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Swine 2000

Part IV: Changes in the U.S. Pork Industry, 1990-2000



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Introduction

In 1983, promoters of the concept that would become the USDA's National Animal Health Monitoring System (NAHMS) envisioned a program that would monitor changes and trends in national animal health and management, thereby providing periodic snapshots of the U.S. food animal industries. With these industry overviews, members could identify opportunities for improvement, provide changing foundations for research and special studies, and detect emerging problems.

Section I of this report presents demographic changes of the United States and world swine industry from a historical perspective using data provided by the National Agricultural Statistics Service (NASS), Census of Agriculture, and Foreign Agriculture Service. Results of three NAHMS national studies in Sections II and III provide an overview of change in U.S. swine management and health from 1990 through 2000. Section IV provides information from other national data bases.

NAHMS first national study of the swine industry, the 1990 National Swine Survey, provided a snapshot of swine health and management and served as a baseline from which industry changes in animal health and management were measured. NAHMS conducted the 1990 National Swine Survey in 18 States, with a target population of sites with at least one sow. The sample represented 95 percent of the U.S. swine population. National estimates generated from this study are reported in *Morbidity/Mortality and Health Management of Swine in the United States* (November 1991).

The second national swine study was implemented in 1995 via two phases: Swine '95 Baseline and Swine '95: Grower/Finisher. Both phases were conducted in the top 16 swine States, which represented 91 percent of the U.S. swine population. The target population for the Baseline phase was producers with at least one pig. Data were collected by two interviews of approximately 1,400 producers. National estimates generated from the Baseline phase are reported in *Swine '95 Part I: Reference of 1995 Swine Management Practices* (October 1995). The Swine '95: Grower/Finisher phase was conducted on-farm via two interviews on sites with at least 300 market pigs. National estimates generated from the Swine '95: Grower/Finisher phase are reported in *Part II: Reference of 1995 Grower/Finisher Health and Management* (May 1996).

Swine 2000 was designed to provide both participants and the industry with information on nearly 94 percent of the U.S. swine herd on sites with 100 or more pigs. Data for *Part I: Reference of Swine Health and Management in the United States, 2000* (August 2001) were collected from 2,499 swine production

sites from 2,328 operations. NASS collaborated with Veterinary Services to select a producer sample statistically designed to provide inferences to the Nation's swine population on sites with 100 or more pigs. The study included 17 of the major pork-producing States, which 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. Respective results were published in Swine Part II: Reference of Swine Health and Health Management in the United States, 2000 (March 2002) and Swine Part III: Reference of Swine Health and Environmental Management, 2000 (September 2002).

Interpretation of changes in estimates among three national studies conducted between 1990 and 2000 are difficult and may be speculative in nature. Major influences behind differences in estimates may be due to differences in the composition of the target population as described above. Differences are documented in each summary table to aid in interpretation. Differences also may occur in the factors being measured, e.g., changes in question wording, random variation, and true secular time trends in the pork industry. These differences have been documented to aid in interpretation.

Most data are producer-reported and may vary according to recollection, record quality, and consistency of the interpretation of questions. These concerns are minimized by extensively training interviewers.

Further information on NAHMS studies and reports is available at www.aphis.usda.gov/vs/ceah/ncahs

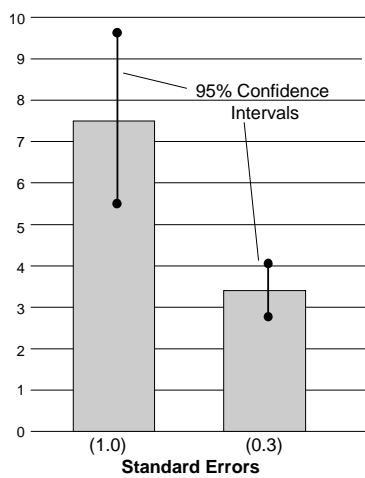
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Terms Used In This Report

All-in/all-out management: management practice where every animal is removed from a room, building, or site so swine areas can be cleaned and disinfected.

NA: not available

Examples of a 95% Confidence Interval



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, the confidence intervals created in this manner will contain the true population mean 95 out of 100 times. In the example to the left, 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 2. In general, when comparing point estimates between categories, estimates with confidence levels that overlap are not considered different. 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.

Pig average: A single value for each swine site multiplied by the number of pigs on that site is summed over all sites and divided by the number of pigs on all sites. This way, the result is adjusted for the number of pigs on each site. For example, from table 4a on p34 the average age is multiplied by the number weaned for each site. This product is then summed over all sites and divided by the sum of pigs weaned over all sites. The result is the average weaning age of all pigs.

Producer-identified cause: Causes of pig illnesses or deaths derived from observations of clinical signs reported by participating producers and not substantiated by a veterinarian or laboratory.

Sites: Distinct geographic locations or premises designated as production sites 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 premises.

Standard error: See description under population estimates above.

Section I: Demographic Changes in the U.S. Pork Industry, 1850-2002

A. Historical Changes in the U.S. Pork Industry

1. Total pig inventory

The Census of Agriculture has collected hog and pig inventory numbers at 5-year intervals since 1850. The table below shows inventory numbers at approximately 10-year intervals (every other Census). The U.S. hog and pig inventory had sporadic increases and declines from 1850 to 1880, with a peak of 49 million head in 1880 and a low of 25 million head in 1870. A relatively stable inventory predominated from 1890 through 1930, when the inventory remained near 60 million head. By 1940, inventory had declined 40 percent, followed by a similar percentage rebound by 1950. Hog and pig inventory peaked in 1959 at nearly 68 million head. Estimates in subsequent years consistently remained near 55 million head, increasing to 60.4 million head in 2002. With the exception of 1940, the number of hog sites declined dramatically from a high in 1920. The 2002 Census shows the number of sites at only 1.8 percent of those in 1900, while the inventory number of head is nearly the same level. As a result, the average herd size increased from less than 20 head in the early and mid 1900s to 766 head in 2002.

a. Changes in U.S. hog and pig inventory, 1850-1997:

Year*	Total Inventory (1,000 Head)	Sites Reporting	Average Herd Size
1850	30,354	NA	NA
1860	33,513	NA	NA
1870	25,135	NA	NA
1880	49,773	NA	NA
1890	57,427	NA	NA
1900	62,868	4,335,363	15
1910	58,186	4,351,751	13
1920	59,346	4,850,807	12
1930	56,288	3,535,119	16
1940	34,037	3,766,675	9
1950	55,722	3,011,807	19
1959	67,949	1,848,784	37
1969	55,455	686,097	81
1978	57,697	445,117	130
1987	52,271	243,398	215
1992	57,563	191,347	301
1997	61,188	124,889	490
2002	60,405	78,895	766

*Census of Agriculture data. 1850-1950 includes all States except Alaska and Hawaii. 1959-2002 includes all 50 States.

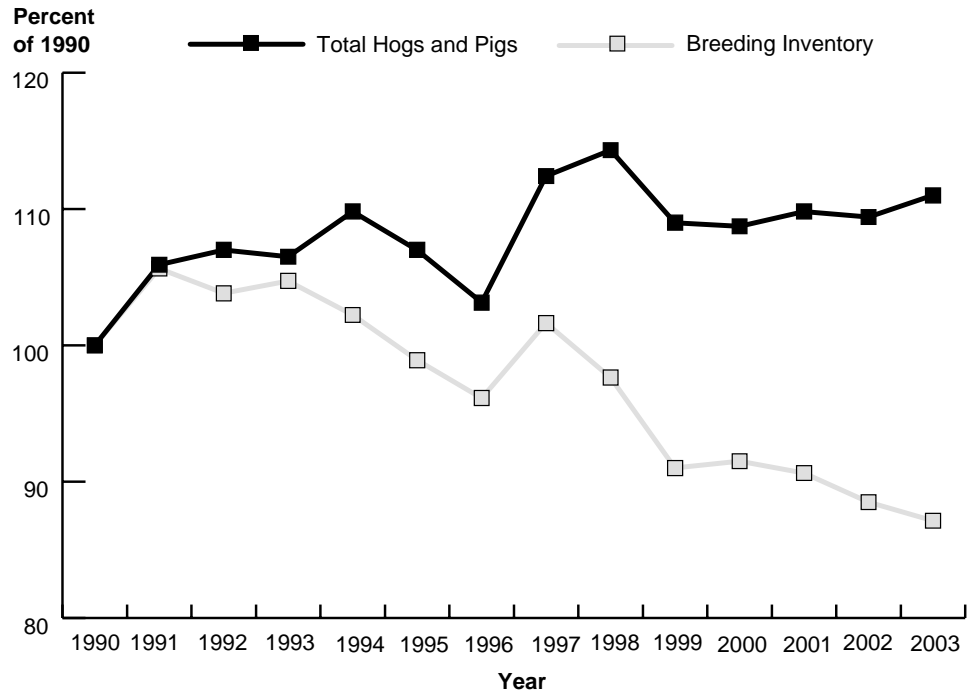
Each year, NASS surveys a random sample of producers to provide national estimates of animal populations and food production. This section reports NASS' demographics of the U.S. pork industry as published December 1 of each year. From 1990 through 2000, hog and pig inventory estimates increased 8.6 percent and were up 11.0 percent by 2003. Year-to-year inventories varied slightly, but the overall trend was upward to 1998. Breeding inventory made up 12.6 percent of total inventory in 1990 compared to 10.6 percent in 2000 and 9.9 percent in 2003, indicating a more productive breeding herd.

b. Changes in U.S. hog and pig and breeding inventories, December 1, 1990-2003:*

Year	Hogs and Pigs				Breeding Inventory			
	1,000 Head	Pct. Previous Year	Pct. of 1990	Pct. of 1995	1,000 Head	Pct. Previous Year	Pct. of 1990	Pct. of 1995
1990	54,416	101.2	100.0	--	6,847	99.9	100.0	--
1991	57,649	105.9	105.9	--	7,229	105.6	105.6	--
1992	58,202	101.0	107.0	--	7,109	98.3	103.8	--
1993	57,940	99.5	106.5	--	7,166	100.8	104.7	--
1994	59,738	103.1	109.8	--	6,998	97.7	102.2	--
1995	58,201	97.4	107.0	100.0	6,770	96.7	98.9	100.0
1996	56,124	96.4	103.1	96.4	6,578	97.2	96.1	97.2
1997	61,158	109.0	112.4	105.1	6,957	105.8	101.6	102.8
1998	62,204	101.7	114.3	106.9	6,682	96.0	97.6	98.7
1999	59,335	95.4	109.0	101.9	6,233	93.3	91.0	92.1
2000	59,110	99.6	108.6	101.6	6,267	100.5	91.5	92.6
2001	59,722	101.0	109.8	102.6	6,201	98.9	90.6	91.6
2002	59,554	99.7	109.4	102.3	6,058	97.7	88.5	89.5
2003	60,389	101.4	111.0	103.8	5,965	98.5	87.1	88.1

*National Agricultural Statistics Service (NASS) data

U.S. Total Hog and Pig Inventory and Breeding Inventory, as a Percentage of 1990 Inventory, 1990-2003*



*NASS data

2. Number of swine sites and herd size

The number of U.S. swine sites has decreased steadily since 1990, but the sharpest decline occurred in the mid 1990s. In 2000, the number of swine sites in the United States decreased by two-thirds of the 1990 number, and in 2003 the number of swine sites had decreased to nearly one-fourth the number reported in 1990.

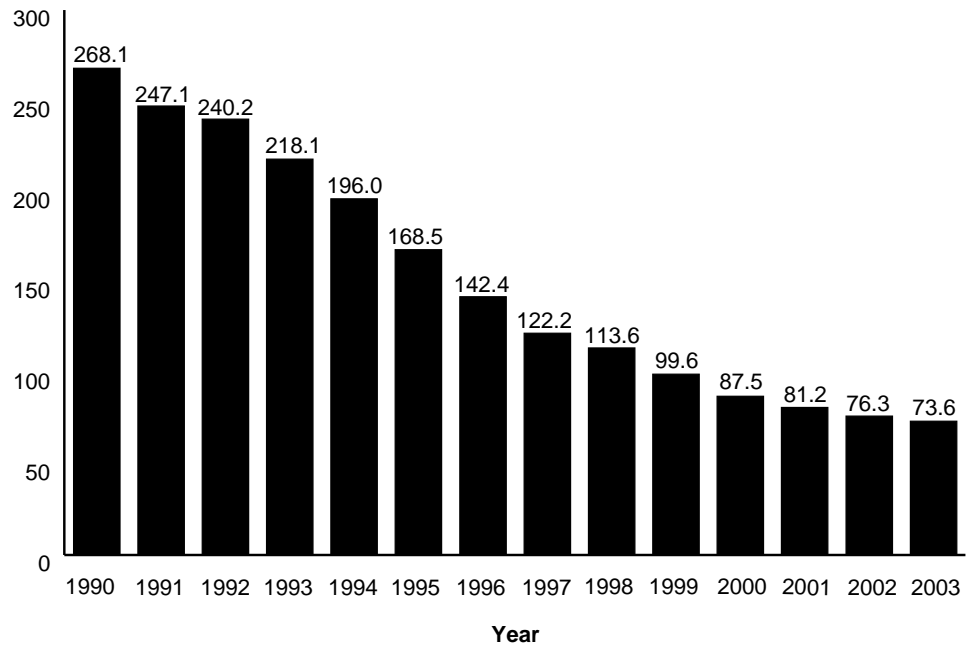
a. Changes in the number of U.S. swine sites, 1990-2003:*

Year	Number	Percent Previous Year	Percent of 1990	Percent of 1995
1990	268,140	89.1	100.0	--
1991	247,090	92.1	92.1	--
1992	240,150	97.2	89.6	--
1993	218,060	90.8	81.3	--
1994	196,030	89.9	73.1	--
1995	168,450	85.9	62.8	100.0
1996	142,380	84.5	53.1	84.5
1997	122,160	85.8	45.6	72.5
1998	113,590	93.0	42.4	67.4
1999	99,620	87.7	37.2	59.1
2000	87,470	87.8	32.6	51.9
2001	81,220	92.9	30.3	48.2
2002	76,250	93.9	28.4	45.3
2003	73,600	96.5	27.4	43.7

*NASS data

Number of U.S. Swine Sites, 1990-2003*

**Number Sites
(x1,000)**



*NASS data

Small herds still represent the majority of U.S. pig sites. However, herds with fewer than 100 head steadily declined as a percentage of all sites from 1990 through 1999. The percentage of herds with a total inventory of 1,000 or more head consistently increased, from 4.0 percent in 1990 to 14.7 percent in 2000 and 16.3 percent in 2003.

b. Percentage of U.S. pig sites by herd size, 1990-2003:*

Year	Percent Sites					Total
	Herd Size					
	1-99 Head	100-499 Head	500-999 Head	1,000-1,999 Head	2,000 or More Head	
1990	63.9	25.0	7.1	4.0	**	100.0
1991	61.4	26.4	7.8	4.4	**	100.0
1992	60.2	26.5	8.1	3.6	1.6	100.0
1993	60.2	25.8	8.4	3.6	2.0	100.0
1994	58.6	25.9	8.8	4.2	2.5	100.0
1995	57.4	26.2	9.0	4.4	3.0	100.0
1996	57.5	25.0	9.1	4.8	3.6	100.0
1997	56.9	23.0	9.5	5.5	5.1	100.0
1998	54.4	23.8	9.9	6.0	5.9	100.0
1999	54.2	22.8	9.2	6.6	7.2	100.0
2000	57.3	19.3	8.7	6.7	8.0	100.0
2001	58.8	17.6	8.3	6.5	8.8	100.0
2002	59.8	16.1	8.2	6.6	9.3	100.0
2003	60.2	15.8	7.7	6.6	9.7	100.0

*NASS data

**Estimates available for only 1,000 or more head



A larger percentage of U.S. total hog and pig inventory has shifted to herds consisting of 2,000 or more head. The percentage of pig inventory on sites with 2,000 or more head has more than doubled since 1992.

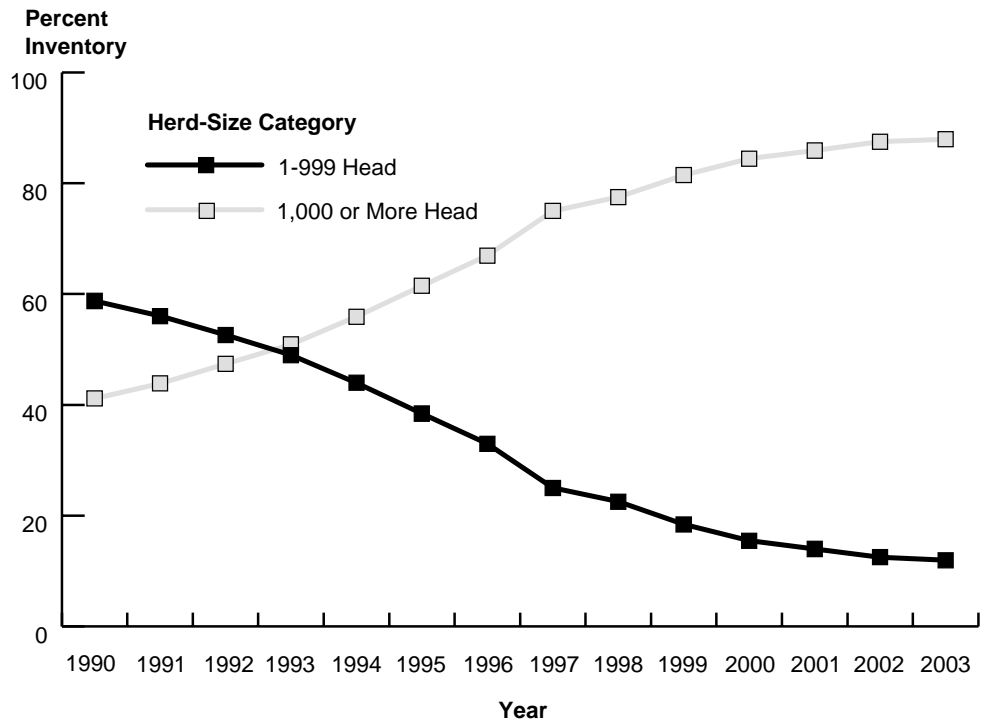
c. Percentage of U.S. total hog and pig inventory by herd size, 1990-2003:*

Year	Herd Size					Total
	1-99 Head	100-499 Head	500-999 Head	1,000-1,999 Head	2,000 or More Head	
1990	6.4	28.6	23.8	41.2	**	100.0
1991	5.5	27.2	23.4	43.9	**	100.0
1992	5.3	25.3	22.0	18.9	28.5	100.0
1993	5.0	22.5	21.5	17.5	33.5	100.0
1994	4.0	20.5	19.5	18.0	38.0	100.0
1995	3.5	18.0	17.0	17.0	44.5	100.0
1996	3.0	15.0	15.0	16.0	51.0	100.0
1997	2.0	11.0	12.0	14.5	60.5	100.0
1998	2.0	9.5	11.0	14.0	63.5	100.0
1999	1.5	8.0	9.0	13.0	68.5	100.0
2000	1.0	6.5	8.0	12.5	72.0	100.0
2001	1.0	5.5	7.5	12.0	74.0	100.0
2002	1.0	5.0	6.5	12.0	75.5	100.0
2003	1.0	4.5	6.5	11.0	77.0	100.0

*NASS data.

** Estimates available for only 1,000 or more head.

Percentage of U.S. Total Hog and Pig Inventory by Herd-Size Category, 1990-2001*



*NASS data

In general, a steady increase occurred in the number of pigs saved per litter each year from 1990 to 2003. With the exception of 1990, 1993, and 1998, the December to February quarter posted the fewest pigs saved per litter of the four quarters.

d. Changes in pigs saved per litter, per quarter, 1990-2003:¹

Year	Dec-Feb ²	Pct. 1990	Pct. 1995	Mar-May	Pct. 1990	Pct. 1995	June-Aug	Pct. 1990	Pct. 1995	Sept-Nov	Pct. 1990	Pct. 1995
1990	7.83	100.0	--	7.94	100.0	--	7.90	100.0	--	7.82	100.0	--
1991	7.87	100.5	--	7.96	100.3	--	7.89	99.9	--	7.89	100.9	--
1992	8.04	102.7	--	8.08	101.8	--	8.14	103.0	--	8.05	102.9	--
1993	8.14	104.0	--	8.13	102.4	--	8.09	102.4	--	8.05	102.9	--
1994	8.10	103.4	--	8.26	104.0	--	8.21	103.9	--	8.16	104.3	--
1995	8.24	105.2	100.0	8.32	104.8	100.0	8.34	105.6	100.0	8.35	106.8	100.0
1996	8.43	107.7	102.3	8.48	106.8	101.9	8.55	108.2	102.5	8.54	109.2	102.3
1997	8.63	110.2	104.7	8.67	109.2	104.2	8.72	110.4	104.6	8.68	111.0	104.0
1998	8.70	111.1	105.6	8.75	110.2	105.2	8.72	110.4	104.6	8.66	110.7	103.7
1999	8.73	111.5	105.9	8.80	110.8	105.8	8.86	112.2	106.2	8.78	112.3	105.1
2000	8.76	111.9	106.3	8.86	111.6	106.5	8.84	111.9	106.0	8.85	113.2	106.0
2001	8.72	111.4	105.8	8.89	112.0	106.9	8.89	112.3	106.4	8.85	112.8	105.6
2002	8.77	112.0	106.4	8.84	111.3	106.3	8.92	112.9	107.0	8.86	113.3	106.1
2003	8.81	112.5	106.9	8.88	111.8	106.7	8.90	112.7	106.7	8.93	114.2	106.9

¹ Ratio of expected number of pigs weaned to sows/gilts farrowed, NASS data

² December preceding year

B. Pork Industry Changes

1. Inventories by State

The following tables describe U.S. pork industry changes at 5-year intervals starting in 1990. The pig inventories and number of sites are by State and based on USDA-NASS data. The tables also identify which States participated in the three NAHMS national swine studies. In the United States there were nearly 5 million more pigs in 2000 than in 1990. Significant increases in the production of pigs were reported in Colorado, Minnesota, Mississippi, North Carolina, Oklahoma, Texas, Utah, and Wyoming. States that cut production by more than half were: Alabama, Arizona, Florida, Georgia, Idaho, Kentucky, Maryland, New Mexico, Oregon, Rhode Island, Tennessee, Washington, and West Virginia. There was less than one-third the number of U.S. swine sites in 2000 than in 1990.

a. Changes in pig inventories by State (source: NASS data):

State	Total Pigs (1,000 Head)					Number Sites				
	Dec. 1, 1990	Dec. 1, 1995	Dec. 1, 2000	2000 Pct. of 1990	2000 Pct. of 1995	1990	1995	2000	2000 Pct. of 1990	2000 Pct. of 1995
Alabama ¹	355	230	165	46.5	71.7	4,500	2,100	700	15.6	33.3
Alaska	1	2	1	66.7	40.0	40	50	50	125.0	100.0
Arizona	110	125	9	8.2	7.2	400	310	230	57.5	74.2
Arkansas ³	760	790	685	90.1	86.7	3,100	1,790	1,100	35.5	61.5
California ¹	195	240	150	76.9	62.5	4,000	3,200	1,000	25.0	31.3
Colorado ^{1 3}	300	580	840	280.0	144.8	2,000	1,400	900	45.0	64.3
Connecticut	7	5	4	58.0	80.0	450	400	180	44.4	50.0
Delaware	31	33	20	64.5	60.6	420	200	100	31.0	65.0
Florida	130	85	40	30.8	47.1	5,000	3,200	1,400	28.0	43.7
Georgia ^{1 2}	1,100	700	380	34.5	54.3	8,000	3,000	1,200	15.0	40.0
Hawaii	36	34	26	72.2	76.5	500	300	230	46.0	76.7
Idaho	60	45	24	40.0	53.3	2,000	1,100	400	20.0	36.4
Illinois ^{1 2 3}	5,700	4,800	4,150	72.8	86.5	15,300	9,600	5,100	33.3	53.1
Indiana ^{1 2 3}	4,400	4,000	3,350	76.1	83.7	13,000	9,000	4,400	33.8	48.9
Iowa ^{1 2 3}	13,800	13,500	15,100	109.4	111.9	35,000	25,000	12,300	35.1	49.2
Kansas ^{2 3}	1,500	1,300	1,520	101.3	116.9	6,000	3,800	1,600	26.7	42.1
Kentucky ²	920	800	430	46.7	53.7	6,500	3,800	1,300	20.0	34.2
Louisiana	50	55	29	58.0	52.7	2,500	1,200	650	26.0	54.2
Maine	8	7	6	75.0	85.7	1,600	1,300	300	18.7	23.1
Maryland ¹	162	80	40	24.7	50.0	1,400	800	430	30.7	53.7
Massachusetts	33	21	21	63.6	100.0	850	700	300	35.3	42.9

a. Changes in pig inventories by State (continued):

State	Total Pigs (1,000 Head)					Number Sites				
	Dec. 1, 1990	Dec. 1, 1995	Dec. 1, 2000	2000 Pct. of 1990	2000 Pct. of 1995	1990	1995	2000	2000 Pct. of 1990	2000 Pct. of 1995
Michigan ^{1 2 3}	1,250	1,100	950	76.0	86.4	5,500	4,700	2,500	45.5	53.2
Minnesota ^{1 2 3}	4,500	4,950	5,800	128.9	117.2	15,000	10,500	7,300	48.7	69.5
Mississippi	149	225	315	211.4	140.0	6,000	2,300	1,500	25.0	65.2
Missouri ^{2 3}	2,800	3,550	2,900	103.6	81.7	16,000	8,500	3,600	22.5	42.4
Montana	185	180	155	83.8	86.1	1,500	900	650	43.3	72.2
Nebraska ^{1 2 3}	4,300	4,050	3,050	70.9	75.3	12,500	10,000	4,000	32.0	40.0
Nevada	14	7.0	7.5	53.6	107.1	140	140	100	71.4	71.4
New Hampshire	6	3.0	4.0	66.7	133.3	750	400	250	33.3	62.5
New Jersey	25	34.0	14.0	56.0	41.2	700	650	400	57.1	61.5
New Mexico	27	5.0	3.0	11.1	60.0	900	500	400	44.4	80.0
New York	103	66	80	77.7	121.2	2,900	1,800	1,100	37.9	61.1
N. Carolina ^{1 2 3}	2,800	8,200	9,300	332.1	113.4	10,000	6,000	3,600	36.0	60.0
North Dakota	265	280	185	69.8	66.1	2,100	1,500	700	33.3	46.7
Ohio ^{1 2 3}	2,000	1,800	1,490	74.5	82.8	13,600	8,500	5,200	38.2	61.2
Oklahoma	215	1,000	2,310	1,074.4	231.0	5,200	3,400	2,700	51.9	79.4
Oregon ¹	80	45	32	40.0	71.1	2,400	1,600	1,000	41.7	62.5
Pennsylvania ^{1 2 3}	920	1,000	1,030	112.0	103.0	7,500	4,600	3,300	44.0	71.7
Rhode Island	5.3	3.0	2.5	47.2	83.3	90	60	50	55.6	83.3
S. Carolina	400	350	290	72.5	82.9	5,500	2,000	900	16.4	45.0
South Dakota ^{2 3}	1,770	1,450	1,320	74.6	91.0	7,700	5,400	1,900	24.7	35.2
Tennessee ^{1 2}	620	500	230	37.1	46.0	8,500	4,000	1,500	17.6	37.5
Texas ³	550	500	920	167.3	184.0	11,000	7,000	4,300	39.1	61.4
Utah	33	62	550	1666.7	887.1	900	700	500	55.6	71.4
Vermont	5	2.5	2.5	50.0	100.0	1,100	400	250	22.7	62.5
Virginia ¹	430	380	425	98.8	111.8	3,500	1,800	1,200	34.3	66.7
Washington	56	51	27	48.2	52.9	2,500	1,400	800	32.0	57.1
W. Virginia	30	22.0	10	33.3	45.5	2,300	1,400	1,000	43.5	71.4
Wisconsin ^{1 2 3}	1,200	880	610	50.8	69.3	9,400	5,700	2,700	28.7	47.4
Wyoming	20	73	108	540.0	147.9	400	350	200	50.0	57.1
U. S. ^{4 5 6}	54,416	58,201	59,110	108.6	101.6	268,140	168,450	87,470	32.6	51.9

¹Participated in 1990 National Swine Survey²Participated in Swine '95 Study³Participated in Swine 2000 Study⁴Total States participating in 1990 National Swine Survey: 18⁵Total States participating in Swine '95: 16⁶Total States participating in Swine 2000: 17

C. World Pork Production Changes

1. Inventories by country

Pork production increased 7 percent worldwide between 1991 and 2001.

Korea, the Philippines, Canada, Mexico, and the People's Republic of China had significant increases in pig inventory during this period.

a. Changes in pig inventories in selected countries:*

Continent and Country		Jan. 1, 1991	Jan. 1, 1996	Jan. 1, 2001
		1,000 Head	1,000 Head	1,000 Head
North America	Canada	10,172	11,588	13,576
	Mexico	8,593	11,100	10,649
	United States	54,416	58,201	59,110
	<i>Subtotal</i>	73,181	80,889	83,335
South America	Brazil	32,550	32,068	32,440
	<i>Subtotal</i>	32,550	32,068	32,440
European Union—15		116,668	115,959	123,261
Eastern Europe	Bulgaria	4,187	2,140	1,143
	Czech Republic	4,630	4,024	3,594
	Hungary	8,000	5,032	4,834
	Poland	19,739	20,343	16,988
	Romania	12,003	7,960	4,797
	<i>Subtotal</i>	48,559	39,499	31,356
Former Soviet Union	Russian Federation	38,314	22,630	15,780
	Ukraine	19,427	13,144	7,652
	<i>Subtotal</i>	57,741	35,774	23,432
Asia	China, Peoples Republic of	362,408	441,692	446,815
	Japan	11,355	9,900	9,785
	Korea, Republic of	4,528	6,461	7,350
	Philippines	8,007	9,023	11,715
	Taiwan	8,565	10,510	7,495
	<i>Subtotal</i>	394,863	477,586	483,160
Oceania	Australia	2,530	2,600	2,748
	<i>Subtotal</i>	2,530	2,600	2,748
Total		726,092	784,375	779,732

*Statistical data provided by Foreign Agriculture Service (FAS)

b. Changes in pig inventory percentages in selected countries:*

Country and Continent		2001 as Pct. of 1991	2001 as Pct. of 1996
		Percent	Percent
North America	Canada	133.5	117.2
	Mexico	123.9	95.9
	United States	108.6	101.6
	<i>Subtotal</i>	113.9	103.0
South America	Brazil	99.7	101.2
	<i>Subtotal</i>	99.7	101.2
European Union—15		105.7	106.3
Eastern Europe	Bulgaria	27.3	53.4
	Czech Republic	77.6	89.3
	Hungary	60.4	96.1
	Poland	86.1	83.5
	Romania	40.0	60.3
	<i>Subtotal</i>	64.6	79.4
Former Soviet Union	Russian Federation	41.2	69.7
	Ukraine	39.4	58.2
	<i>Subtotal</i>	40.6	65.5
Asia	China, Peoples Republic of	123.3	101.2
	Japan	86.2	98.8
	Korea, Republic of	162.3	113.8
	Philippines	146.3	129.8
	Taiwan	87.5	71.3
	<i>Subtotal</i>	122.4	101.2
Oceania	Australia	108.6	105.7
	<i>Subtotal</i>	108.6	105.7
Total		107.4	99.4

*Statistical data provided by FAS

Section II: Health and Productivity Changes in the U.S. Pork Industry, NAHMS Population Estimates, 1990, 1995, 2000

A. Farrowing Phase

1. Death loss and productivity¹

Stillbirths and mummies per litter were similar in 1990 and 2000. Born alive per litter increased 5.0 percent, and total born per litter increased 4.0 percent.

Average parity distributions were available for the 1990 study (not shown) but not for the 1995 and 2000 studies. Preweaning deaths per litter were similar in 1990 and 2000. The number of pigs weaned per litter increased by 0.4 pigs per litter.

a. Per litter productivity:

Measure	1990 National Swine Survey ²			Swine '95 (12/94-11/95)			Swine 2000 (12/99-11/00)		
	No.	Std. Error	Pct.	No.	Std. Error	Pct.	No.	Std. Error	Pct.
Stillbirths and mummies per litter	0.87	NA	8.41	0.65	(0.02)	6.49	0.81	(0.04)	7.53
Born alive per litter	9.47	(0.04)	91.59	9.37	(0.07)	93.51	9.94	(0.06)	92.47
Total born per litter	10.34	(0.04)	100.00	10.02	(0.07)	100.00	10.75	(0.08)	100.00
Preweaning deaths per litter	1.10	(0.04)	11.62	0.88	(0.03)	9.39	1.17	(0.03)	11.77
Weaned per litter	8.37	(0.05)	88.38	8.49	(0.06)	90.61	8.77	(0.06)	88.23
Total born alive per litter	9.47	(0.04)	100.00	9.37	(0.06)	100.00	9.94	(0.06)	100.00

¹ Per litter productivity was calculated as a ratio of a weighted sum of events (such as number born) across all sites (numerator) to the weighted sum of farrowings across all sites (denominator).

² Prospective monitoring via diary cards for a 3-month period per farm with farms enrolled at different times covering the entire year.

2. Cause of preweaning piglet deaths, 1990, 1995, and 2000

In all three studies, producers identified piglets “being laid on” as the leading cause of preweaning deaths. The significant decrease in the percentage of scours-related deaths reported between 1990 and 1995 continued in 2000.

Note: The Swine 2000 questionnaire was modified from previous questionnaires to include respiratory cause of death.

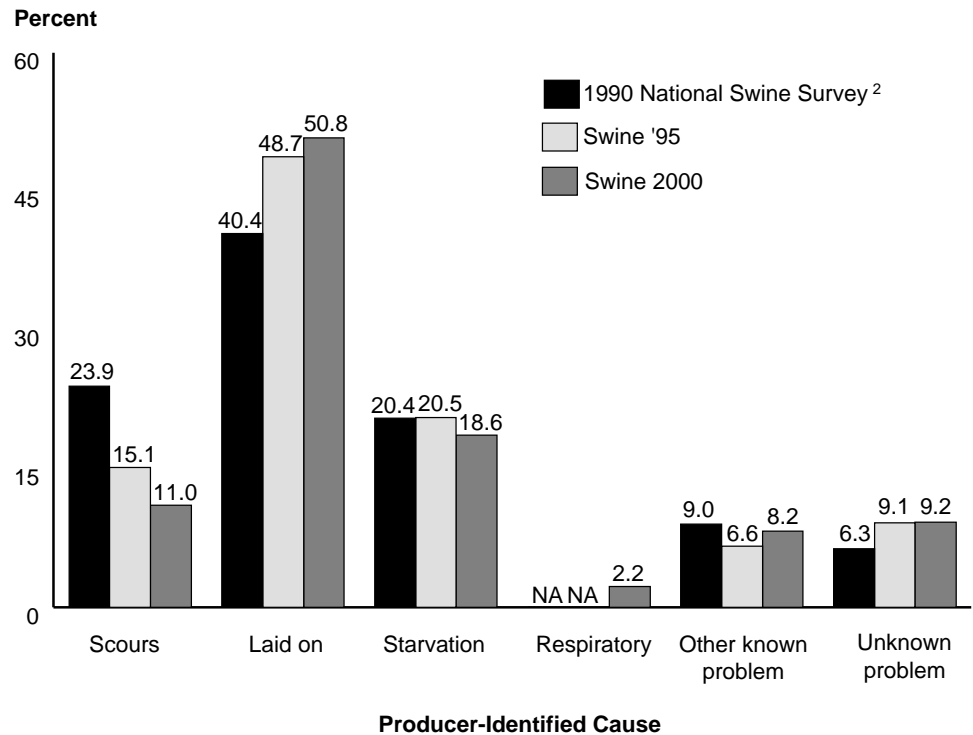
a. Percentage of preweaning deaths¹ by producer-identified cause:

Question Variation	1990 National Swine Survey ²		Swine '95 (12/94-11/95)		Swine 2000 (12/99-11/00)	
	Percent of deaths due to attributed first and second leading causes of death		Percent deaths due to all causes		Percent deaths due to all causes	
Cause	Percent	Std. Error	Percent	Std. Error	Percent	Std. Error
Scours	23.9	(1.5)	15.1	(0.2)	11.0	(1.7)
Laid on	40.4	(1.8)	48.7	(3.4)	50.8	(2.1)
Starvation	20.4	(1.1)	20.5	(2.7)	18.6	(1.9)
Respiratory	NA		NA		2.2	(0.4)
Other known problem	9.0	(1.8)	6.6	(1.0)	8.2	(1.0)
Unknown problem	6.3	(1.5)	9.1	(1.3)	9.2	(1.0)
Total	100.0		100.0		100.0	

¹The change in denominator from percentage of first and second leading causes to percentage of deaths due to all causes will decrease estimates for the most common causes of death and increase estimates for the less frequent causes.

²Percentage of deaths due to attributed first and second leading causes of death.

Percentage of Prewaning Deaths¹ by Producer-Identified Cause, 1990, 1995, 2000



¹ The change in denominator from percentage of first and second leading causes to percentage of deaths due to all causes will decrease estimates for the most common causes of death and increase estimates for the less frequent causes.
² Percentage of deaths due to attributed first and second leading causes of death.

3. Culling rate of sows, 1990, 1995, and 2000

Since 1990, the percentage of breeding-age females culled over a 12-month period has declined. The reason-specific cull rates (for a 6-month period) rose for lameness from 1995 to 2000. **Note: The categories (reasons for culling) differed between the 1995 and 2000 studies: in 1995, disease was a specific cull reason, whereas in 2000 reproductive failure replaced the disease category.**

a. Percentage of breeding-age females culled over a 12-month period as a percentage of sow and gilt inventory:

1990 National Swine Survey*		Swine '95 (12/94-11/95)		Swine 2000 (12/99-11/00)	
Percent	Standard Error	Percent	Standard Error	Percent	Standard Error
43.5	NA	41.2	(1.7)	37.7	(2.5)

*Prospective monitoring via diary cards for a 3-month period per farm with farms enrolled at different times covering the entire year.

b. Breeding-age females culled from December 1 through May 31, as a percentage of the June 1 sow and gilt inventory for 1995 and 2000, by reason culled:

Reason Culled	Swine '95		Swine 2000	
	Percent Females	Std. Error	Percent Females	Std. Error
Age	8.0	(0.5)	7.3	(0.4)
Lameness	1.9	(0.2)	2.8	(0.3)
Performance	6.9	(0.6)	2.1	(0.1)
Disease	0.5	(0.1)	NA	
Reproductive failure	NA	(--)	3.7	(0.2)
Other	2.5	(0.5)	1.6	(0.3)
Total	19.8		17.5	

B. Nursery Phase

1. Death loss

The nursery mortality rate reported in Swine 2000 was slightly higher than the rates reported in the previous two studies. **Note: The definition of a nursery varied among the studies.**

a. Percentage of nursery pigs that died during the nursery phase:

1990 National Swine Survey ^{1,2}		Swine '95 ³ (12/94-5/95)		Swine 2000 ³ (12/99-5/00)	
Percent	Std. Error	Percent	Std. Error	Percent	Std. Error
2.4	(0.1)	2.3	(0.1)	2.6	(0.1)

¹Question variation: nursery unit, all weaned pigs less than 40 pounds.

²Based on questionnaire for a 3-month period prior to the interview; farms enrolled at different times covering the entire year.

³Question variation: nursery unit, physically separate unit.



2. Cause of nursery pig deaths

Scours was the leading cause of nursery pig deaths in 1990 (25.1 percent), while respiratory problems accounted for the highest mortality in 1995 (32.4 percent) and 2000 (28.9 percent). Starvation also caused a higher percentage of total nursery-phase deaths in 1995 and 2000 than in 1990. Causes for about one-fifth of the deaths remain unknown.

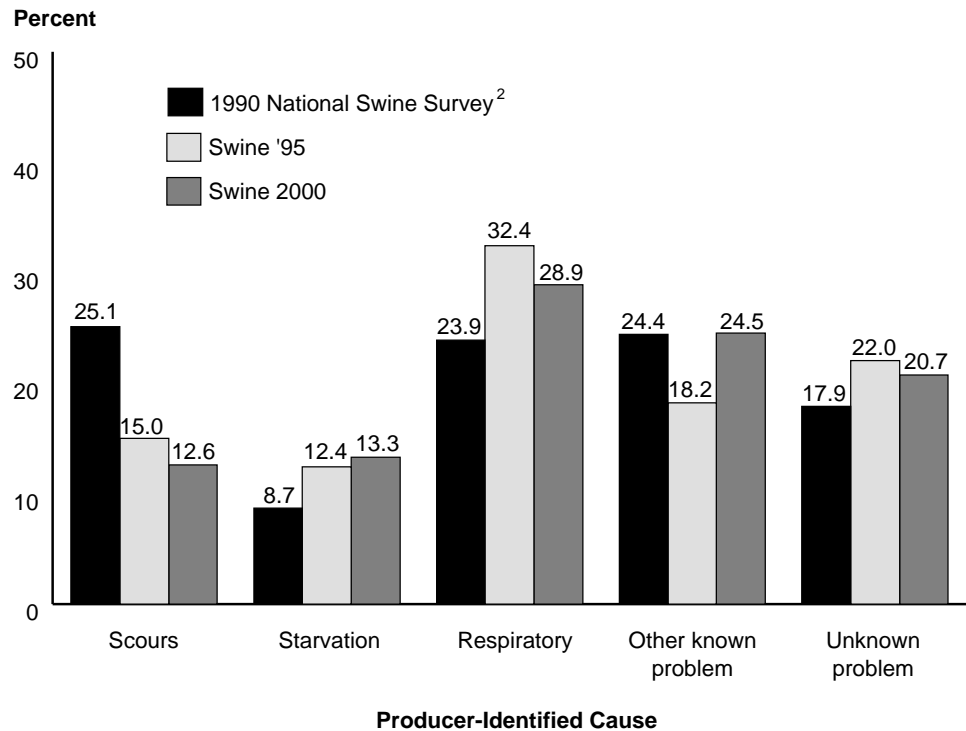
a. Percentage of nursery pig deaths¹ by producer-identified cause:

Question Variation	1990 National Swine Survey ²		Swine '95 (12/94-5/95)		Swine 2000 (12/99-5/00)	
	Percent of deaths due to attributed first and second leading causes of death		Percent deaths due to all causes		Percent deaths due to all causes	
Cause	Percent	Std. Error	Percent	Std. Error	Percent	Std. Error
Scours	25.1	(2.7)	15.0	(1.7)	12.6	(1.2)
Starvation	8.7	(1.2)	12.4	(1.8)	13.3	(1.1)
Respiratory	23.9	(2.5)	32.4	(2.5)	28.9	(1.7)
Other known problem	24.4	(3.6)	18.2	(2.8)	24.5	(3.4)
Unknown problem	17.9	(1.7)	22.0	(2.5)	20.7	(3.5)
Total	100.0		100.0		100.0	

¹The change in denominator from percentage of first and second leading causes to percentage of deaths due to all causes will decrease estimates for the most common causes of death and increase estimates for the less frequent causes.

²Percentage of deaths due to attributed first and second leading causes of death.

Percentage of Nursery-Pig Deaths¹ by Producer-Identified Cause, 1990, 1995, 2000



¹The change in denominator from percentage of first and second leading causes to percentage of deaths due to all causes will decrease estimates for the most common causes of death and increase estimates for the less frequent causes

²Percentage of deaths due to attributed first and second leading causes of death

**C. Grower/
Finisher Phase**

1. Death loss

A sharp rise in the grower/finisher mortality rate occurred between 1990 and 2000.

a. Percentage of grower/finisher pigs that died in the grower/finisher phase or in the grower/finisher unit:

1990 National Swine Survey (12 months)		Swine '95 (12/94-5/95)		Swine 2000 (12/99-5/00)	
Percent	Std. Error	Percent	Std. Error	Percent	Std. Error
1.8	(0.1)	2.1	(0.1)	2.9	(0.1)

2. Cause of grower/finisher pig deaths

The percentage of grower/finisher deaths attributed to various causes did not change significantly between 1995 and 2000.

a. Percentage of grower/finisher deaths¹ by producer-identified cause:

Question Variation	1990 National Swine Survey ²		Swine '95 (12/94-5/95)		Swine 2000 (12/99-5/00)	
	Percent of deaths due to attributed first and second leading causes of death		Percent of deaths due to all causes		Percent of deaths due to all causes	
Cause	Percent	Std. Error	Percent	Std. Error	Percent	Std. Error
Scours	1.9	(0.4)	7.5	(1.2)	5.3	(2.0)
Lameness	7.9	(0.8)	8.0	(0.7)	8.4	(0.8)
Trauma	8.6	(1.3)	6.7	(0.6)	8.0	(0.5)
Respiratory problem	47.9	(2.6)	40.2	(2.1)	39.1	(2.0)
Stress	NA		NA		6.7	(0.6)
Other known problem	14.9	(1.9)	17.2	(1.9)	14.2	(1.5)
Unknown problem	18.8	(1.9)	20.4	(1.7)	18.3	(1.4)
Total	100.0		100.0		100.0	

¹ The change in denominator from percentage of first and second leading causes to percentage of deaths due to all causes will decrease estimates for the most common causes of death and increase estimates for less frequent causes.

²First and second leading causes (see piglet cause of death).

D. Swine diseases**1. Seroprevalence of porcine respiratory and reproductive syndrome (PRRS) virus, 1990, 1995, and 2000**

As determined by serology on blood collected during the studies, the percentage of nonvaccinated breeding herds with at least one breeding female testing positive for PRRS increased steadily from one-third of sites in 1990 to nearly two-thirds of sites in 2000.

a. Percentage of sites with animals testing positive for PRRS via serology (and within-herd prevalence):

Measure	1990 National Swine Survey ¹	Swine '95 ²	Swine 2000 ³
Percentage sites	35.7	47.7	62.0
Average percentage of sows/gilts positive per site	33.0	23.9	21.0

¹IFA test dilution 1:20; n = 3,372 samples from 412 sites. Up to 10 samples per farm collected from farrowing sows.

²Samples restricted to nonvaccinated, gestating sows (n = 2,359 samples from 174 sites). IFA test dilution 1:20. Up to 15 samples collected from gestating sows per site.

³Samples restricted to nonvaccinated, gestating sows (n = 3,732 samples from 150 sites). IDEXX ELISA SP ratio 0.4 used as cutoff for positive. Up to 30 samples collected from gestating sows per sites.

2. Diseases reported in 12-month period

Salmonella, swine dysentery, transmissible gastroenteritis (TGE), and *Actinobacillus pleuropneumoniae* (APP) declined in the breeding herds from 1995 to 2000, whereas the percentage of breeding herds affected with clinical PRRS remained the same. A similar pattern was seen in nurseries and grower/finisher units, except that the percentage of nurseries affected with swine dysentery did not decline.

a. Percentage of sites where the following diseases were diagnosed in the **breeding herd** by a veterinarian or laboratory during the 12 months prior to the interview:

Diseases	Swine '95		Swine 2000	
	Percent	Std. Error	Percent	Std. Error
TGE	5.2	(1.4)	1.8	(0.5)
PRRS	16.7	(2.6)	16.2	(2.6)
<i>Salmonella</i>	4.6	(1.9)	0.8	(0.3)
Swine dysentery	5.2	(2.1)	0.1	(0.1)
APP	5.3	(2.0)	1.5	(0.4)

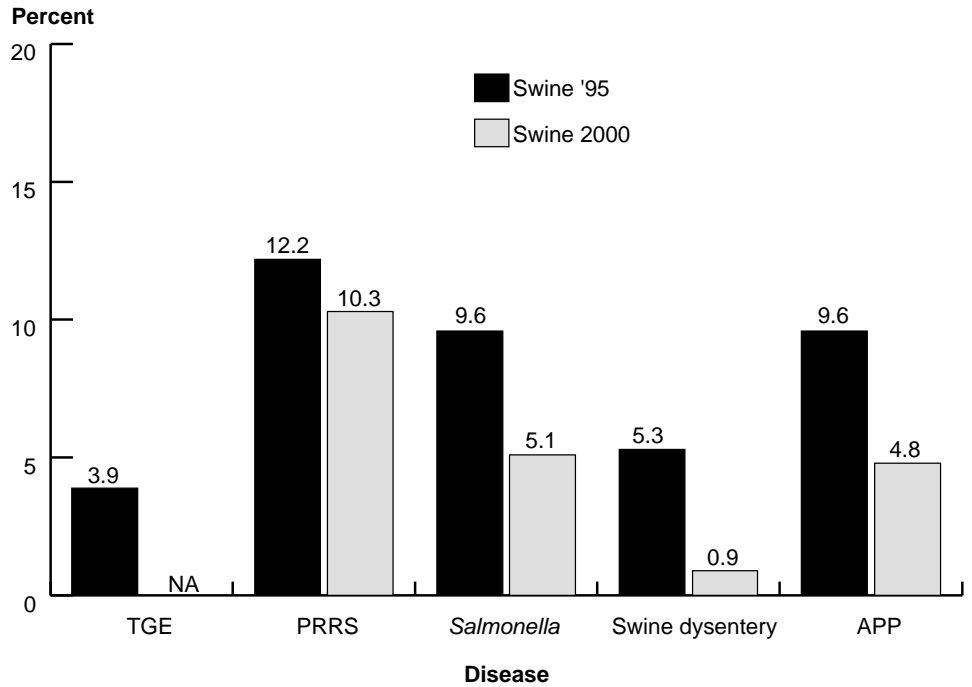
b. Percentage of sites where the following diseases were diagnosed in **nursery pigs** by a veterinarian or laboratory during the 12 months prior to the interview:

Disease	Swine '95		Swine 2000	
	Percent	Std. Error	Percent	Std. Error
TGE	3.8	(1.3)	0.6	(0.3)
PRRS	9.7	(1.9)	11.6	(3.2)
<i>Salmonella</i>	8.6	(2.1)	4.5	(1.0)
Swine dysentery	1.2	(0.6)	1.8	(0.9)
APP	6.0	(2.0)	3.8	(0.9)

c. Percentage of sites where the following diseases were diagnosed in **grower/finisher pigs** by a veterinarian or laboratory during the 12 months prior to the interview:

Disease	Swine '95		Swine 2000	
	Percent	Std. Error	Percent	Std. Error
TGE	3.9	(1.3)	NA	(--)
PRRS	12.2	(2.1)	10.3	(1.7)
<i>Salmonella</i>	9.6	(2.5)	5.1	(1.1)
Swine dysentery	5.3	(1.7)	0.9	(0.4)
APP	9.6	(2.1)	4.8	(0.9)

Percentage of Sites Where the Following Diseases Were Diagnosed in Grower/Finisher Pigs by a Veterinarian or Laboratory During the 12 Months Prior to the Interview



Section III: Management Changes in the U.S. Pork Industry, NAHMS Population Estimates, 1990, 1995, 2000

A. Breeding Animals

1. Mating techniques

There was nearly a fourfold increase in the percentage of sites using artificial insemination over the 10-year period (6.6 percent in 1990 to 23.2 percent in 2000). Almost three-fourths (72.6 percent) of the 2000 sow and gilt inventory were bred by artificial insemination, up from 1.0 percent in 1990. Pen-mating using multiple females and one or more boars continued to be the mating technique used on most sites, although its use declined from 86.1 percent of sites in 1990 to 73.3 percent of sites in 2000. However, sow and gilt inventory bred with this method dropped sharply from 67.1 percent of sows/gilts in 1990 to 25.9 percent in 2000.

a. For sites with 100 or more head, percentage of sites by mating techniques used in any sows and gilts:

Mating Techniques	1990 National Swine Survey		Swine '95 (12/94-5/95)		Swine 2000* (in 3 months prior to interview)	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Hand-mated individually by artificial insemination	6.6	NA	11.3	(1.6)	23.2	(1.7)
Hand-mated individually naturally	24.6	NA	25.8	(2.4)	13.0	(1.3)
Pen-mated with multiple females and one or more boars	86.1	NA	83.4	(1.6)	73.3	(1.8)

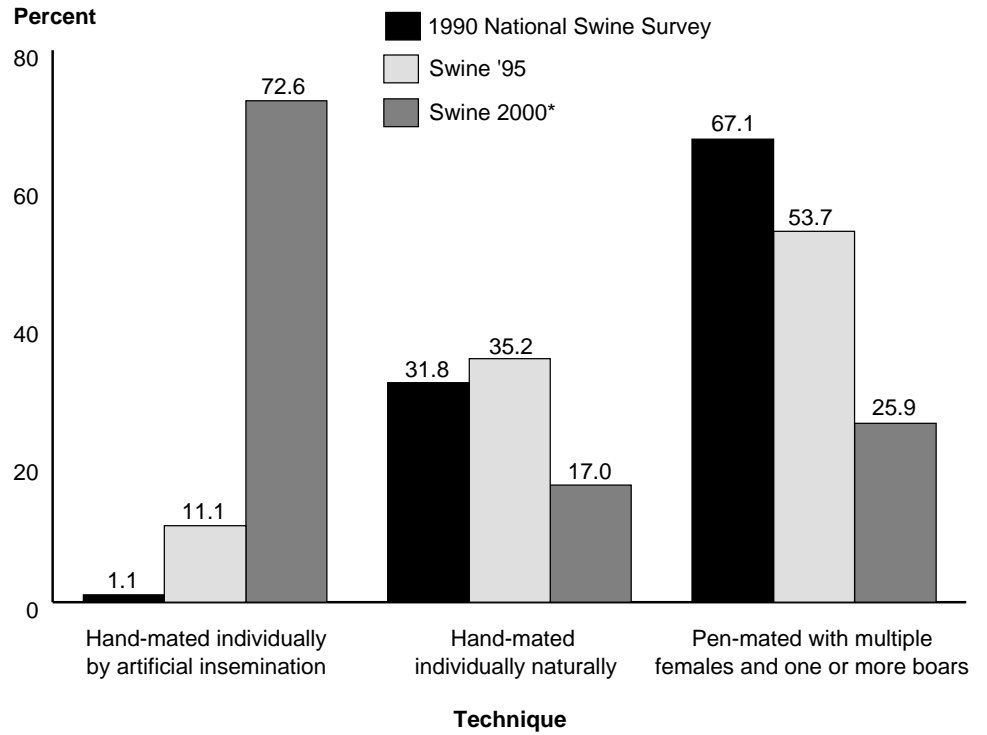
*Sites may have used more than one technique

b. Percentage of sows and gilts mated by the following techniques:

Mating Techniques	1990 National Swine Survey		Swine '95 (12/94-5/95)		Swine 2000* (12/99-5/00)	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Hand-mated individually by artificial insemination	1.1	NA	11.1	(1.2)	72.6	(2.2)
Hand-mated individually naturally	31.8	NA	35.2	(2.1)	17.0	(2.9)
Pen-mated with multiple females and one or more boars	67.1	(2.6)	53.7	(2.5)	25.9	(2.1)

*Sows may have received more than one technique for first two matings

Percentage of Sows and Gilts Mated by the Following Techniques, 1990, 1995, 2000



*Sows may have received more than one technique for first two matings

2. Preventive practices for sows and gilts

In general, the percentage of sites using routine preventive practices (deworming, mange/lice treatment, prophylactic antibiotics) in sows and gilts declined between 1995 and 2000, particularly the percentage of sites using mange/lice treatment. A similar pattern was seen on sites with boars.

a. For sites with sows and gilts on-site and with 100 or more head, percentage of sites that reported regular use of the following preventive practices:

Practice	Swine '95		Swine 2000	
	Percent	Std. Error	Percent	Std. Error
Deworm	88.7	(1.5)	83.0	(1.9)
Mange/lice treatment	81.2	(2.0)	67.9	(2.3)
Antibiotics in feed	49.0	(2.8)	43.5	(2.5)
Antibiotics in water	5.1	(1.1)	2.5	(0.6)
Antibiotics – injection	37.4	(2.7)	38.5	(2.4)

3. Preventive practices for boars

a. For sites with boars on-site and with 100 or more head, percentage of sites that reported regular use of the following preventive practices:

Practice	Swine '95		Swine 2000	
	Percent	Std. Error	Percent	Std. Error
Deworm	85.8	(1.7)	76.8	(2.1)
Mange/lice treatment	78.8	(2.1)	65.0	(2.3)
Antibiotics in feed	39.7	(2.7)	33.6	(2.4)
Antibiotics in water	4.5	(1.1)	2.5	(0.6)
Antibiotics by injection	28.9	(2.6)	25.6	(2.0)

B. Suckling Piglets

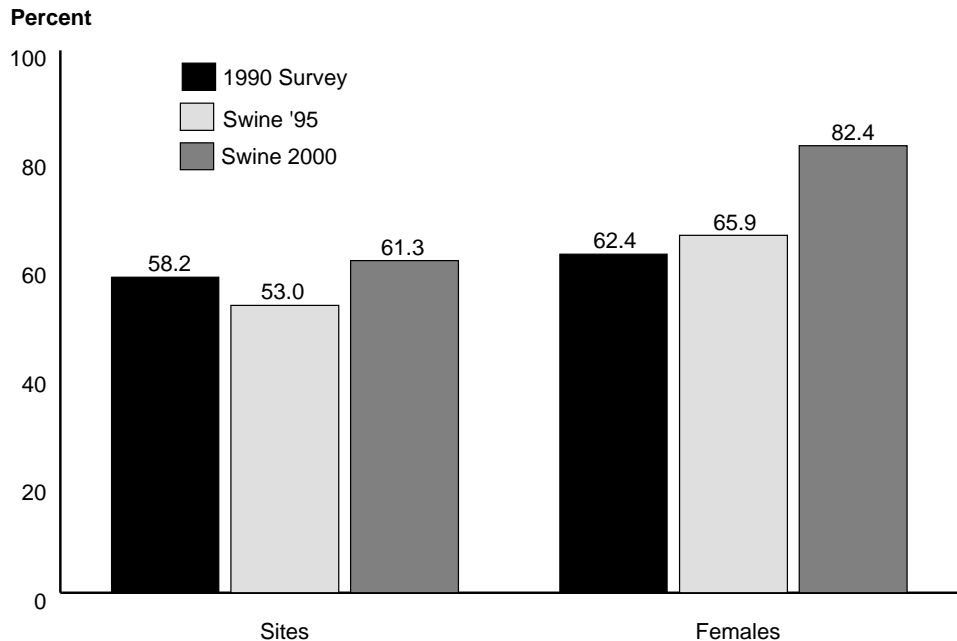
1. Pig flow management

In all three studies, over half of sites with 100 or more head practiced all-in/all-out management in the farrowing phase. The overall inventory of females on sites practicing all-in/all-out farrowing increased from 62.4 percent in 1990 to 82.4 percent in 2000. The use of all-in/all-out farrowing was more common on larger sites.

a. Percentage of sites practicing all-in/all-out management in the farrowing phase and percentage of females on these sites:

Sites/Females	1990 National Swine Survey		Swine '95		Swine 2000	
	Percent	Std. Error	Percent	Std. Error	Percent	Std. Error
Sites with:						
1 or more head	48.2	(2.5)	46.2	(2.5)	NA	NA
100 or more head	58.2	NA	53.0	(2.7)	61.3	(2.5)
Females on these sites with:						
1 or more head	55.1	(2.9)	65.5	(2.5)	NA	NA
100 or more head	62.4	NA	65.9	(2.5)	82.4	(1.9)

For Sites With 100 or More Head, Percentage of Sites Practicing All-In/All-Out Management in the Farrowing Phase and Percentage of Females on These Sites



2. Waste management

The reported difference in waste management practices may be due in part to the fact that the question asked in the 1990 National Swine Survey was changed in 1995 to reflect the type of waste management system “used most” rather than “ever used.” The waste management system most frequently “ever used” in 1990 was hand cleaning (41.6 percent of sites). Hand cleaning declined from 28.3 percent of sites in 1995 to 11.6 percent of sites in 2000, most likely due to the exit of many small producers from the industry (see graph p12). In 1995 and 2000, pit-holding was used most.

a. For sites with total confinement farrowing facilities, percentage of sites by type of waste management system used in the farrowing phase:

Question variation	1990 National Swine Survey		Swine '95		Swine 2000	
	Ever used		Used most		Used most	
Waste Management System	Percent	Std. Error	Percent	Std. Error	Percent	Std. Error
None	0.1	(0.1)	5.1	(1.9)	1.6	(0.6)
Pit-holding	29.2	(2.5)	41.1	(2.9)	51.1	(2.8)
Mechanical scraper/tractor	12.1	(3.3)	10.1	(1.8)	8.6	(1.6)
Hand cleaned	41.6	(4.9)	28.3	(3.1)	11.6	(2.6)
Flush-under slats	16.5	(2.2)	9.7	(1.3)	21.8	(2.1)
Flush-open gutter	7.0	(1.4)	3.2	(0.9)	3.9	(0.9)
Other	7.9	(1.7)	2.5	(0.8)	1.4	(0.4)
Total	NA*		100.0		100.0	

*Not applicable

3. Preventive practices

In general, the percentage of sites using routine preventive practices in suckling piglets declined since 1995, particularly the percentage using mange/lice treatment and deworming. The percentage of sites that routinely administered iron to piglets declined from 85.6 percent in 1990 to 75.4 percent in 2000. However, the percentage of pigs weaned on sites that administered iron remained above 90 percent in all three studies.

a. For sites that had a farrowing phase, percentage of sites reporting regular use of preventive practices on piglets before or at weaning:

Preventive Practice	1990 National Swine Survey		Swine '95 ¹ (12/94-5/95) 100 or More Head		Swine 2000 ¹ (12/99-5/00) 100 or More Head	
	Percent	Std. Error	Percent	Std. Error	Percent	Std. Error
Deworm	48.0	(2.9)	67.4	(2.4)	31.8	(2.3)
Mange/lice treatment	40.2	(2.9)	65.9	(2.4)	29.0	(2.2)
Antibiotics – injection	32.7	(2.7)	49.2	(2.8)	44.2	(2.3)
Iron – oral or injection	85.6	NA	82.8	(2.0)	75.4	(2.2)

¹100 or more head

4. Average weaning age

A significant drop in average weaning age occurred between 1995 and 2000, with the average weaning age of pigs in 2000 at less than 20 days of age.

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

1990 National Swine Survey		Swine '95 (12/94-5/95)		Swine 2000 (12/99-5/00)	
Average Age	Standard Error	Average Age	Standard Error	Average Age	Standard Error
28.8	(0.3)	25.7	(0.5)	19.3	(0.2)



C. Nursery Pigs

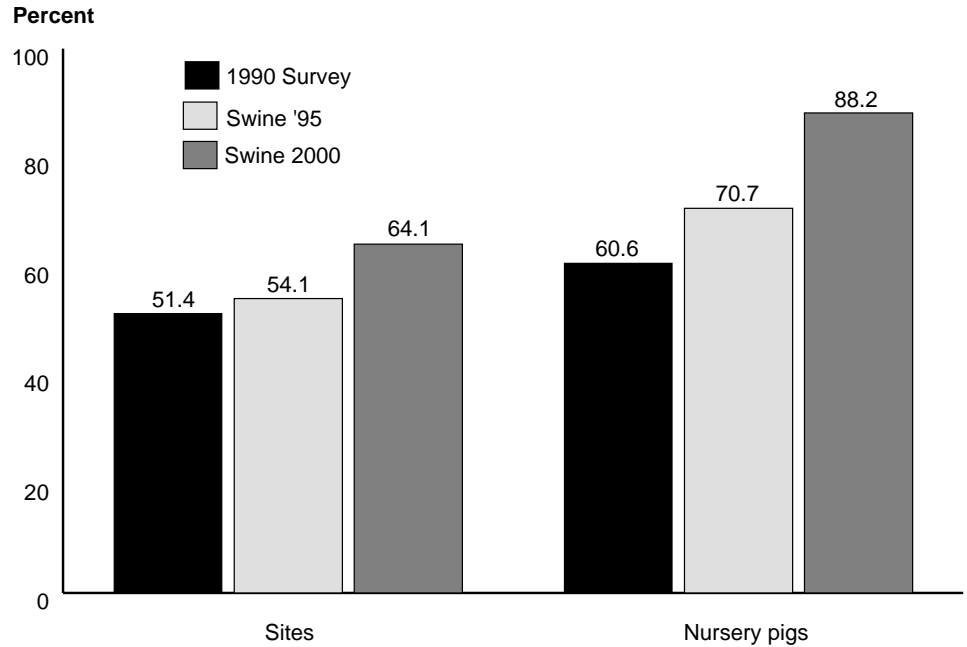
1. Pig flow management

On sites with 100 or more head, the percentage of nursery pigs managed as all-in/all-out increased from 60.6 percent in 1990 to 88.2 percent in 2000. The percentage of sites practicing all-in/all-out management in the nursery rose from half to two-thirds of sites, mostly from 1995 to 2000. Some of the difference may be due to a change in the questionnaire definition of a nursery unit, as well as consolidation of swine onto larger farms, which were more likely to practice all-in/all-out pig flow.

a. For sites with a nursery phase, percentage of sites practicing all-in/all-out management in the nursery phase and percentage of nursery pigs on these sites:

Sites/Nursery Pigs	1990 National Swine Survey		Swine '95		Swine 2000	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Nursery unit definition	All weaned pigs less than 40 lbs.		Physically separate unit		Physically separate unit	
Sites with:						
1 or more head	47.8	(3.5)	48.2	(2.8)	NA	NA
100 or more head	51.4	NA	54.1	(2.9)	64.1	NA
Nursery pigs on these sites with:						
1 or more head	53.5	(3.3)	69.8	(2.5)	NA	NA
100 or more head	60.6	NA	70.7	(2.6)	88.2	NA

For Sites With a Nursery Phase and 100 or More Head, Percentage of Sites Practicing All-In/All-Out Management in the Nursery Phase and Percentage of Nursery Pigs on These Sites



2. Age leaving nursery

On average, pigs left the nursery at 63.3 days of age in 2000, a slight increase from 1995.

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

1990 National Swine Survey		Swine '95		Swine 2000	
Average Age	Standard Error	Average Age	Standard Error	Average Age	Standard Error
62.0	(0.5)	60.3	(0.8)	63.3	(0.5)

D. Grower/ Finisher Pigs

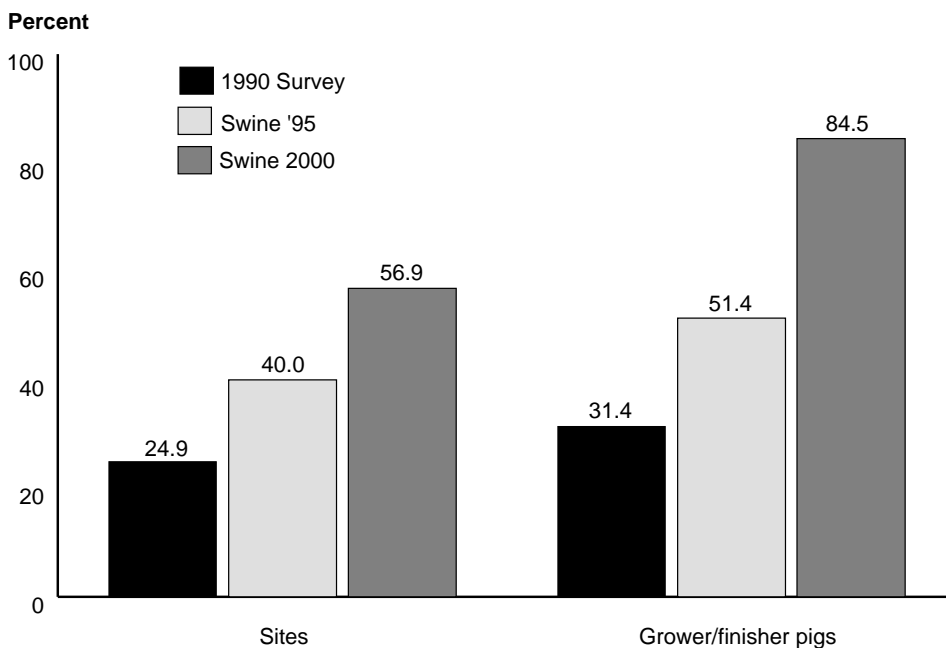
1. Pig flow management

On sites with 100 or more head, the percentage of sites that used all-in/all-out in the grower/finisher phase increased steadily from 24.9 percent of sites in 1990 to 56.9 percent of sites in 2000. The percentage of pigs managed as all-in/all-out almost tripled from 1990 to 2000. Larger sites adopted all-in/all-out management in the grower/finisher phase more frequently than smaller sites.

a. For sites that had a grower/finisher phase, percentage of sites practicing all-in/all-out management in the grower/finisher phase and percentage of grower/finisher pigs on these sites:

Sites/Grower/Finisher	1990 National Swine Survey		Swine '95		Swine 2000	
	Percent	Std. Error	Percent	Std. Error	Percent	Std. Error
Sites with:						
1 or more head	30.0	(1.9)	42.4	(2.5)	NA	NA
100 or more head	24.9	NA	40.0	(2.5)	56.9	NA
Grower/finisher pigs on these sites with:						
1 or more head	23.9	(1.6)	51.0	(2.2)	NA	NA
100 or more head	31.4	NA	51.4	(2.3)	84.5	NA

For Sites That Had a Grower/Finisher Phase and 100 or More Head, Percentage of Sites Practicing All-In/All-Out Management in the Grower/Finisher Phase and Percentage of Grower/Finisher Pigs on These Sites



2. Market age

The average market age of grower/finisher pigs dropped between 1990 and 1995 but changed little between 1995 and 2000. However, according to NASS data, the average live weight of market hogs at slaughter increased steadily between 1990 and 2000 (250 pounds and 263 pounds, respectively).

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

1990 National Swine Survey		Swine '95		Swine 2000	
Average Age	Std. Error	Average Age	Std. Error	Average Age	Std. Error
180.0	(0.5)	176.4	(1.0)	177.6	(1.1)

E. General Farm Management**1. Vaccination practices**

The general decline in the use of vaccines between 1990 and 1995 continued in 2000. Fewer sites used vaccines for the four diseases included in all three studies. Less than half the sites vaccinated against these pathogens in 2000.

a. Percentage of sites regularly using vaccines against the following diseases, regardless of pig age:

Disease	1990 National Swine Survey		Swine '95		Swine 2000	
	Percent	Std. Error	Percent	Std. Error	Percent	Std. Error
PRRS						
1 or more head	NA	NA	22.6	(1.7)	NA	NA
100 or more head	NA	NA	27.3	(2.0)	28.3	(1.6)
Erysipelas						
1 or more head	69.6	NA	49.0	(2.2)	NA	NA
100 or more head	80.8	NA	65.4	(2.3)	49.5	(1.8)
Escherichia coli scours						
1 or more head	49.9	NA	38.7	(2.1)	NA	NA
100 or more head	58.0	NA	55.3	(2.4)	36.2	(1.8)
Parvovirus						
1 or more head	65.6	NA	44.0	(2.2)	NA	NA
100 or more head	75.2	NA	59.2	(2.5)	46.3	(1.8)
Leptospirosis						
1 or more head	70.5	NA	47.0	(2.2)	NA	NA
100 or more head	81.0	NA	63.0	(2.5)	47.8	(1.8)

2. Isolation or quarantine of new arrivals

One of the most important steps a producer can take to protect a herd from disease is to properly isolate and acclimatize new breeding stock. More sites in 2000 always isolated new breeding stock than sites in 1995. In 2000, about a third of sites (32.0 percent) always isolated new breeding females, and over half of sites (54.8 percent) always isolated new breeding males. The percentage of sites with no new breeding females in 6 months remained essentially unchanged, but the percentage of sites that had no new breeding males declined by half. Health testing of new breeding females declined; 39.7 percent of sites indicated none of the new breeding females were tested in 2000 compared to 27.4 of sites in 1995.

a. For sites with 100 or more head, percentage of sites by frequency of placing new arrivals through a separation or quarantine process:

	Breeding Females				Breeding Males			
	Swine '95		Swine 2000		Swine '95		Swine 2000	
Frequency	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Always	23.8	(2.1)	32.0	(2.2)	43.5	(2.4)	54.8	(2.4)
Sometimes	9.0	(1.3)	8.1	(1.4)	11.1	(1.7)	11.3	(1.6)
Never	22.0	(2.2)	16.9	(1.8)	18.2	(1.8)	20.2	(2.0)
No new arrivals	45.2	(2.6)	43.0	(2.4)	27.2	(2.3)	13.7	(1.5)
Total	100.0		100.0		100.0		100.0	

b. For sites that isolated or quarantined new arrivals and had 100 or more head, percentage of sites that health tested these arrivals (either before or after isolation), by proportion of animals tested:

	Breeding Females				Breeding Males			
	Swine '95		Swine 2000		Swine '95		Swine 2000	
Proportion	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
All	42.0	(4.4)	43.5	(3.7)	44.4	(3.3)	51.8	(3.1)
Some	30.6	(3.8)	16.8	(2.4)	20.0	(2.4)	8.3	(1.4)
None	27.4	(3.6)	39.7	(3.8)	35.6	(3.2)	39.9	(3.2)
Total	100.0		100.0		100.0		100.0	

3. Carcass disposal

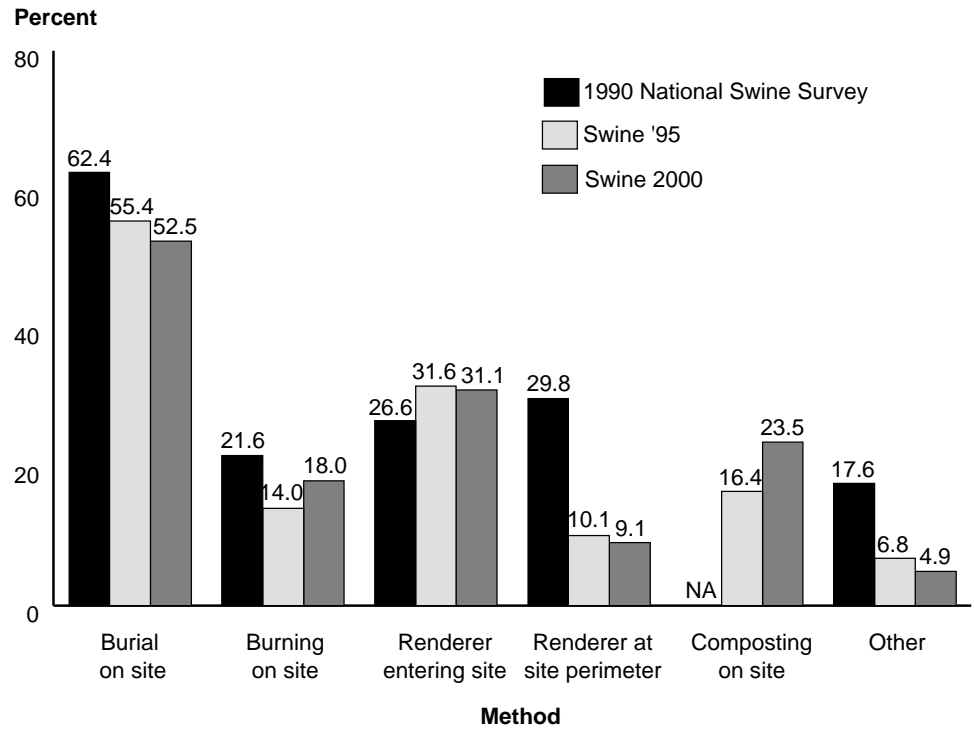
In 2000, most sites continued to dispose of carcasses by burial on the site (52.5 percent of sites), although this method of disposal declined since 1990. Since 1990, use of renderers at site perimeter decreased significantly. There was an increase in the percentage of sites that disposed of carcasses by composting. Almost a fourth of sites composted carcasses in 2000.

a. Percentage of sites by method of carcass disposal:

Method	1990 National Swine Survey		Swine '95 ¹ (12/94-5/94)		Swine 2000 ¹ (12/99-5/00)	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Burial on site	62.4	(3.2)	55.4	(3.0)	52.5	(2.6)
Burning on site	21.6	(2.1)	14.0	(1.8)	18.0	(2.0)
Renderer entering site	26.6	(2.5)	31.6	(2.6)	31.1	(2.5)
Renderer at site perimeter	29.8	(3.3)	10.1	(1.5)	9.1	(1.4)
Composting on site	NA	NA	16.4	(2.1)	23.5	(2.2)
Other	17.6	(2.2)	6.8	(1.4)	4.9	(1.2)

¹100 or more head

Percentage of Sites by Method of Carcass Disposal



4. Rodent control

Cats were the primary means of rodent control in 1990 (87.0 percent of sites), followed closely by bait or poison (85.1 percent of sites). Bait or poison was the most common method in 1995 and 2000 (85.1 percent and 88.5 percent of sites, respectively). The decrease in the use of cats may be due to increased awareness about the role cats play in transmitting pathogens such as *Trichinella spiralis*, *Toxoplasma gondii*, and others. Use of traps for rodent control remained essentially unchanged.

a. For sites with 100 or more head, percentage of sites regularly using rodent control methods:

Method	1990 National Swine Survey		Swine '95		Swine 2000	
	Percent	Std. Error	Percent	Std. Error	Percent	Std. Error
Cats	87.0	NA	68.7	(2.2)	60.6	(1.7)
Traps	14.7	NA	15.9	(1.6)	19.6	(1.5)
Bait or poison	85.1	NA	85.1	(1.9)	88.5	(1.2)
Dog	NA	NA	NA	NA	33.9	(1.8)
Professional exterminator	NA	NA	NA	NA	4.4	(0.5)
Other	5.9	NA	9.5	(1.7)	2.6	(0.9)

5. Proximity to nearest swine farm or market

The percentage of sites within 0.5 miles of another swine site increased from 20.2 percent in 1990 to 28.3 percent in 2000. However, the percentage of sites that had another swine site within 0.5 miles to less than 3.0 miles declined from 62.3 percent in 1990 to 53.5 percent in 2000.

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

Miles	1990 National Swine Survey		Swine '95		Swine 2000	
	Percent	Std. Error	Percent	Std. Error	Percent	Std. Error
Less than .25	7.3	(1.6)	5.1	(0.8)	5.2	(0.8)
.25 to .49	12.9	(1.9)	20.8	(1.7)	23.1	(1.5)
.50 to .99	31.1	(2.9)	21.3	(1.9)	25.6	(1.6)
1.0 to 2.99	31.2	(2.7)	29.1	(2.1)	27.9	(1.5)
3.0 to 4.99	5.6	(1.3)	11.9	(1.7)	9.3	(0.9)
5.0 or more	11.8	(4.0)	11.8	(1.6)	8.9	(0.9)
Unknown	0.1	(0.1)	NA		NA	
Total	100.0		100.0		100.0	



Section IV: Trends in Other National Data Bases

A. Slaughter Condemnation Rates in Federally- Inspected Slaughter Plants, 1990 Through 2000

1. Market pigs

Market pig condemnation rates for deads steadily increased from 0.78 per 1,000 pigs slaughtered in 1990 to 2.85 per 1,000 pigs slaughtered in 2000. This accounted for the largest single reason for market pig condemnation.

Condemnation rates for septicemia and pericarditis have been higher since 1997. Condemnation rates for arthritis gradually declined between 1990 and 2000.

a. Rate of condemnations per 1,000 pigs slaughtered for selected dispositions by year:*

Disease	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Avg.
Deads	0.782	0.775	0.764	0.908	1.130	1.467	2.096	2.454	2.948	2.885	2.847	1.738
Abscess Pyemia	0.233	0.230	0.209	0.168	0.170	0.170	0.209	0.231	0.169	0.151	0.137	0.188
Arthritis	0.153	0.146	0.092	0.091	0.097	0.086	0.092	0.097	0.082	0.059	0.080	0.097
Pneumonia	0.105	0.107	0.097	0.081	0.097	0.088	0.115	0.148	0.120	0.101	0.099	0.105
Septicemia	0.104	0.117	0.084	0.087	0.093	0.089	0.092	0.137	0.119	0.132	0.138	0.108
Erysipelas	0.060	0.057	0.057	0.052	0.053	0.065	0.060	0.050	0.038	0.039	0.046	0.053
Toxemia	0.041	0.033	0.057	0.025	0.025	0.020	0.025	0.032	0.032	0.031	0.046	0.033
Nephritis	0.020	0.021	0.019	0.018	0.015	0.013	0.017	0.019	0.015	0.011	0.015	0.016
Pericarditis	0.014	0.024	0.015	0.010	0.010	0.009	0.011	0.018	0.022	0.031	0.026	0.017

*Source: Food Safety Inspection Service (FSIS)

The number of carcasses condemned for residues dropped significantly from a high of 232 in 1990 to 12 in 2000.

b. Number of condemnations for selected dispositions by year:*

Disease	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Avg.
CNS disorder	327	112	202	288	275	193	271	449	995	381	622	374.1
Residue	232	106	97	129	64	39	81	8	62	22	12	77.5
Metritis	94	132	60	34	27	37	35	21	94	41	33	55.3
Tetanus	--	89	54	4	6	80	--	29	--	1	36	27.2
Actinomycosis	15	--	2	10	2	7	16	1	189	37	50	29.9
Eosinophilic myositis	3	4	21	2	2	--	--	--	19	2	7	5.5
Cysticercosis	1	1	--	--	1	1	--	--	1	1	--	0.5

*Source: FSIS

2. Sows

Cull sow condemnation rates for deads increased dramatically from 1.74 per 1,000 sows slaughtered in 1990 to over 6 per 1,000 sows slaughtered in 2000. Most of this increase occurred since 1995. Condemnation rates for sows due to pneumonia and septicemia also increased since 1995.

a. Rate of condemnations per 1,000 sows slaughtered for selected dispositions, by year:*

Disease	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Avg.
Deads	1.740	1.897	1.631	1.605	1.723	1.992	2.603	3.366	3.022	3.485	6.050	2.759
Abscess Pyemia	1.493	1.215	1.221	1.016	1.098	1.246	1.219	1.097	1.050	1.364	1.586	1.256
Arthritis	0.147	0.169	0.153	0.101	0.080	0.069	0.195	0.031	0.089	0.028	0.053	0.101
Pneumonia	0.406	0.336	0.380	0.332	0.279	0.257	0.501	0.400	0.411	.0475	0.548	0.398
Septicemia	0.311	0.411	0.314	0.305	0.327	0.253	0.311	0.532	0.417	0.404	0.764	0.407
Erysipelas	0.048	0.030	0.025	0.028	0.016	0.018	0.020	0.038	0.035	0.034	0.046	0.031
Toxemia	0.136	0.137	0.128	0.153	0.156	0.162	0.155	0.240	0.279	0.307	0.175	0.180
Nephritis	0.053	0.064	0.069	0.077	0.064	0.054	0.042	0.044	0.046	0.016	0.040	0.052
Pericarditis	0.089	0.108	0.071	0.076	0.079	0.090	0.106	0.041	0.063	0.092	0.127	0.088

Source: FSIS

The number of carcasses condemned for residues decreased dramatically since 1995 (a total of 111 carcasses between 1990 and 1995 compared to 5 carcasses between 1996 and 2000).

b. Number of condemnations for selected dispositions, by year:*

Disease	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Avg.
CNS disorder	90	126	104	124	21	100	59	69	78	23	106	81.8
Residue	21	14	33	27	12	4	3	--	1	1	--	10.5
Metritis	135	186	162	113	69	49	43	216	141	37	49	109.1
Tetanus	1	--	--	7	--	--	4	9	3	4	--	2.5
Actinomycosis	--	3	1	1	4	7	13	1	--	1	1	2.9
Eosinophilic myositis	1	5	1	1	4	7	--	--	1	--	1	1.9
Cysticercosis	1	--	2	1	--	--	--	--	--	--	10	1.3

*Source: FSIS

B. *Salmonella* Serotypes, 1990 Through 2000

1. Most frequently identified serotypes

The table below lists the top 10 *Salmonella* serotypes found in swine, from the most frequent, cholerasuis (var. Kunzendorf) to the least frequent, Worthington (based on 1990 rankings). Cholerasuis (var. Kunzendorf), Derby, and Typhimurium are consistently identified by the National Veterinary Services Laboratories (NVSL) as the most frequent isolates from clinically affected swine. However, each year from 1990 to 2000 these three serotypes accounted for a smaller proportion of the total number of serotypes isolated (from 82 to 31 percent). This trend suggests that there is an increasingly broad distribution of *Salmonella* serotypes being shed by clinically affected swine. *S. Typhimurium* (var. Copenhagen) had been isolated less frequently than *S. Typhimurium* each year until 1996. Since that time *S. Typhimurium* (var. Copenhagen) has become more frequent and has been the most frequently isolated serotype from clinically affected swine since 1998.

a. Most frequently identified *Salmonella* serotypes* from swine, by year:

Serotype	1990		1991		1992		1993		1994		1995	
	Number Isolates	Rank	Number Isolates	Rank	Number Isolates	Rank	Number Isolates	Rank	Number Isolates	Rank	Number Isolates	Rank
Cholerasuis (var. Kunzendorf)	1,047	1	889	1	1,068	1	840	1	238	1	369	1
Derby	71	2	109	2	137	2	107	2	91	2	251	2
Typhimurium	63	3	78	3	97	3	81	3	45	3	95	3
Typhimurium (var. Copenhagen)	37	4	34	5	36	5	40	5	35	4	70	5
Agona	32	5	49	4	61	4	46	4	21	6	84	4
Anatum	19	6	25	6	25	8	27	7	19	8	44	8
Heidelberg	18	7	--	--	32	6	33	6	18	9	64	6
Enteritidis	16	8	18	7	27	7	16	8	--	--	47	7
Infantis	10	9	17	8	--	--	10	9	--	--	--	--
Cholerasuis	7	10	7	10	14	10	8	10	6	10	4	10
Bietri	--	--	--	--	--	--	--	--	--	--	--	--
Brandenburg	--	--	9	9	18	9	--	--	22	5	5	9
Mbandaka	--	--	--	--	--	--	--	--	--	--	--	--
Schwarzengrund	--	--	--	--	--	--	--	--	--	--	--	--
Worthington	--	--	--	--	--	--	--	--	20	7	--	--
Percent of total	91.9		92.9		91.4		90.1		86.1		86.5	
All others	116		95		142		132		83		161	
Total	1,436		1,330		1,657		1,340		598		1,194	

*Source: NVSL—data reflect isolates submitted from clinical cases (1990- 2000) and monitoring for serotyping (1990-1993) and do not necessarily reflect the population of *Salmonella* in swine throughout the United States.

a. Most frequently identified *Salmonella* serotypes* from swine, by year
(continued)

Serotype	1996		1997		1998		1999		2000	
	Number Isolates	Rank	Number Isolates	Rank	Number Isolates	Rank	Number Isolates	Rank	Number Isolates	Rank
Cholerasuis (var. Kunzendorf)	343	1	203	1	185	3	191	2	222	2
Derby	115	2	82	3	205	2	118	4	127	5
Typhimurium	86	4	51	5	108	4	139	3	140	3
Typhimurium (var. Copenhagen)	113	3	161	2	237	1	374	1	410	1
Agona	43	6	33	6	--	--	50	6	52	8
Anatum	32	7	29	7	39	6	35	8	49	9
Heidelberg	69	5	68	4	71	5	82	5	132	4
Enteritidis	--	--	--	--	--	--	--	--	--	--
Infantis	--	--	--	--	24	7	47	7	58	7
Cholerasuis	8	8	--	--	13	9	--	--	--	--
Bietri	--	--	--	--	--	--	0	10	--	--
Brandenburg	--	--	14	8	--	--	--	--	20	10
Mbandaka	6	10	6	10	5	10	8	9	--	--
Schwarzengrund	6	9	--	--	--	--	--	--	--	--
Worthington	--	--	14	9	24	8	--	--	117	6
Percent of total	82.4		87.4		81.2		80.7		84.1	
All others	175		95		211		249		251	
Total	996		756		1,122		1,293		1,578	

*Source: NVSL—data reflect isolates submitted from clinical cases (1990- 2000) and monitoring for serotyping (1990-1993) and do not necessarily reflect the population of *Salmonella* in swine throughout the United States.

Appendix I: Swine Information Materials Available from NAHMS

Index of NAHMS Swine Information, October 2002. Comprehensive directory of past NAHMS Swine reports by subject—30 pages

Part IV: Changes in the U.S. Pork Industry, 1990-2000, April 2005. Compares results of the NAHMS 1990 National Swine Survey, Swine '95 Study, and Swine 2000 Study—50 pages

Part III: Reference of Swine Health & Environmental Management in the United States, 2000, September 2002. Third descriptive report of the NAHMS Swine 2000 study—51 pages.

Part II: Reference of Swine Health & Health Management in the United States, 2000, March 2002. Second descriptive report of the NAHMS Swine 2000 study—66 pages.

Part I: Reference of Swine Health and Management in the United States, 2000, August 2001. First descriptive report of the NAHMS Swine 2000 study—55 pages.

Part III: 1990-95 Changes in the U.S. Pork Industry, October 1997. Compares results of the NAHMS 1990 National Swine Survey and the Swine '95 Study—34 pages.

Part II: Reference of Grower/Finisher Health & Management Practices, May 1995. Second descriptive report of the NAHMS Swine '95 study—24 pages.

Part I: Swine Management Practices, September 1995. First descriptive report of the NAHMS Swine '95 study—24 pages.

Morbidity/Mortality and Health Management of Swine in the United States, November 1991. Descriptive report of the NAHMS 1990 National Swine Survey—40 pages.

These reports as well as several information sheets generated using data from NAHMS swine studies are available at: www.aphis.usda.gov/vs/ceah/ncahs/nahms/swine/swine.htm