplasma SIV

Before concerns about pressing health issues can be addressed, researchers must assess the levels and impacts of infection within the population and identify factors associated with each pathogen. NAHMS often collects blood samples to obtain disease prevalence rates. By adding management data to the analyses, we can identify factors that affect the spread of disease along with good production and preventive practices that can help producers minimize the spread of disease on the farm.

- NAHMS Swine 2000 needs assessment efforts found that respiratory diseases are of greatest concern to pork producers and more knowledge on several key pathogens is needed. The Swine 2000 study will research respiratory diseases such as porcine reproduction and respiratory syndrome (PRRS), *Mycoplasma*, and swine influenza virus (SIV).

- Individual test results for PRRS will be returned to producers as a direct benefit for allowing blood samples to be taken from breeding sows and late finishers. Collectively, test results on these respiratory diseases will allow NAHMS to determine disease prevalence rates on a national basis.

## Serum bank for the future

Through NAHMS' 1990 National Swine Survey and Swine '95 study, a serum bank was established at the National Veterinary Services Laboratories (NVSL) for collaborative projects. To date, researchers have used the serum bank to determine a baseline national prevalence of the PRRS virus, to further understand Trichinae and Toxoplasma infection in U.S. pigs, to measure the level of finishing hog and breeding animal exposure to *Lawsonia intracellularis*, and to research the natural history of emerging diseases, such as the new swine flu (swine influenza virus H3N2).

- Blood samples collected during the Swine 2000 study will add to the serum bank, thereby ensuring this resource is available for future national research on domestic swine diseases and emerging pathogens.

## Salmonella Toxoplasma Yersinia

On-farm information about food-borne pathogens is of high interest to consumers, the pork industry, and various government agencies. Almost no information exists for some pathogens, while we know enough about others to begin planning voluntary certification programs. These planners need on-farm information to identify good production practices. By using such practices, producers can minimize risks associated with eating pork and maintain consumer confidence. Representatives of producer groups, veterinarians, academia, and the government requested that NAHMS find out: How many producers have adopted practices known to ensure safe pork? What effects have their efforts had on the food-borne pathogens in the U.S. swine population? What other practices can help minimize the spread of these pathogens?

- Swine 2000 will provide an industry score card on reduction of *Salmonella* on the farm since requirements for reducing this pathogen were implemented in the packing industry. The national prevalence of *Yersinia* is unknown, and a measure is needed. Toxoplasma was included in the study because the perception of this disease as a public health concern is increasing.

- Prevalence information on these pathogens will help advance cooperative disease control efforts, describe current use of good production practices that will enhance research on risk factors, and assist the industry in targeting producer education efforts to improve adoption of good production practices.

## Antibiotic use

Information on antibiotic use is a priority for people working in pork production due to regulatory pressures and consumer demand. Knowledge of the level and pattern of antibiotic use, particularly for growth promotion, is critical to assess the pros and cons of antibiotic use on farm. Principles for judicious use of antibiotics have been identified to offset the associated risks.

- Swine 2000 will describe the adoption level of good production practices related to antibiotics. The study will also provide information on the decision-making process - who has the greatest influence regarding use of drugs and medications on the farm - an area which has changed drastically in the U.S. pork industry in recent years. Swine 2000 information related to antibiotics will assist industry and animal health officials in establishing judicious use campaigns and benefit public health.

## Environmental issues

Nutrient management and odor reduction are both pressing issues for U.S. pork producers. NAHMS Swine 2000 results will assist national education programs and guide policy development with objective information on use of environmental practices.

- NAHMS will capture data on adoption of environmentally sound production practices related to nutrient management plans, manure storage and application, and carcass disposal. Also, NAHMS will describe how many operations use a host of odor-reduction technologies currently being researched which may lead to recommendations in areas such as diet manipulation, waste treatment, and facility modifications. Goals are to assess industry progress on environmental issues and target future efforts for developing guidelines and educational programs for producers.

## Say YES to NAHMS Swine 2000!

In the spring of 2000, the National Agricultural Statistics Service (NASS) will contact eligible pork producers about participating in this NAHMS national study. NASS statistically selected swine operations to represent over 90 percent of the U.S. swine population on operations with a total inventory of 100 or more. This population is located in 17 states.[1]

NASS data collectors will begin interviews with producers in June 2000. At that time, full benefits will be discussed and producers will be offered the opportunity to participate in the biological sampling portion of the study.

As always, links between NAHMS data and the operations on which the data were collected are confidential and are not included in national data bases.

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#N329.0300

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

INFO SHEET
Veterinary Services

United States Department of Agriculture
Animal and Plant Health Inspection Service
September 2002

# Feed Management of Swine

Proper feed management is important to all U.S. swine operations. Feed procurement, safe storage, optimum diet preparation, and timely distribution are management decisions that strongly influence the financial health of operations. On modern swine operations, feed management is used not only to optimize pig performance, but also to prevent and treat swine disease, reduce nutrient excretions and objectionable odors, and reduce the risk of *Salmonella* in the final pork product.

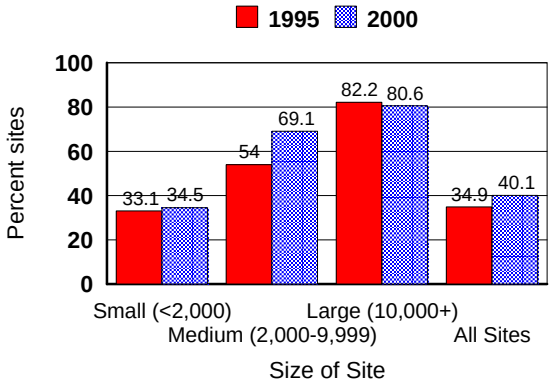
The USDA's National Animal Health Monitoring System (NAHMS) collected data on swine health and management practices from a random sample of swine production sites in 17 States[1] as part of the Swine 2000 study. These sites represented 94 percent of the U.S. pig inventory and 92 percent of U.S. pork producers with 100 or more pigs. Overall, 2,499 swine production sites participated in the first interview from June 1, 2000, through July 14, 2000. A second interview was completed by 895 of these sites between August 21, 2000, and November 3, 2000. A final interview was completed by 799 of these sites between December 1, 2000, and February 28, 2001. For estimates in this report, small, medium, and large sites refer to sites with less than 2,000, 2,000 to 9,999, and 10,000 or more pigs in total inventory, respectively. Some comparisons in this report are made to findings from the NAHMS Swine '95 study conducted five years previously.

## Phase Feeding

To optimize growth and efficiency, swine producers change diet contents frequently during the grower/finisher phase. In this report, phase feeding is defined as the feeding of four or more different diets during the grower/finisher phase. The Swine 2000 study indicated that 24.0 percent of sites fed two different diets during the grower/finisher period, while 26.2 percent fed three, and 40.1 percent fed four or more. The percentage of sites using phase feeding in 2000 (40.1 percent) increased slightly since 1995 (34.9 percent). In both 1995 and 2000, the percentage of sites using phase feeding increased as site size increased (Figure 1).

Figure 1.

**Percent of Sites Using Phase Feeding (in 1995 and 2000) by Size of Site**




Generally, as site size increased so did the number of diets. Small sites, on average, fed 3.3 diets during the grower/finisher period, whereas medium and large sites, on average, fed 4.7 and 5.0 diets, respectively. More large (73.7 percent) and medium (76.0 percent) sites kept records on feed intake than did small sites (50.0 percent).

## Split-Sex Feeding

Split-sex feeding is a common management practice where different diets are fed to gilts and barrows. The study showed that more large (45.6 percent) and medium (56.0 percent) sites practiced split-sex feeding than did small sites (15.2 percent). While the percentage of small and medium sites using split-sex feeding has remained fairly constant since 1995 (14.0 percent and 55.4 percent, respectively), the percentage of large sites using split-sex feeding has greatly decreased from 78.2 percent of sites in 1995 to 45.6 percent of sites in 2000. This decrease may be due to leaner genetics, the logistics of implementation on large sites, or a lack of economic benefit. In 2000, pigs, on average, were 9.0 weeks of age when split-sex feeding was initiated. This age did not vary significantly among the different sized sites.

## Feed Additives

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

Antibiotics, dewormers, and parasiticides are added frequently to pigs' diets, primarily to control disease and promote growth. During the 6 months prior to the Swine 2000 survey, antibiotics were included in grower/finisher diets (for any reason) on 88.5 percent of sites with grower/finisher pigs. Antibiotics were administered in grower/finisher feed to treat respiratory diseases on 27.4 percent of sites, enteric diseases on 15.2 percent of sites, and for growth promotion on 63.7 percent of sites. Dewormers were administered in grower/finisher feed on 39.7 percent of sites.

## Odor Control Through Diet Manipulation

Producers were asked about the various diet manipulation strategies they used to control odor. Half (50.2 percent) reported using some sort of diet manipulation to reduce odor. The most common methods were: finely-ground grain; vegetable oil or fat (to control dust); and synthetic amino acids. Each of the previous was practiced more commonly on large sites than small sites. While use of low-phytate corn is rare, more than 10 percent of sites used phytase in feed.

**Table 1. Feed-Related Odor Reducing Strategies**

| Diet Manipulation Strategy | Percent Sites |
|---|---|
| Finely-ground grain | 27.3 |
| Vegetable oil or fat to control dust | 24.0 |
| Synthetic amino acids and/or low crude protein | 19.8 |
| Pelleting | 15.3 |
| Phytase | 11.0 |
| Other feed additives for odor control (e.g., Microaid) | 10.1 |
| Add 10-percent fiber | 8.5 |
| Low phytate corn | 0.4 |
| Other diet manipulations | 1.4 |

## Protein and Fat Sources in the Diet

Several ingredients are available as protein and fat sources for grower/finisher diets. Soybean meal or other vegetable proteins were by far the most common protein sources used (97.6 percent of sites) regardless of site size. Animal and/or vegetable fat were the most common fat sources used (35.6 percent of sites). Large sites were much more likely to add animal and/or vegetable fats to grower/finisher diets than small sites (71.1 percent compared to 30.0 percent, respectively).

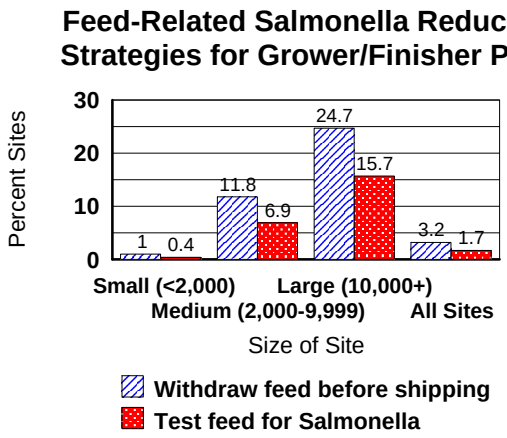
## *Salmonella* Reduction

There are several feed-related intervention strategies that may be used to reduce *Salmonella* shedding by grower/finisher pigs. These include withdrawal of feed before shipping to slaughter (3.2 percent of sites) and testing feed for *Salmonella* (1.7 percent of sites). Both of these intervention strategies were used more commonly as site size increased (Figure 2).

Figure 2.

Only 1.0 percent of all sites fed probiotics, and 0.5 percent of sites fed a competitive exclusion product to reduce shedding of *Salmonella* by grower/finisher pigs.

For

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INFO SHEET

Veterinary Services

United States Department of Agriculture

Animal and Plant Health Inspection Service

September 2002

# Highlights of NAHMS' Swine 2000: Part III

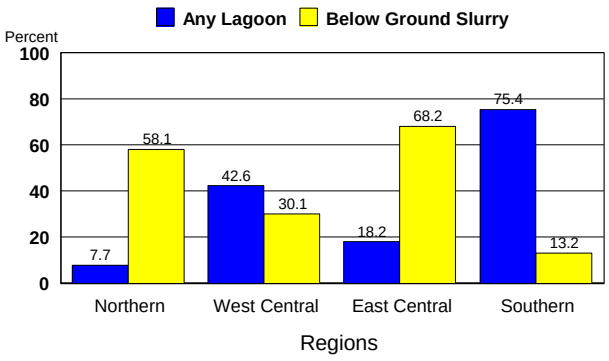
In 2000, the USDA's National Animal Health Monitoring System (NAHMS) conducted a study of swine operations within the top 17 pork-producing States.[1] These operations represented 94 percent of the U.S. swine herd on operations with 100 or more pigs on December 1, 1999.

The following highlights were excerpted from a report released in September 2002: *Swine 2000 Part III: Reference of Swine Health and Environmental Management in the United States, 2000:*

- The annual removal rate of breeding-age females via death loss and culling was 45.9 percent.
- Overall, 10.9 pigs were born per litter, of which 10.0 were born alive and 8.8 were weaned (June 1, 2000, through November 30, 2000).
- From June 1, 2000, through November 30, 2000, a higher percentage of pigs died in grower/finisher units (3.0 percent) than in nurseries (2.4 percent). Of pigs entering the grower/finisher unit, 2.1 percent were removed as lightweight pigs.
- Fewer small sites (less than 25 percent) constructed and maintained all swine facilities to keep out birds than large sites (more than 85 percent).
- Of sites using baits around the outside of gestation buildings, about half placed baits more than 50 feet apart, which is too far to be effective for rats and mice.
- Large sites were more likely to place baits inside gestations buildings than outside, and placed baits outside feed-storage facilities more often than inside.
- The majority of U.S. swine production sites had the following animals on their operations: cats (73.1 percent of sites); dogs (70.9 percent of sites); and cattle (51.7 percent of sites).
- Almost 60 percent of U.S. swine production sites in the southern region reported the presence of feral swine in their county, compared to less than 6 percent of sites in the other regions.
- Regardless of herd size, the three most important sources of food safety information were: veterinarians (76.1 percent); pork industry magazines (71.9 percent); and industry programs (69.7 percent).
- Lagoons were used more commonly in the southern region (75.4 percent of sites) and west central region (42.6 percent of sites), compared to the other regions, where less than 20 percent of sites used a lagoon. The northern and east central regions were more likely to use below-ground slurry storage, such as deep pits (Figure 1).

Figure 1.

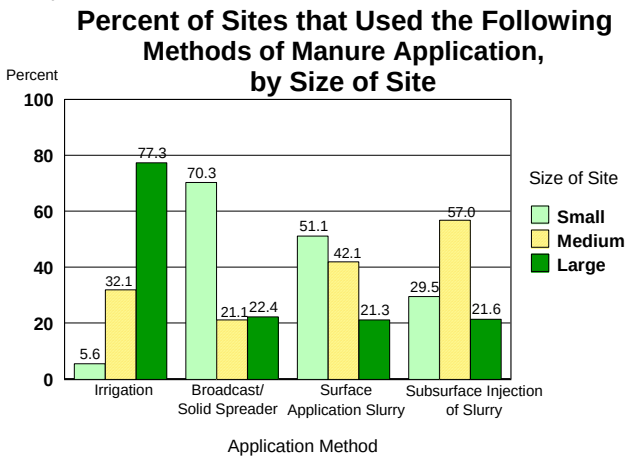
**Percent of Sites that Used the Following Waste Storage Systems, by Region**




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

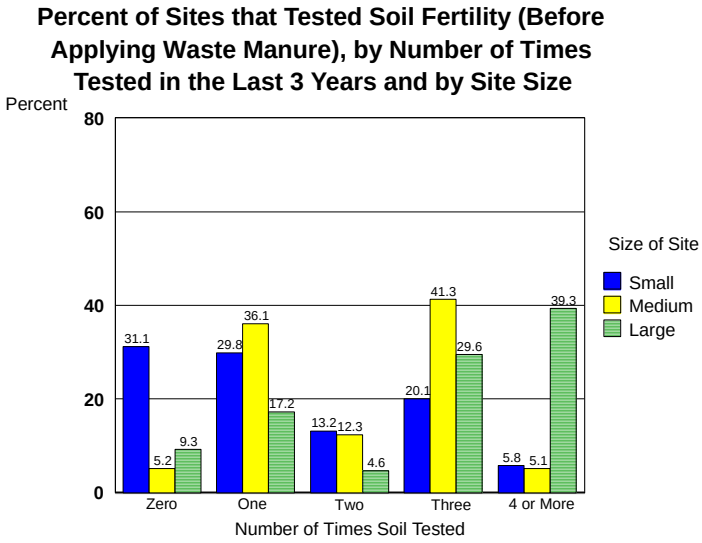
- Almost 85 percent of sites with lagoons used compact clay liners.
- Most often, lagoons on large sites were newer (just 17.3 percent were over 10-years old) than lagoons on small sites (62.7 percent were over 10-years old).
- More than 90 percent of large sites had a formal, written nutrient management plan (NMP), compared to less than 20 percent of small sites. Sites in the west central region were least likely to have an NMP (14.6 percent), while sites in the southern region were most likely to have an NMP (79.5 percent).
- For sites that had an NMP, agricultural extension was the most important source for creating the plan. Other important sources included certified crop consultants, Natural Resources Conservation Service (NRCS) engineers, and agronomists.
- The predominant method of manure application in the southern region was irrigation, a practice rarely implemented in the other regions.
- Small sites applied most often solid manure using broadcast spreaders. Medium-sized sites applied slurry via surface application or subsurface injection. Large sites applied manure most commonly in liquid via irrigation (Figure 2).

Figure 2.




- Almost one-third (31.1 percent) of small sites did no soil fertility testing during the previous 3 years (Figure 3).

Figure 3.




- Numerous strategies were used for controlling odor from swine production sites, including diet manipulation (50.2 percent of sites); manure management (28.9 percent of sites); and air quality (28.2 percent of sites). Diet manipulation was the strategy used most commonly.
- Adding chemical or biological additives to manure to control odor was practiced on 3.6 percent and 12.4 percent of sites, respectively.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Veterinary Services

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Animal and Plant Health Inspection Service

January 1996

# Environmental Practices/Management by U.S. Pork Producers

Environmental management is an integral part of the pork production system. Key factors in the success of today's pork producers are management of manure, water, soil conservation, and air. **Manure management on pork operations has become recognized as a significant factor in protecting the natural environment and maintaining overall acceptance of pork.**

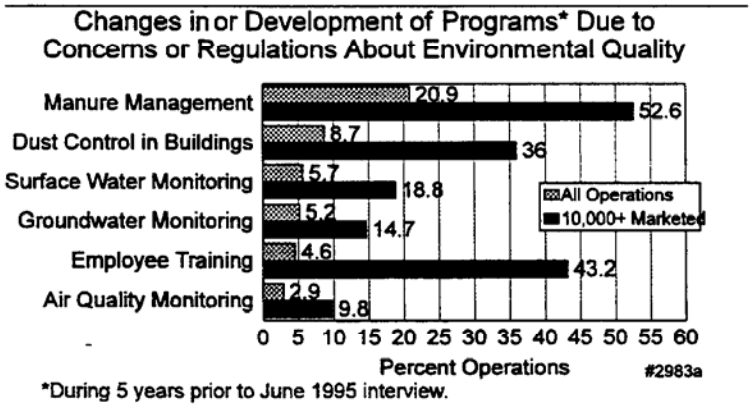
During the summer of 1995, the USDA's National Animal Health Monitoring System (NAHMS) contacted pork producers in 16 states[1] as part of the Swine '95 study. The herds in these states represented 91 percent of the United States hog inventory. Information collected during the study provided an overview of environmental practices by United States pork producers.

## Environmental Programs

Concerns or regulations about environmental quality led many producers to change or develop management schemes during the 5 years prior to the Swine '95 study. Nearly 21 percent of the producers stated they changed or developed manure management programs (Figure 1).

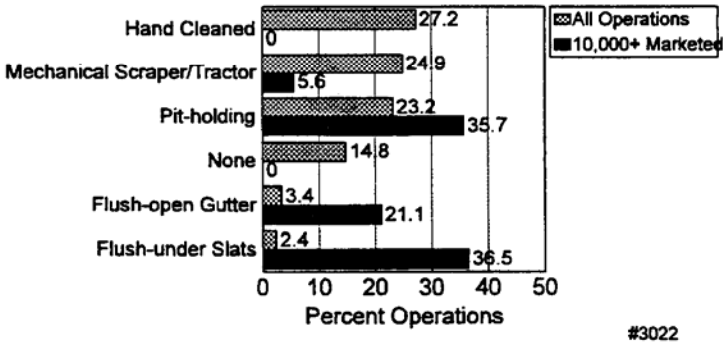
**Nearly 53 percent of producers *that marketed 10,000 or more hogs* from December 1, 1994, to May 31, 1995, changed their manure management, and 36.0 percent changed their dust control programs during the 5-year period.** Many of these operations also changed their programs for monitoring groundwater, surface water, and air quality (14.7, 18.8, and 9.8 percent, respectively). These changes and those shown for employee training programs indicate a growing producer awareness of responsible environmental management.

Figure 1




*During 5 years prior to June 1995 interview.

Figure 2




## Manure Collection

The type of manure management system used most often depends on the size and type of facility on the farm. Hand cleaning was the most common method of manure management utilized in the grower/finisher phase of production (Figure 2). The same is true of operations with a

1 Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Carolina, Ohio, Pennsylvania, South Dakota, Tennessee, and Wisconsin.

farrowing phase. A mechanical scraper/tractor was the second most common system on operations with grower/finisher pigs. Pit-holding was used most commonly by operations in the nursery and was the second most common method used in the farrowing phase. In operations that marketed 10,000 or more head, pit holding and flushing were more common than scrapers or hand cleaning.

Fourteen percent of all operations reported no manure management system in their farrowing operation, and 4.0 percent reported none in the nursery. Nearly 15 percent of operations reported no manure management system in the grower/finisher phase. Of the latter operations, 85.9 percent had a total inventory of 600 pigs or fewer and housed grower/finisher pigs in facilities with access to lots or pastures. **Less than one percent of the operations with more than 2,500 pigs on inventory reported no manure management system used in the grower/finisher area.**

*The information presented below pertains to those producers who had 300 or more grower/finisher hogs, rather than all swine operations as previously discussed.*

## Manure Storage

Manure was stored by various means before application, and some producers used more than one system. Figure 3 shows that the below-floor slurry, or deep pit, method was used by 49.4 percent of operations. Over 20 percent of the grower/finisher operations used *un*covered anaerobic lagoons, and 19.4 percent used *below-ground* slurry storage.

Most common among operations *of 10,000 or more head marketed* were below-floor slurry pits (53.4 percent) and anaerobic lagoons without covers (76.2 percent.)

## Manure Disposal

Over 96 percent of grower/finisher operations did not separate manure for disposal.

Nearly 98 percent of operations with 300 or more grower/finisher hogs disposed of manure on land owned or rented by the operation. Just over 4 percent gave some away. Not quite 1.0 percent sold manure, and 0.5 percent paid someone to take it.

**When manure was disposed of on land owned or rented by the operation, 57.8 percent of these operations used a broadcast/solid spreader method of disposal** (Figure 4.) For slurry use, 46.0 percent used surface application methods and 21.9 percent subsurface application. Subsurface applications prevent enviromental odor problems and are less likely to cause surface water contamination.

Figure 3

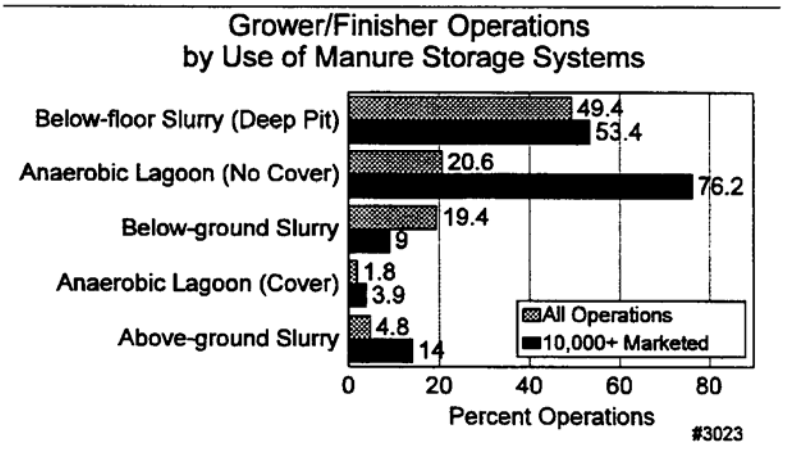
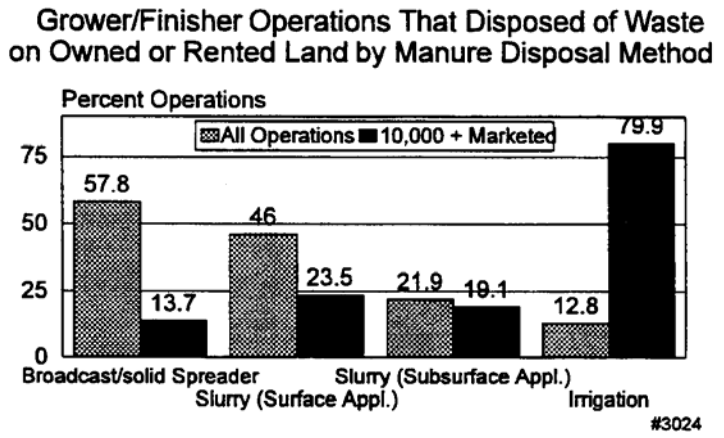



Figure 4




Operations with more than 10,000 pigs marketed were more likely to irrigate manure (79.9 percent) and less likely to broadcast with a spreader (13.7 percent).

The goal of most pork producers is an environmentally friendly method of manure management and disposal that retains valuable soil nutrients.

NAHMS collaborators on the Swine '95 study included the National Agricultural Statistics Service (USDA); State and Federal Veterinary Medical Officers and Animal Health Technicians; and the National Veterinary Services Laboratories (USDA:APHIS:VS).

Other information from the Swine '95 is available on biosecurity, vaccination practices, and antibiotic usage. For more information on these topics or the study in general, contact:

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# Antibiotic Usage in Premarket Swine

Pork producers and other consumers are becoming increasingly aware of food safety concerns such as antibiotic residues in products.

The National Pork Producers Council (NPPC) has developed the Pork Quality Assurance (PQA) program to help producers avoid antibiotic residues in pork by emphasizing good management in handling and use of animal health products on the swine operation. To prevent antibiotic residues, the industry is working diligently to encourage producers to identify animals treated at a late finishing stage and observe proper withdrawal times prior to marketing.

The purpose of the National Animal Health Monitoring System's (NAHMS) Swine '95: Grower/Finisher study was to compile national information on animal health and food safety in pork production. Beginning in the summer of 1995, NAHMS contacted 418 pork producers with 300 or more market hogs in 16 of the primary hog-producing states.[1] Herds in the selected states represented 91 percent of the grower/finisher hogs produced in the United States and provided an overview of antibiotic management in premarket swine.

### Antibiotic Usage in 1995

The study indicated 92.7 percent of all grower/finisher *pigs* received antibiotics in their diets at some time during the grower/finisher period.

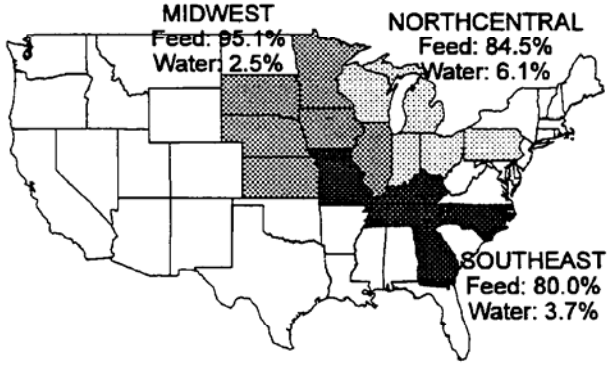
Swine '95 results indicated that, for disease prevention or growth promotant purposes, pork producers used feed antibiotics much more commonly than antibiotics administered in water. Ninety-one percent of *all operations* used antibiotics in feed on a preventive basis during the grower/finisher phase of production. Only 3.2 percent of the operations administered antibiotics in water during the same production phase.

Narrowing in on operations that are *best described as farrow-to-finish*, 89.5 percent used antibiotics on a preventive basis in feed, and 1.7 percent delivered them in water. **The percentages for operations classified as *grower/finisher only* were 97.4 percent for feed and 10.1 percent for water.**

Regionally, use of antibiotics in feed varied from 80.0 percent in the Southeastern region to 95.1 percent in the Midwest (Figure 1). More operations in the Northcentral region delivered antibiotics in water.

Figure 1

Use of Antibiotics in Feed and Water on a Preventive Basis for Grower/Finisher Hogs



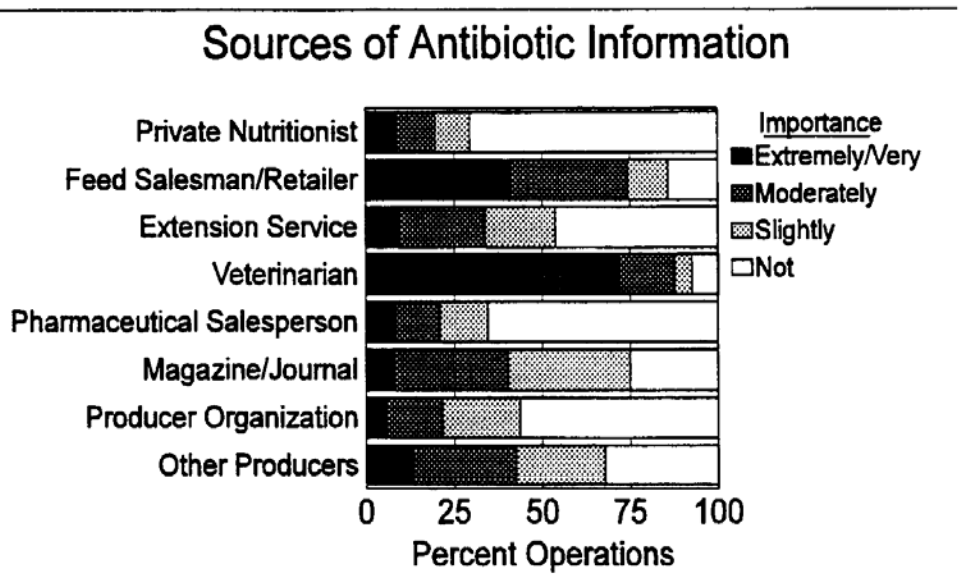

Percent All Operations

#3063

1 Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Carolina, Ohio, Pennsylvania, South Dakota, Tennessee, and Wisconsin.

Swine '95 data do not show how many producers fed antibiotics at lower concentrations or fed no antibiotics during the final finishing stage of production. These practices not only lower the cost of the diet, but greatly decrease the possibility of antibiotic residues in premarket hogs.

Figure 2




#3064

Of producers using antibiotics for preventive purposes in grower/finisher rations, 40.0 percent used chlortetracycline, 30.4 percent for tylosin, and 52.1 percent for bacitracin. These three were the most frequently used antibiotics and were fed on average for 58.1, 57.4, and 72.2 days, respectively.

### Antibiotic Information

Swine '95 indicated that **72.1 percent of producers considered the veterinarian an *extremely* or *very* important source of antibiotic information** (Figure 2.) Feed salespersons or retailers rated second highest for antibiotic information with 41.0 percent of the producers considering them *extremely* or *very* important. The majority of producers did not consider private nutritionists, pharmaceutical salespersons, or producer organizations to be important sources of antibiotic information.

### Trends in Antibiotic Usage

While comparisons or changes in management of antibiotic use following the NPPC's 1989 introduction of the PQA program are difficult to assess, NAHMS can provide some information. The 1990 NAHMS National Swine Survey collected information on use of antibiotics for preventive purposes in feed and water that can be compared to Swine '95 results. **Use of antibiotics for preventive purposes in feed in breeding females has increased since the 1990 study**, from 39.1 to 45.5 percent of operations. For boars, the practice has increased from 10.9 to 38.4 percent of operations.

Producers selling feeder-size pigs for roasting or cull sows should be mindful of possible use of antibiotics in these animals prior to being sold.

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