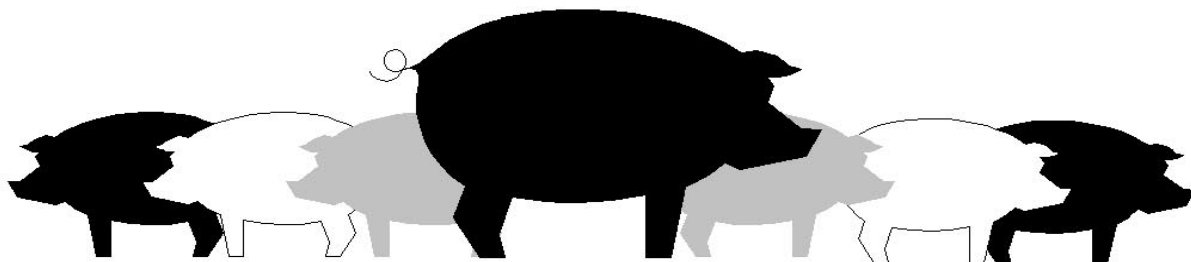
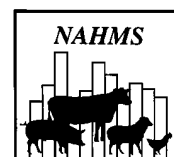


# Part III: Changes in the U.S. Pork Industry 1990-1995



October 1997



## Acknowledgements

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The 1990 National Swine Survey and Swine '95 Study were cooperative efforts between State and Federal agricultural statisticians, animal health officials, university researchers, and extension personnel. We want to thank the National Agricultural Statistics Service (NASS) enumerators and State and Federal Veterinary Medical Officers (VMO's) who visited the farms and collected the data for 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, Veterinary Medical Officer (VMO), Animal Health Technician (AHT), and NASS enumerators were critical in providing quality data for National Swine Survey and Swine '95 reports. All participants are to be commended for their efforts, particularly the producers whose voluntary efforts made the study possible.

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Dr. Nora Wineland, NAHMS Program Leader

# Table of Contents

<b>Introduction</b> .....	<b>1</b>
<b>Terms used in this report</b> .....	<b>2</b>
<b>Section I: Demographic Changes in the U.S. Pork Industry, 1850-1995</b> .....	<b>3</b>
A. Historical changes in the U.S. pork industry .....	3
1. Total hog and pig inventory .....	3
2. Number of swine operations and herd size .....	5
B. Pork industry changes by state .....	7
C. Changes in world pork production .....	9
<b>Section II: Health and Productivity Changes in the U.S. Pork Industry, 1990-1995</b> .....	<b>10</b>
A. Farrowing phase .....	10
1. Death loss and productivity .....	10
2. Cause of death for preweaning pigs, 1990 and 1995 .....	12
3. Culling rate of sows, 1990 and 1995 .....	14
B. Nursery phase .....	14
1. Death loss .....	14
2. Cause of nursery pig deaths .....	15
C. Grower/finisher phase .....	16
1. Death loss .....	16
2. Cause of grower/finisher hog deaths .....	16
D. Swine diseases .....	17
1. Seroprevalence of PRRS virus, 1990 and 1995 .....	17
2. Conditions reported in 12-month period .....	18
<b>Section III: Management Changes in the U.S. Pork Industry, 1990-1995</b> .....	<b>19</b>
A. Breeding animals .....	19
1. Mating techniques .....	19
2. Preventive practices for sows and gilts .....	20
3. Preventive practices for boars .....	20
B. Suckling piglets .....	21
1. Pig flow management .....	21
2. Waste management .....	21

3. Preventive practices .....	22
4. Average weaning age.....	22
C. Nursery pigs.....	23
1. Pig flow management .....	23
2. Age leaving nursery.....	23
D. Grower/Finisher hogs .....	24
1. Pig flow managment .....	24
2. Market age .....	24
E. General farm managment.....	25
1. Business and marketing arrangements .....	25
2. Records.....	26
3. Vaccination practices.....	26
4. Isolation and health testing of new stock.....	27
5. Use of veterinarians .....	28
6. Carcass disposal.....	29
7. Rodent control .....	29
8. Biosecurity.....	30
9. Proximity to nearest swine farm and market.....	31
<b>Section IV: Trends in Other National Data Bases .....</b>	<b>32</b>
A. Slaughter condemnation rates, 1990 through 1995.....	32
1. Market hogs .....	32
B. <i>Salmonella</i> serotypes, 1990 through 1995.....	33
1. Most frequently identified serotypes.....	33
C. Foodborne outbreaks of human illness from pork, 1973-1992.....	34
1. Number of outbreaks .....	34

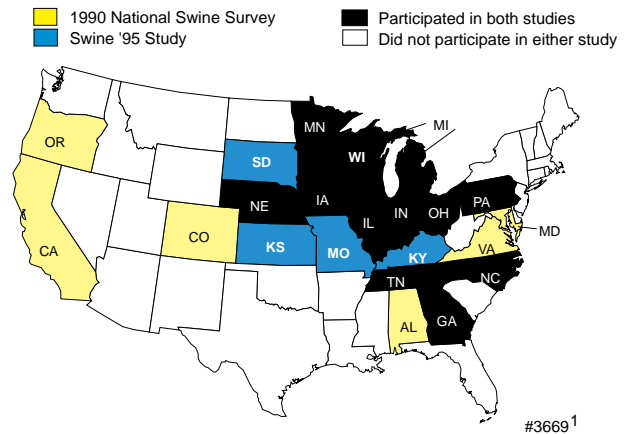
# Introduction

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. They hoped to provide periodic snapshots of 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 shows demographic changes of the U.S. 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 two NAHMS national studies in Sections II and III present an overview of change in U.S. swine management and health during the 5-year period of 1990 through 1995. 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 animal health and management that would serve as a baseline from which to measure industry changes in animal health and management. NAHMS conducted the National Swine Survey in 18 states with a target population of operations with at least one sow. The sample represented 95 percent of the U.S. hog population. National estimates generated from this study are reported in *Morbidity/Mortality and Health Management of Swine in the United States* (November 1991).

**States Participating in NAHMS Swine Studies, 1990 and 1995**



Two national studies were implemented in 1995: the Swine '95 Baseline and the Swine '95: Grower/Finisher studies. Both projects were conducted in the top 16 swine states which represented 91 percent of the United States hog population. The target population for the Baseline study were those producers with at least one hog. Data were collected by two interviews of approximately 1,400 producers. National estimates generated from this study are reported in *Swine '95 Part I: Reference of 1995 Swine Management Practices* (October 1995).

1990 National Swine Survey Sample Profile		Swine '95 Study Sample Profile	
Female Breeding Herd Size	Number of Responding Operations	Number of Hogs & Pigs Sold	Number of Responding Operations
0	7	Less than 2,000	1,136
1-49	495	2,000-9,999	277
50-99	406	10,000 or more	64
100-499	636	Total	1,477
500 or more	117		
Total	1,661		
Type of Operation	Number of Responding Operations	Type of Operation	Number of Responding Operations
Farrow-to-finish	1,304	Farrow-to-finish	915
Grower/finisher	11	Grower/finisher only	359
Producer of feeder pigs	311	Producer of feeder pigs	170
Producer of breeding stock	35	Producer of weaned pigs	23
Total	1,661	Producer of breeding stock	10
		Total	1,477

The Swine '95:Grower/Finisher study was conducted on farm via two interviews on operations with at least 300 market hogs. National estimates generated from this study are reported in *Part II: Reference of 1995 Grower/Finisher Health and Management* (May 1996).

1 Identification numbers are assigned to each graph in this report for public reference.

Interpretation of changes in national estimates between 1990 and 1995 are difficult and may be speculative in nature. Major influences behind differences in estimates may be due to differences in composition of the target population as described above, and we have taken great effort to document the differences in each summary table. Swine '95 estimates may be adjusted to account for major differences in the two study populations, typically for the sub-population of operations with at least one sow. Estimates for these sub-populations are identified as "Swine '95 Comparable" and defined in the appropriate tables. Differences may also occur in the factor being measured, e.g., changes in question wording; random variation; and true secular time trends in the pork industry. We have documented these differences to aid in interpretation.

All NAHMS swine study reports are accessible on the World Wide Web at <http://www.aphis.usda.gov/vs/ceah/cahm> (see NAHMS and Swine Reports). Discussions on selected topics are accessible through [gopher.aphis.usda.gov](http://gopher.aphis.usda.gov) (menu choices: APHIS Information; Animal Health Information; Animal Health Monitoring, Risk Assessments, and Emerging Issues.)

For questions about either report or additional copies, please contact the address shown below.

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## Terms Used in This Report

N/A: not available.

**Population estimates:** averages and proportions weighted to represent the population. Most of the estimates in this report are provided with a measure of variability called the standard error and denoted by ( $\pm$ ). Chances are 95 out of 100 that the interval created by the estimate plus or minus two standard errors will contain the true population value. In the example at right, an estimate of 7.5 with a standard error of  $\pm 1.0$  results in a range 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  $\pm 0.3$  and results in a range of 2.8 and 4.0.

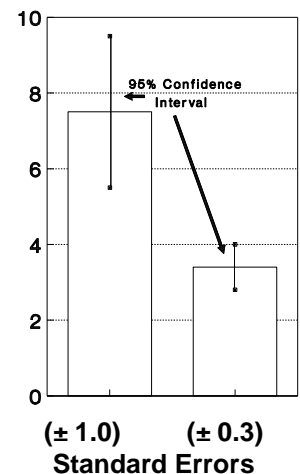
**Operation average:** a single value for each swine operation is summed over all operations reporting divided by the number of operations reporting. For instance, operation average weaning age (shown on page 22) is calculated by summing reported average weaning age over all operations divided by the number of operations.

**Pig average:** a single value for each swine operation multiplied by the number of pigs on that operation is summed over all operations and divided by the number of pigs on all operations. This way, the result is adjusted for the number of pigs on each operation. For the above example from page 22, the average age is multiplied by the number weaned for each operation. This product is then summed over all operations and divided by the sum of pigs weaned over all operations. 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.

**Standard error:** see description under population estimates above.

Examples of a  
95% Confidence Interval



#999

## Section I: Demographic Changes in the U.S. Pork Industry, 1850-1995

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

#### 1. Total Hog and 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 percent rebound increase by 1950. Hog and pig inventory peaked in 1959 at nearly 68 million head. Estimates in subsequent years consistently remained near 55 million head.

With the exception of 1940, the number of hog operations declined dramatically from a high in 1920 in comparison to rather stable inventory levels. The 1992 Census showed only 4 percent of operations had nearly the same inventory as in 1900. As a result, the average herd size increased from less than 20 head in the early and mid 1900's to over 300 in 1992.

a. Changes in U.S. hog and pig inventory, 1850-1992.			
Year*	Total Inventory (1,000 Head)	Operations Reporting	Average Herd Size
1850	30,354	N/A	N/A
1860	33,513	N/A	N/A
1870	25,135	N/A	N/A
1880	49,773	N/A	N/A
1890	57,427	N/A	N/A
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

\* Census of Agriculture data. 1850-1950 includes all states except Alaska and Hawaii. 1959-1992 includes all 50 states.

Each year, the USDA’s National Agricultural Statistics Service (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 in their December *Hogs & Pigs* reports.

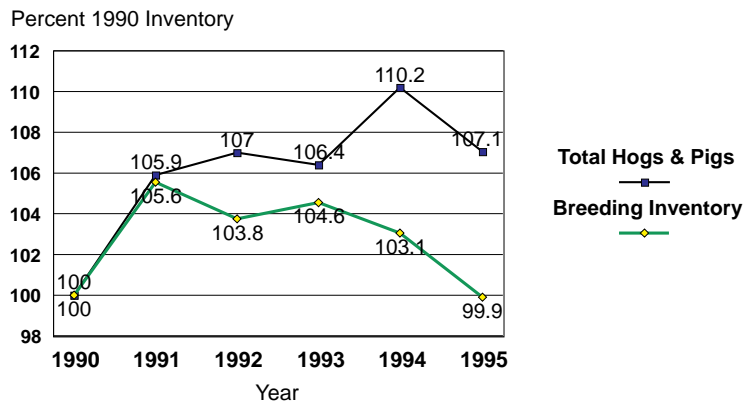
In the 6 years from 1990 through 1995, hog and pig inventory estimates increased approximately 7 percent. Year-to-year inventories varied slightly, but the overall trend was upward. Breeding inventory made up approximately 12 percent of total inventory over the 1990-1995 period, but showed a general downward trend indicating a more productive industry.

b. Changes in the U.S. hog and pig inventory, December 1, 1990-1995.\*

Year	Total Hogs and Pigs			Breeding Inventory			
	1,000 Head	Percent Previous Year	Percent of 1990	1,000 Head	Percent Total Inventory	Percent Previous Year	Percent 1990
1990	54,416	101.2	100.0	6,847	12.6	99.9	100.0
1991	57,649	105.9	105.9	7,229	12.5	105.6	105.6
1992	58,202	101.0	107.0	7,109	12.2	98.3	103.8
1993	57,904	99.5	106.4	7,165	12.4	100.8	104.6
1994	59,990	103.6	110.2	7,060	11.8	98.5	103.1
1995	58,264	97.1	107.1	6,839	11.8	96.9	99.9

\* National Agriculture Statistics Service (NASS) data.

### Percent of U.S. Hog and Pig Inventory as a Percent of 1990 Inventory, 1990-1995\*



\* National Agricultural Statistics Service

#3710



## 2. Number of Swine Operations and Herd Size

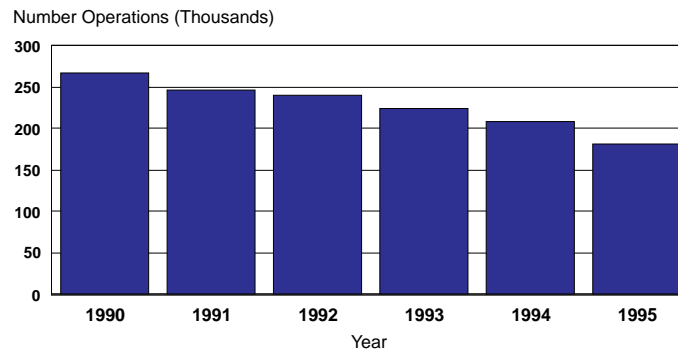
The number of U.S. swine operations has decreased more than 30 percent since 1990. A steady decline has occurred each year, culminating with a nearly 13 percent decrease from 1994 to 1995.

a. Changes in the number of U.S. swine operations, 1990-1995.\*

Year	Number	Percent Previous Year	Percent of 1990
1990	268,140	89.1	100.0
1991	247,090	92.1	92.1
1992	240,150	97.2	89.6
1993	225,210	93.8	84.0
1994	207,980	92.3	77.6
1995	181,750	87.4	67.8

\* National Agriculture Statistics Service (NASS) data.

### Number of U.S. Swine Operations, 1990-1995\*



\* National Agricultural Statistics Service

#3670

The smallest herds, while still representing the majority of U.S. hog operations, are steadily declining in number. The proportion of herds with a total inventory of 1,000 or more head is consistently increasing.

b. Percent of U.S. hog operations by herd size, 1990-1995.\*

Year	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	**
1991	61.4	26.4	7.8	4.4	**
1992	60.2	26.5	8.1	3.6	1.6
1993	61.1	25.3	8.3	3.5	1.8
1994	59.9	25.5	8.5	3.9	2.2
1995	59.4	25.0	8.7	4.3	2.6

\* National Agriculture Statistics Service (NASS) data.  
 \*\* Estimates available for only 1,000 or more head.

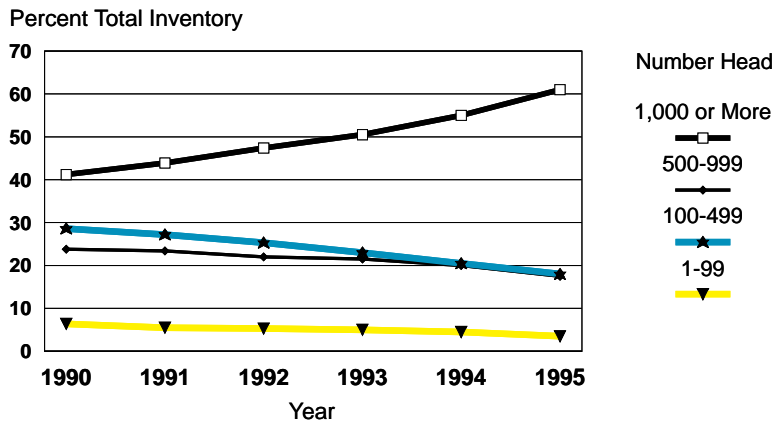
A larger proportion of U.S. hog inventory is shifting to herds consisting of 2,000 or more head.

c. Percent of U.S. hog inventory by herd size, 1990-1995.\*

Year	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	**
1991	5.5	27.2	23.4	43.9	**
1992	5.3	25.3	22.0	18.9	28.5
1993	5.0	23.0	21.5	17.5	33.0
1994	4.5	20.5	20.0	18.0	37.0
1995	3.5	18.0	17.5	17.0	44.0

\* National Agriculture Statistics Service (NASS) data.  
 \*\* Estimates available for only 1,000 or more head.

### Percent of U.S. Hog Inventory by Herd Size, 1990-1995\*



\* National Agricultural Statistics Service

#3711

A steady increase in the number of pigs saved per litter has generally occurred each year since 1990. Note the small seasonal variation shown in 1995.

d. Changes in pigs saved per litter by quarter, 1990-1995.\*

Year	Dec.-Feb.**	% 1990	Mar.-May	% 1990	June-Aug.	% 1990	Sept.-Nov.	% 1990
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	8.15	104.1	8.12	102.3	8.09	102.4	8.05	102.9
1994	8.10	103.4	8.26	104.0	8.22	104.1	8.18	104.6
1995	8.27	105.6	8.32	104.8	8.34	105.6	8.34	106.6

\* Ratio of expected number of pigs weaned to sows/gilts farrowed, National Agriculture Statistics Service (NASS) data.

\*\* December preceding year.

## **B. Pork Industry Changes by State**

---

The following tables describe U.S. pork industry changes between 1990 and 1995 by state based on USDA:National Agricultural Statistics Service data. The tables also identify which states were in two NAHMS national swine studies, the 1990 National Swine Survey and the Swine '95 Study.

Nearly 4 million more hogs and pigs were inventoried in 1995 than in 1990 in the U.S. Significant increases in production of hogs were reported in Alaska, California, Colorado, Mississippi, Missouri, North Carolina, Oklahoma, Utah, and Wyoming. Three states more than doubled their total hog inventory (North Carolina, Oklahoma, and Wyoming). States in the Northeast showed the greatest decline in hog inventory.

The number of U.S. swine operations declined over 30 percent in the 5-year period. Alaska and New Jersey were the only two states that reported increases in number of swine operations from 1990 to 1995.

a. Changes in hog and pig inventories and operations by state (NASS data).								
State	Study Participation		Total Hogs and Pigs (Thousand Head)			Number Operations		
	NSS '90 (Y=Yes)	Swine '95 (Y=Yes)	Dec. 1, 1990	Dec. 1, 1995	1995 as Percent of 1990	1990	1995	1995 as Percent of 1990
Alabama	Y		355	230	64.8	4,500	2,100	46.7
Alaska			1.2	2	166.7	40	50	125.0
Arizona			110	125	113.6	400	400	100.0
Arkansas			760	790	103.9	3,100	2,800	90.3
California	Y		195	240	123.1	4,000	3,800	95.0
Colorado	Y		300	580	193.3	2,000	1,400	70.0
Connecticut			6.9	4	58.0	450	400	88.9
Delaware			31	33	106.5	420	150	35.7
Florida			130	85	65.4	5,000	3,200	64.0
Georgia	Y	Y	1,100	900	81.8	8,000	4,200	52.5
Hawaii			36	34	94.4	500	350	70.0
Idaho			60	45	75.0	2,000	1,100	55.0
Illinois	Y	Y	5,700	4,800	84.2	15,300	9,600	62.7
Indiana	Y	Y	4,400	4,000	90.9	13,000	9,600	73.8
Iowa	Y	Y	13,800	13,400	97.1	35,000	25,000	71.4
Kansas		Y	1,500	1,230	82.0	6,000	4,300	71.7
Kentucky		Y	920	800	87.0	6,500	3,800	58.5
Louisiana			50	55	110.0	2,500	1,200	48.0
Maine			8	7	87.5	1,600	1,600	100.0
Maryland	Y		162	77	47.5	1,400	900	64.3
Massachusetts			33	18	54.5	850	700	82.4
Michigan	Y	Y	1,250	1,100	88.0	5,500	4,700	85.5
Minnesota	Y	Y	4,500	4,950	110.0	15,000	12,000	80.0
Mississippi			149	245	164.4	6,000	3,300	55.0
Missouri		Y	2,800	3,550	126.8	16,000	8,500	53.1
Montana			185	180	97.3	1,500	900	60.0
Nebraska	Y	Y	4,300	4,050	94.2	12,500	10,000	80.0
Nevada			14	8.5	60.7	140	140	100.0
New Hampshire			6	3	50.0	750	400	53.3
New Jersey			25	34	73.5	700	750	107.1
New Mexico			27	5	18.5	900	500	55.6
New York			103	66	64.1	2,900	1,800	62.1
North Carolina	Y	Y	2,800	8,200	292.9	10,000	6,600	66.0
North Dakota			265	280	105.7	2,100	1,400	66.7
Ohio	Y	Y	2,000	1,800	90.0	13,600	12,300	90.4
Oklahoma			215	1,000	465.1	5,200	3,400	65.4
Oregon	Y		80	45	56.3	2,400	1,600	66.7
Pennsylvania	Y	Y	920	1,000	108.7	7,500	5,500	73.3
Rhode Island			5.3	2.8	52.8	90	60	66.7
South Carolina			400	350	87.5	5,500	2,000	36.4
South Dakota		Y	1,770	1,450	81.9	7,700	5,200	67.5
Tennessee	Y	Y	620	500	80.6	8,500	4,000	47.1
Texas			550	500	90.9	11,000	7,000	63.6
Utah			33	62	187.9	900	700	77.8
Vermont			5	2.1	42.0	1,100	450	40.9
Virginia	Y		430	380	88.4	3,500	2,100	60.0
Washington			56	51	91.1	2,500	1,800	72.0
West Virginia			30	22	73.3	2,300	1,400	60.9
Wisconsin	Y	Y	1,200	900	75.0	9,400	6,200	66.0
Wyoming			20	73	365.0	400	400	100.0
U.S.	18	16	54,416	58,264	107.1	268,140	181,750	67.8

## C. Changes in World Pork Production

Pork production increased 8 percent worldwide between 1991 and 1996. Ireland, Korea, Mexico, China, Taiwan, and France each had increased production of 20 percent or more in 1996 compared to 1991. Significant declines in production from 1991 to 1996 were estimated in Germany, Switzerland, several Eastern European countries, the former Soviet Union, and Japan.

a. Changes in hog and pig inventories in selected countries.\*

Country	January 1, 1991 (Thousand Head)	January 1, 1996, Preliminary (Thousand Head)**	1996 as Percent of 1991
Canada	10,172	12,097	118.9
Mexico	8,593	11,118	129.4
United States	54,416	58,264	107.1
<b>Total: North America</b>	<b>73,181</b>	<b>81,479</b>	<b>111.3</b>
Brazil	32,550	32,497	99.8
<b>Total: South America</b>	<b>32,550</b>	<b>32,497</b>	<b>99.8</b>
Austria	3,688	3,706	100.5
Belgium-Luxembourg	6,496	7,153	110.1
Denmark	9,282	10,709	115.4
France	12,013	14,524	120.9
Germany	30,818	23,736	77.0
Greece	1,141	1,070	93.8
Ireland	1,069	1,542	144.2
Italy	8,837	7,964	90.1
Netherlands	13,788	13,958	101.2
Portugal	2,664	2,400	90.1
Spain	16,001	18,600	116.2
Sweden	2,201	2,330	105.9
United Kingdom	7,380	7,351	99.6
<b>Total: European Union</b>	<b>115,378</b>	<b>115,043</b>	<b>99.7</b>
Switzerland	1,723	1,425	82.7
<b>Total: Other Western Europe</b>	<b>1,723</b>	<b>1,425</b>	<b>82.7</b>
Bulgaria	4,187	2,140	51.1
Czech Republic	4,630	3,805	82.2
Hungary	8,000	5,032	62.9
Poland	19,739	20,343	103.1
Romania	12,003	7,797	65.0
<b>Total: Eastern Europe</b>	<b>48,559</b>	<b>39,117</b>	<b>80.6</b>
Russian Federation	38,500	22,600	58.7
Ukraine	19,427	13,144	67.7
<b>Total: Former Soviet Union</b>	<b>57,927</b>	<b>35,744</b>	<b>61.7</b>
China, Peoples Republic of	362,408	441,692	121.9
Japan	11,355	9,900	87.2
Korea, Republic of	4,528	6,461	142.7
Phillipines	8,007	9,023	112.7
Taiwan	8,565	10,510	122.7
<b>Total: Asia</b>	<b>394,863</b>	<b>477,586</b>	<b>120.9</b>
Australia	2,530	2,600	102.8
<b>Total: Oceania</b>	<b>2,530</b>	<b>2,600</b>	<b>102.8</b>
<b>TOTAL</b>	<b>726,711</b>	<b>785,491</b>	<b>108.1</b>

\* Production Estimates and Crop Assessment Division, USDA:Foreign Agriculture Service (FAS).

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

### A. Farrowing Phase

#### 1. Death Loss and Productivity<sup>1</sup>

From 1990 to 1995, reported stillbirths and mummies per litter decreased nearly 25 percent (from 0.87 to 0.65), while born alive per litter decreased 1 percent. Therefore, though the total pigs born per litter dropped (10.34 to 10.02) the percent born alive per litter increased from 91.59 to 93.51 percent. Average parity distributions for the two studies are not known, however culling rates are presented in Table 3 on page 14. Prewearing deaths per litter decreased 20 percent (from 1.10 to 0.88). Overall, the number of pigs weaned per litter increased by 0.12 pigs.

a. Per litter productivity.						
Measure	1990 National Swine Survey			Swine'95		
	Number	Standard Error	Percent	Number	Standard Error	Percent
Stillbirths & mummies per litter	0.87	N/A	8.41	0.65	(± 0.02)	6.49
Born alive per litter	9.47	(± 0.04)	91.59	9.37	(± 0.07)	93.51
Total born per litter	10.34	(± 0.04)	100.00	10.02	(± 0.07)	100.00
Prewearing deaths per litter	1.10	(± 0.04)	11.62	0.88	(± 0.03)	9.39
Weaned per litter	8.37	(± 0.05)	88.38	8.49	(± 0.06)	90.61
Total born alive per litter	9.47	(± 0.04)	100.0	9.37	(± 0.06)	100.0

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

Estimates in this table are for those producers reporting in all four quarters. Only slight differences were reported in quarterly estimates of per litter productivity in 1995. The total number of pigs born, born alive, and weaned per litter were lowest for the months of March through May. The higher standard error for these months suggests that the drop may not have been experienced by many producers.

b. Per litter productivity by quarter*, 1995.			
Measure	Swine'95		
	Number	Standard Error	Percent
December - February			
Stillbirths & mummies per litter	0.64	(± 0.03)	6.35
Born alive per litter	9.44	(± 0.08)	93.65
Total born per litter	10.08	(± 0.09)	100.0
Preweaning deaths per litter	0.86	(± 0.03)	9.11
Weaned per litter	8.58	(± 0.06)	90.89
Total born alive per litter	9.44	(± 0.08)	100.00
March - May			
Stillbirths & mummies per litter	0.62	(± 0.03)	6.26
Born alive per litter	9.29	(± 0.14)	93.74
Total born per litter	9.91	(± 0.16)	100.00
Preweaning deaths per litter	0.86	(± 0.05)	9.26
Weaned per litter	8.43	(± 0.05)	90.74
Total born alive per litter	9.29	(± 0.14)	100.00
June - August			
Stillbirths & mummies per litter	0.67	(± 0.03)	6.65
Born alive per litter	9.40	(± 0.07)	93.35
Total born per litter	10.07	(± 0.08)	100.00
Preweaning deaths per litter	0.86	(± 0.04)	9.15
Weaned per litter	8.54	(± 0.06)	90.85
Total born alive per litter	9.40	(± 0.07)	100.00
September - November			
Stillbirths & mummies per litter	0.70	(± 0.03)	6.93
Born alive per litter	9.40	(± 0.07)	93.07
Total born per litter	10.10	(± 0.08)	100.00
Preweaning deaths per litter	0.90	(± 0.06)	9.57
Weaned per litter	8.50	(± 0.07)	90.43
Total born alive per litter	9.40	(± 0.06)	100.00
* Quarters defined per National Agricultural Statistics Service (NASS) <i>Hogs &amp; Pigs Report</i> .			

## 2. Cause of Death for Preweaning Pigs, 1990 and 1995

Producers in both the 1990 and 1995 studies identified piglets “being laid on” as the leading cause of preweaning deaths. A significant decrease in the number of scours-related deaths was reported along with a slight increase in unknown problems causing preweaning deaths.

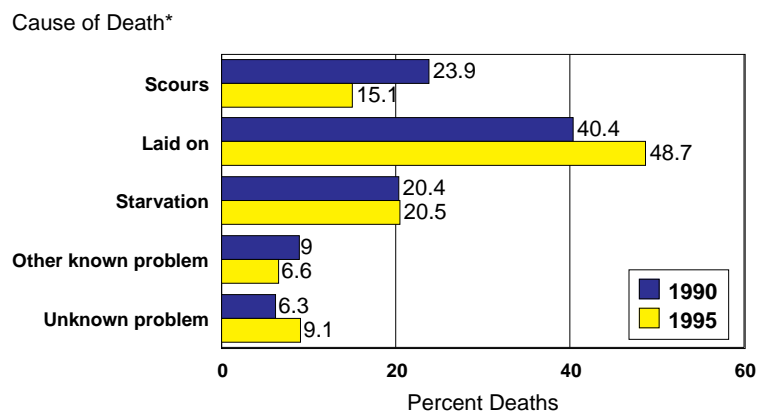
Causes of preweaning deaths were identified for quarterly comparison of 1995 data. Of those farms that reported for all four quarters, being laid on was consistently the leading cause of preweaning deaths. Scours-related deaths had a higher incidence in the December through May quarters, while incidence of starvation-related mortality occurred most frequently in the June through November time period.

a. Percent of preweaning deaths by cause of death identified by producers.

Measure	1990 National Swine Survey*	Standard Error	Swine'95 Total	Standard Error
Scours	23.9	(± 1.5)	15.1	(± 0.2)
Laid on	40.4	(± 1.8)	48.7	(± 3.4)
Starvation	20.4	(± 1.1)	20.5	(± 2.7)
Other known problem	9.0	(± 1.8)	6.6	(± 1.0)
Unknown problem	6.3	(± 1.5)	9.1	(± 1.3)
Total	100.0		100.0	

\*Percent of deaths due to attributed first and second leading cause of death.

### Percent of Preweaning Deaths by Cause of Death\*, 1990-1995



\* As identified by producers.

#3671



b. Percent of preweaning deaths identified by producers by quarter, 1995.		
Measure	Swine'95*	Standard Error
December - February		
Scours	15.2	(± 1.8)
Laid on	48.9	(± 2.7)
Starvation	17.8	(± 1.9)
Other known problem	6.7	(± 1.5)
Unknown problem	11.4	(± 2.1)
Total	100.0	
March - May		
Scours	19.9	(± 4.4)
Laid on	46.1	(± 3.4)
Starvation	16.7	(± 2.0)
Other known problem	6.7	(± 1.5)
Unknown problem	10.6	(± 1.7)
Total	100.0	
June - August		
Scours	13.0	(± 2.3)
Laid on	50.2	(± 4.1)
Starvation	23.8	(± 4.5)
Other known problem	5.8	(± 1.1)
Unknown problem	7.2	(± 1.3)
Total	100.0	
September - November		
Scours	12.6	(± 2.2)
Laid on	50.4	(± 4.1)
Starvation	24.1	(± 4.4)
Other known problem	5.4	(± 1.1)
Unknown problem	7.5	(± 1.4)
Total	100.0	
*Sample = farms that reported for all four quarters.		

### 3. Culling Rate of Sows, 1990 and 1995

The percent of breeding-age females culled over a 12-month period in 1995 was essentially the same as that reported in 1990.

a. Percent of breeding-age females culled over 12-month period as a percent of sow and gilt inventory.			
1990 National Swine Survey	Standard Error	Swine'95 Total	Standard Error
43.5	N/A	41.2	(± 1.7)

## B. Nursery Phase

### 1. Death Loss

Although a change in definition of a nursery was made in the questionnaire between 1990 and 1995, essentially no difference was reported in the number of nursery pig deaths during the nursery phase.

a. Percent of nursery pigs that died during the nursery phase.				
	1990 National Swine Survey*	Standard Error	Swine'95 (12/94-5/95)	Standard Error
Question Variation	Nursery unit: all weaned pigs less than 40 lbs.		Nursery unit: physically separate unit.	
	2.4	(± 0.1)	2.3	(± 0.1)

\*For 3-month period prior to the National Swine Survey interview.

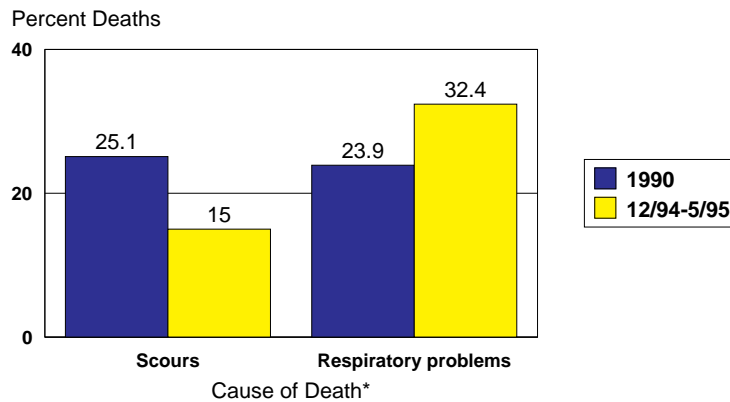
## 2. Cause of Nursery Pig Deaths<sup>1</sup>

Scours was identified as 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). The rise in deaths attributed to respiratory problems is notable. Starvation and unknown problems were also estimated to cause a higher percentage of total nursery-phase deaths in 1995 than in 1990.

a. Percent of nursery-phase deaths by cause of death identified by producer.				
Measure	1990 National Swine Survey*	Standard Error	Swine'95 (12/94-5/95)	Standard Error
Question Variation	Percent of deaths due to attributed first and second leading causes of death.		Percent of deaths due to all causes.	
Scours	25.1	(± 2.7)	15.0	(± 1.7)
Starvation	8.7	(± 1.2)	12.4	(± 1.8)
Respiratory problem	23.9	(± 2.5)	32.4	(± 2.5)
Other known problem	24.4	(± 3.6)	18.2	(± 2.8)
Unknown problem	17.9	(± 1.7)	22.0	(± 2.5)
Total	100.0		100.0	

\* Percent of deaths due to attributed first and second leading cause of death.

### Percent of Nursery-Phase Deaths Due to Scours & Respiratory Problems\*, 1990-1995



\* As identified by producers.

#3672

<sup>1</sup> The change in denominator from percent of first and second leading causes to percent of deaths due to all causes will decrease estimates for the most common causes of death and increase estimates for causes that are less frequent.

## C. Grower/Finisher Phase

### 1. Death Loss

Only minor differences were reported in grower/finisher deaths in the two NAHMS studies.

a. Percent of grower/finisher hogs that died in the grower/finisher phase or in grower/finisher units.					
1990 National Swine Survey (12 months)	Standard Error	Swine '95 Comparable* (12/94-5/95)	Standard Error	Swine'95 Total (12/94-5/95)	Standard Error
1.8	(± 0.1)	1.9	(± 0.1)	2.1	(± 0.1)
*Population: All operations with at least one sow. (See Introduction for discussion.)					

### 2. Cause of Grower/Finisher Hog Deaths<sup>1</sup>

An increase in scours-related mortality of grower/finishers was identified by producers in the Swine' 95 study over the 1990 study (from 1.9 percent to 7.1 percent). Respiratory problems contributed to fewer deaths than reported for 1990, but remained the leading cause of death identified for grower/finishers. Death loss due to trauma declined.

a. Percent of grower/finisher deaths by cause of death identified by producer.						
Measure	1990 National Swine Survey*	Standard Error	Swine'95 Comparable** (12/94-5/95)	Standard Error	Swine'95 Total (12/94-5/95)	Standard Error
Question Variation	Percent of deaths due to attributed first and second leading causes of death.		Percent of deaths due to all causes.			
Scours	1.9	(± 0.4)	7.1	(± 1.0)	7.5	(± 1.2)
Lameness	7.9	(± 0.8)	7.9	(± 0.7)	8.0	(± 0.7)
Trauma	8.6	(± 1.3)	6.9	(± 0.7)	6.7	(± 0.6)
Respiratory problem	47.9	(± 2.6)	39.5	(± 2.2)	40.2	(± 2.1)
Other known problem	14.9	(± 1.9)	17.7	(± 2.0)	17.2	(± 1.9)
Unknown problem	18.8	(± 1.9)	20.9	(± 1.9)	20.4	(± 1.7)
Total	100.0		100.0		100.0	
* First and second leading cause (see piglet cause of death).						
**Population: All operations with at least one sow.						

<sup>1</sup> The change in denominator from percent of first and second leading causes to percent of deaths due to all causes will decrease estimates for the most common causes of death and increase estimates for causes that are less frequent.

## D. Swine Diseases

### 1. Seroprevalence of porcine respiratory and reproductive syndrome (PRRS) virus, 1990 and 1995

The percent of operations with animals testing positive for porcine reproductive and respiratory syndrome (PRRS) increased from 1990 to 1995 to include nearly one-half of all tested operations with at least one sow. Over two-thirds of sampled operations had positive PRRS results under the Swine '95 testing protocol (see \*\*\* footnote in table below).

A decrease in the mean percent of positive sows per farm was reported in 1995 as compared to 1990. This change points to an increase in the relative importance of the finisher phase as an on-farm reservoir for the PRRS virus.<sup>1</sup> (For further discussion of these results, see NAHMS Swine '95 Info Sheet #N225.197, Prevalence of PRRS Virus in the United States.)

a. Percent of operations with animals testing positive for porcine reproductive and respiratory syndrome (PRRS) via serology (and percent of animals on operations with positive animals):			
Measure	1990 National Swine Survey*	Swine '95 Comparable**	Swine'95 Total***
Percent of operations	35.7	47.7	68.5
Average percent of sows positive per operation	33	23.9	46.6
*IFA test dilution 1:20; n=3,372 samples from 412 operations. Up to 10 samples per farm collected from farrowing sows. **Swine '95 samples restricted to nonvaccinated, gestating pigs (n=2,359 samples from 174 operations). IFA test dilution 1:20. ***n=8,038 samples from 286 operations. Up to 30 samples collected per operation; no more than 15 from gestating pigs and the balance from late finisher pigs.			

<sup>1</sup> One significant difference between 1990 and 1995 was the introduction of the PRRS vaccine. See Table III.E.3.a on page 26 for percent of operations using vaccine for PRRS in 1995.

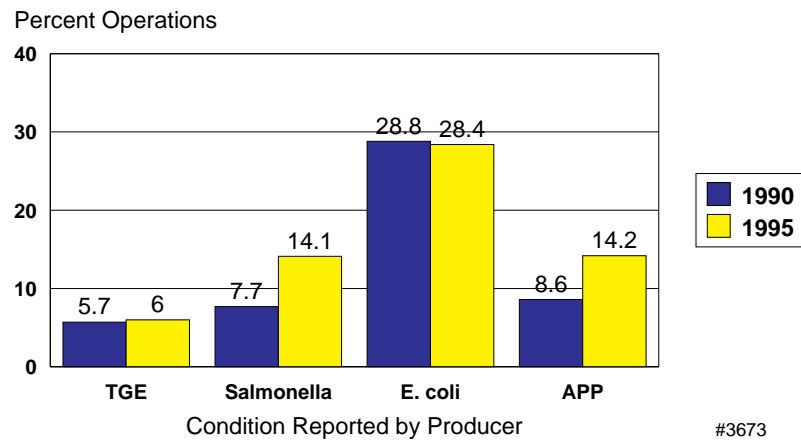
## 2. Conditions reported in 12-month period

Both *Salmonella* and Actinobacillus pleuropneumonia (APP) nearly doubled in frequency among conditions identified by producers during the previous 12 months in the 1995 study versus the 1990 study. Differences in question wording and composition of study population between 1990 and 1995 may account for some of the differences in estimates. Differences in composition were particularly in regards to grower/finishers.

a. Percent of operations reporting the condition:

Condition	1990 National Swine Survey	Standard Error	Swine'95	Standard Error
Transmissible gastroenteritis (TGE)	5.7	N/A	6.0	(± 1.5)
<i>Salmonella</i>	7.7	N/A	14.1	(± 2.6)
<i>Escherichia coli</i>	28.8	N/A	28.4	(± 4.0)
Actinobacillus pleuropneumonia (APP)	8.6	N/A	14.2	(± 3.0)

### Percent of Operations by Conditions Reported in 12-Month Period, 1990-1995



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

## A. Breeding Animals

### 1. Mating Techniques

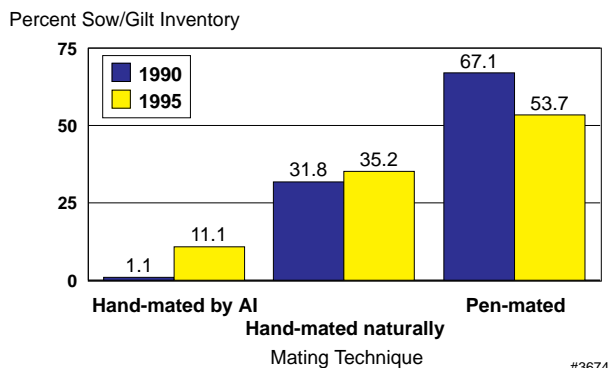
Pen-mating using multiple females and one or more boars continued to be the most frequently used mating technique, although sow and gilt inventory bred with this method declined from 1990 to 1995 (from 67.1 to 53.7 percent).

The percentage of operations using artificial insemination doubled over the 5-year period (from 3.8 percent to 7.8 percent). Over one-tenth of the 1995 sow and gilt inventory was bred by artificial insemination, a 10-fold increase over 1990.

Natural hand-mating of sows and gilts was used on approximately one-fourth of the operations studied. From these data, it is not clear whether producers shifted from pen-mating or hand mating to use of artificial insemination.

a. Use of various mating techniques.				
Measure	1990 National Swine Survey	Standard Error	Swine'95	Standard Error
Hand-mated individually by artificial insemination				
Percent operations*	3.8	N/A	7.8	(± 1.1)
Percent sow & gilt inventory	1.1	N/A	11.1	(± 1.2)
Hand-mated individually naturally				
Percent operations*	23.9	N/A	24.5	(± 2.3)
Percent sow & gilt inventory	31.8	N/A	35.2	(± 2.1)
Pen-mated with multiple females and one or more boars				
Percent operations*	84.0	(± 2.0)	80.6	(± 2.2)
Percent sow & gilt inventory	67.1	(± 2.6)	53.7	(± 2.5)
*Operations may have used more than one technique.				

**Percent of Sow/Gilt Inventory by Mating Technique Used, 1990-1995**



## 2. Preventive Practices for Sows and Gilts

Administration of antibiotics as a preventive practice for sows and gilts increased dramatically over the 5-year period. Injection of antibiotics nearly doubled (from 15.9 percent to 30.3 percent) and use of antibiotics in water increased since 1990 (from 0.8 percent to 6.6 percent). Other preventive practices for sows and gilts remained relatively unchanged.

a. For those operations that had sows and gilts, percent of operations reporting regular use of preventive practices.

System	1990 National Swine Survey	Standard Error	Swine'95 Total (12/94-5/95)	Standard Error
Deworm	85.4	(± 2.0)	85.0	(± 1.9)
Mange/lice treatment	72.0	(± 4.0)	74.2	(± 2.3)
Antibiotics in feed	39.1	(± 3.0)	45.5	(± 2.6)
Antibiotics in water	0.8	(± 0.3)	6.6	(± 1.6)
Antibiotics - injection	15.9	(± 1.9)	30.3	(± 2.3)

## 3. Preventive Practices for Boars

The trend of increased antibiotic administration reported for sows/gilts was also identified for boars. A significant rise in the use of injectable antibiotics (from 1.5 percent to 22.3 percent) was seen from 1990 to 1995 along with increased use of antibiotics in feed (from 10.9 percent to 38.4 percent) and water (from 0.0 percent to 4.7 percent). Deworming and treatment for mange/lice continued to be common practices in 1995 for the majority of operations that had boars.

a. For those operations that had boars, percent of operations that reported regular use of preventive practices.

System	1990 National Swine Survey	Standard Error	Swine'95 Total (12/94-5/95)	Standard Error
Deworm	76.3	(± 2.6)	79.7	(± 2.1)
Mange/lice treatment	69.5	(± 4.1)	70.5	(± 2.4)
Antibiotics in feed	10.9	(± 2.2)	38.4	(± 2.6)
Antibiotics in water	0.0	(± 0.0)	4.7	(± 1.2)
Antibiotics - injection	1.5	(± 0.7)	22.3	(± 2.0)



## B. Suckling Piglets

### 1. Pig Flow Management

Approximately one-half of operations practiced all-in/all-out management in the farrowing phase both years (48.2 percent in 1990 and 46.2 percent in 1995). However, the overall inventory of females managed as all-in/all-out increased from 55.1 percent to 65.5 percent. These results indicate that more larger operations are using all-in/all-out management in the farrowing phase.

a. Percent of operations (and percent of females) practicing all-in/all-out management in the farrowing phase.

Measure	1990 National Swine Survey	Standard Error	Swine'95	Standard Error
Percent operations	48.2	(± 2.5)	46.2	(± 2.5)
Percent females on these operations	55.1	(± 2.9)	65.5	(± 2.5)

### 2. Waste Management

A difference in reported waste management practices may in part be due to a change in the Swine' 95 question. The question was changed to reflect the type of waste management system "used most" rather than "ever used". The most frequently reported waste management system used in 1990 was hand cleaning (41.6 percent) which declined in use to 28.3 percent of operations. In 1995, pit-holding was used most (41.1 percent) according to Swine' 95 information.

a. For operations with total confinement farrowing facilities, percent of operations by type of waste management system used in the farrowing phase.

System	1990 National Swine Survey	Standard Error	Swine'95 Total	Standard Error
Question variation	Ever used.		Used most.	
None	0.1	(± 0.1)	5.1	(± 1.9)
Pit-holding	29.2	(± 2.5)	41.1	(± 2.9)
Mechanical scraper/tractor	12.1	(± 3.3)	10.1	(± 1.8)
Hand cleaned	41.6	(± 4.9)	28.3	(± 3.1)
Flush-under slats	16.5	(± 2.2)	9.7	(± 1.3)
Flush-open gutter	7.0	(± 1.4)	3.2	(± 0.9)
Other	7.9	(± 1.7)	2.5	(± 0.8)
Total	—		100.0	

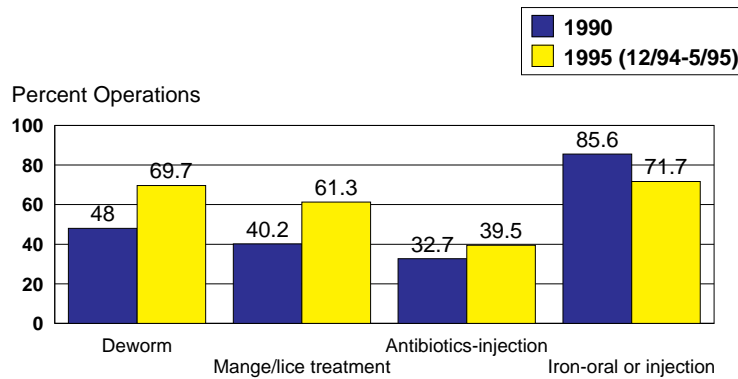
### 3. Preventive Practices

Regular use of dewormers (69.7 percent), injectable antibiotics (39.5 percent), and mange/lice treatment (61.3 percent) as preventive practices for piglets increased over the 5-year period. Use of oral or injectable iron was down from 85.6 percent to 71.7 percent.

a. For those operations that had a farrowing phase, percent of operations reporting regular use of preventive practices on piglets before or at weaning.

System	1990 National Swine Survey	Standard Error	Swine'95 Total (12/94-5/95)	Standard Error
Deworm	48.0	(± 2.9)	69.7	(± 2.2)
Mange/lice treatment	40.2	(± 2.9)	61.3	(± 2.5)
Antibiotics - injection	32.7	(± 2.7)	39.5	(± 2.5)
Iron - oral or injection	85.6	N/A	71.7	(± 2.4)

**Percent of Operations that Reported Regular Use of Preventive Practices for Piglets, 1990-1995**



\* For those operations that had a farrowing phase.

#3675

### 4. Average Weaning Age

The average weaning age of piglets decreased by approximately 3 days (from 28.8 to 25.7 days) on an individual pig basis, but remained unchanged as reported for the average operation.

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

Measure	1990 National Swine Survey	Standard Error	Swine'95 Total	Standard Error
Operation average	34.7	(± 0.4)	34.7	(± 0.7)
Pig average	28.8	(± 0.3)	25.7	(± 0.5)

## C. Nursery Pigs

### 1. Pig Flow Management

The overall number of nursery pigs managed as all-in/all-out increased over 16 percent during the 5-year period (from 53.5 percent to 69.8 percent), while the number of operations practicing all-in/all-out management remained essentially unchanged. Some of the difference in results may be due to a change made 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 operations that had a nursery phase, percent of operations (and percent of nursery pigs) practicing all-in/all-out management in the nursery phase.

Measure	1990 National Swine Survey	Standard Error	Swine '95 Total	Standard Error
Question Variation	Nursery unit: all weaned pigs less than 40 lbs.		Nursery unit: physically separate unit.	
Percent operations	47.8	(± 3.5)	48.2	(± 2.8)
Percent nursery pigs	53.5	(± 3.3)	69.8	(± 2.5)

### 2. Age Leaving Nursery

The average pig in the U.S. left the nursery at 60.3 days of age in 1995, a decrease of almost 2 days compared to 1990.

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

Measure	1990 National Swine Survey	Standard Error	Swine'95	Standard Error
Operation average	64.1	(± 0.6)	63.3	(± 0.9)
Pig average	62.0	(± 0.5)	60.3	(± 0.8)

## D. Grower/Finisher Hogs

### 1. Pig Flow Management

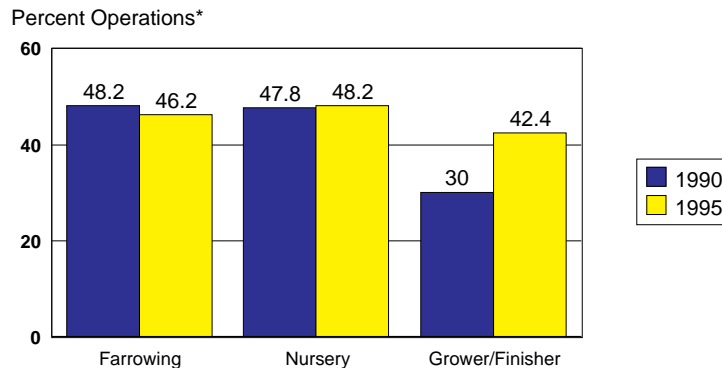
The percentage of grower/finisher hogs managed as all-in/all-out nearly doubled between the comparable reporting periods, while the number of operations using all-in/all-out management for grower/finishers rose by only 5.0 percent. These results indicate that larger operations were adopting all-in/all-out management in the grower/finisher phase more frequently than smaller operations.

a. For operations that had a grower/finisher phase, percent of operations (and percent of grower/finisher hogs on those operations) using all-in/all-out management in the grower/finisher phase.

Measure	1990 National Swine Survey	Standard Error	Swine'95 Comparable*	Standard Error	Swine'95	Standard Error
Percent operations	30.0	(± 1.9)	35.0	(± 2.7)	42.4	(± 2.5)
Percent grower/finisher hogs	23.9	(± 1.6)	46.3	(± 2.7)	51.0	(± 2.2)

\*Population: All operations with at least one sow.

### Percent of Operations\* Using All-in, All-out Management by Phase



\* For those operations that had the specified phase.

#3266

### 2. Market Age

The average market age on grower/finisher operations decreased by over 6 days from 1990 to 1995 (from 183.2 to 176.8 days). On an individual pig basis, the average market age in 1995 was lower by 1.4 days. Overall, in 1995 as compared to 1990, the average pig was weaned 3 days younger, stayed in the nursery 1.7 days longer, and had about the same length of stay in the grower/finisher phase (118 days).

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

Measure	1990 National Swine Survey	Standard Error	Swine '95 Comparable*	Standard Error	Swine'95 Total	Standard Error
Operation Average	183.2	(± 3.9)	176.8	(± 0.8)	175.8	(± 1.0)
Pig average	180.0	(± 0.5)	178.6	(± 1.0)	176.4	(± 1.0)

\*Population: All operations with at least one sow.

## E. General Farm Management

### 1. Business and Marketing Arrangements

An overwhelming majority of swine operations continued to be independent producers that marketed their own animals, although a 5.5 percent decrease was reported in comparable 1995 inventory marketed by this method. Total inventory marketed through contract producers more than doubled, but still accounted for less than 10 percent of pig inventory.

a. Percent of operations (and percent total inventory on those operations) by business and marketing arrangements that best described the pig operation.						
Measure	1990 National Swine Survey	Standard Error	Swine '95 Comparable*	Standard Error	Swine'95 Total	Standard Error
Independent Producer - Marketing Their Own						
Percent operations	93.8	(± 1.2)	93.5	(± 0.9)	87.7	(± 1.5)
Percent total inventory	91.0	N/A	85.5	(± 1.9)	76.9	(± 1.5)
Independent Producer - Marketing Through a Cooperative						
Percent operations	5.5	(± 1.1)	4.6	(± 0.9)	3.9	(± 0.7)
Percent total inventory	4.7	N/A	4.7	(± 0.9)	4.7	(± 0.9)
Contract Producer - Operation Is Contractor or Contractee						
Percent operations	0.7	(± 0.3)	1.0	(± 0.3)	3.6	(± 0.5)
Percent total inventory	4.3	N/A	8.9	(± 1.7)	17.3	(± 1.3)
Other						
Percent operations	N/A	N/A	0.9	(± 0.5)	4.8	(± 1.4)
Percent total inventory	N/A	N/A	0.9	(± 0.3)	1.1	(± 0.3)
*Population: All operations with at least one sow.						

## 2. Records

The percent of operations that used any record keeping system was roughly the same in 1995 as in 1990. A pocket diary or calendar was the most widely used record keeping system and increased in popularity during the 5-year period (from 64.3 percent to 71.9 percent). Record card and service bureau-based systems were used less frequently, while computer-based systems gained popularity.

a. Percent of operations by type of record keeping system.

Type	1990 National Swine Survey	Standard Error	Question Variation	Swine '95 Comparable*	Standard Error	Swine'95 Total	Standard Error
Pocket diary or calendar	64.3	(± 3.2)		71.9	(± 2.4)	66.2	(± 2.2)
Record cards for individual members of a breeding herd	28.0	(± 3.3)		18.7	(± 1.7)	13.6	(± 1.2)
Microcomputer-based record keeping system	8.0	(± 0.6)	Home computer-based record keeping system	13.2	(± 1.6)	13.5	(± 1.4)
Service bureau-based record keeping system	7.6	(± 1.0)		5.7	(± 0.8)	5.2	(± 0.6)
Other record keeping system	29.3	(± 1.7)		12.0	(± 1.6)	15.5	(± 1.6)
Any	92.5	N/A		90.6	(± 1.8)	86.5	(± 1.8)

\*Population: All operations with at least one sow.

## 3. Vaccination Practices

As vaccines were used less frequently on finishing floors, all estimates for 1995 were lower. However, even for those operations with sows (Swine '95 Comparable), fewer operations reported use of vaccines for the four diseases included in both studies. Comparable Swine' 95 data showed a decrease of over 10 percent in operations vaccinating for Erysipelas, Parvovirus, and Leptospirosis. About one-fourth of the operations vaccinated for porcine reproductive and respiratory syndrome (PRRS) in 1995, just months after its introduction.

a. Percent of operations regularly using vaccines in pigs against the following diseases **regardless of pig type**.

Disease	1990 National Swine Survey	Standard Error	Swine '95 Comparable*	Standard Error	Swine'95 Total	Standard Error
Percent Operations						
Porcine reproductive and respiratory syndrome	N/A	N/A	25.6	(± 2.1)	22.6	(± 1.7)
Erysipelas	69.6	N/A	56.2	(± 2.6)	49.0	(± 2.2)
<u>Escherichia coli</u> scours	49.9	N/A	47.4	(± 2.5)	38.7	(± 2.1)
Parvovirus	65.6	N/A	54.1	(± 2.6)	44.0	(± 2.2)
Leptospirosis	70.5	N/A	59.4	(± 2.6)	47.0	(± 2.2)

\*Population: All operations with at least one sow.

### 4. Isolation and Health Testing of New Stock

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. Yet, separation/quarantine and health testing of new arrivals decreased for breeding animals and increased only slightly for feeder pigs. Note: The 1990 questionnaire asked whether or not new animals were isolated. The 1995 questionnaire asked how frequently new animals were isolated: always, sometimes, or never. The change from a yes or no response to a frequency question may account for differences in estimates. Of those producers who separated/quarantined new breeding stock, approximately two-thirds also health tested them. This result remained unchanged in 1995.

a. Percent of all operations that placed all new arrivals through a separation or quarantine process.

Pig Type	1990 National Swine Survey	Standard Error	Swine '95 Comparable*	Standard Error	Swine'95 Total	Standard Error
Breeding females	33.6	(± 3.8)	27.5	(± 2.4)	19.5	(± 1.7)
Breeding males	60.9	(± 4.8)	45.8	(± 2.6)	32.8	(± 2.0)
Feeder pigs	2.1	(± 1.4)	3.9	(± 3.9)	9.8	(± 1.5)

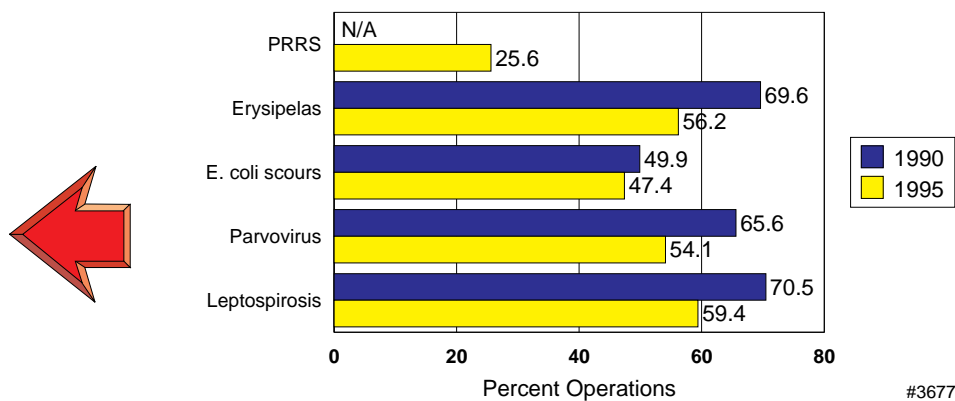
\*Population: All operations with at least one sow.

b. Percent of all operations reporting that all new arrivals were health tested.

Pig Type	1990 National Swine Survey	Standard Error	Swine '95 Comparable*	Standard Error	Swine'95 Total	Standard Error
Breeding females	22.3	(± 2.1)	17.4	(± 1.8)	12.3	(± 1.3)
Breeding males	42.1	(± 2.7)	28.2	(± 2.3)	19.8	(± 1.7)
Feeder pigs	0.8	(± 0.4)	3.0	(± 1.1)	4.9	(± 1.0)

\*Population: All operations with at least one sow.

### Percent of Operations that Regularly Used Vaccines Against the Following Diseases Regardless of Pig Type, 1990-1995



### 5. Use of Veterinarians

Less than half of all operations (49.4 percent) used veterinarians for any purpose between December 1, 1994, and May 31, 1995. It is expected that producers with finishing floors were less likely to use a veterinary consultant than those that farrowed sows. Thus, the large decline between 1990 and 1995 can be partially attributed to differences in study population. Also, differences in question wording could have played a big role. Large declines were observed in the use of veterinarians for vaccination consultation (29.1 percentage points), individual pig treatments (19.0 percentage points), and providing drugs (32.1 percentage points). Use of a veterinarian for nutritional needs (nutritional consult) was essentially unchanged.

a. Percent all operations that used a veterinarian for any purpose.

Purpose	1990 National Swine Survey (Ever Used)	Standard Error	Swine '95 Comparable* 12/94-5/95	Standard Error	Swine'95 Total 12/94-5/95	Standard Error
	75.4	(± 4.0)	49.4	2.6	42.1	(± 2.2)

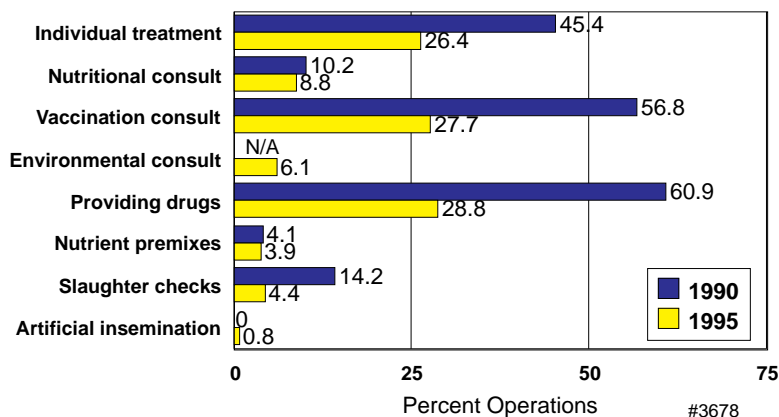
\*Population: All operations with at least one sow.

b. Percent of all operations that used a veterinarian for the following purposes.

Purpose	1990 National Swine Survey	Standard Error	Swine '95 Comparable*	Standard Error	Swine'95 Total	Standard Error
Individual pig treatment	45.4	(± 3.7)	26.4	(± 1.9)	23.5	(± 1.6)
Nutritional consultation	10.2	(± 1.7)	8.8	(± 1.5)	7.7	(± 1.1)
Vaccination consultation	56.8	(± 4.1)	27.7	(± 2.3)	23.0	(± 1.8)
Environmental consultation	N/A	—	6.1	(± 1.1)	5.2	(± 0.8)
Providing drugs	60.9	(± 4.3)	28.8	(± 2.0)	24.2	(± 1.5)
Providing nutrient premixes	4.1	(± 1.3)	3.9	(± 1.1)	4.0	(± 0.9)
Slaughter checks	14.2	(± 1.7)	4.4	(± 0.9)	3.9	(± 0.7)
Artificial insemination	0.0	(± 0.0)	0.8	(± 0.3)	1.0	(± 0.3)

\*Population: All operations with at least one sow.

**Percent of Operations that Used a Veterinarian for the Following Purposes, 1990-1995**





### 6. Carcass Disposal

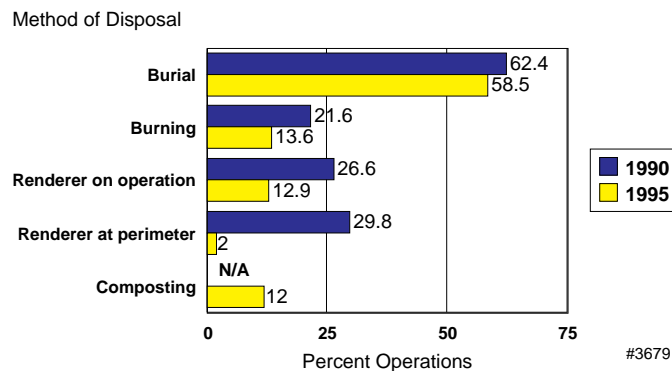
Most carcasses continued to be disposed of by burial on the operation (58.5 percent). Burning and use of renderers decreased significantly. Over 10 percent of operations disposed of carcasses using on-site composting in 1995.

a. Percent of operations by method of carcass disposal.

Method	1990 National Swine Survey	Standard Error	Swine '95 Comparable*	Standard Error	Swine'95 Total	Standard Error
Percent Operations						
Burial (on operation)	62.4	(± 3.2)	58.5	(± 2.6)	57.3	(± 2.3)
Burning (on operation)	21.6	(± 2.1)	13.6	(± 1.7)	12.3	(± 1.4)
Renderer entering operation	26.6	(± 2.5)	12.9	(± 1.5)	25.1	(± 1.8)
Renderer at perimeter of operation	29.8	(± 3.3)	2.0	(± 0.4)	6.9	(± 0.9)
Composting on operation	N/A	N/A	12.0	(± 1.5)	10.5	(± 1.3)
Other	17.6	(± 2.2)	6.2	(± 1.4)	7.2	(± 1.3)

\*Population: All operations with at least one sow.

**Percent of Operations by Method of Carcass Disposal, 1990-1995**



### 7. Rodent Control

Cats were the primary means of rodent control in both 1990 (88.1 percent) and 1995 (71.6 percent), although their use seems to be declining. This drop may have been due to increased awareness in the role of cats in transmission of pathogens such as *Trichinella spiralis*, *Toxoplasma gondii*, and others. Other methods of rodent control remained essentially unchanged.

a. Percent of operations regularly using the following rodent control methods.

Method	1990 National Swine Survey	Standard Error	Swine '95 Comparable*	Standard Error	Swine'95 Total	Standard Error
Cats	88.1	(± 2.5)	71.6	(± 2.3)	68.5	(± 2.1)
Traps	14.2	(± 2.7)	15.9	(± 1.7)	13.0	(± 1.3)
Bait or poison	78.5	(± 4.1)	79.5	(± 2.3)	74.0	(± 2.2)
Other	6.1	(± 1.4)	5.5	(± 1.0)	7.0	(± 1.1)

\*Population: All operations with at least one sow.

### 8. Biosecurity

No direct estimate is available from the 1990 National Swine Survey on the percent of operations that restricted entry to the premises to employees only. However, when asked about biosecurity practices required for visitors, 11 percent of operations were coded as not applicable (N/A), suggesting that visitors were not allowed.

Nearly half of all Swine '95 operations allowed only employees to enter the premises. Showers or footbaths were rarely required on those operations that allowed others on the premises. In addition, a ten-fold decrease was reported in the percent of operations that limited visitors to those that had not been on another pig operation that day.

a. Percent of operations where entry to the premises was restricted to employees only.							
Measure	1990 National Swine Survey	Standard Error	Question Variation	Swine '95 Comparable*	Standard Error	Swine'95 Total	Standard Error
	11.0**	N/A		45.2	(± 2.5)	40.5	(± 2.1)
i. Percent of all operations where <i>feed delivery personnel or livestock haulers</i> were required to:							
Shower before entering operation	1.1	(± 0.7)		0.2	(± 0.1)	0.2	(± 0.1)
Use a footbath before entering operation:			Use a footbath before entering operation				
Feed delivery personnel	4.2	(± 1.3)		2.1	(± 0.8)	1.9	(± 0.6)
Hired livestock haulers	2.4	(± 0.7)					
Not have been on another pig operation that day	N/A	N/A		3.4	(± 0.8)	4.1	(± 0.9)
ii. Percent of all operations where <i>visitors other than feed delivery personnel and livestock haulers</i> were required to:							
Shower before entering operation:							
Percent of all operations	3.4	(± 1.1)		0.4	(± 0.1)	0.4	(± 0.1)
Use a footbath before entering operation:							
Percent operations	9.4	(± 1.7)		2.9	(± 0.8)	2.7	(± 0.6)
Not have been on another pig operation that day:							
Percent operations	42.9	(± 3.9)		4.5	(± 0.8)	4.8	(± 0.9)
*Population: All operations with at least one sow.							
**Responses to biosecurity measures (for shower, change of boots, and change of coveralls) were coded as not applicable, suggesting that visitors were not allowed. Estimates were 10.5, 11.9, and 11.0 percent of operations, respectively.							

## 9. Proximity to Nearest Swine Farm and Market

Distances to nearest swine operation remained relatively stable in distribution with over 70 percent being within 3 miles apart. Nearly 10 percent fewer operations reported the nearest known operation to be within the 0.5 to 0.99 mile range.

Most operations reported the nearest known swine market to be 5 or more miles away. More than 15 percent of operations were within 5 miles of the nearest market in 1990 and 1995.

a. Percent of operations by distance in miles from this operation to nearest known operation with pigs (and swine market).						
Measure	1990 National Swine Survey	Standard Error	Swine '95 Comparable*	Standard Error	Swine'95 Total	Standard Error
<b>Nearest Operation</b>						
Less than .25 miles	7.3	(± 1.6)	5.6	(± 1.0)	5.1	(± 0.8)
.25-.49 miles	12.9	(± 1.9)	19.5	(± 1.8)	20.8	(± 1.7)
.50-.99 miles	31.1	(± 2.9)	22.7	(± 2.2)	21.3	(± 1.9)
1.0-2.99 miles	31.2	(± 2.7)	28.1	(± 2.4)	29.1	(± 2.1)
3.0-4.99 miles	5.6	(± 1.3)	12.9	(± 2.1)	11.9	(± 1.7)
5.0 or more miles	11.8	(± 4.0)	11.2	(± 1.7)	11.8	(± 1.6)
Unknown	0.1	(± 0.1)				
Total	100.0		100.0		100.0	
<b>Nearest Swine Market</b>						
Less than .25 miles	0.8	(± 0.5)	0.3	(± 0.3)	0.4	(± 0.3)
.25-.49 miles	0.6	(± 0.5)	1.4	(± 0.4)	1.3	(± 0.4)
.50-.99 miles	0.6	(± 0.4)	1.2	(± 0.4)	1.1	(± 0.3)
1.0-2.99 miles	3.5	(± 1.0)	6.4	(± 1.4)	6.3	(± 1.2)
3.0-4.99 miles	12.1	(± 2.3)	8.1	(± 1.2)	8.2	(± 1.0)
5.0 or more miles	82.4	(± 2.9)	82.6	(± 1.8)	82.7	(± 1.6)
Total	100.0		100.0		100.0	
*Population: All operations with at least one sow.						

## Section IV: Trends in Other National Data Bases

### A. Slaughter Condemnation Rates, 1990 Through 1995

#### 1. Market Hogs

Rates for condemnations for deads steadily increased from 1990 to 1995 and accounted for the largest single reason for condemnation. Condemnation rates for Abscess Pyemia and arthritis declined.

The number of carcasses condemned for residues dropped significantly from a high of 232 in 1990 to 39 carcasses in 1995.

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

Disease	1990	1991	1992	1993	1994	1995	Average
Deads	0.782	0.776	0.765	0.909	1.132	1.467	0.972
Abscess Pyemia	0.232	0.230	0.208	0.169	0.170	0.170	0.197
Arthritis	0.154	0.146	0.091	0.091	0.097	0.086	0.111
Pneumonia	0.105	0.107	0.097	0.081	0.097	0.088	0.096
Septicemia	0.104	0.117	0.084	0.087	0.093	0.089	0.096
Erysipelas	0.060	0.057	0.057	0.052	0.053	0.065	0.057
Toxemia	0.041	0.033	0.057	0.026	0.025	0.020	0.034
Nephritis	0.020	0.021	0.019	0.018	0.015	0.013	0.018
Pericarditis	0.014	0.024	0.015	0.010	0.010	0.009	0.014

\*Source: Food Safety Inspection Service (FSIS).

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

Disease	1990	1991	1992	1993	1994	1995	Average
CNS disorder	327	112	202	288	275	191	233
Residue	232	106	97	129	64	39	111
Metritis	94	132	60	34	29	37	64
Tetanus	—	89	54	4	6	80	47
Actinomycosis	15	—	2	10	2	7	7
Eosinophilic myositis	2	4	21	2	2	—	6
Cysticercosis	1	1	—	—	1	1	1

\*Source: Food Safety Inspection Service (FSIS).

## B. *Salmonella* Serotypes, 1990 through 1995

### 1. Most Frequently Identified Serotypes

*Salmonella* serotypes cholerasuis (kunzendorf), derby, and typhimurium are consistently identified by NVSL as the most frequent isolates from clinically affected swine. However, each year, from 1990 to 1995, these three serotypes accounted for a smaller proportion of the total number of serotypes isolated (from 82 to 58 percent). This trend suggests there is an increasingly broad distribution of *Salmonella* serotypes being shed by clinically affected swine.

a. Most frequently identified *Salmonella* serotypes from swine (clinical cases) by year.\*

#	1990		1991		1992		1993		1994		1995	
	Serotype	Total	Serotype	Total	Serotype	Total	Serotype	Total	Serotype	Total	Serotype	Total
1	Cholerasuis (kunzendorf)	1,047	Cholerasuis (kunzendorf)	889	Cholerasuis (kunzendorf)	1,068	Cholerasuis (kunzendorf)	840	Cholerasuis (kunzendorf)	238	Cholerasuis (kunzendorf)	369
2	Derby	71	Derby	109	Derby	137	Derby	107	Derby	91	Derby	251
3	Typhimurium	63	Typhimurium	78	Typhimurium	97	Typhimurium	81	Typhimurium	45	Typhimurium	95
4	Typhimurium (copenhagen)	37	Agona	49	Agona	61	Agona	46	Typhimurium (copenhagen)	35	Agona	84
5	Agona	32	Typhimurium (copenhagen)	34	Typhimurium (copenhagen)	36	Typhimurium (copenhagen)	40	Brandenburg	22	Typhimurium (copenhagen)	70
6	Anatum	19	Anatum	25	Heidelberg	32	Heidelberg	33	Agona	21	Heidelberg	64
7	Heidelberg	18	Enteritidis	18	Enteritidis	27	Anatum	27	Worthington	20	Enteritidis	47
8	Enteritidis	16	Infantis	17	Anatum	25	Enteritidis	16	Anatum	19	Anatum	44
9	Infantis	10	Brandenburg	9	Brandenburg	18	Infantis	10	Heidelberg	18	Brandenburg	5
10	Cholerasuis	7	Cholerasuis	7	Cholerasuis	14	Cholerasuis	8	Cholerasuis	6	Cholerasuis	4
	% of total	91.9	% of total	92.9	% of total	91.4	% of total	90.1	% of total	86.1	% of total	83.7
	All others	116	All others	95	All others	142	All others	132	All others	83	All others	161
	Total	1,436	Total	1,330	Total	1,657	Total	1,340	Total	598	Total	1,234

\*Source: National Veterinary Services Laboratories (NVSL).

## C. Foodborne Outbreaks of Human Illness from Pork, 1973-1992

### 1. Number of Outbreaks

There has been a sharp drop in the total number of foodborne disease outbreaks (unknown and confirmed etiology) attributed to pork or ham over the last two decades.

a. Number of foodborne outbreaks of illness where pork or ham was the confirmed food vehicle, 1973-1992.*	
Period	Total Number of Outbreaks
1973-77	119
1978-82	86
1983-87	47
1988-92	29

\*Source: Centers for Disease Control and Prevention.

# Swine Informational Materials Available from NAHMS

## Info sheets:

- Swine '95 study results, October 1995 - January 1997. Topics include: *Salmonella*, porcine reproductive & respiratory syndrome (PRRS), mycotoxins in feed, biosecurity measures, vaccination practices, environmental practices/management, antibiotics, sources of pigs, feed management, & marketing.
- *USDA Identifies Pork Industry's Information Gaps*, December 1994. Presents results of Swine '95 needs assessment activities.
- *Swine Slaughter Surveillance Program*, May 1992. Presents results of slaughter checks from a Minnesota/NAHMS feasibility study.
- 1990 National Swine Survey results, November 1991. Topics include: *biosecurity measures, preweaning morbidity & mortality, sow productivity, total confinement and farrowing facilities, preventive practices, consultants, and water quality.*

## Tabular summaries with graphic presentations:

- *Part III: 1990-1995 Changes in the U.S. Pork Industry*, October 1997. This 34-page report compares results of the NAHMS 1990 National Swine Survey and the Swine '95 Study.
- *Part II: Reference of Grower/Finisher Health & Management Practices*, May 1995. The second tabular summary of NAHMS Swine '95 results is 24 pages long.
- *Part I: Swine Management Practices*, September 1995. This 24-page tabular summary is the first release of data collected during the NAHMS Swine '95 study.
- *Morbidity/Mortality and Health Management of Swine in the United States*, November 1991. Forty-page tabular summary of the data collected during the 1990 National Swine Survey.
- *DxMONITOR Animal Health Report*, quarterly. The DxMONITOR reports a varying number of porcine confirmed disease diagnoses and animal health data from participating veterinary diagnostic laboratories across the United States and USDA animal health staff. (The spring 1997 DxMONITOR includes swine brucellosis and pseudorabies virus.)

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Results of NAHMS studies are also available on the **dairy cattle, beef cow/calf, beef feedlot, sheep, equine, and catfish** industries.

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