

## Biosecurity on U.S. Swine Sites

Biosecurity involves the use of certain management practices designed to prevent the introduction and spread of disease. Examples of these practices include: housing features, pig-flow techniques within and between management phases, restriction of new animal sources, quarantine and testing of new arrivals, rodent control and control of other animals that may be vectors for pathogens, and monitoring human and vehicle entry between and within sites.

In 2000 and 2006, the USDA's National Animal Health Monitoring System (NAHMS) conducted studies on swine health and management practices from a random sample of swine production sites with 100 or more pigs in 17 States\*. These States represented approximately 94 percent of U.S. pig inventory and 94 percent of U.S. pork producers with 100 or more pigs.

### Housing and pig-flow management

How animals are raised in terms of confinement level and flow management within stages of production and marketing processes is a facet of herd biosecurity. For example, pigs that are not confined or are rotated in and out of facilities continuously may have a better chance of acquiring and spreading certain disease agents.

Total confinement was the most common type of facility for all phases of production, except gestation. However, the percentage of sites that managed gestating pigs in total confinement increased from 22.4 percent in the 2000 swine study to 34.6 percent in the 2006 study.

A similar trend occurred for grower/finisher pigs, with the use of total confinement facilities increasing from 42.9 percent of sites in 2000 to 53.2 percent in 2006, and the use of an open building with outside access decreasing from 33.2 percent in 2000 to 23.3 percent in 2006 (table 1).

#### \*States

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

**Table 1. For Sites with the Specified Production Phases, Percentage of Sites by Facility Type Used Most, 2006**

Facility Type	Percent Sites Production Phase			
	Gestation Percent	Farrowing Percent	Nursery Percent	Grower /Finisher Percent
Total confinement	34.6	67.7	74.0	53.2
Open building with no outside access	13.3	10.6	10.7	20.4
Open building with outside access	37.3	15.1	11.3	23.3
Lot with hut or no building	8.6	3.3	1.8	1.8
Pasture with hut or no building	6.2	3.3	2.2	1.3
Total	100.0	100.0	100.0	100.0

Except for the gestation phase, most sites used some form of all-in/all-out management. During the gestation phase, the majority of sites in 2006 (61.5 percent) used continuous flow management, a decrease from 71.4 percent in 2000. During the grower/finisher phase, continuous flow management decreased from 40.5 percent of sites in 2000 to 26.1 percent in 2006 (table 2). No significant decrease occurred in the percentage of sites that used continuous flow management during the other phases of production.



Photo courtesy of National Pork Board

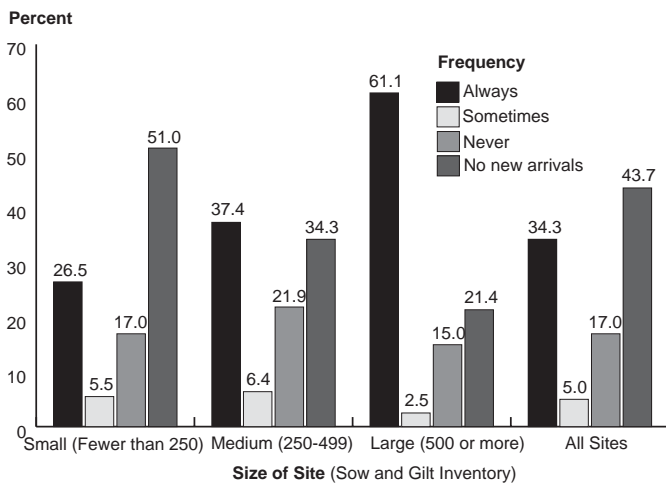
**Table 2. For Sites with the Specified Production Phases, Percentage of Sites by Pig-flow Management Style, 2006**

Management Style	Percent Sites Production Phase			
	Gestation	Farrowing	Nursery	Grower/ Finisher
Continuous flow	61.5	33.5	25.0	26.1
All swine removed without cleaning and disinfecting	4.6	4.7	3.6	6.2
All-in/all-out by room, with room cleaned and disinfected	10.0	37.1	30.5	17.5
All-in/all-out by building, with building cleaned and disinfected	7.7	16.1	29.8	35.0
All-in/all-out by site, with site cleaned and disinfected	1.4	1.9	7.1	12.1
Not applicable (no housing)	14.8	6.7	4.0	3.1
Total	100.0	100.0	100.0	100.0

**Biosecurity for breeding pigs**

When new breeding stock are brought to a site, there is concern that they might introduce a pathogen to the herd. In addition, existing pathogens in the herd might infect new arrivals. These risks can be reduced by minimizing new arrivals, isolating new arrivals, or by acclimating new arrivals to disease agents. Less than one-half of sites (43.7 percent) did not have new arrivals of breeding females during the last 12 months. A higher

**Figure 1. Percentage of Sites by Frequency New Breeding Females were Typically Isolated or Quarantined, and by Size of Site**



percentage of small sites (51.0 percent) had no new arrivals compared with large sites (21.4 percent). Conversely, a higher percentage of large sites (61.1 percent) always isolated new arrivals compared with small sites (26.5 percent) [figure 1].

Table 3 shows the percentage of sites by methods used to acclimate new arrivals. A higher percentage of large sites used feedback of feces from other swine and feedback of mummies, placentas, or stillborn pigs as methods of acclimating newly arriving breeding stock than small sites. Approximately 6 of 10 medium sites (59.6 percent) and 5 of 10 large sites (50.9 percent) used exposure to cull females as a method of acclimation compared with about 3 of 10 small sites (29.0 percent). A higher percentage of large sites (90.5 percent) used vaccinations to acclimate new arrivals compared with small sites (59.7 percent).

**Table 3. For Sites with Newly Arriving Breeding Stock, Percentage of Sites by Method Used to Acclimate New Arrivals and by Size of Site**

Method	Percent Sites Size of Site (Sow and Gilt Inventory)			All Sites
	Small (Fewer than 250)	Medium (250-499)	Large (500 or More)	
Feedback of feces from other swine	12.6	34.1	44.7	20.8
Feedback of mummies, placentas, or stillborn pigs	4.6	10.9	23.0	8.8
Exposure to cull females (gilts and sows)	29.0	59.6	50.9	35.8
Exposure to sick pigs	4.5	9.6	9.9	6.0
Give vaccinations	59.7	74.8	90.5	67.1
Other	6.8	2.9	2.0	5.5

The percentage of sites that used these different acclimation methods remained relatively unchanged from 2000 to 2006, with the exception of vaccination. The percentage of small sites that used vaccinations to acclimate newly arriving breeding stock decreased from the swine 2000 study to the swine 2006 study (81.6 and 59.7 percent, respectively). The percentage of sites that used these different acclimation methods remained relatively unchanged from 2000 to 2006.

About 40 percent of all sites used artificial insemination (AI) as the predominant mating technique for sows during at least one mating. This practice varied widely by size of site. Most large sites (91.6 percent) used AI as the predominant mating technique for sows, while 65.7 percent of medium sites and 20.8 percent of small sites did so. For sites that used AI, nearly 80 percent purchased semen, while 16.8 percent collected

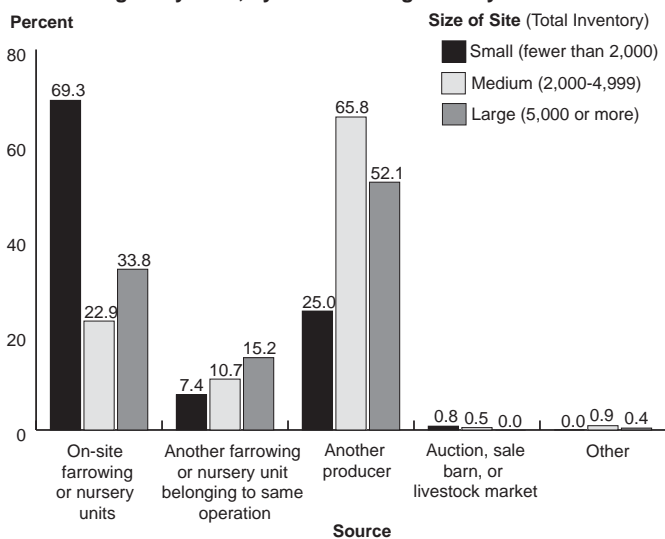
semen on-site, and 15.9 percent collected semen off-site but did not purchase it. Semen itself can be a source of pathogens, and some producers improve biosecurity by using commercial semen screened for pathogens.

From December 2005 through May 2006, nearly 90 percent of sites with a gestating phase brought their sows and gilts into the gestation phase from on-site sources. Many producers, therefore, keep their breeding herd fairly closed. However, weaned pigs used for marketing or replacement of breeding stock often come from a variety of sources, particularly when trying to keep facilities full on larger sites. The health practices of these sources are a biosecurity consideration.

### Biosecurity for weaned pigs

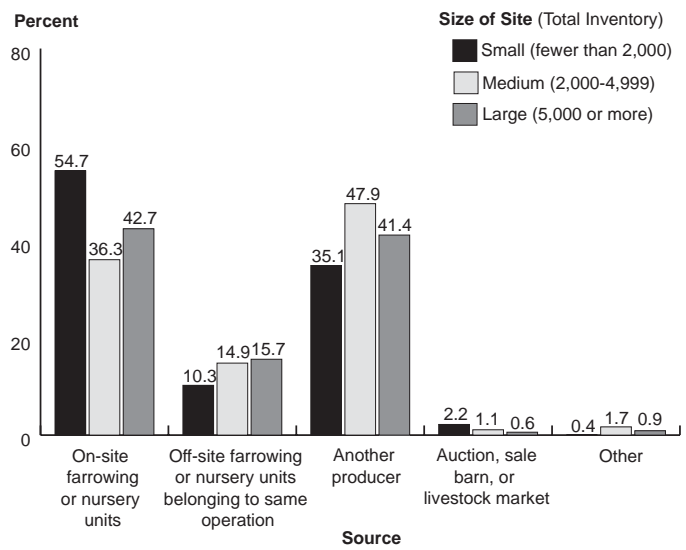
On sites with a nursery phase, 69.3 percent of small sites primarily obtained pigs for the nursery from on-site farrowing or nursery units (figure 2). Over 6 of 10 medium sites (65.8 percent) and five of 10 large sites (52.1 percent) obtained pigs for the nursery from another producer, while fewer than 3 of 10 small sites (25.0 percent) did so. Less than 1 percent of sites used an auction, sale barn or livestock market as a source of nursery pigs.

**Figure 2. For Sites With a Nursery Phase, Percentage of Sites that Brought or Placed any Pigs Into the Nursery Phase from December 2005 through May 2006, by Source of Pigs and by Size of Site**



Half of sites with a grower/finisher phase (49.9 percent) obtained new pigs for grower/finisher units on-site, such as their own nursery. The majority of small sites (54.7 percent) brought pigs into the grower/finisher phase from on-site. The most common source of grower/finisher pigs on medium sites was other pig producers (47.9 percent of sites). For large sites, the two most common sources of grower/finisher pigs were on-site and other pig producers (42.7 and 41.4 percent of sites, respectively) [Figure 3].

**Figure 3. For Sites With a Grower/finisher Phase, Percentage of Sites that Brought or Placed any Pigs Into the Grower/Finisher Phase from December 2005 through May 2006, by Source of Pigs and by Size of Site**



### Visitor restrictions

About 80 percent of sites in 2006 did not allow anyone except employees to come in contact with areas where swine were housed, compared to about 65 percent of sites in 2000. For sites where nonemployees were allowed to enter swine facilities in 2006, 95.4 percent allowed business visitors (e.g., an electrician), but only 68.1 percent allowed nonbusiness visitors.

A higher percentage of small sites (77.6 percent) allowed nonbusiness visitors compared to medium and large sites (42.9 and 32.0 percent, respectively). When nonbusiness visitors were allowed to enter swine facilities, the most common preventive measures required were to change to clean boots and coveralls before entering (26.5 percent of sites) and/or wait at least 24 hours after visiting another swine site before entering swine facilities (25.7 percent of sites).

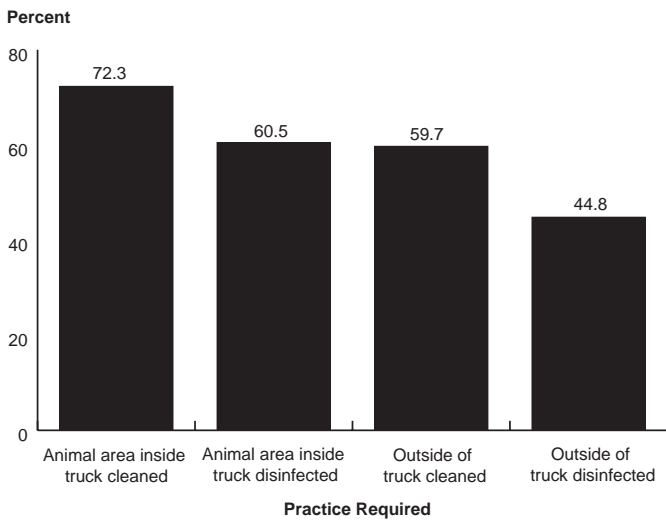
When business visitors were allowed to enter swine facilities, the most common preventive measure required was to change to clean boots and coveralls before entering the facilities (48.4 percent of sites).

Vehicles can be a mechanism for disease spread. Certain restrictions are often placed on commercial haulers before entry into a site. Slightly more than half of sites (51.3 percent) allowed commercial trucks or trailers on sites where pigs were kept. A higher percentage of large and medium sites (61.1 and 64.9 percent, respectively) allowed commercial trucks or trailers than did small sites (45.5 percent). Cleaning and disinfecting commercial livestock trucks and trailers before entry into a swine site may reduce the risk these vehicles pose to swine.

Nearly three of four sites (72.3 percent) required cleaning of the animal area inside the truck or trailer before entering the pig area. Three of five sites (60.5

percent) required animal areas to be disinfected, and three of five sites (59.7 percent) required cleaning of the outside of the truck. Fewer than one-half the sites (44.8 percent) required disinfection of the outside of trucks (figure 4). All of these practices increased as size of site increased.

**Figure 4. For Sites that Allowed Trucks or Trailers from Commercial Livestock Transporters or Animal Haulers to Enter the Pig Site, Percentage of Sites by Required Cleaning and Disinfecting Practices for Livestock Trucks or Trailers**



## Rodent control

Rodents, domestic animals, and some wildlife may serve as reservoirs for various swine diseases. Nearly all sites (97.3 percent) used some manner of rodent control. The most common method of rodent control used was bait or poison (87.9 percent of sites) followed by cats (51.2 percent of sites). The placement of bait stations in a building used to house swine or structures used to store feed may affect the efficacy of this rodent control method. When sites had at least one building used to house swine, nearly half of these buildings (47.7 percent) had rodent bait stations placed inside, and 32.0 percent of the buildings had bait stations placed outside at 50-foot intervals or less. Large sites had a higher percentage of buildings equipped with bait stations placed outside at 50-foot intervals or less than medium and small sites. Similarly, for sites that stored feed in a structure (open or closed) the most commonly used rodent control method was the placement of bait stations outside these structures at 50-foot intervals or less apart (29.4 percent of sites).

## Housing biosecurity

For sites with at least one building used to house swine, over 60 percent of sites indicated that all buildings used to house swine were constructed and maintained to keep out birds, cats, and dogs. A higher percentage of large and medium sites housed swine in

buildings that kept out birds, cats, rats, mice, and dogs than did small sites (table 4).

**Table 4. For Sites with at Least One Building Used to House Swine, Percentage of Sites in Which All Buildings Used for Swine were Constructed and Structurally Maintained to Keep Out the Following Types of Animals, by Size of Site**

Animal Type	Percent Sites Size of Site (Total Inventory)			
	Small (Fewer than 2,000)	Medium (2,000- 4,999)	Large (5,000 or More)	All Sites
Birds	49.3	85.2	91.3	62.0
Rats and mice	36.1	70.3	69.7	47.3
Cats	50.5	88.6	94.8	63.9
Dogs	56.6	92.1	95.1	68.8

Complete descriptive reports and other information sheets from NAHMS Swine Studies are available at: <http://nahms.aphis.usda.gov>

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