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## 2005 United States Animal Health Report

United States Department of Agriculture, Animal and Plant Health Inspection Service

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# 2005

UNITED STATES

## Animal Health Report

United States Department of Agriculture  
Animal and Plant Health Inspection Service  
Agriculture Information Bulletin No. 800



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Issued August 2006

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# Foreword

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Welcome to the second annual report on the status of animal health in the United States. As you may know, last year's United States Animal Health Report was our first effort to provide a comprehensive overview of the health of our Nation's vast domestic animal resources. On the basis of the feedback received from stakeholders at home and abroad, our inaugural animal health report was a success. For the 2005 edition, we strove to do even better, updating and refining the report to guarantee that it provides the latest information on issues important to all our stakeholders. To ensure our continued success in meeting our stakeholders' needs, we have provided a form at the back of this report that allows you to send us your comments and ideas about how we can make next year's report better. If you prefer to submit your comments online, or if this copy of the report does not include the reporting form, please go to <http://www.surveymonkey.com/s.asp?u=873681978995> and complete the interactive survey.

In 2005, as in years past, we sought new ways to strengthen and amplify efforts aimed at ensuring that the United States maintains healthy livestock and poultry populations. For example, the National Animal Health Laboratory Network (NAHLN) was developed recently to screen routine and specific-risk samples for foreign animal diseases (FADs). The newly formed National Animal Health Surveillance System (NAHSS) works to improve early detection and global risk surveillance of FADs. Objectives of the NAHSS 2005 strategic plan include enhancing domestic and global surveillance to identify elevated risks and encouraging the development and application of new technologies for early and rapid disease detection.

In addition, the Emergency Management and Diagnostics division within the U.S. Department of Agriculture's (USDA) Veterinary Services led efforts in the creation and management of the Animal and Plant Health Inspection Service's National Avian Influenza (AI) Response Team. We held a workshop to determine gaps in USDA policies, plans, and technological capabilities related to high-pathogenicity AI.

Presidential Directive-9 concerning homeland security led to the establishment of the National Veterinary Stockpile. The stockpile includes animal vaccines, antivirals, therapeutic products, and other supplies to respond to an intentional or unintentional introduction of FADs and biological threat agents that would affect agriculture, the Nation's food system, the economy, and human health. The stockpile represents a change in USDA's approach to managing animal and plant disease outbreaks by providing rapidly available supplies of vaccines, therapeutics, and countermeasures for use against naturally occurring animal disease outbreaks or agroterrorism. The United States currently stockpiles vaccines against foot-and-mouth disease (FMD) and AI.

To evaluate current capabilities of the stockpile, we held an FMD outbreak training exercise in 2005 with rapid response teams, incident management actions, and interagency coordination at an incident command center. Management and actions related to movement and quarantine, appraisal, vaccination, euthanasia, and disposal were evaluated.

I believe you will find this report an important and thorough source of information on the status of U.S. livestock, poultry, and aquaculture commodities as well as the programs and strategies used to ensure their continued health.

—John Clifford  
Deputy Administrator,  
Veterinary Services  
USDA-APHIS  
Washington, DC



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## CHAPTER 1

# Overview of U.S. Livestock, Poultry, and Aquaculture Production in 2005

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### Available Statistics

The National Agricultural Statistics Service (NASS) of the U.S. Department of Agriculture (USDA) collects and publishes official statistics for the U.S. livestock, poultry, and aquaculture populations. These statistics are based on the Census of Agriculture conducted every 5 years (e.g., 1997 and 2002) and surveys conducted monthly, quarterly, or annually as determined by the particular commodity. Frequency of surveys and sample sizes by commodity are shown in appendix 1 (table A1.1).

The Census of Agriculture, which is a complete enumeration of the entire agricultural segment of the economy, is the only source of detailed, county-level data of all farms and ranches in all 50 States selling or intending to sell agricultural products worth \$1,000 or more in a year. The most recent Census data were collected for 2002 and published in spring 2004. The U.S. maps presented in this chapter are based on the 2002 Census of Agriculture, which provides animal inventory levels as of December 31, 2002.

In NASS' ongoing sample survey and estimation programs, data is collected and estimates are published within the same month to provide users with the most up-to-date and timely information—even in the years the Census is conducted. The massive data-collecting, editing, and summarizing effort required to prepare the Census naturally results in a publication lag. Consequently, sample survey estimates and final Census reports rarely

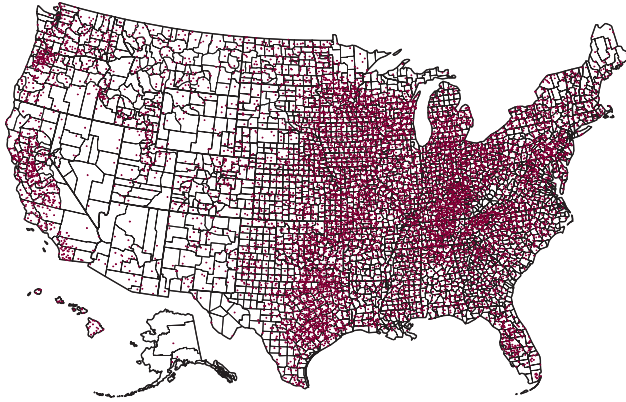
show exactly the same numbers. These ongoing sample surveys provide the most up-to-date statistics between the Census years and are themselves subject to revision when current-year estimates are made. This is why, if you compare statistics that we printed in the animal health report for 2004 with statistics published in this year's version of the report for 2004, the numbers do not always match. In fact, after each 5-year Census of Agriculture, NASS reviews all of the previous 5 years' worth of sample survey estimates, revises the figures, and publishes the results as "Final Estimates."

### Number of Farms

Estimates for the number of farms were based on the definition of a farm as "any establishment from which \$1,000 or more of agricultural products were sold or would be normally sold during the year." Map 1 illustrates the distribution of farms across the United States based on the 2002 Census. In general, there were fewer farms in the western half of the United States; however, western farms and ranches were generally larger than those in the eastern half of the United States, as shown in map 2. A higher percentage of land area in the Central United States was dedicated to land in farms (map 3). In 2005, there were 2.10 million farms, compared with 2.11 million in 2004. Total land in farms was 933.4 million acres in 2005, which represents a decrease from 936.3 million acres in 2004. The average farm size of 444 acres in 2005 was nearly the same as the average acreage in 2004.

MAP 1. **Number of Farms: 2002**

United States Total: 2,128,982



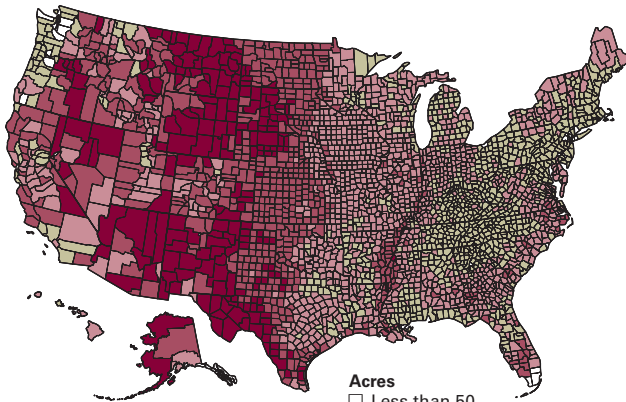
1 Dot = 200 Farms

## Relative Magnitude of Industries by Value of Production

As shown in map 4, the Central and Eastern States had a higher concentration in value of livestock and poultry in 2002 compared with the Western States. In recent years, the total value of production has been split nearly equally between crop and livestock (and poultry) production. In the 2002 Census of Agriculture, 52.6 percent of total value of production came from livestock and poultry. Map 5 illustrates that the coastal areas and North Central portions of the United States generally made a smaller livestock and poultry contribution to the total market value. These areas had heavy concentrations of crop, fruit, and vegetable products.

MAP 2. **Average Size of Farms in Acres: 2002**

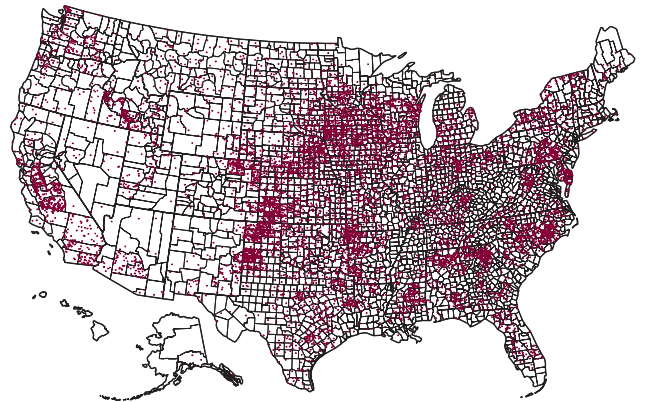
United States Average: 441



Acres  
 □ Less than 50  
 □ 50-179  
 □ 180-499  
 □ 500-1,999  
 □ 2,000 or more

MAP 4. **Value of Livestock, Poultry, and Their Products Sold: 2002**

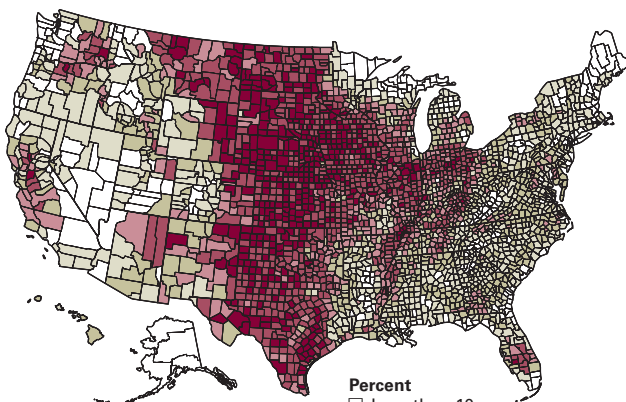
United States Total: \$105,494,401,000



1 Dot = \$10,000,000

MAP 3. **Acres of Land in Farms as Percent of Land Area in Acres: 2002**

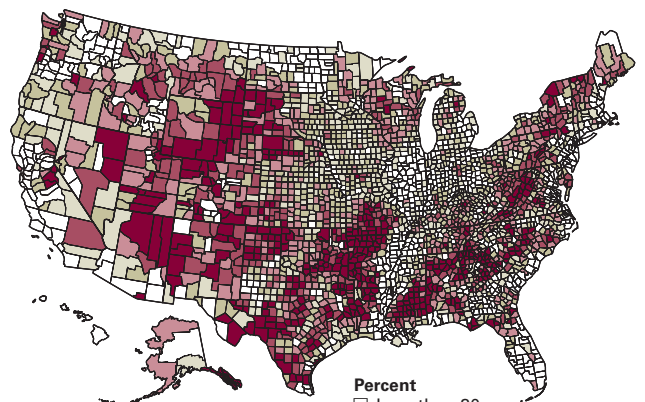
United States: 41.4 Percent



Percent  
 □ Less than 10  
 □ 10-29  
 □ 30-49  
 □ 50-69  
 □ 70-89  
 □ 90 or more

MAP 5. **Value of Livestock, Poultry, and Their Products as Percent of Total Market Value of Agricultural Products Sold: 2002**

United States: 52.6 Percent



Percent  
 □ Less than 30  
 □ 30-49  
 □ 50-64  
 □ 65-79  
 □ 80-89  
 □ 90 or more

Table A1.2 in appendix 1 identifies specific major livestock, poultry, and crop commodity values for 2005. Figure 1a shows that livestock and poultry accounted for slightly more than half the total value of production. Note that poultry contributed 26.5 percent of the total value of livestock, poultry, and their products (fig. 1b).

## Introduction to the Livestock, Poultry, and Aquaculture Industries

USDA defines a cattle operation as any place having one or more head of cattle on hand at any time during the year. In 2005, almost half the farms in the United States had cattle and calves, for a total of 982,510 cattle operations. Only a small number of these cattle operations (78,295) were dairies for milk production. The value of production for cattle and calves was roughly \$36.7 billion. The value of milk production was about \$26.9 billion. The poultry industries were the next largest commodity in the United States, with production valued at around \$28.2 billion. Numbers were very similar for operations with hogs and operations with sheep (67,330 and 68,280, respectively), although the comparative values of production were dissimilar (table 1). *Note:* Detailed statistics for each commodity are provided in tables A1.2 through A1.14 in appendix 1.

FIGURE 1A: **Value of production in 2005: Crops v. livestock and poultry as a percentage of total.\***

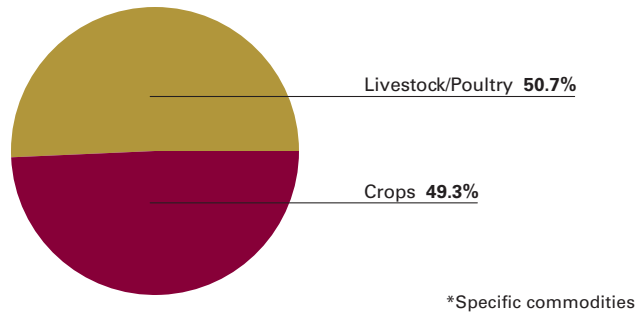


FIGURE 1B: **Value of production in 2005: Specific commodities as a percentage of the respective total of livestock, poultry, and their products.**

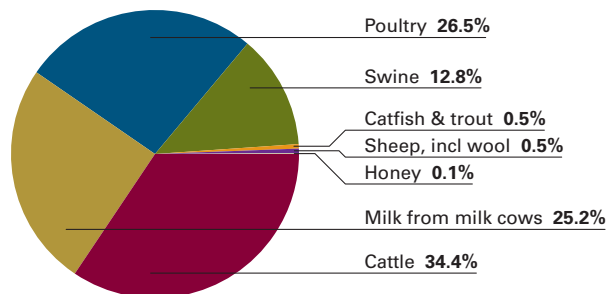


TABLE 1: **Livestock, poultry, and aquaculture statistics for 2005**

Commodity	Inventory (1,000)	Operations	Value of production (\$1,000)	Appendix reference for detail
All cattle and calves	<sup>1</sup> 97,102	982,510	36,739,445	A1.3
Milk cows	<sup>1</sup> 9,058	78,295	<sup>2</sup> NA	A1.4
Beef cows	<sup>1</sup> 33,253	770,170	NA	A1.5
Cattle on feed	<sup>1</sup> 14,132	88,199	NA	A1.6
Hogs and pigs	<sup>3</sup> 61,449	67,330	13,643,568	A1.7
Sheep and lambs (plus wool)	<sup>1</sup> 6,230	68,280	482,298	A1.8
Poultry	<sup>5</sup> Detail	NA	28,241,351	A1.9
Equine	<sup>4</sup> 5,317	NA	NA	A1.10
Catfish	<sup>5</sup> Detail	1,035	482,125	A1.11
Trout	<sup>5</sup> Detail	601	74,191	A1.11
Honey	<sup>5</sup> Detail	NA	157,795	A1.12

1 Inventory as of January 1, 2006.

2 Not available.

3 Inventory as of December 1, 2005.

4 Inventory as of January 1, 1999.

5 Detailed breakout of inventory is shown in respective appendices.

## Cattle and Calves (Beef and Dairy)

In 2002, the Nation's nearly 100 million cattle and calves (beef and dairy) were dispersed widely across the country, with a heavier concentration generally in the Central States (map 6).

Overall, the number of cattle and calves in the United States has steadily increased since 1869 via a cyclical or "wave" effect, reaching a peak in 1975 and then declining during the next 2 decades despite a slight upturn in the mid-1990s. Historically, changes in the cattle cycle occur at roughly 10-year intervals. Recently, the Nation's inventory of cattle and calves has shown an upward turn after several years of gradual decline (fig. 1c).

The number of cattle and calf operations has declined steadily during the past 15 years. A similar decline has also occurred in the number of beef operations (fig. 2). The decrease in the number of cattle and calves operations is due primarily to the decline in the number of small operations.

In 2005, small operations (1–49 head) accounted for 62.3 percent of all operations but only 11 percent of the total inventory of cattle and calves. Large operations (500 or more head) accounted for just 2.9 percent of all operations but contained 42.4 percent of all inventory of cattle and calves (fig. 3 and also table A1.3 in appendix 1).

MAP 6. **Cattle and Calves—Inventory: 2002**

United States Total: 95,497,994

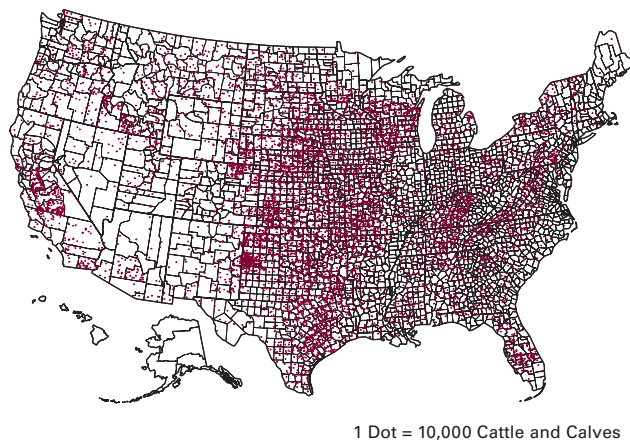


FIGURE 2: **Number of all cattle and beef cow operations, United States, 1989–2005.**

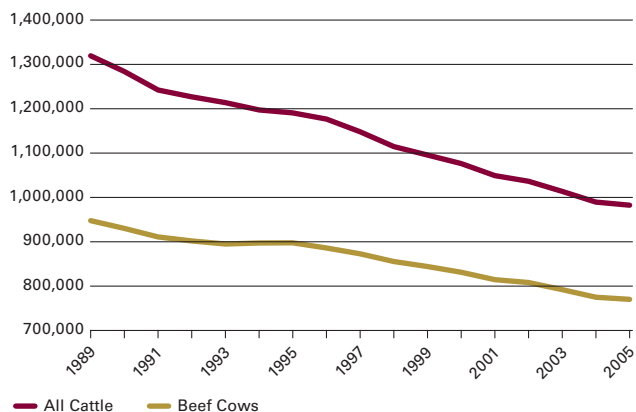


FIGURE 1C: **Cattle and calves: U.S. inventory on January 1 for selected years, 1869–2005.**

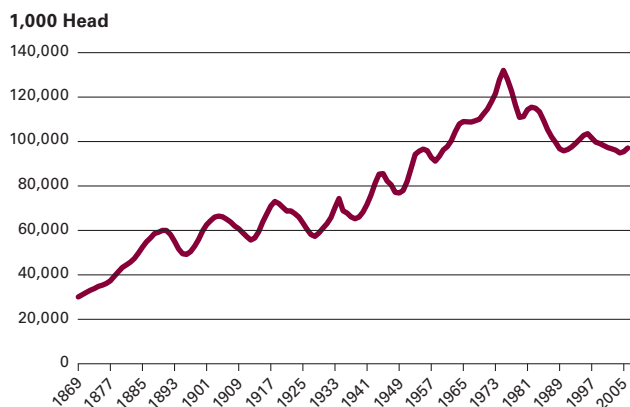
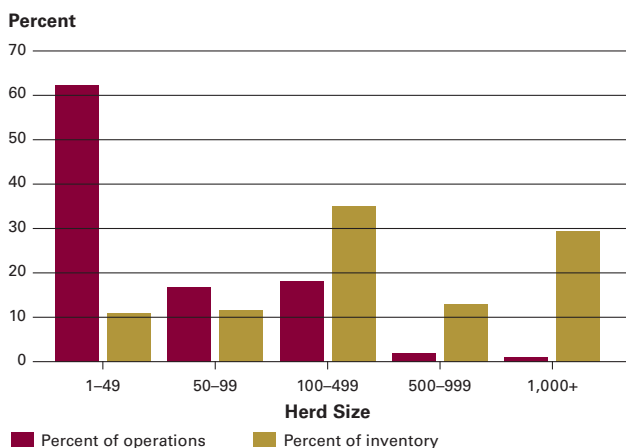


FIGURE 3: **Cattle and calves: Percent operations and inventory by herd size.**

2005 Operations = 982,510  
Jan. 1, 2006, Inventory = 97.10 million



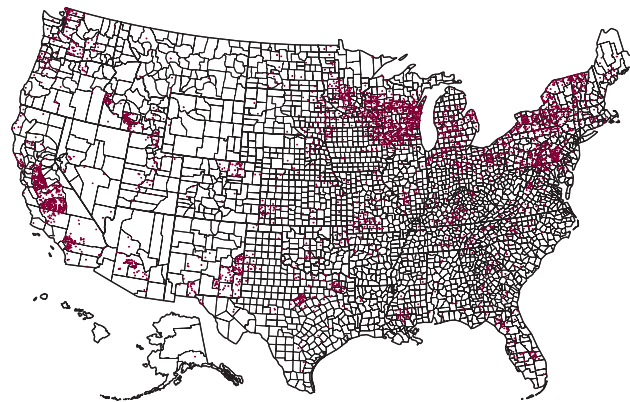
## Milk Cows—Dairy

MAP 7. **Milk Cows—Inventory: 2002**

United States Total: 9,103,959

The distribution of milk cows in the United States is characterized by a concentration of milk cows in California, Wisconsin, Minnesota, and States in the Northeast (map 7).

The U.S. milk cow population has remained relatively stable with just a 4-percent decrease since January 1, 1996. In contrast, the number of operations with milk cows in 2005 was only 56 percent of the number of operations in 1995 (fig. 4). A small percentage of large operations (500 or more milk cows) had a large percentage of milk cows (fig. 5). Annual milk production per cow increased from 16,405 pounds in 1995 to 19,576 pounds in 2005—a 19-percent increase. Table A1.4 in appendix 1 documents dairy production for 2004 and 2005.



1 Dot = 2,000 Milk Cows

FIGURE 4: **Milk cows: U.S. number of operations, 1993–2005.**

### Number of Operations

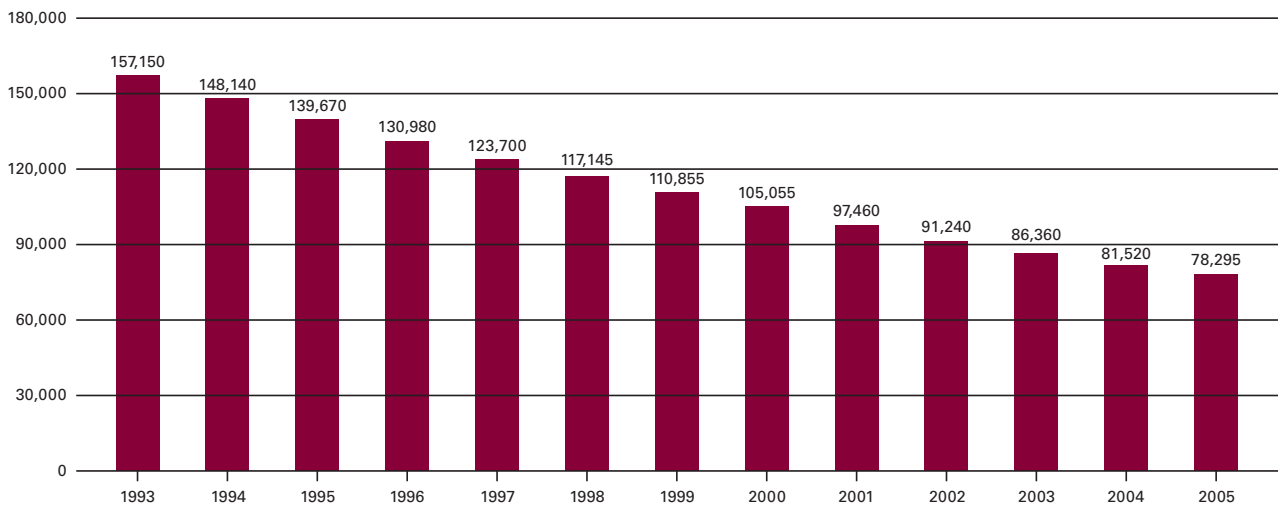
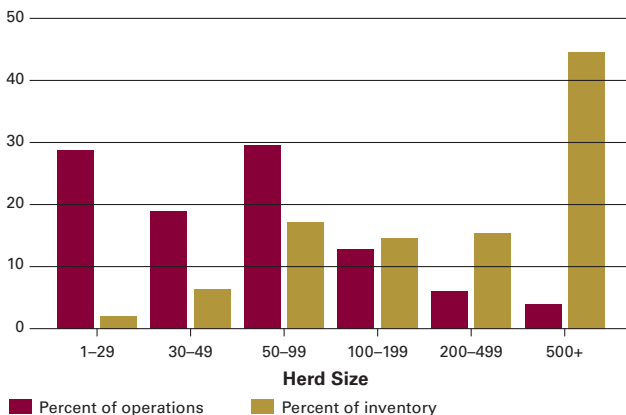


FIGURE 5: **Milk cows: Percent operations and inventory, by herd size.**

2005 Operations = 78,295

Jan. 1, 2006, Inventory = 9.06 million

### Percent



■ Percent of operations    ■ Percent of inventory



## Beef Cows

In 2002, beef cows were distributed widely across the United States. In general, however, States in the Central part of the Nation had heavier concentrations of beef cows (map 8).

The overall trend in the number of beef cows (fig. 6) follows the trend shown for the total inventory of cattle and calves (fig. 1c). Essentially, inventory levels have remained stable over the last decade (fig. 7). Beef cows accounted for 78.6 percent of the total cow inventory on January 1, 2006.

In 2005, a relatively large number of operations in the United States (770,170) had beef cows. However, the number of operations with beef cows has declined gradually since 1996 (1 to 2 percent per year, as shown in fig. 2). This decrease is most notable in small operations (1–49 head). Following a common trend seen in other livestock commodities, the population of beef cows on large operations (100 or more head) has increased and now accounts for 53.1 percent of total U.S. beef cow inventory as of January 1, 2006 (fig. 8 and table A1.5 in appendix 1). These large operations account for only 10.2 percent of all beef cow operations in the United States but have more than half the total beef cow inventory.

MAP 8. **Beef Cows—Inventory: 2002**

United States Total: 33,398,271

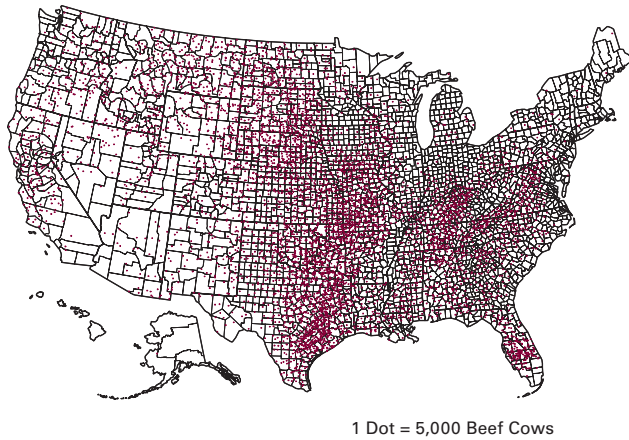


FIGURE 6: **Beef cows: U.S. inventory as of January 1 in selected years, 1920–2006.**

2006 Inventory = 33.25 million

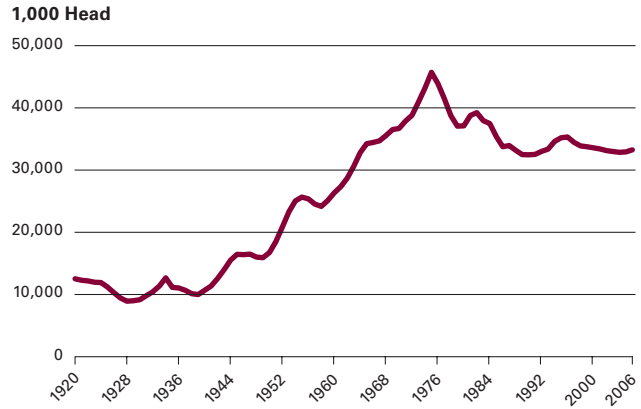


FIGURE 7: **Beef cows: U.S. inventory as of January 1 for all years, 1980–2006.**

Number (1,000 head)

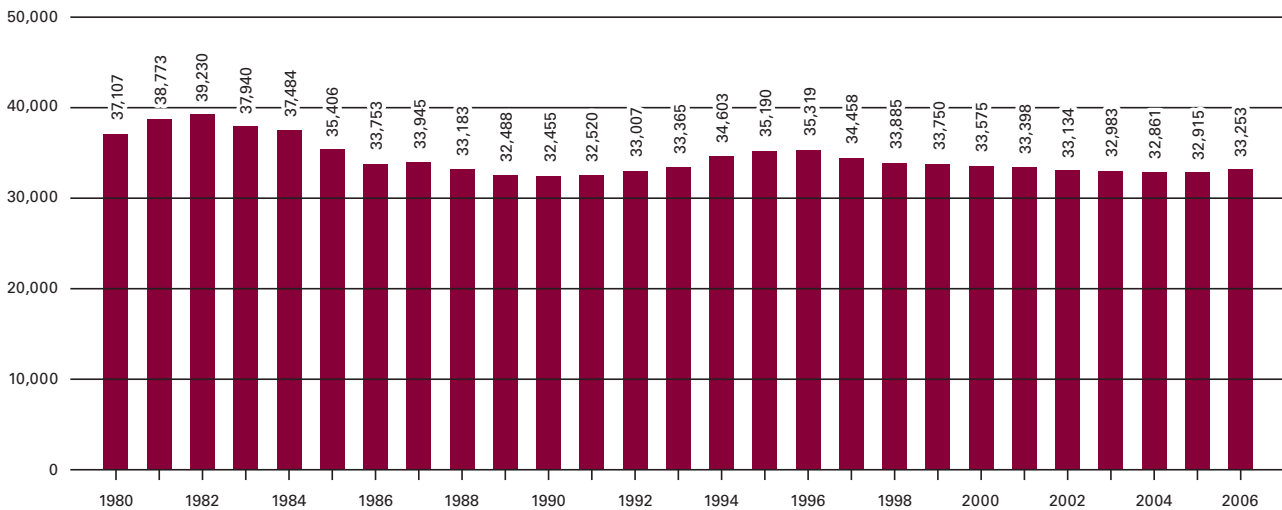
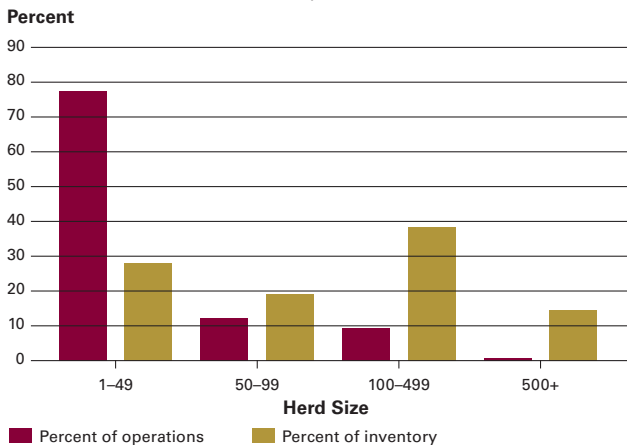


FIGURE 8: **Beef cows: Percent operations and inventory, by herd size, as of January 1, 2006.**

2005 Operations = 770,170

Jan. 1, 2006, Inventory = 33.25 million





## Cattle on Feed

Cattle and calves on feed are fed a ration of grain or other concentrate in preparation for slaughter, and the majority are in feedlots in States with large grain supplies (map 9).

On January 1, 2006, three States (Kansas, Nebraska, and Texas) accounted for over half (57.2 percent) the inventory. Large numbers of cattle on feed are in relatively few feedlots; 126 feedlots (0.1 percent of all feedlots) accounted for 40.4 percent of the total U.S. cattle-on-feed inventory (table A1.6 in appendix 1). Inventory numbers in feedlots typically reach high points in December, January, and February and low points in August and September because of the seasonal availability of grazing resources and the predominance of spring-born calves (fig. 9a). As a result, commercial cattle slaughter typically reaches a high point in May, June, and July (fig. 9b). Steers and heifers accounted for 83.4 percent of the federally inspected slaughter in 2005. Federally inspected slaughter accounted for 98.3 percent of the 32.4 million head of commercially inspected slaughter (table A1.3 in appendix 1).

## Hogs

Historically, hog production has been most common in the upper Midwest (map 10). Iowa is the largest hog-producing State and had 26.9 percent of the U.S. inventory of all hogs and pigs on December 1, 2005. During the past 2 decades, North Carolina has increased its production and is now the Nation's second-largest hog-producing State with 16 percent of the inventory. The practice of shipping pigs from production areas (e.g., North Carolina) to grower-finisher areas in the upper Midwest continued in 2005.



MAP 9. **Cattle on Feed—Inventory: 2002**

United States Total: 14,905,545

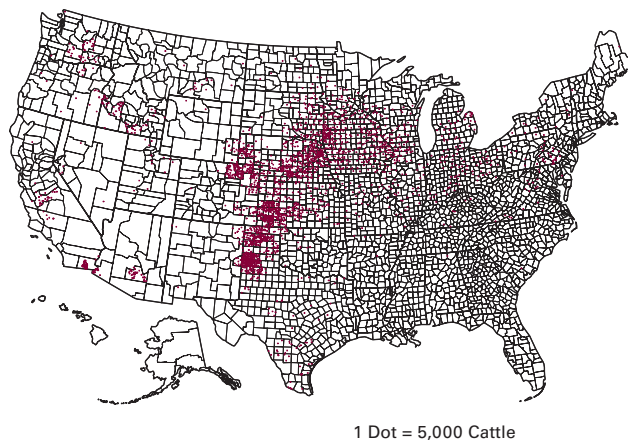


FIGURE 9A: **U.S. cattle on feed at feedlots with capacity of 1,000 or more head.**

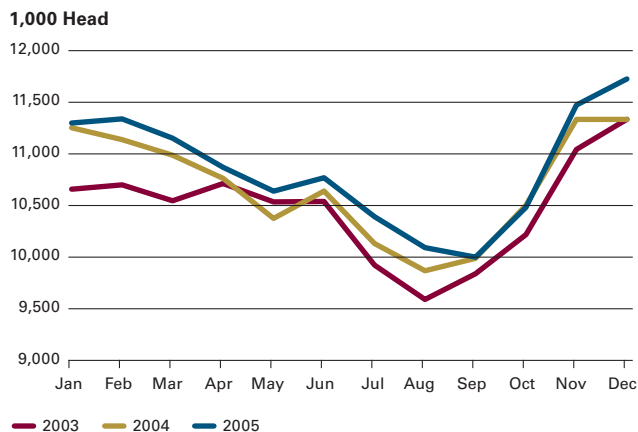
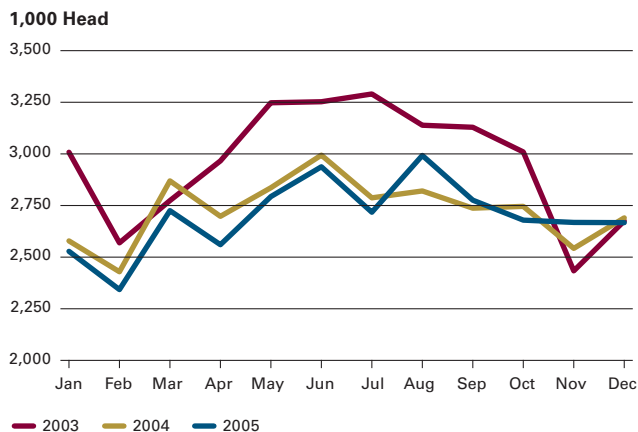
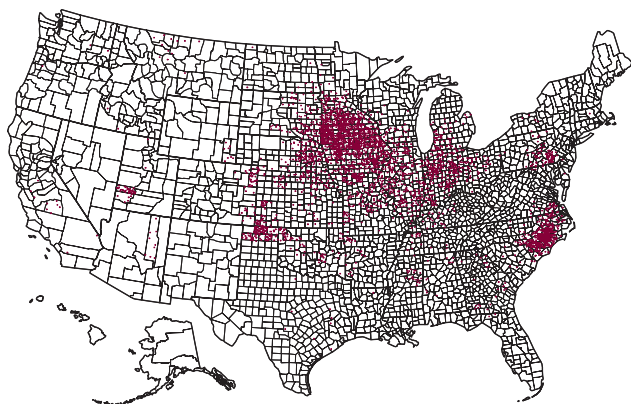


FIGURE 9B: **Cattle: U.S. commercial slaughter, by month, 2003–05.**



MAP 10. **Hogs and Pigs—Inventory: 2002**

United States Total: 60,405,103



1 Dot = 15,000 Hogs and Pigs



In the United States, inventory levels are estimated and published quarterly (December, March, June, and September). From quarter to quarter, the U.S. inventory of all hogs has fluctuated over the past decade. More change from quarter to quarter was shown in 1995–2000 compared with the quarter-to-quarter variation shown in the last 5 years. Historically, inventory numbers reach a low point on March 1 and peak on September 1 (fig. 10a). The number of hogs kept for breeding decreased by 11 percent during the last decade.

The number of hogs slaughtered commercially typically reaches a low point in May, June, or July, followed by increases until peaking in October (fig. 10b) in preparation for the holiday season. Commercial hog slaughter totaled 103.6 million head in 2005.

The number of operations with hogs declined steadily during the past decade, decreasing by 60 percent over the last 10 years (since 1995) (fig. 11). The majority of swine operations (60.3 percent) had fewer than 100 head, but these operations accounted for only 1 percent of the inventory. During the past decade, there has been a steady increase in the number of large operations (5,000 or more head), with the exception of a slight decline in 2003. Large operations (3.5 percent of all operations) now maintain more than half of the U.S. hog inventory.

In 2005, the United States had 67,330 hog operations with a production value of \$13.6 billion (table A1.7 in appendix 1).

FIGURE 10A: **Hogs and pigs: U.S. inventory, by quarter, 1995–2006.**

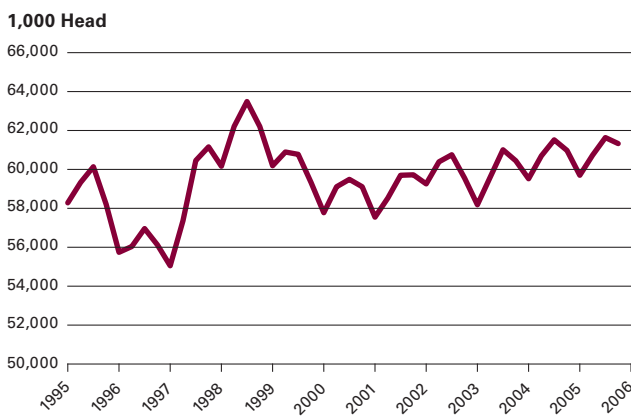


FIGURE 10B: **Hogs: U.S. commercial slaughter, by month, 2003–05.**

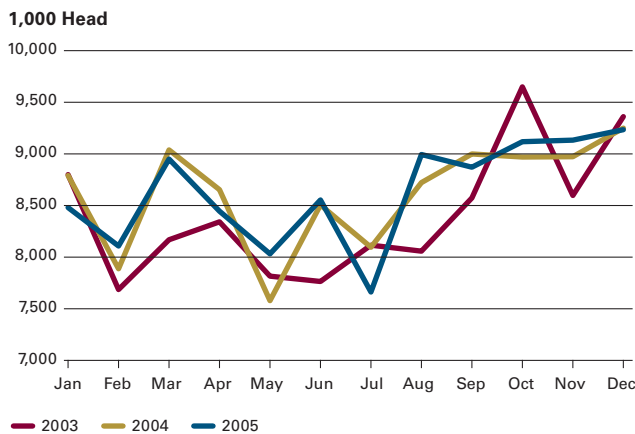
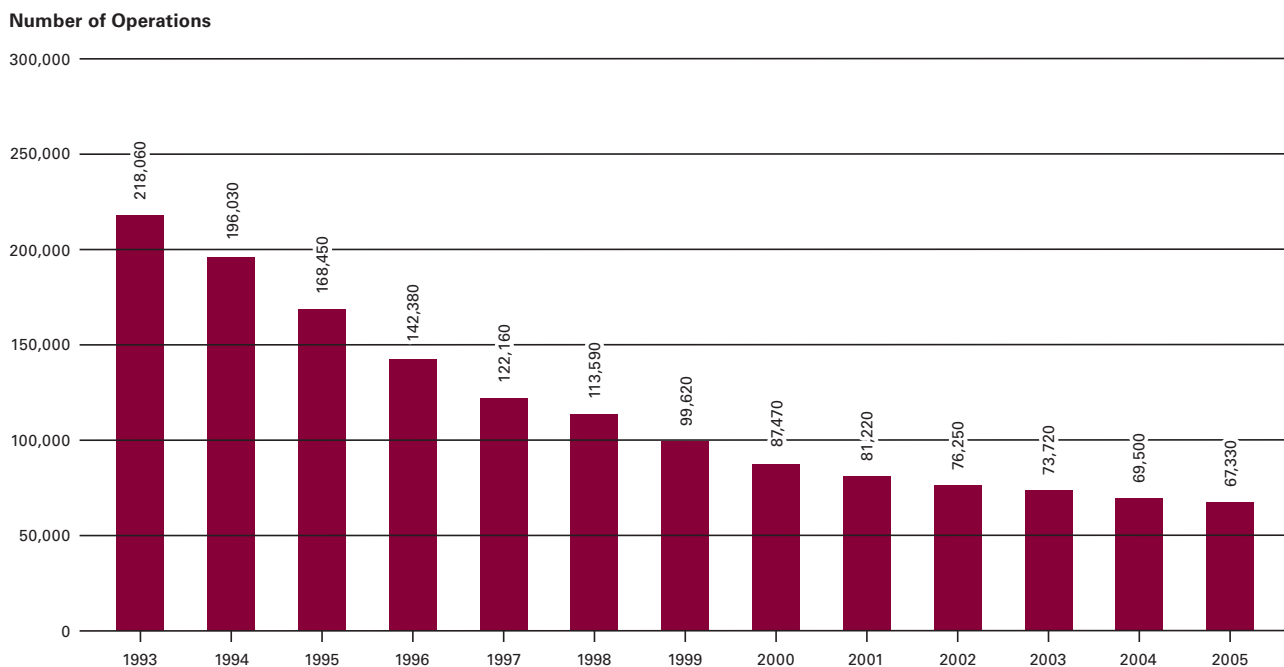


FIGURE 11: **Hogs and pigs: U.S. number of operations, 1993–2005.**



### Sheep and Goats

The U.S. sheep industry is located primarily in the Western and Central States (map 11). Typically, the Western States are characterized by large range flocks, whereas those in the Central and Eastern States are mostly small, fenced flocks.

The number of sheep has declined steadily since the late 1980s with the exception of a brief peak in inventory in 1990; however, there was a small increase on January 1, 2005, and a 2-percent increase on January 1, 2006 (fig. 12).

The number of operations with sheep since the late 1980s has declined gradually, although the total has remained steady in the last 5 years (fig. 13a).

MAP 11. **Sheep and Lambs—Inventory: 2002**  
United States Total: 6,341,799

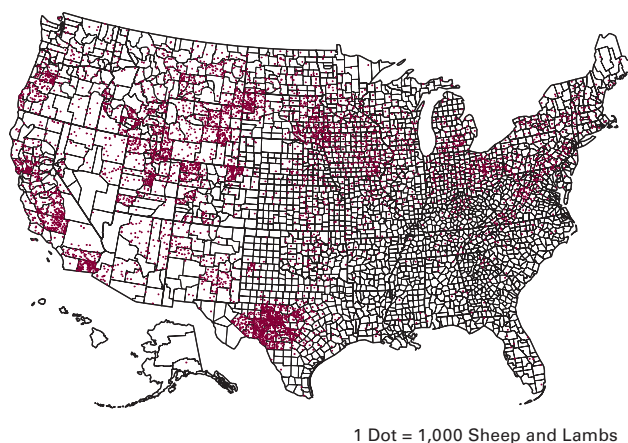


FIGURE 12: **Sheep and lambs: U.S. inventory on January 1, 1988–2006.**

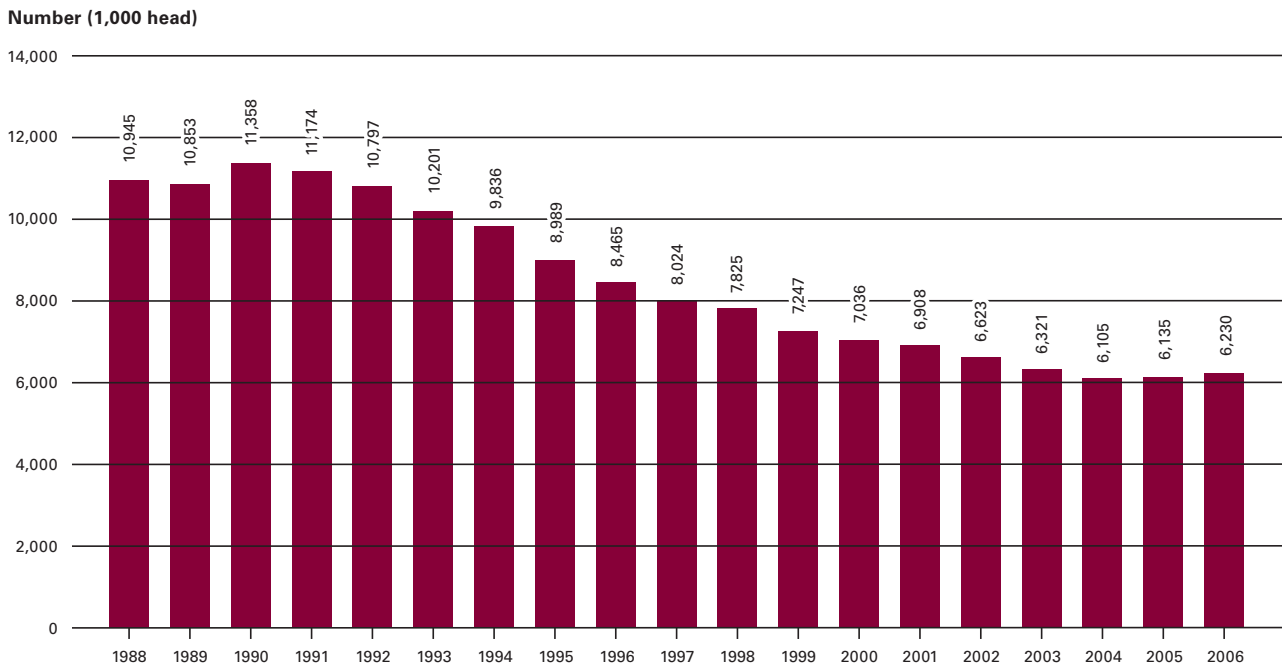
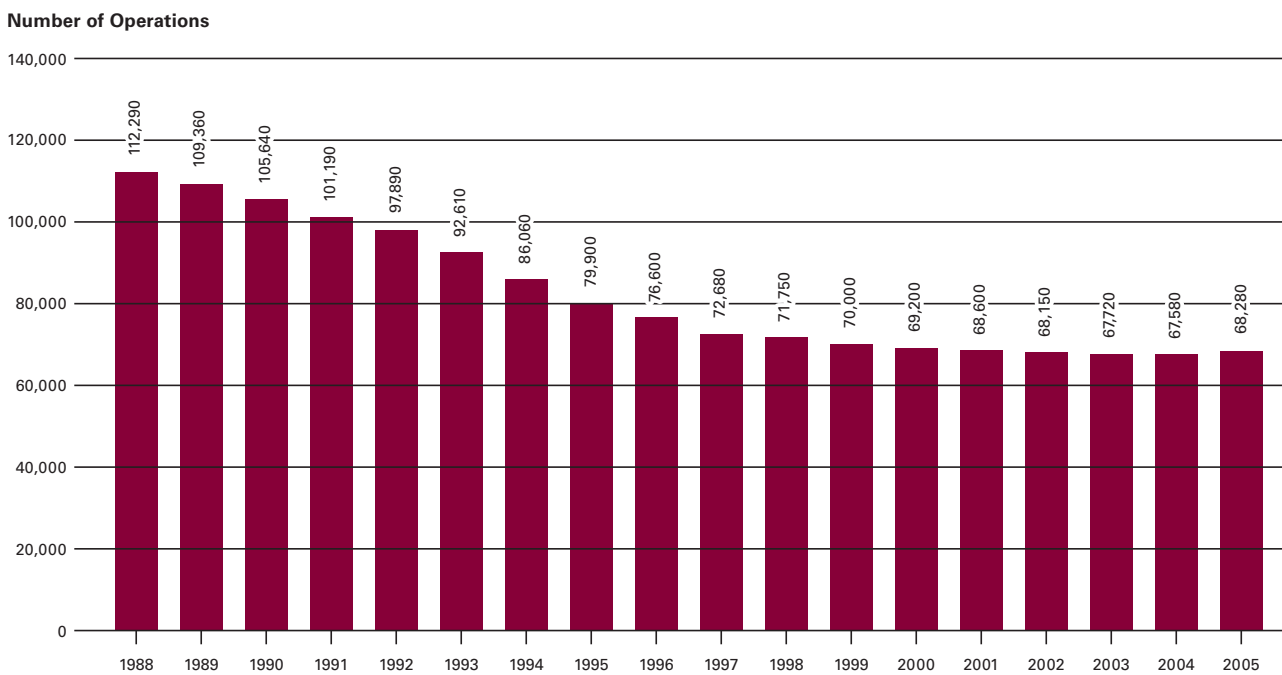


FIGURE 13A: **Sheep and lambs: U.S. number of operations, 1988–2005.**

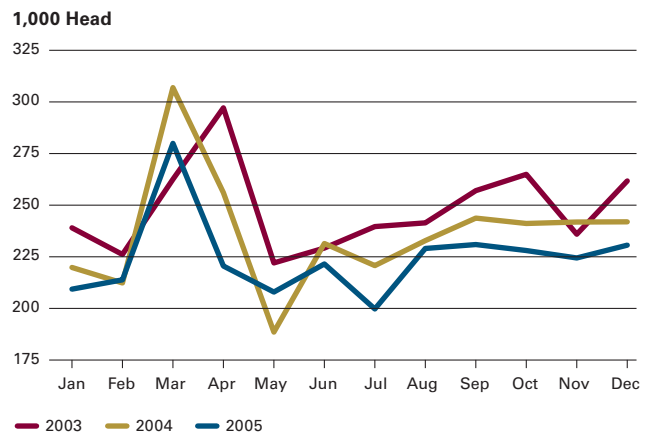




The January 1, 2006, total inventory of U.S. sheep and lambs was 6.2 million head. Almost a third of these sheep (28.7 percent) are located on a large number of small operations; 90.8 percent of the 68,280 total operations had fewer than 100 head of sheep and lambs (table A1.8 in appendix 1). Commercial sheep and lamb slaughter totaled 2.70 million head in 2005. Slaughter typically peaks in March or April (fig. 13b).

There were 2.83 million goats in the United States on January 1, 2006, which represents a 4-percent increase over the 2005 population. Texas accounted for 46.7 percent of the total. The number of Angora and milk goats was nearly identical (278,000 and 288,000, respectively). Meat and other goats totaled 2.26 million head, which was up 5 percent from 2005.

FIGURE 13B: **Sheep: U.S. commercial slaughter, by month, 2003-05.**



## Poultry Industries

Map 12 shows the economic importance of the poultry industries to the Eastern States—especially the Southeastern States. Note that the value of poultry and eggs is a high percentage of the total value of agricultural products sold in these States. The broiler segment of the poultry industries dominates other segments—eggs, turkeys, and chickens (excluding broilers)—in terms of value of production. Broilers account for nearly three-fourths the value of production (fig. 14). The quantity of production for each segment has increased rapidly over the past 50 years (figs. 15a–c).

MAP 12. **Value of Poultry and Eggs as Percent of Total Market Value of Agricultural Products Sold: 2002**

United States: 11.9 Percent

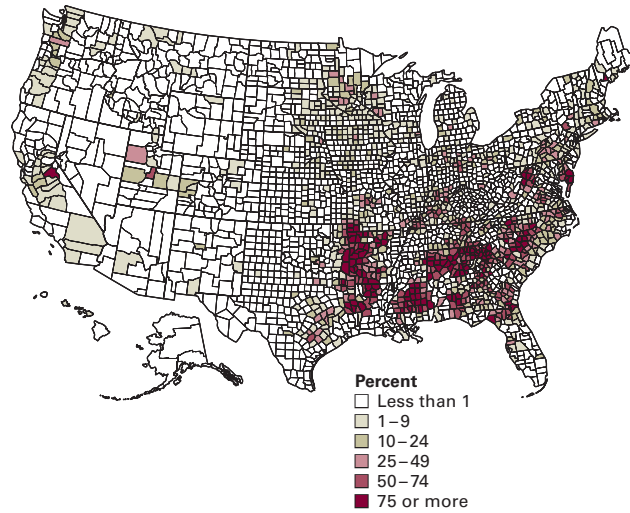


FIGURE 14: **Value of production: Broilers, eggs, turkeys, chickens, and total, United States, 1994–2005.**

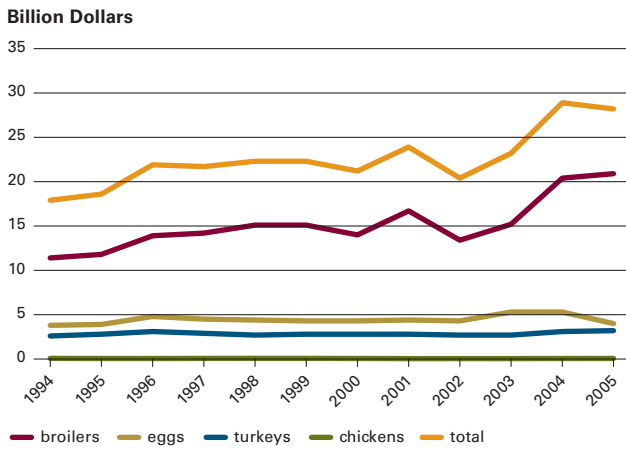


FIGURE 15B: **U.S. egg production, 1943–2005.**

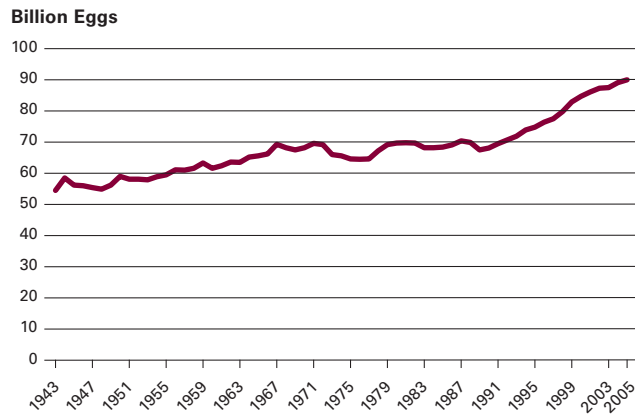


FIGURE 15A: **U.S. broiler production, 1953–2005.**

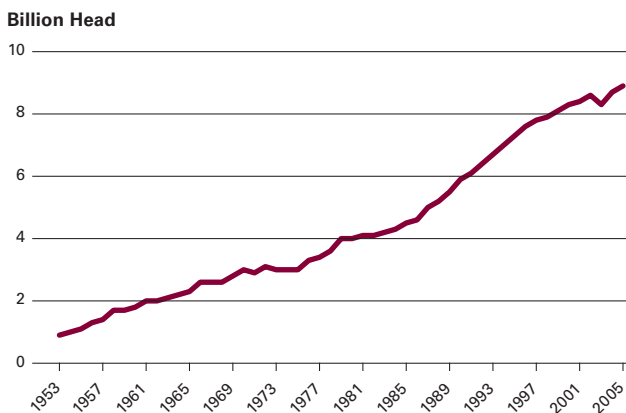
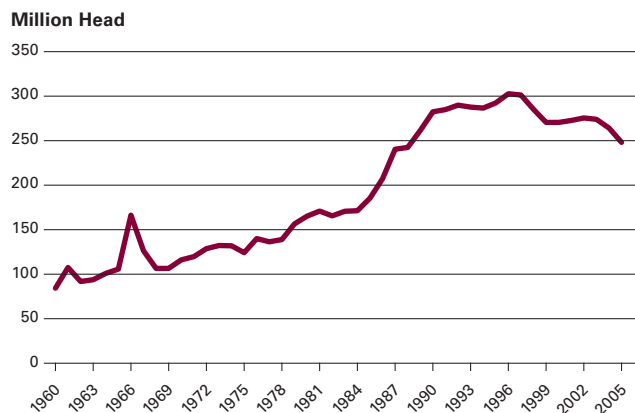


FIGURE 15C: **U.S. turkey production, 1960–2005.**



Broiler production is concentrated heavily in the Nation's Southeastern States (map 13), whereas layers are dispersed more widely over the Central and Eastern States (map 14).

Turkey production is concentrated in the eastern half of the United States (map 15). Minnesota and North Carolina accounted for about one-third of the total number of turkeys raised in 2005.

The broiler and layer industries are characterized by a relatively small number of large companies. USDA does not provide annual estimates of the number of companies or production sites. The broiler value of production was 74 percent of the \$28.2 billion poultry industries production in 2005. Egg production accounted 14.3 percent of the total value of production (table A1.9 in appendix 1).

Hatchery statistics for 2005 include 9.48 billion broiler-type chickens hatched, 437 million egg-type chicks hatched, and 276 million poults hatched in turkey hatcheries. The capacity of chicken hatcheries on January 1, 2006, was 888 million eggs, and the capacity of turkey hatcheries was 39 million eggs.

More than 99 percent of total U.S. poultry slaughter for the major species is done in federally inspected slaughter plants. Slaughter of young chickens<sup>1</sup> accounted for 85.7 percent of the total live weight of poultry slaughtered in 2005 (fig. 16).

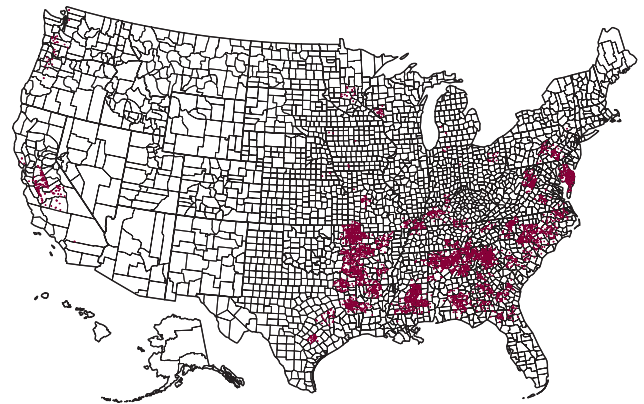
The average live weight of young chickens slaughtered has steadily increased over the previous decade (fig. 17).

In 2005, 319 plants killed poultry under Federal inspection. Young chickens were killed in 220 plants in 35 States, and young turkeys were slaughtered in 42 plants in 24 States.

<sup>1</sup> Young chickens are commercially grown broilers, fryers, and other young, immature birds (e.g., roasters and capons).

MAP 13. **Number of Broilers and Other Meat-Type Chickens Sold: 2002**

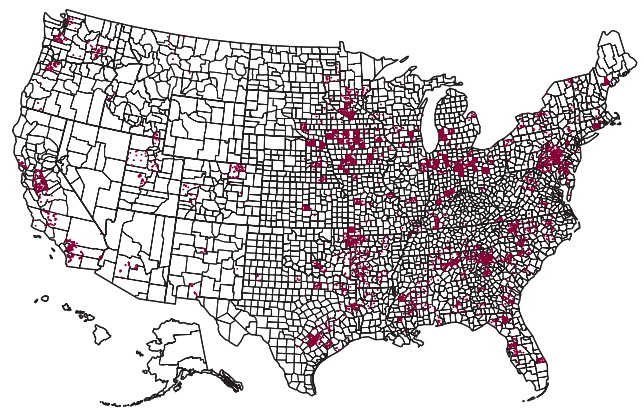
United States Total: 8,500,313,357



1 Dot = 2,000,000 Broilers

MAP 14. **Layers 20 Weeks Old and Older—Inventory: 2002**

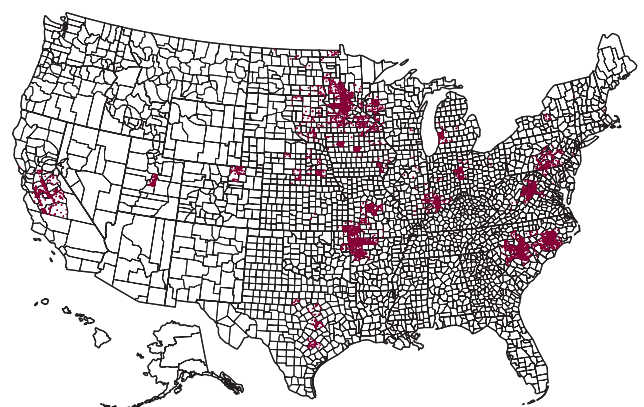
United States Total: 334,435,155



1 Dot = 60,000 Layers 20 Weeks Old and Older

MAP 15. **Number of Turkeys Sold: 2002**

United States Total: 283,247,649



1 Dot = 60,000 Turkeys

FIGURE 16: **Poultry: Total live weight slaughtered in 2005, in percentage, by type of poultry.**

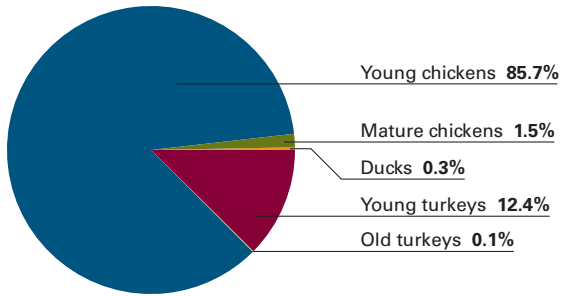
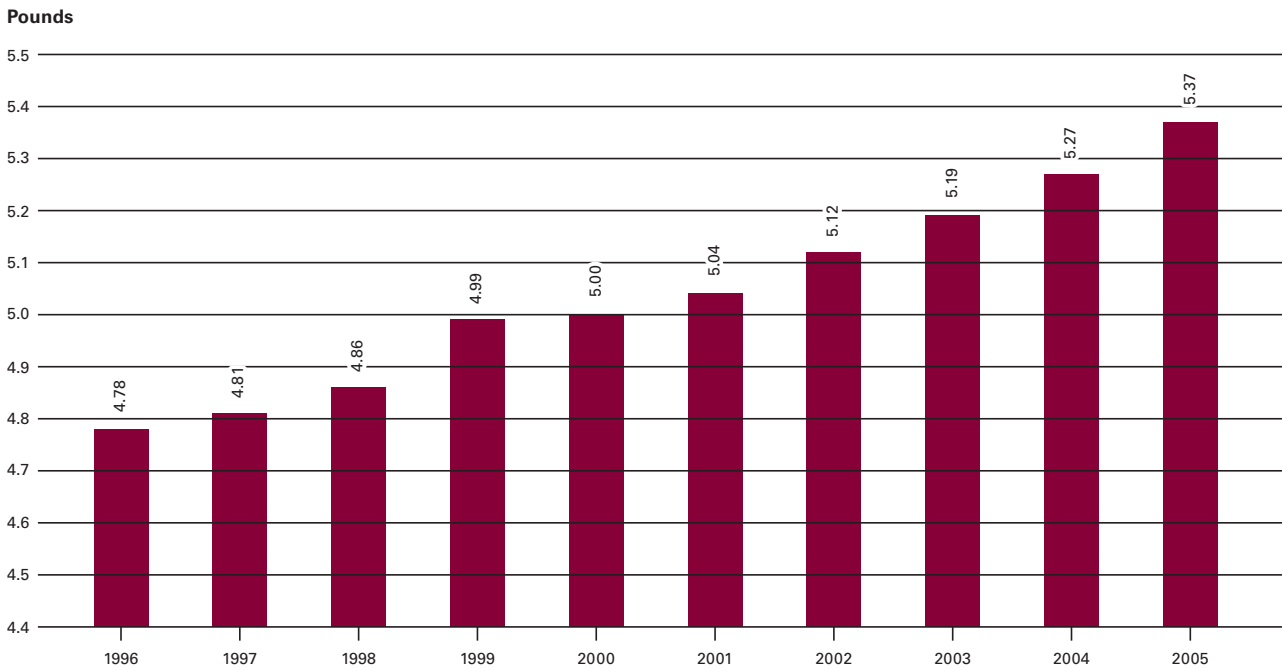


FIGURE 17: **Young chickens: Average slaughter live weight, in pounds, 1996-2005.**







## Equine Industry

Statistics on the demographics of the U.S. equine industry are sparse. USDA does not have an equine estimation program.

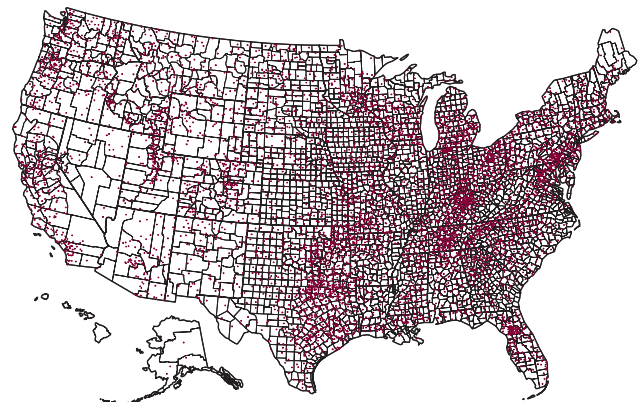
The 2002 Census of Agriculture showed 3.64 million horses and ponies reported from 542,223 farms. Map 16 illustrates the broad and even distribution of horses and ponies across the United States. The 2002 Census also reported 105,358 mules, burros, and donkeys located on 29,936 farms.

USDA published equine inventories located on all places (farms and nonfarms) for January 1, 1998, at 5.25 million head, and January 1, 1999, inventories of 5.32 million head (table A1.10 in appendix 1). In addition, 39.1 percent of the January 1, 1998, total was estimated to be on nonfarm locations. The estimated value of sales was \$1.64 billion for 1997 and \$1.75 billion for 1998.

USDA publishes no estimates for the number of operations with all types of equids, and no information by size of equid operation is published for the United States.

MAP 16. **Horses and Ponies—Inventory: 2002**

United States Total: 3,644,278



1 Dot = 500 Horses and Ponies

## Fish and Other Aquaculture Products

The 2002 Census of Agriculture estimated the value of fish and other aquaculture products sold at about \$1.1 billion. Combined catfish and trout sold accounted for 78.4 percent of the total, by weight. Catfish production was concentrated (96.3 percent) in four Southern States: Alabama, Arkansas, Louisiana, and Mississippi. Mississippi accounted for 53.8 percent of total pounds of catfish sold. The total value of catfish sales for 2005 was \$482.1 million, which was up less than 1 percent over the previous year (table A1.11 in appendix 1). Food-size catfish accounted for 93.3 percent of total sales.

Trout production was dispersed more widely across the United States. Idaho accounted for 51.2 percent of total value of fish sold, followed by North Carolina at 9.5 percent and California at 8.8 percent. The total value of all trout sales, both fish and eggs, was \$74.2 million in 2005—an increase of 4 percent from 2004.



## Honey Production

Honey production in 2005 from producers with five or more colonies totaled 175 million pounds, which represents a 5-percent decrease since 2004 (table A1.12 in appendix 1). This decrease, combined with a 15-percent drop in honey prices, resulted in a 2005 value of production of \$157.8 million, reflecting a 20-percent decline from the previous year. The distribution of honey production is rather widespread across the United States, although North Dakota and California accounted for 19.3 and 17.2 percent of the total production, respectively.

## Miscellaneous

The 2002 Census of Agriculture reported several miscellaneous livestock and poultry commodities, which are shown in table A1.13 in appendix 1.

## Number of Livestock Slaughter Plants in the United States

On January 1, 2006, there were 806 federally inspected U.S. slaughter plants (down from 826 plants on January 1, 2005). Federally inspected plants are those that transport meat interstate and must employ Federal inspectors to ensure compliance with USDA standards. Additional plants considered federally inspected are Talmedge–Aiken plants. Although USDA is responsible for inspection in these plants, actual Federal inspection is carried out by State employees. During 2005, 657 plants slaughtered cattle (table A1.14 in appendix 1), and 13 of these plants produced almost 54 percent of the total cattle slaughtered. Eleven of the 227 plants that slaughtered calves accounted for 79 percent of the total, and 4 of the 496 plants that slaughtered sheep or lambs in 2005 produced 67 percent of the total. In 2005, 371 plants slaughtered goats. Hogs were slaughtered at 630 plants, 13 of which accounted for slightly over 58 percent of the total. Iowa, Kansas, Nebraska, and Texas accounted for almost 53 percent of U.S. commercial red-meat production in 2005. Commercial red-meat production by month typically reaches a low point in February (fig. 18). Commercial beef and pork production in 2005 dominated (54.1 and 45.2 percent, respectively), as shown in figure 19.

There were 2,087 State-inspected or custom-exempt slaughter plants in the United States on January 1, 2006, compared with 2,116 plants on January 1, 2005. State-inspected plants sell and transport exclusively intrastate. State inspectors ensure compliance with individual State standards as well as with Federal meat and poultry inspection statutes. Custom-exempt plants do not sell meat but operate on a custom slaughter basis only. The animals and meat are not federally inspected, but the facilities must meet local health requirements.

FIGURE 18: U.S. commercial red meat production, by month, 2003–05.

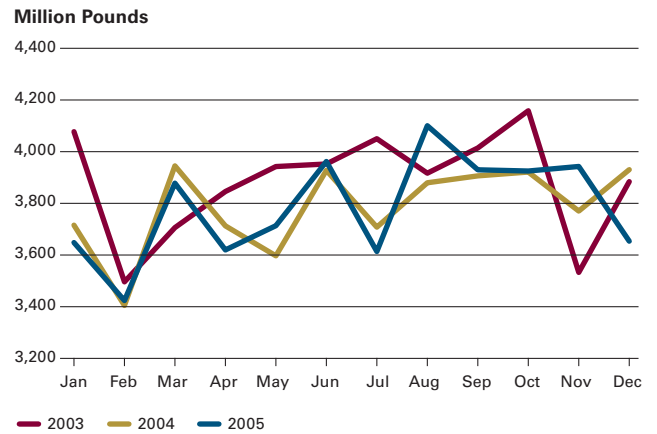
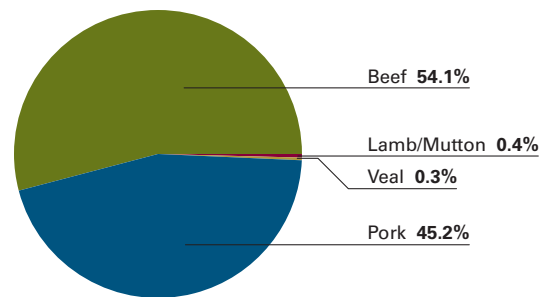


FIGURE 19: U.S. commercial red meat production, by percentage, 2005.



## Use of Technology in Agricultural Industries

The ability of the Nation's producers to access information electronically could contribute to more rapid control of disease outbreaks. Since 1997, NASS has statistically measured farm computer usage every other year.

In 2005, 57 percent of U.S. livestock farms had access to a computer, up from 36 percent in 1997 (fig. 20). At 59 percent, dairy farms had a slightly higher rate of computer access than beef farms (52 percent) in 2005. For both beef and dairy farms, large farms (\$250,000 and over) had a higher percentage of computer access than small farms (\$1,000–249,999). In 2005, 72 and 80 percent of large beef and dairy farms, respectively, had computer access, compared with 51 and 50 percent of small beef and dairy farms, respectively.

Less than one-third of all livestock farms (29 percent) used computers for their farm business in 2005, but a large difference in computer usage between small farms and large farms was observed. On only 27 percent of small livestock farms were computers used for farm business, whereas 64 percent of large farms used them.

The percentage of livestock farms with Internet access increased from 12 percent in 1997 to 50 percent in 2005 (fig. 21). Just under half of dairy farms (48 percent) had Internet access in 2005, but beef farms had a slightly lower rate at 44 percent. Again, large farms had a consistently higher rate of Internet access than small farms.

FIGURE 20: **Percentage of farms with computer access, by production type, 1997–2005.**

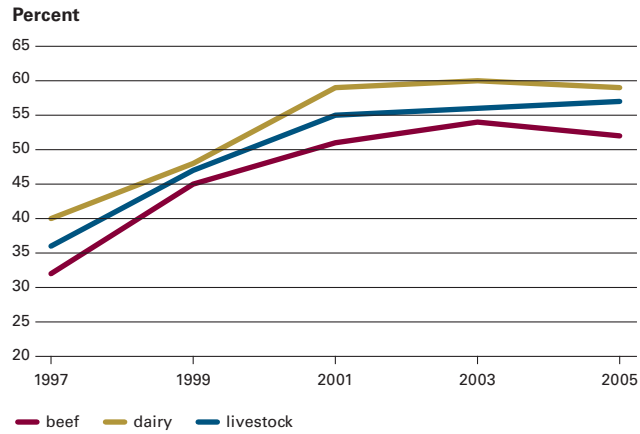
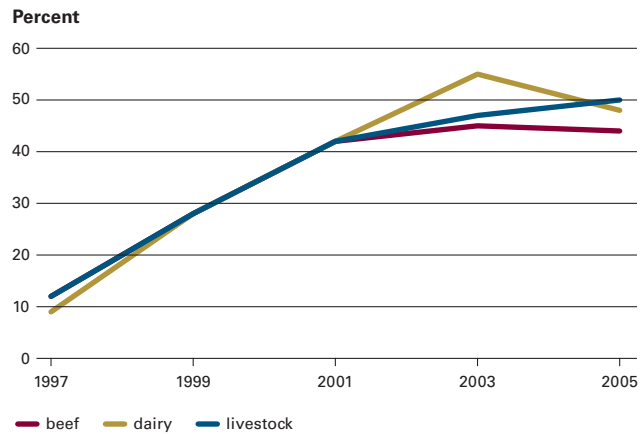


FIGURE 21: **Percentage of farms with Internet access, by production type, 1997–2005.**





## CHAPTER 2

# National Animal Health Surveillance System (NAHSS)

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NAHSS is a Veterinary Services (VS) initiative designed to integrate existing animal-health monitoring programs and surveillance activities into a comprehensive and coordinated system. NAHSS is charged with enhancing the collection, collation, and analysis of animal health data and facilitating timely and efficient dissemination of animal health information. NAHSS also augments the Nation's ability to detect the early signs of biological threats.

In December 2004, the NAHSS Steering Committee, in collaboration with the National Surveillance Coordinator and the National Surveillance Unit (NSU), finalized a strategic plan for national animal-health surveillance. VS established four primary goals for the NAHSS:

1. Early detection and global risk surveillance for foreign animal diseases (FADs),
2. Early detection and global risk surveillance for emerging diseases,
3. Enhanced surveillance for current program diseases, and
4. Monitoring and surveillance for diseases of major impact on production and marketing.

### Program Disease Surveillance

The national eradication and certification programs, which eradicate, prevent, or minimize animal diseases of economic concern, are a fundamental component of VS' efforts to promote, ensure, and improve the biological and commercial health of U.S. livestock and poultry. VS eradication programs include scrapie in sheep and goats, tuberculosis in cattle and cervids, pseudorabies in swine, brucellosis in swine, and brucellosis in cattle and bison. Control and certification programs include chronic wasting disease in cervids, Johne's disease in cattle, trichinae in swine, and the Swine Health Protection Inspection Program, which regulates feeding of food waste to swine. More detailed information about these programs and their current status is provided in chapter 3.

### FAD Surveillance and Programs

#### FAD Surveillance and Investigations

Efforts to detect FAD events in the United States include field investigations, disease-specific surveillance programs, and diagnostic laboratory surveillance. FAD field investigations are conducted by specially trained Federal, State, or private accredited veterinarians. VS operates disease-specific surveillance programs for the following diseases: bovine spongiform encephalopathy (BSE), exotic Newcastle disease (END), classical swine fever (CSF), avian influenza (AI), and infectious salmon anemia

(ISA). A National Animal Health Laboratory Network (NAHLN) was developed recently to screen routine and specific-risk samples for FADs. In addition, NAHSS, coordinated by VS' NSU, will improve early detection and global risk surveillance of FADs. The NAHSS 2005 strategic plan (<[http://www.aphis.usda.gov/vs/ceah/ncahs/nsu/nahss/NAHSS\\_Strategic\\_Plan\\_2005\\_0216.pdf](http://www.aphis.usda.gov/vs/ceah/ncahs/nsu/nahss/NAHSS_Strategic_Plan_2005_0216.pdf)>) contains specific objectives to this end. Those objectives include enhancing domestic and global surveillance to identify elevated risks and encouraging the development and application of new technologies for early and rapid disease detection.

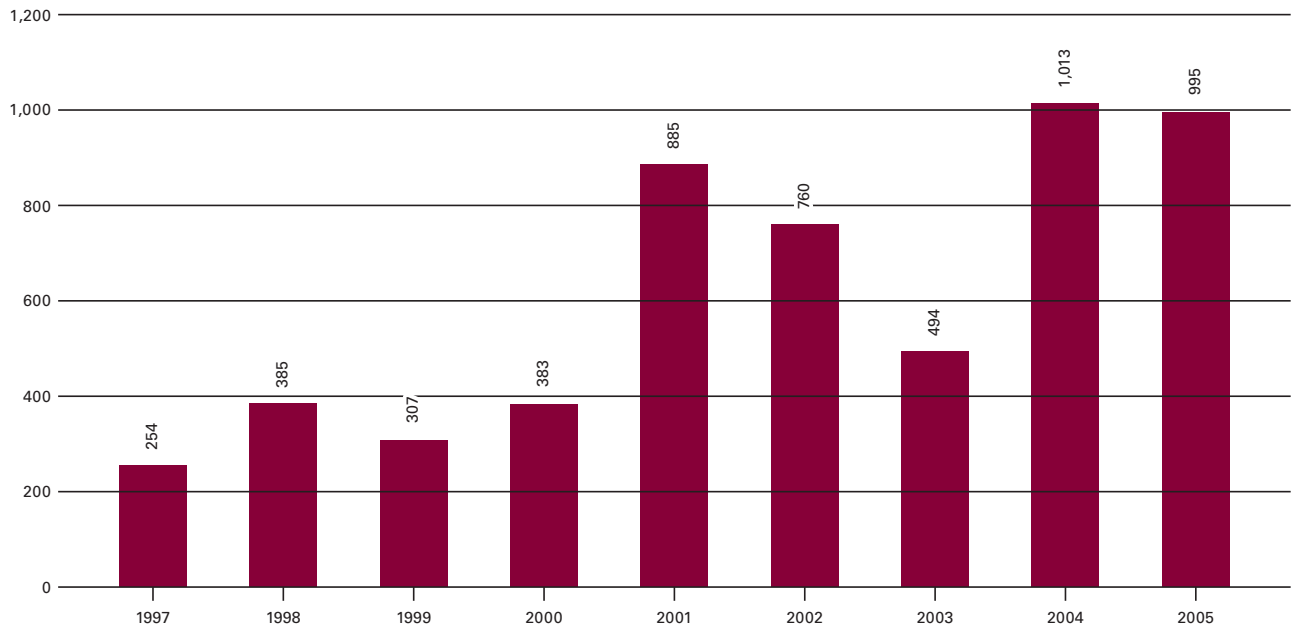
In 2005, VS conducted 995 investigations of FADs or emerging disease incidents in 47 States plus Puerto Rico (table A2.1 in appendix 2). Colorado, Utah, and Wyoming reported the most investigations (146, 144, and 130, respectively), of which 138, 143, and 124, respectively, were in response to a vesicular stomatitis outbreak that ultimately was reported in 6 additional States: Arizona, Idaho, Montana, Nebraska, New Mexico, and Texas. In addition to these 9 States, 25 more States, plus Puerto Rico, conducted 5 or more FAD investigations in 2005.

From 1997 through 2005, the number of investigations per year ranged from a low of 254 in 1997 to a high of 1,013 in 2004 (fig. 22). The high number of investigations in both 2004 and 2005 reflects the occurrence of the vesicular stomatitis outbreak.

Samples were submitted under Priority 1 status to the National Veterinary Services Laboratories (NVSL) for six investigations conducted in 2005. Priority 1 status is reserved for investigations for which the field investigator feels there is a high likelihood that the observed condition is an FAD or emerging disease incident (EDI) and requires prompt laboratory diagnostic information. Specimens submitted under Priority 1 are processed through diagnostic testing protocols in the most expedient way possible regardless of the time of day or the day of the week.

In 2005, vesicular conditions (painful, blisterlike lesions) of the muzzle and feet were the most common complaint investigated. There were 817 vesicular complaints: 603 in equids (horses, donkeys, and mules), 146 in cattle, 37 in goats, 14 in sheep, 12 in pigs, 4 in alpaca, and 1 in bison (table A2.2 in appendix 2). Differential diagnoses of FAD concern for vesicular conditions in equids include vesicular stomatitis. In ruminants, camelids, captive cervids, and swine, concern for any vesicular lesions would include not only vesicular stomatitis but also foot-and-mouth disease (FMD), which is a highly contagious viral infection of skin or mucous membranes that primarily affects cloven-hoofed domestic and wild animals. FMD would have a severe economic impact if it entered the United States and spread throughout the country.

FIGURE 22: **Number of FAD/EDI investigations, by year, 1997–2005.**



In cattle, BSE is one of the FAD differential diagnoses of concern for the complaint of central nervous system (CNS) signs, such as changes in temperament, abnormal posture, and ataxia. In 2005, VS continued surveillance for BSE through its Enhanced BSE Surveillance Plan established in 2004, testing 419,268 brain submissions and conducting 12 FAD investigations for the complaint of CNS signs in bovines.

Of the 995 investigations conducted in 2005, 447 resulted in a confirmed FAD finding with 445 diagnosed positive for vesicular stomatitis. One investigation, initiated for a complaint of maggots and ticks, resulted in a positive diagnosis of screwworm infestation; the other investigation for a complaint of high death loss in rabbits established a positive diagnosis for rabbit hemorrhagic disease. Early identification and quick response ensured that both FAD investigations were resolved with no indication of further spread.

### FAD Programs

VS conducts surveillance specifically for AI, END, ISA, cattle fever ticks, CSF, tropical bont tick (TBT), and screwworm to improve detection of disease and to document that the United States is free from specific diseases. Brief descriptions of the programs are provided below.

**END**—The development of a national END surveillance program began in late 2003. The two primary goals of END surveillance are to (1) facilitate early detection of END in commercial and noncommercial poultry populations across the United States and (2) identify at-risk populations to enhance targeted surveillance activities. Surveillance relies on reporting of sick birds by owners and on active screening for birds entering the country illegally.

**END Surveillance in 2005**—NVSL has approved 30 laboratories to perform real-time reverse-transcriptase–polymerase chain reaction (RT–PCR) assays for END virus. Activities include surveillance of the live-bird market system (LBMS) and shows and fairs as well as passive surveillance of samples submitted to diagnostic laboratories. Under the program, 8,911 specimens from 19 States were tested for END in FY 2005, all with negative results. In addition, through the California Avian Health Program, 21,484 poultry on 1,783 premises tested negative for END.



### Low-Pathogenicity AI Program: Commercial Industry Component

Through participation in the voluntary National Poultry Improvement Plan (NPIP), all commercial breeding operations producing primary and multiplier egg-type and meat-type chickens and turkeys are monitored for *Salmonella pullorum* (pullorum disease) and *S. gallinarum* (fowl typhoid). Nearly all primary poultry breeding operations—and many multiplier poultry breeding operations—are monitored for other egg-transmitted and hatchery-disseminated diseases such as *Salmonella enterica* serotype *enteritidis*, *Mycoplasma gallisepticum*, *M. synoviae*, and *M. meleagridis* (turkeys only). Flocks primarily producing meat-type chickens for breeding are monitored for all serotypes of *Salmonella*. In 2000, USDA–APHIS published its final rule for a U.S. Avian Influenza Clean classification for primary egg- and meat-type chicken breeding flocks. APHIS added both a U.S. Avian Influenza Clean program for exhibition poultry and upland gamebird breeding flocks and a U.S. H5/H7 Avian Influenza Clean classification for turkey breeding flocks in 2004. Finally, official delegates of the NPIP’s 37th biennial conference ratified the addition of a provision in the Code of Federal Regulations that provides for participation by commercial table-egg layer, broiler, and meat-turkey operations. The code contains provisions for U.S. H5/H7 low-pathogenicity AI (LPAI) monitored classification for participating flocks and slaughter plants.



**LBMS Program**—The domestic LPAI program provides surveillance to prevent and control H5 and H7 LPAI in the LBMS. Surveillance in the LBMS began in 1986 when markets were first identified as sources of AI infection in domestic poultry. In 1994, H7N2 LPAI was introduced into the LBMS. In October 2004, VS published uniform standards for H5 and H7 LPAI to establish a more consistent approach to controlling LPAI in LBMS. States that volunteered to participate enacted regulations to ensure compliance within their LBMS, including producer, distributor, and retail market components.

Training was provided to State and Federal animal health technicians (AHTs), veterinary medical officers (VMOs), and other stakeholders working with the H5/H7 LPAI Program in the LBMS. This technical training focused on LBMS activities, diseases of poultry, laboratory testing, biosecurity, personal protective equipment, State regulations, the demonstration of correct euthanasia techniques, the use of geographic information systems, the role of the Animal and Plant Health Inspection Service's (APHIS) Investigative and Enforcement Services, risk assessment, the National Animal Identification System, and an update on H5N1 high-pathogenicity AI (HPAI) in Asia.

As a result of recent effort by VS and the States, the incidence of LPAI in the LBMS in the Northeastern United States decreased in fiscal year (FY) 05.

**Biosecurity for the Birds Program**—The Biosecurity for the Birds outreach and education program continued in 2005. To reach the program's target audience, program personnel placed information about Biosecurity for the Birds on feedsacks. In addition, the program was advertised in rural cooperative publications and community newspapers with a focus on reaching communities most likely to have backyard birds. Materials developed as part of the campaign included brochures, posters, giveaways, displays, videos, and a Web site (<<http://www.aphis.usda.gov/vs/birdsecurity>>). Materials were distributed at State and county fairs, poultry shows, veterinary conferences, universities, and 4-H meetings. In addition, the NPIP mailed information about the program to 3,000 targeted residences.

**Infectious Salmon Anemia (ISA)**—In 2001, ISA virus infection was detected at salmon sites in Cobscook Bay, ME. In December 2001, the Secretary of Agriculture declared an ISA disease emergency, which permitted allocation of funds to APHIS to provide indemnity, epidemiologic, and surveillance assistance to Maine's salmon industry over a 2-year period.

**Disease Standards**—To help prevent another large-scale ISA outbreak, APHIS continued the epidemiologic and surveillance assistance beyond the initial 2-year period. Between the beginning of the outbreak and the emergency declaration, a group of fish health veterinarians and biologists developed ISA disease control standards based on existing New Brunswick, Canada, ISA policies and practices implemented by the Norwegian salmon industry. The final standards were published in early 2002 as the USDA-APHIS Infectious Salmon Anemia Program Standards.

The standards delineate seven requirements for participating in the ISA program, which provides both disease control stipulations and compensation. These seven standards require farms to:

- Develop a veterinarian-client-patient relationship;
- Participate in State-mandated surveillance;
- Develop and implement biosecurity protocols for marine sites, processing plants, and vessels;
- Develop action plans for ISA prevention and control;
- Participate in a statewide sea-lice control program;
- Report complete inventory, mortality, and fish health information; and
- Cooperate with program officials by completing periodic biosecurity audits.

**Biosecurity and Surveillance**—Biosecurity is a key component of the ISA program. Many important risk factors identified in the transmission of ISA are related to biosecurity issues, including handling and disposing of processing waste, blood, and stun-water; removing and disposing of dead salmon; controlling movements of vessels, equipment, and human site traffic; maintaining and using disinfection stations; and managing pens to control sea lice.

The initial goal of surveillance is the prompt detection of ISA virus infection. Surveillance is a mandatory activity at all Maine salmon sites and is performed by the site veterinarian at a frequency dictated by the ISA status of the site. These inspections, required at least monthly, include a visual overview of the site, a review of mortality records, the collection and submission of at least 10 moribund or freshly expired salmon, and a completed submission form that is sent to an APHIS-approved laboratory.

Biosecurity audits are performed semiannually on high-risk sites, yearly on low-risk sites, and at least annually on vessels. Audit reports identify observed strengths and weaknesses, make recommendations for improvements, and prioritize response times by apparent relative risk.

**Program Implementation**—The ISA Program, initiated in early January 2002 in partnership with the Maine Department of Marine Resources, continued through 2005. In 2005, 1,454 samples were collected during 178 inspections at 12 cage sites (table 2). These samples bring the total number of samples collected during the program to 10,244 during 1,119 inspections. Two vessel audits and 11 site audits were conducted. The low number of vessel audits in 2005 reflects the U.S. acceptance of vessel audits performed by New Brunswick officials. Through the year, 19 cages were confirmed positive for ISA at 5 previously confirmed sites. All fish were removed from disease-confirmed cages.

The APHIS Eastport, ME, ISA staff published findings from several epidemiologic ISA studies in 2005. Topics included the predictability of apparent prevalence of ISA based on mortality rates, the importance of early depopulation of ISA-infected cages, identification of risk factors important to ISA outbreaks on Maine farms, and the impact of hydrographics on the distribution of ISA in Passamaquoddy and Cobscook Bays in Maine and New Brunswick. The hydrographics study prompted a dramatic change in bay management strategy. In 2006, Maine and New Brunswick salmon sites will begin to stock salmon in coordinated 3-year cycles, starting with Cobscook Bay and Canadian salmon sites around Deer Island and Campobello Island, NB.

In 2005, the number of ISA genotypes detected and reported continued to increase. At year's end, 15 New Brunswick genotypes were detected, 3 of which had also been detected in Maine. Ongoing epidemiologic studies target husbandry-related risk factors relevant to ISA, incorporation of geographic information system technologies into disease pattern assessment, field assessment of genotype variability, efficacy of sea-lice management practices, and improved integration of cross-border data exchange and management.

TABLE 2: **ISA inspections**

	2002	2003	2004	2005	Total
Samples	1,962	3,187	3,641	1,454	10,244
Inspections	189	371	381	178	1,119
Sites	20	22	21	12	N/A
Site audits	22	21	13	11	67
Vessel audits	8	11	0	2	21
Cages confirmed positive	0	5	17	19	41
Confirmed cages removed	0	5	17	19	41
New confirmed sites	1	2	6	5	N/A
Previously confirmed sites	0	0	1	5	N/A
Sites in water	20	22	21	12	N/A

**Cattle Tick Surveillance**—The Cattle Fever Tick Eradication Program began in 1906 with the objective of eradicating populations of fever ticks (*Boophilus microplus* and *B. annulatus*) that had become endemic in the Southern United States. Fever ticks carry and transmit bovine babesiosis (*Babesia bigemina* and *B. bovis*), which causes illness and high mortality in naïve cattle. By 1943, the eradication campaign had been declared complete, and all that remained was a permanent quarantine zone along the Rio Grande in south Texas. That permanent quarantine zone exists to this day as a nearly 500-mile-long swath of land from Del Rio to Brownsville, TX, ranging in width from several hundred yards to about 10 miles.

Program personnel, including 61 mounted inspectors who patrol the Rio Grande along the Mexican border, conduct range inspections of premises within the quarantine zone and apprehend stray and smuggled livestock from Mexico. Program personnel also inspect and treat livestock on premises found to be infested with fever ticks, regularly inspect premises that have been quarantined

for infestations or exposures, and perform the required inspection and treatment of all cattle and horses moving out of the quarantine zone.

In FY 2005, eradication personnel apprehended 35 stray and smuggled animals (16 cattle and 19 horses) from Mexico, 9 of which were infested with fever ticks. In FY 2005, 117 premises were found to be infested with fever ticks, 39 of which were outside the quarantine zone. These figures represent an increase in infestations over 2004 levels when 94 infestations were detected, 20 of which were outside the quarantine zone. Although fever-tick infestation rates tend to spike cyclically over a period of several years, the current infestation rate within the quarantine zone is higher than has ever been recorded, and there is an apparent increase in the maintenance of ticks on wildlife—most notably on white-tailed deer and nilgai.

**TBT Surveillance**—This tick species transmits heartwater, a fatal livestock and wildlife disease, and the lethal form of acute bovine dermatophilosis (a skin infection). These diseases are not themselves contagious but



are transmitted by the ticks. The TBT is endemic in the Caribbean. APHIS believes that much of the recent interisland spread of the TBT has occurred through movement of livestock and infested migratory birds—in particular cattle egrets. Because these egrets fly between the Caribbean and Florida, there is a chance they could bring TBTs to the Continental United States.

APHIS is now eradicating TBTs from the island of St. Croix and conducting surveillance activities on other islands such as St. Thomas and Puerto Rico. FAD diagnosticians have been sent to the Caribbean to conduct heightened surveillance activities. Imported reptiles (e.g., turtles) are inspected for ticks at ports-of-entry such as Miami.

Currently, nine areas on St. Croix are known to be infested. Four are now vacant and are being monitored for vacancy, and five are being treated actively. Ninety-two high-risk premises are under treatment because they are adjacent to TBT-positive premises. Capture and impoundment of stray cattle, sheep, goats, and horses has increased from preprogram levels—particularly in and near high-risk areas. The animals are scratched and treated with coumaphos, an acaricide approved by the Environmental Protection Agency (EPA), after being captured and impounded. Horses without a permanent identification are identified with a microchip. Cattle, sheep, and goats not otherwise identified are bangle-tagged in the right ear, and a radio-frequency ID button tag is applied in the left ear. Tick specimens are collected and submitted to NVSL for identification confirmation. Additional research continues, including examining birds and small mammals for ticks and using collars impregnated with amitraz, an EPA-approved acaricide, on Virgin Island white hair sheep.

**Screwworm Surveillance—*Cochliomyia homnivorax*** (Coquerel), the New World cattle screwworm, is found only in warm climates throughout the Americas. It is an obligate parasite that feeds on tissues or fluids of all warmblooded living animals, including humans. The pest has been eradicated from the southeastern United States (1959), southwestern United States (1966), Mexico (1991), Belize and Guatemala (1994), El Salvador (1995), Honduras (1998), Nicaragua (1999), Costa Rica (2000), and Panama up to the Canal Zone (2001).

A permanent barrier for screwworm prevention was established along with the permanent barrier for FMD in the Provinces of Darien and Comarca Kuna Yala in Panama. These provinces are regulated by laws governing animal production as a measure to reduce possible introduction of FMD into Panama. To maintain the barrier, an agreement was signed by the United States and Panama to build a screwworm-rearing facility to produce the sterile insects needed to maintain the barrier zone. A \$40 million screwworm mass-rearing facility in Panama is now under construction. The plant is expected to be operational at the end of 2006.

The goal to eradicate screwworm in the United States, Mexico, and Central America has been realized with the barrier established in the Isthmus of Panama and a buffer zone 20 nautical miles into Colombia. No case of screwworm has been found in Panama since August 2005. Dispersal of sterile screwworm flies is ongoing as a preventive measure at the rate of about 36 million flies per week.

NVSL personnel perform identifications for suspected screwworm infestations in the United States. Table 3 lists the number of submissions NVSL received for myiases and suspected screwworms during each of the past few years.

TABLE 3: **Screwworm submissions tested by NVSL**

Year	Number of submissions	Positives
2001	161	0
2002	102	0
2003	74	0
2004	74	0
2005	49	1

**CSF Surveillance**—The United States has been free of CSF since 1978. CSF is still endemic in many other countries in the Western Hemisphere, including Mexico, Cuba, Haiti, and the Dominican Republic. In 2005, VS developed a comprehensive surveillance plan for CSF. Included are three main surveillance programs for detecting CSF in domestically raised commercial swine. The first is a reporting system through which private practitioners, producers, diagnosticians, and slaughter inspectors report all cases that display clinical signs similar to an FAD. A CSF case definition was created and published to assist in the reporting of suspicious cases to either the State Veterinarian or VS’ Area Veterinarian-in-Charge. Reported cases initiate an FAD field investigation. The second program is based on testing tonsil specimens from sick pigs submitted to the NAHLN. Domestic specimens are collected at participating veterinary diagnostic laboratories, selected slaughter plants, or by APHIS–Wildlife Services’ biologists from feral pigs. The third component of the comprehensive surveillance plan allows for more discretionary testing of high-risk swine in selected States, such as monitoring sick pigs on waste-feeding sites in Texas or pigs in Puerto Rico adjacent to illegal boat landings.

This CSF surveillance plan was implemented late in 2005. All CSF testing in 2005 was done by VS’ Foreign Animal Disease Diagnostic Laboratory (FADDL). Testing was done on sera and tissues collected from high-risk healthy and sick pigs and submitted from various sources—mostly diagnostic labs and VS field VMOs. All samples tested by FADDL in the past 3 years were negative (table 4).

## National Animal Health Reporting System (NAHRS)

The United States is a signatory country of the World Trade Organization (WTO). Member countries are obligated to comply with the WTO’s Agreement on the Application of Sanitary and Phytosanitary Standards. The WTO assigned standards-setting authority to the World Organization for Animal Health (OIE) for international trade-related animal health issues. For more than 25 years, VS has reported the occurrence of OIE-notifiable diseases in the United States. The U.S. status of OIE-reportable diseases is listed in table A2.3 appendix 2.

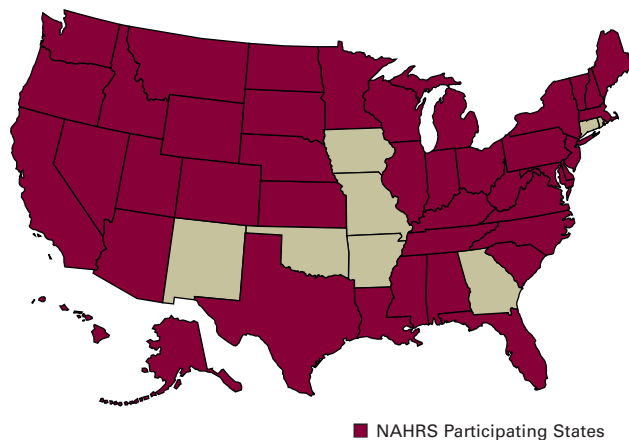
NAHRS is a voluntary, cooperative animal-disease reporting system designed to collect monthly data through State animal health officials on the presence or absence of confirmed OIE-reportable diseases in commercial livestock, poultry, and aquaculture species in participating States. NAHRS is a joint effort of the United States Animal Health Association (USAHA), the American Association of Veterinary Laboratory Diagnosticians, and APHIS. NAHRS provides a summary-level overview of the status of OIE-reportable diseases in participating States. States that do not participate in NAHRS are still required to report to the FAD surveillance and National Program Disease surveillance data systems of APHIS and VS.

In 2005, 42 States reported disease information to NAHRS (fig. 23). Several nonparticipating States are preparing to report to NAHRS. The States participating in NAHRS in 2005 accounted for 86, 66, 90, 67, and 84 percent of the value of production for the U.S. cattle, swine, sheep, poultry, and catfish commodities, respectively.

TABLE 4: **Classical swine fever samples tested by FADDL**

CY	Serum samples tested	Tissue samples tested	Number of source States
2003	17,524	1,037	35
2004	17,188	1,166	31
2005	12,440	410	24

FIGURE 23: **States participating in NAHRS in 2005.**



## Emerging Issues

An emerging animal disease can be defined as a newly identified pathogen or strain, a known pathogen in a new location, or a new presentation of a known pathogen. It is an event that has a negative impact—real or perceived—on animal health, economics, or public health. Agricultural producers and scientists around the world are discovering and identifying emerging animal diseases and other issues that threaten animal production and related industries. Nipah virus in Malaysia and Hendra virus in Australia are two recent examples. Avian pneumovirus, ISA, West Nile virus, and monkeypox virus are recent examples of such emerging diseases occurring domestically. Recent controversy about levels of dioxin in meat and dairy products is an example of an emerging issue that affects animal health and production but is not related to a pathogen.

Within VS' Centers for Epidemiology and Animal Health (CEAH), the Center for Emerging Issues (CEI) identifies and tracks potential emerging animal health issues, assesses and analyzes emerging animal health issues, and forecasts disease emergence. CEI has developed an electronic surveillance process that transforms animal disease event information into actionable intelligence for VS.

### Identification and Tracking of Emerging Animal Health Issues

Emerging animal health issues are identified through electronic scanning of open-source media and text mining. Using a combination of complex predefined queries and software capable of receiving large amounts of text data, CEI processes reduce about 25,000 records to 8,000 records of greatest interest each month. Analysts then read, organize, and store the records to monitor emerging animal-health issues and trends at both the national and international levels. To track emerging animal-health issues after the filtering process, analysts transfer records into the Emerging Veterinary Events (eVe) system, which is a Web-based application used to house all records of emerging issues. Compiling records from multiple data sources into one centralized database permits timely identification and tracking of emerging issues over time. Disease events in the eVe database are prioritized by analysts using an algorithm to gauge the relative importance of events. An Animal Disease Analysis Mapping module is being developed and will be integrated with the existing eVe system, providing Web-based mapping and basic spatial analysis capability for the analysis of emerging animal-health issues.

### Assessment and Analysis of Emerging Animal-Health Issues

After identifying a potential emerging animal-health issue, analysts verify the authenticity and accuracy of the reported event. Once details of the event are verified, CEI may develop reports regarding the event. For example, an impact worksheet is designed to provide a qualitative risk assessment to VS decisionmakers rapidly to determine if the disease event has the potential to substantially impact the U.S. livestock industry. Emerging disease notices provide an indepth overview of the epidemiology and ecology of an emerging or reemerging animal disease. Specific reports on emerging issues are also available.

### Forecasting Disease Emergence

CEI's 2005 report, "Overview of Predictive Infectious-Disease Modeling," contains important considerations for developing predictive infectious-disease models, including a brief overview of model types and methodologies used to predict known and new infectious diseases, and describes examples of early warning systems utilizing models. Numerous authors have suggested using the biological, ecological, environmental, and societal factors associated with disease emergence as a way to improve prediction; however, interactions among these emergence factors can be complex, making modeling difficult. To address this issue, CEI is developing the disease-emergence risk-assessment tool for assessing the disease emergence potential in the U.S. food-fish aquaculture industries.

Developing the disease-emergence risk-assessment tool has required aligning potential emergence risk factors into a structured model permitting a qualitative risk assessment. Key factors associated with disease emergence were identified, and for each risk factor various risk levels were established so that individual industry sectors could be assessed based on the sector's characteristics. Within the assessment tool, disease emergence is separated into three separate elements: disease evolution (which examines the potential for novel pathogens to develop or for existing pathogens to evolve), pathways (which examines the potential for known or new pathogens to move from country to country), and spread (which examines the potential for newly emerged, evolved, or introduced pathogens to spread from the point of emergence, evolution, or introduction).

Once completed, the disease-emergence assessment tool can be used to identify areas of vulnerability and mitigation measures, as well as to monitor how changes in the dynamics associated with an industry increase or decrease disease emergence potential over time. A detailed description of the disease-emergence tool and results from its application to the aquaculture industry will be available in late 2006.



## Monitoring Activities (NAHSS)

Goal 4 of the NAHSS Strategic Plan addresses monitoring and surveillance for diseases of major impact on animal production and marketing. Objectives within this goal include coordinating and collaborating on monitoring animal-health and production trends and contributing to animal-disease-awareness education for producers and veterinarians. The National Center for Animal Health Surveillance (NCAHS), which is part of CEAH, is responsible for coordinating surveillance and monitoring activities. Within NCAHS is the National Animal Health Monitoring Program Unit. This unit designs, analyzes, and reports results from the National Animal Health Monitoring System (NAHMS) studies that began in 1990.

The NAHMS unit has created a niche of expertise, combining the knowledge of veterinarians, economists, and statisticians to address information needs primarily via national livestock and poultry study development, analysis, and reporting of results. Much of the information collected in a NAHMS study relates to biosecurity, animal movement, and risk of disease. This information not only

describes industry health and management practices but also provides input to risk analyses for determining disease introduction probabilities and helps to define at-risk populations more clearly, giving some insight into how best to assess those populations for surveillance purposes. In addition, the NAHMS unit identifies long-term key animal-health indicators to monitor through various means, including sentinel surveillance.

The core attributes of NAHMS national studies include:

- Probability-based sampling,
- Statistically valid estimates,
- National focus,
- Collection of farm-based management and biologic information,
- Nonregulatory nature,
- Voluntary participation,
- Confidentiality of data, and
- Increased awareness of participating producers as to improved husbandry methods, animal disease events, biosecurity, etc.

NAHMS national studies have been conducted for swine and dairy (three studies each), poultry (two), feedlot (two), beef cow and calf (two), sheep (two), equine (two), and aquaculture (two). Reports from these studies are available on the NAHMS Web site (<<http://nahms.aphis.usda.gov>>).

To fill the gap between NAHMS national studies, which provide periodic snapshots on the health and management of a given industry, NAHMS conducts ongoing efforts such as the Sentinel Feedlot Monitoring Program. Each month, NAHMS receives reports on morbidity and mortality of feedlot cattle. Feedlot consulting veterinarians provide the data and are given comparison reports.

The NAHMS unit has worked with three USDA agencies (APHIS, the Agricultural Research Service, and the Food Safety and Inspection Service) to create the Collaboration in Animal Health and Food Safety Epidemiology Program. The mission of this surveillance has two components: food safety and animal health.

The NAHMS unit also receives data from States and analyzes and reports results on an ongoing basis for the National Johne's Disease Demonstration Herd Project.

## NAHMS Equine 2005 Study

The NAHMS Equine 2005 study collected health and management information from 2,893 equine operations regarding health practices influencing equine infectious-disease incidence and estimated the occurrence of selected equine health-related events. For details regarding study design and data analysis, and to view the full report, go to <<http://www.aphis.usda.gov/vs/ceah/ncahs/nahms/equine>>.

**Mortality Rate and Causes of Death for Equids**—In the 12 months preceding the study interview, 4.9 percent of foals born alive died in the first 30 days of life. The largest percentage of foal deaths was attributed to injury or trauma followed by failure to get milk or colostrum.

The overall mortality rate for resident equids 30 days and older during the 12 months before the interview was 1.8 percent. Old age was the leading cause of death in equids older than 6 months, followed by injury, wounds, trauma, and colic.

**Vaccination Practices for Equids**—Overall, 75.9 percent of operations indicated that they had given at least some type of vaccines to resident equids during the 12 months preceding the interview.

**Movement of Equids**—Overall, 36.6 percent of operations had not moved resident equids off the operation and back onto it in the previous 12 months.

## NAHMS Poultry 2004 Study

FAD introduction into noncommercial poultry, such as the END outbreak in California in 2002, poses risk to all segments of the U.S. poultry industries. Compared with the commercial segment of the poultry industries, information on the noncommercial segment was sparse. To define noncommercial poultry populations better—in particular, backyard flocks, gamefowl breeder flocks, and live-poultry markets—NAHMS conducted the Poultry 2004 study.

To estimate the density of backyard flocks located within 1 mile of commercial operations, the National Agricultural Statistics Service (NASS) selected a sample of 350 commercial poultry operations in 18 top poultry-producing States (accounting for 81 percent of the U.S. value of poultry production) from its list of poultry operations. A 1-mile-radius circle was “drawn” around each operation, and door-to-door canvassing was conducted within these circles to enumerate premises with birds. Premises with backyard flocks completed a questionnaire focusing on bird health, movement, and biosecurity practices. In

addition, a similar questionnaire, provided in both English and Spanish, was mailed to all members of State affiliates of the United Gamefowl Breeders Association as well as to members of State associations not affiliated with it.

Brief results from the two components of the study (backyard flocks and gamefowl breeder flocks) show that an average of less than two residences per circle had backyard flocks. Gamefowl breeder flocks were larger, used more health care and biosecurity practices, and moved birds more frequently compared with backyard flocks.

A third area of the noncommercial segment was also examined in 2005, entailing a survey in 183 live-poultry markets throughout the United States. A questionnaire was administered to markets addressing types of birds and other animals in the market, biosecurity, and cleaning and disinfecting practices. Testing for AI was conducted more frequently in the North, where 98.4 percent of markets were tested at least once and 86.4 percent of markets were tested four or more times between March 2004 and March 2005; 83.1 percent of markets in the South region were tested at least once, and 18 percent were tested four or more times during the year. Factors associated with persistent presence of LPAI included region, number of times markets were cleaned and disinfected, and trash disposal of dead birds. Detailed results from each of the three studies were published and are available on the NAHMS Web site.





## Sheep and Lamb Death Loss by Cause, 2004

The United States publishes sheep death loss (number of head) annually and cause of loss on a periodic basis (roughly every 5 years). Since 1994, the percentage of sheep inventory or lamb crop lost to all causes has remained relatively constant at about 6 and 10 percent, respectively (fig. 24). Since 2000, however, losses of both sheep and lambs have decreased slightly, and both reached a 10-year low in 2005, when 5.5 percent of the sheep inventory and 9.3 percent of the lamb crop were lost.

**Cause-of-Loss Estimates**—Predator and nonpredator cause-of-loss estimates for the United States (at the State level) started in 1994 and were repeated in 1999 and 2004 as a cooperative effort between NASS and APHIS. For 2004, nonpredator loss accounted for 69.2 percent of sheep loss and 59.0 percent of lamb loss.

The most common nonpredator cause of loss for sheep was old age (26.8 percent of nonpredator losses), followed by lambing problems (13.4 percent) and digestive problems (12.9 percent) (fig. 25).

In 2004, the most common nonpredator causes of lamb loss were respiratory problems (22.8 percent of nonpredator losses), followed by digestive problems (19.8 percent) and weather (14.8 percent) (fig. 26).



FIGURE 24: **Sheep and lamb losses due to all causes, 1994–2005.**

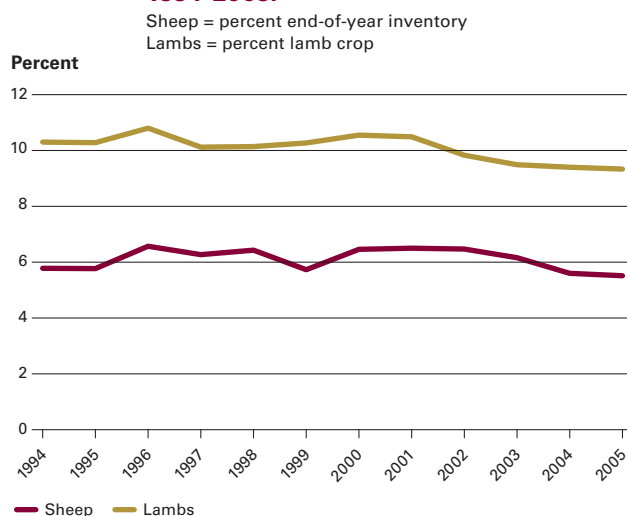


FIGURE 25: **Nonpredator sheep losses, in percentages by cause, 2004.**

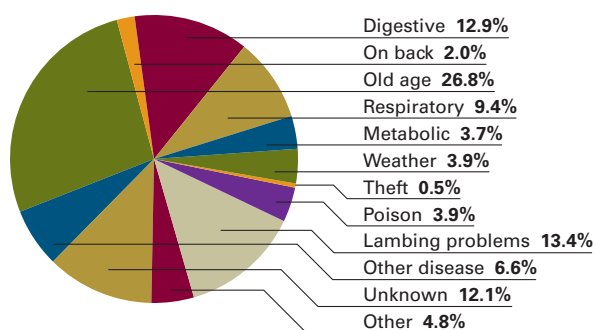
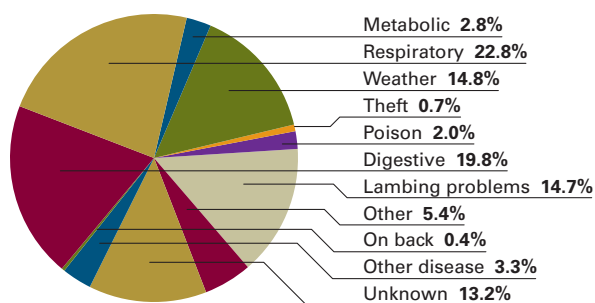


FIGURE 26: **Nonpredator lamb losses, in percentages by cause, 2004.**



## Cattle Death Loss by Cause, 2005

Since 1990, the percentage of cattle inventory lost to all causes has remained relatively constant at approximately 2 percent. The percentage of calf crop lost decreased from 7.25 percent in 1990 to just over 6 percent in 2005 (fig. 27).

**Cause of Loss**—Predator and nonpredator cause-of-loss estimates for cattle and calves started in 1991 and were repeated for 1995, 2000, and 2005 as a cooperative effort between NASS and APHIS. The most recent estimates (2005) are presented here (fig. 28). Overall, 98.0 percent of cattle losses and 93.3 percent of calf losses were due to nonpredator causes. Important causes of loss for cattle were calving problems (11.1 percent), digestive problems (11.1 percent), and respiratory problems (24.8 percent).

The most frequently reported causes of loss for calves were respiratory problems (31.8 percent), digestive problems (21.2 percent), and calving problems (17.7 percent) (fig. 29).

## Surveillance Planning, Analysis, and Development

### Pseudorabies Surveillance Plan

Swine are the only natural host for pseudorabies virus (PRV), a contagious herpesvirus causing reproductive problems such as abortions, stillbirths, mummies, and infertility. Death loss, especially in suckling pigs, can be extremely high. Pigs that survive develop a permanent latent infection. PRV infection may be lethal in other species as well, including cattle, sheep, goats, raccoons, rats, cats, and dogs.

The State–Federal–industry pseudorabies eradication program culminated with a declaration by the Pseudorabies Control Board at the 2004 USAHA meeting that all States had achieved Stage V—Free status. This USAHA Pseudorabies Committee recognized that USDA should undertake a complete overhaul of PRV surveillance. As a result, CEAH’s NSU was charged with developing a comprehensive surveillance plan for PRV.

The objectives of PRV surveillance covered in this comprehensive plan include the following:

**Objective 1**—Conduct surveillance for rapid detection of PRV in U.S. commercial production swine. Although PRV has been eradicated from commercial production swine, it is still endemic in feral swine and can also be found occasionally in transitional swine herds, which are defined as captured feral swine or domestic swine in contact (or potentially in contact) with feral swine.

FIGURE 27: **Death-loss statistics for cattle and calves, by percentage, 1990–2005.**

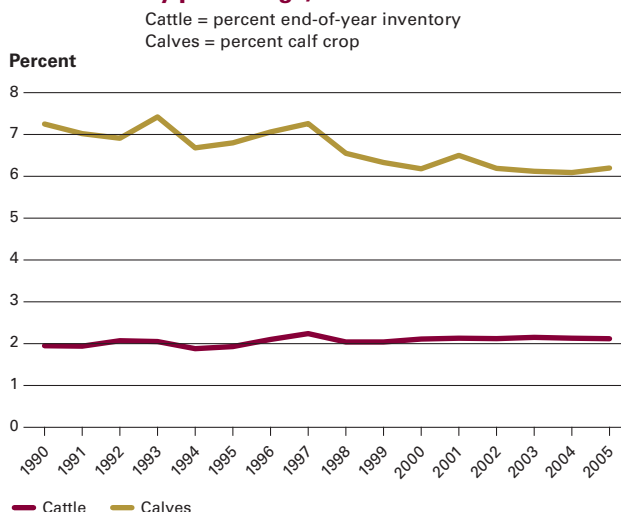


FIGURE 28: **Causes of death in cattle (excluding predators), by percentage, 2005.**

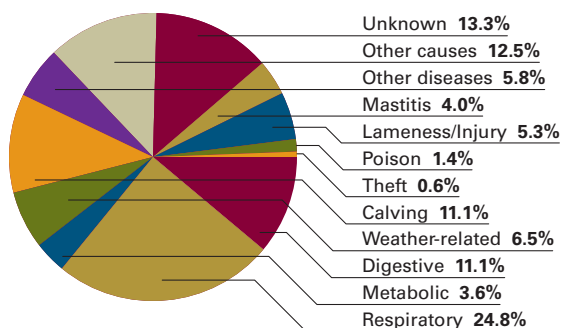
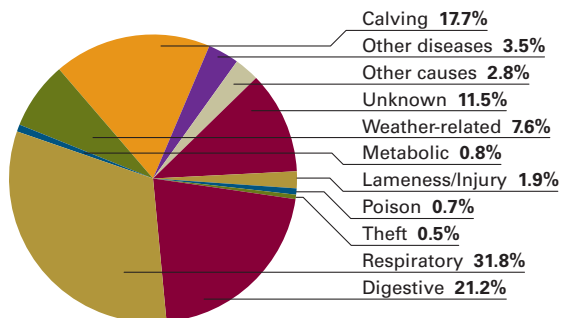


FIGURE 29: **Causes of death in calves (excluding predators), by percentage, 2005.**



In spring 2005, CEAH's Trade Risk Team conducted an "Assessment of the Risk on a State-by-State Basis for Re-exposure of Commercial Production Swine Herds to Pseudorabies Virus in the United States."

The two primary means by which PRV may reappear in U.S. commercial production swine are via reactivation in an old sow or reintroduction by exposure to feral swine. Cases in which reactivation is a clinical event (recrudescence) will be identified through laboratory-based surveillance of submissions that feature high mortality in pigs, CNS symptoms in suckling pigs, abortions, still births, mummification, embryonic death, and infertility. The most efficient surveillance mechanism to detect reactivation without the presence of overt clinical symptoms will be random testing of PRV exposure of cull sows at slaughter.

Reintroduction of PRV into commercial production swine would most likely occur via direct exposure to free-roaming feral hogs or indirect exposure to wild boar on premises owned by hunting clubs. The majority of feral swine are found in the Southern States. Surveillance will be conducted via onfarm testing on a routine basis and in response to passively reported "direct exposure" events between feral and commercial swine.

**Objective 2**—Monitor the risk of introducing PRV into U.S. commercial swine. Clearly, the greatest risk of introducing PRV into commercial swine comes from direct or indirect exposure to feral pigs. Because PRV remains endemic in feral swine, it is important to monitor the distribution of the feral swine population. Another aspect that will be monitored is the size of the population at risk for exposure, i.e., outdoor production sites.

**Objective 3**—Surveillance of international PRV status. The PRV status of neighboring countries and trading partners is particularly important and will be monitored on a regular basis.

Development of the surveillance plan for PRV will continue in 2006 with implementation of the plan expected to begin in 2007.

## **BSE Surveillance**

Since 1990, the U.S. Department of Agriculture (USDA) has taken aggressive measures to prevent the introduction and potential spread of BSE. Following confirmation of BSE in an imported cow in December 2003, USDA designed and implemented an Enhanced BSE Surveillance Program to more accurately determine the level of disease present in the U.S. cattle population.

The Enhanced BSE Surveillance Program tested as many cattle as possible in the targeted high-risk population beginning June 1, 2004. Collection at an enhanced level has continued beyond 18 months to ameliorate concerns of trading partners. Experience in the United Kingdom and Europe has shown that, if present, BSE is most likely to be detected in adult cattle exhibiting clinical signs consistent with the disease.

In general, the highest risk categories are adult cattle showing clinical signs involving the central nervous system (CNS) and dead and nonambulatory cattle with clinical signs that could not be adequately evaluated. This population was estimated to total 445,886 adult cattle per year in the United States. This number was derived in part from National Animal Health Monitoring System (NAHMS) surveys of livestock producers and other estimates.

This estimate includes adult cattle in the following categories:

- Condemned at slaughter for CNS signs;
- Moribund, dead, injured, or emaciated (FSIS data 2002);
- CNS abnormalities reported for FAD investigations (APHIS data 2003);
- Died onfarm of unknown causes;
- Lameness or injury that resulted in euthanasia; and
- Cattle that died with signs of incoordination or severe depression.

The sampling strategy was designed to target animals in these categories.

Between June 1, 2004, and March 17, 2006, BSE samples were collected from 5,776 unique locations across the United States. These locations included slaughter plants, renderers, farms, public health laboratories, veterinary diagnostic laboratories, and salvage slaughter (3D-4D)<sup>1</sup> plants.

To determine the extent to which the U.S. surveillance is consistent with OIE guidelines, we have evaluated and classified surveillance data over the past 7 years according to OIE standards (table 5).

In May 2005, the OIE General Assembly approved a new chapter and appendix for BSE surveillance. This approach assigned point values to each sample, based on animal age and the subpopulation it was from, and the likelihood of detecting infected cattle of that age in that

<sup>1</sup> 3D-4D facilities are slaughter facilities that salvage meat from dead, dying, disabled, or diseased animals, the meat from which would not likely pass inspection for human consumption (i.e., edible meat). Much of this meat goes into either pet food or rendering.

TABLE 5: **OIE points from BSE surveillance in the U.S. accumulated for 7 years**

Year of testing <sup>1</sup>	Total samples <sup>2</sup>	Clinical suspects	Fallen stock	Casualty slaughter	Healthy slaughter	OIE points <sup>3</sup>
10/1/05 to 03/17/06 <sup>4</sup>	181,564	438	142,337	18,991	19,798	285,491
FY <sup>5</sup> 2005	413,647	1,527	361,557	50,557	6	899,642
FY 2004	90,085	1,066	62,054	25,096	1,869	592,369
FY 2003	20,778	577	3,106	16,613	482	267,480
FY 2002	20,380	569	2,818	16,045	948	251,740
FY 2001	5,340	665	1	4,515	159	299,177
FY 2000	2,753	664	0	2,064	25	266,891
4/1/99 to 9/30/99 <sup>6</sup>	666	265	15	351	35	111,014
<b>Total surveillance (including enhanced surveillance)</b>	<b>735,213</b>	<b>5,771</b>	<b>571,888</b>	<b>134,232</b>	<b>23,322</b>	<b>2,973,804</b>
<b>Total for enhanced surveillance only 6/1/04 to 3/17/06</b>	<b>667,767</b>	<b>2,602</b>	<b>559,546</b>	<b>84,534</b>	<b>21,085</b>	<b>1,583,127</b>

1 Testing includes the most recent 7 years of data collected from Apr. 1, 1999, through March 17, 2006.

2 Number of samples and clinical suspects represents animals eligible for surveillance according to the Terrestrial Animal Health Code Article 3.8.4.

3 Note: Animals counted as eligible for OIE points included animals older than 1 year according to the OIE point allocation table. Removal of points from the “juvenile” category of the OIE points table would decrease the total by 2,843 points. Other documents showing U.S. data may vary due to inclusion or exclusion of young animals.

4 Includes 6 months of fiscal year 2006.

5 The U.S. Government’s fiscal year extends from October 1 through September 30 (e.g., FY 2005 began on 10/1/2004 and ended on 9/30/2005).

6 Includes 6 months of FY 1999.

7 Total includes two positive indigenous animals and one positive animal imported from Canada.

subpopulation. (Prior to May 2005, OIE had recommended a surveillance level based on the size of the adult cattle population—for the United States that number was 433 samples with clinical signs consistent with BSE per year.) Sample values were classified in the OIE system as belonging to four surveillance strata (streams): clinical suspect, casualty slaughter, fallen stock, and healthy slaughter. Samples were also stratified by age.

Cattle were categorized in the clinical suspect stream if they were submitted under the submission types of highly suspicious for BSE, rabies suspects, CNS signs, or antemortem-condemned by FSIS with condemnation codes for CNS signs or rabies. In addition, many samples with a clinical history of signs likely to be associated with BSE were submitted in other categories. Many of these represented valuable samples, but the OIE definition of “clinical suspect” did not readily differentiate them from animals with other clinical signs compatible with BSE. Some of these cattle were subsequently categorized as clinical suspects by comparing the likelihood of finding the signs in histopathologically confirmed cases reported

in the United Kingdom<sup>2</sup> with the likelihood of finding the signs in uninfected animals from the enhanced-surveillance targeted population. For example, if a sign or combination of signs were found 30 percent of the time in BSE cases but only once in every 1,000 uninfected animals (0.1 percent), then it would be  $0.30/0.001 = 300$  times more likely to occur in the cases (likelihood ratio = 300 in this case). A likelihood ratio threshold of 807 was established as a cutoff value for determination of clinical suspects. This threshold was estimated using input data from the United Kingdom in the BSurvE<sup>3</sup> model, which provided the average (expected) value for the ratio of probability of an infected animal showing clinical signs to an uninfected animal showing clinical signs. Thus, if a

<sup>2</sup> Wilesmith, J. W.; Ryan, J. B.; Hueston, W. D. 1992. Bovine spongiform encephalopathy: case-control studies of calf feeding practices and meat and bonemeal inclusion in proprietary concentrates. *Research in Veterinary Science* 52(3): 325–331.

<sup>3</sup> Available, as of April 20, 2006, at <<http://www.bsurve.com>>. The BSurvE tool is a Microsoft Excel™ spreadsheet application designed to estimate BSE prevalence based on targeted sampling strategies.

sample was submitted from an animal with combinations of clinical signs at least 807 times more likely to have been seen in BSE cases than in the U.S. high-risk population, it was classified as a clinical suspect.

Cattle with likelihood ratios below the threshold were allocated into surveillance streams according to the animal's submission type as follows:

- Submission types of "Nonambulatory" were classified in the "casualty slaughter" stream;
- Submission types of "Other clinical signs that may be associated with BSE" were classified in the "casualty slaughter" stream;
- Submission types of "FSIS antemortem condemned" were classified in the "casualty slaughter" stream as long as the condemnation reason was not "dead";
- Submission types of "FSIS antemortem condemned" with a condemnation code of "dead" were classified in the "fallen stock" stream;
- Submission types of "dead" were classified in the "fallen stock" stream;
- Submission types of "apparently healthy" were classified in the "healthy slaughter" stream.

BSE surveillance samples from 1999 through 2003 were collected before the OIE surveillance streams were established in 2005 and were not submitted with the same clinical history as that used for the enhanced surveillance in 2004–05. In order to apply the OIE point tables, data about these samples were requested from the National Veterinary Services Laboratories (NVSL) and were sorted by Centers for Epidemiology and Animal Health (CEAH) epidemiologists based on the history included with the sample.

This information is excerpted from the report *Summary of BSE Surveillance in the United States* accessed and available on the Web as of May 2, 2006, at <[http://www.aphis.usda.gov/newsroom/hot\\_issues/bse/content/printable\\_version/SummaryEnhancedBSE-Surv4-26-06.pdf](http://www.aphis.usda.gov/newsroom/hot_issues/bse/content/printable_version/SummaryEnhancedBSE-Surv4-26-06.pdf)>. Details on the Enhanced BSE Surveillance Program are posted at <<http://www.aphis.usda.gov/lpa/issues/bse/BSEOIG.pdf>>.

## Scrapie Surveillance Evaluation

In general, evaluating a surveillance program entails a systematic review to assess the degree to which the program fulfills its stated objectives and meets accepted surveillance standards. Program strengths and areas for improvement are identified, and the program's ability to adapt to changing situations is evaluated. Evaluating the surveillance component of one VS program disease was identified as a key action item in the NAHSS strategic plan (see <[http://www.aphis.usda.gov/vs/ceah/ncahs/nsu/nahss/NAHSS\\_Strategic\\_Plan\\_2005\\_0216.pdf](http://www.aphis.usda.gov/vs/ceah/ncahs/nsu/nahss/NAHSS_Strategic_Plan_2005_0216.pdf)>).

The surveillance component of the VS scrapie program was chosen for evaluation. Led by the NSU, an interdisciplinary working group was developed consisting of an economist, statistician, several veterinary epidemiologists, and an industry representative.

The evaluation process focused on four main areas: surveillance structures (organization and communication), surveillance processes (data collection, data analysis and interpretation, and dissemination of results), qualitative attributes (i.e., simplicity, flexibility, acceptability), and resource distribution and utilization. Characteristics of the system were compared with the draft VS Surveillance Standards, as noted throughout the evaluation.

The evaluation and data gathered focused primarily on the Regulatory Scrapie Slaughter Surveillance Program testing and other nonslaughter surveillance testing in sheep implemented since 2001. Although most of the evaluation results should be applicable to scrapie surveillance in goats, this component was not specifically evaluated. Phone interviews were conducted with State and/or VS field personnel involved in scrapie surveillance activities in nine different States representing both APHIS' Eastern and Western Regions. Questions addressed the general objectives, importance, and efficiency of the program; the communication within the program; and the acceptability, compliance, and coverage of the program. Personnel interviewed were assured anonymity.

The evaluation report has been completed and delivered to VS' National Center for Animal Health Programs.



## Interagency Zoonotic Disease

Recently, the USDA, the U.S. Department of Health and Human Services' Centers for Disease Control and Prevention (CDC), and the Food and Drug Administration formed a working group tasked with coordinating human and animal disease surveillance. Subsequently, additional staff was added at USDA and CDC to (1) identify needed elements and essential partners, (2) develop a system of communication and triggers for action, (3) divide the workload to maximize efficiency and identify roles and responsibilities, and (4) incorporate animal health surveillance into existing systems.

In collaboration with the USAHA, the working group administered a survey beginning July 1, 2005, to all designated State animal and public health veterinarians seeking input to improve communications. Although the majority of respondents were either satisfied or highly satisfied with current working relationships with their counterpart, 95 percent of respondents indicated that combined meetings would improve communications.

Another working-group effort to improve communication and coordination among agencies brought together representatives from the various national laboratory networks (NAHLN, the Laboratory Response Network, and the Food Emergency Response Network) to begin discussions on how to coordinate laboratory surveillance activities to mutual benefit. As a result of this meeting, methods for sharing summary human and animal surveillance data and influenza isolates were identified and are being implemented.



## CHAPTER 3

# Animal Disease Eradication Programs and Control and Certification Programs

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The following Veterinary Services (VS) programs are designed to eradicate, control, or prevent diseases that threaten the biological and commercial health of the U.S. livestock and poultry industries.

### Eradication Programs

VS eradication programs include scrapie in sheep and goats, tuberculosis in cattle and cervids, pseudorabies and brucellosis in swine, and brucellosis in cattle and bison.

### Scrapie in Sheep and Goats

**Disease and Program History**—Scrapie was first discovered in the United States in 1947 in a Michigan flock that, for several years, had imported sheep of British origin from Canada. Since 1952, VS has worked to control scrapie in the United States. As a result of increasing industry and public concern about transmissible spongiform encephalopathies (TSEs) and the discovery of new TSE diagnostic and control methods, VS initiated an accelerated scrapie eradication program in 2000.

**Current Program**—The primary aspects of the scrapie eradication program are animal identification, surveillance, tracing of positive and exposed animals, testing of sheep and goats in exposed flocks, cleanup of infected flocks, and certification of flocks.

**Animal Identification**—Identification of breeding sheep and culled breeding sheep is mandatory when ownership changes. The only sheep that do not have to be identified are those less than 18 months old and, in the case of ewes, those that also have not lambed or become pregnant and are in slaughter channels. As of September 30, 2005, 103,580 premises with sheep and/or goats were recorded in the scrapie national database. (In this database, a premises that contains both sheep and goats might be listed once for each species.) Of these premises, 73,807 have requested and received official eartags (tags approved for use by the Animal and Plant Health Inspection Service [APHIS] in the official scrapie eradication program).

### Regulatory Scrapie Slaughter Surveillance (RSSS)

The RSSS program, initiated on April 1, 2003, is the primary surveillance method for scrapie in the United States. RSSS identifies scrapie-infected flocks through targeted slaughter surveillance of sheep and goat populations that have been recognized as having higher-than-average scrapie prevalence. These are defined as mature black- or mottle-faced sheep and any mature sheep or goats showing clinical signs that could be associated with scrapie, such as poor body condition, wool loss, or gait abnormalities. Only sheep with some form of identification (e.g., such as United States Department of Agriculture [USDA]-approved eartags, electronic ID, backtags, and tattoos or lot identification) are sampled. This arrangement allows for tracing positive animals back to the farm of origin.



During FY 2005, as part of the RSSS program, 30,247 sheep and goat samples, collected from 78 slaughter plants in 24 States, were tested for scrapie using immunohistochemistry on brain or lymphoid tissue, or both. Of the 106 animals diagnosed as positive for scrapie, 93 were black-faced, 11 were mottle-faced, 1 was white-faced, and 1 was unknown.

Under the scrapie program, positive test results are traced back to the animal's flock of origin, and the flock is placed under movement restrictions until all high-risk animals (genetically susceptible females) are removed. High-risk animals that had been moved from these flocks before being placed under movement restrictions are traced and tested.

**Testing Summary**—In response to epidemiologic suspicions of disease, field Veterinary Medical Officers conduct testing to determine if scrapie is present. Such cases are known as regulatory field cases. In addition to the 30,247 samples tested under the RSSS program in 2005, about 5,200 additional tests were conducted for scrapie—either by third-eyelid testing or necropsy—in response to epidemiologic suspicions of disease.

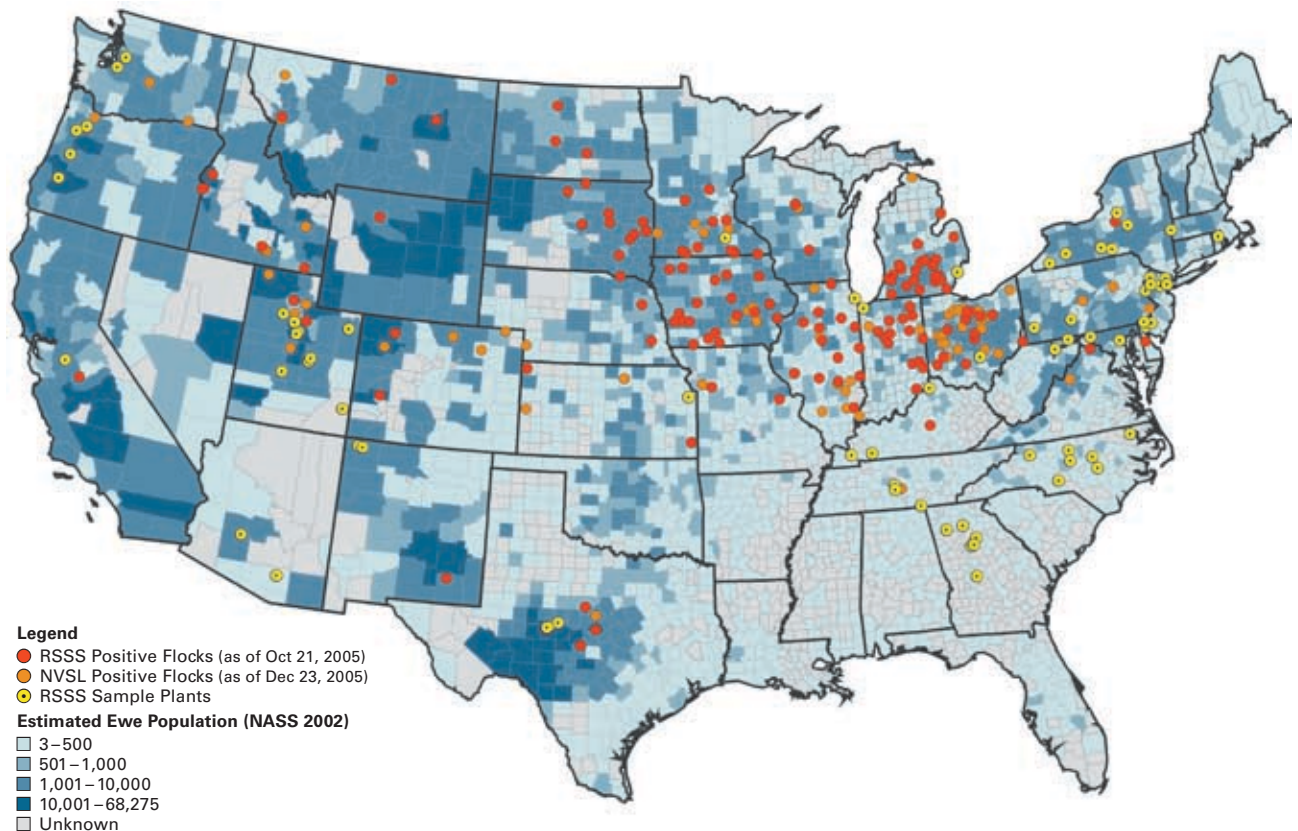
**Case and Infected Flock Summary**—In FY 2005, 165 newly identified infected flocks were reported, and 598 scrapie cases were confirmed and reported by the National Veterinary Services Laboratories (NVSL) (table 6). A scrapie case is defined as an animal for which a diagnosis of scrapie has been made by the NVSL using a USDA-approved test (typically immunohistochemistry on the obex or a peripheral lymph node). During FY 2005, two scrapie cases were reported in goats. Figure 30 presents the geographic location of U.S. mature ewe populations (National Agricultural Statistics Service 2002 Census) relative to flocks found to be positive for scrapie through RSSS sampling or another regulatory or surveillance method (denoted by NVSL-positive flocks).

TABLE 6. **Scrapie cases, FY 2003 through FY 2005**

Tests or examinations	Number of cases		
	FY 2003	FY 2004	FY 2005
Necropsies	315	374	461
Regulatory third-eyelid	32	20	31
RSSS	123	86	106
Total	370	480	598

<sup>1</sup> Includes part of FY 2003 (April 1–September 30, 2003).

FIGURE 30: **Distribution of mature ewe populations, by county, compared to positive flocks (FY 2003–early FY 2006).**



Scrapie susceptibility in sheep in the United States has been associated with two codons that encode for amino acids in the PrP protein. These codons are at positions 136 and 171, the latter of which is thought to be the major determinant of scrapie susceptibility in the United States. For all the scrapie-positive sheep with known genotypes in FY 2005, 98.4 percent were QQ at codon 171. Of these, 82.6 percent were AA at codon 136, 5.4 percent were AV at codon 136, 0.4 percent were VV at codon 136, and 11.6 percent did not have results for codon 136. Of the remaining 1.6 percent that were not QQ at codon 171, 0.3 percent were AAQH and 1.3 percent were AVQR at codons 136 and 171.

**Scrapie Flock Certification Program (SFCP)**—The SFCP is a cooperative effort among producers, State and Federal animal health agencies, and industry representatives. Through the SFCP, a flock becomes certified if, during a 5-year monitoring period, no sheep in the flock are diagnosed with scrapie and no clinical evidence of scrapie is found in the flock. The program categories are described in the following paragraphs.

**Complete Monitored Category**—A flock in this category is approved to participate in the program. There are two status levels for flocks in this category:

- **Enrolled flock:** A flock entering the program is assigned enrolled status and is a “complete monitored enrolled flock.”
- **Certified flock:** An enrolled flock that has met program standards for 5 consecutive years advances to certified status, meaning that it is unlikely to contain any sheep infected with scrapie.

**Selective Monitored Category**—This category, though open to any flock, was designed for producers of slaughter lambs to allow for scrapie surveillance in large production flocks. Only male animals over 1 year of age must have official identification. Producers agree on the basis of flock size to submit for scrapie diagnosis a portion of the mature animals that are culled or die. Additionally, an accredited veterinarian must inspect all cull ewes for clinical signs of scrapie before slaughter. Selective status is maintained indefinitely as long as the flock meets the category requirements.

**Trends in Plan Enrollment**—Enrollment in the SFCP has increased since 2002. As of September 30, 2005, 1,961 flocks were participating, and of these 188 were certified flocks (table 7). One possible reason for the increased number of certifications in 2005 was participant awareness of standards changes, which now allow rams from lower status flocks to be added to certified flocks without lowering the certified flock’s status.

TABLE 7. **Scrapie Flock Certification Program participation 2002–05**

Fiscal year, as of 9/30	Status			
	Flocks	Enrolled	Certified	Selective Monitored
2002	1,539	1,452	78	9
2003	1,776	1,663	105	8
2004	1,868	1,726	135	7
2005	1,961	1,770	188	3

**Challenges**—For the coming year, major challenges are to continue expanding surveillance efforts into underrepresented areas and to increase the traceability of sheep and goats presented for sampling. Traceability will be enhanced by increasing compliance activities and by improving methods for identifying and tracking sheep and goats through review and testing of available identification systems and integration with the National Animal Identification System. A second tier of challenges includes upgrading the scrapie national database, improving field data collection by refining sample collection and submission, and streamlining data entry and analysis.

### **Tuberculosis (TB) in Cattle and Cervids**

**Disease and Program History**—In the 1800s and early 1900s, bovine TB presented a significant health risk to people and caused considerable losses in the cattle industry. To reduce the effects of TB, the Federal Government created the Cooperative State–Federal Tuberculosis Eradication Program, which was initially implemented in 1917. This program is administered by USDA–APHIS, State animal health agencies, and U.S. livestock producers.

Although TB prevalence reached very low levels in the 1990s, eradication has proved difficult. In 2000, a comprehensive Strategic Plan for the Eradication of Bovine Tuberculosis was announced in concert with an emergency declaration by the Secretary of Agriculture. A goal of final eradication was set for the end of 2003.

In 2005, VS reviewed the TB eradication program and the United States Animal Health Association (USAHA) TB strategic plan to evaluate program costs and benefits and determine how best to proceed with TB eradication. After developing and evaluating several plans, the working group recommended a “progressive program” based on elements of the USAHA TB strategic plan and the existing

TB program that will promote a more aggressive approach to eradicating bovine TB in the United States. A new strategic plan for implementing this approach is expected to be released in 2006.

**Current Program**—In the current testing program, States, zones, or regions are classified into five categories based on prevalence of TB in cattle and bison herds (table 8). The publication “Bovine Tuberculosis Eradication: Uniform Methods and Rules” gives the minimum standards adopted and approved by the Deputy Administrator, VS-APHIS, on January 20, 2005 (<<http://www.aphis.usda.gov/vs/naahps/tb/tb-umr.pdf>>). To retain or improve their status, States, zones, or regions must comply with reporting requirements (annually for Accredited Free and Modified Accredited Advanced, semiannually for Modified Accredited and Accredited Preparatory).

In addition, surveillance is conducted primarily by collecting and testing suspicious granulomas at slaughter establishments.

**Disease and Program Status: 2004–05**—In FY 2005, the number of cattle herds found to be TB affected declined relative to the previous year. These herds, however, were detected in locations where TB had not been found for many years. In FY 2005, four affected herds were found, down from six affected herds in FY 2004. Slaughter surveillance for TB continued to improve in FY 2005, and two out of the four newly discovered herds were found through slaughter surveillance. The other two herds were detected as a result of the epidemiologic investigation of one of the TB-affected herds identified at slaughter (they were fence-line contacts).

At the end of 2005, 47 U.S. States, Puerto Rico, the U.S. Virgin Islands, Michigan’s Upper Peninsula, and part of New Mexico were considered Accredited TB Free (table 8). Texas, part of Michigan’s Lower Peninsula, and part of New Mexico were classified as Modified Accredited Advanced, and 11 counties plus portions of 2 other counties in northern lower Michigan were Modified Accredited. During FY 2005, Michigan’s split-State status,

TABLE 8. **Tuberculosis accreditation categories and State status—end of calendar year 2005**

Category	Prevalence of TB	States (numbers as of 12/31/05)
<b>Accredited Free</b>	<b>Zero</b> for cattle and bison	47 U.S. States, Michigan’s Upper Peninsula, most of New Mexico, all of Puerto Rico, and the U.S. Virgin Islands
<b>Modified Accredited Advanced</b>	<b>Less than 0.01 percent</b> of total cattle and bison herds for each of recent years	Texas, part of Michigan’s Lower Peninsula, and part of two counties in eastern New Mexico
<b>Modified Accredited (Regionalized)</b>	<b>Less than 0.1 percent</b> of the cattle and bison herds	11 counties in northern Lower Michigan and parts of 2 other counties
<b>Accredited Preparatory</b>	<b>Less than 0.5 percent</b> of the total number of cattle and bison herds	—
<b>Nonaccredited</b>	<b>Either unknown or 0.5 percent</b> or more of the total number of cattle and bison herds	—

originally granted in FY 2004, was again changed by granting Accredited Free status to the Upper Peninsula and retaining an area of northeastern Lower Michigan as Modified Accredited and the rest of the Lower Peninsula as Modified Accredited Advanced. In addition, in July, USDA approved New Mexico's request for regionalization. New Mexico was divided into two zones; a portion of two counties in eastern New Mexico retained Modified Accredited Advanced status whereas the remainder of the State was granted TB Free Status.

Activities in specific States follow.

**California**—After being downgraded from Accredited TB Free status to Modified Accredited Advanced status in 2003, California completed a 3-county-area test of 691 herds comprising 886,504 individual animals. More than 13,000 head of cattle were destroyed during depopulation of the affected herds and for diagnostic necropsy examinations conducted on skin-test suspects and/or reactors in unaffected herds. California regained Accredited TB Free status in April 2005.

**Michigan**—After reviewing the State's application, epidemiology related to affected herds, and management of infected wildlife, USDA approved Michigan's application for split-State status. As of September 30, 2005, Michigan had received verbal approval from USDA, and an Interim Rule was set to be published in FY 2006.

No new TB-affected herds were detected in FY 2005, and the Upper Peninsula was granted Accredited Free status this year. In the Modified Accredited Zone, 1,100 herds were tested during the fiscal year. The prevalence of TB in wild deer in the Modified Accredited Zone decreased from 0.5 to 0.2 percent.

Two dairy herds, classed as "carry-over herds" from FY 2004, are under test-and-removal herd plans. Both of these herds were detected through area (annual surveillance) testing. One herd, with about 100 head total, had 1 positive animal initially, and 4 subsequent herd tests detected no additional infected cattle. In the other herd, which has about 175 animals, 5 reactors were found on the area testing. Four herd tests conducted subsequently on this farm detected three more TB-positive cattle. This is the second time this herd has been found affected; before TB was detected in 2004, the herd had been found positive in 2000 and released from quarantine in 2002.

Michigan had two slaughter investigations in FY 2005. The first was a histocompatible head lymph node found at slaughter. This was a crossbred beef steer that came from a feedlot in Michigan; however, all of the cattle in the lot originated from out of State. In the second slaughter investigation, a finished Holstein steer was found on further testing to be positive for *M. avium*.



**New Mexico and Arizona**—Through slaughter surveillance, one newly affected dairy was found in Arizona; epidemiologic investigation of this herd is ongoing.

In April 2004, New Mexico applied for regionalization. USDA requested that New Mexico complete all of the epidemiology surrounding the affected herds in that State before any response to that application. New Mexico completed that work during FY 2005, and in July, USDA approved the State's request for regionalization, with two counties in eastern New Mexico retaining Modified Accredited Advanced status and the remainder of the State receiving TB Free Status.

**Texas**—No TB-affected herds were carried over from FY 2004, and no TB-affected herds were disclosed in FY 2005. The last affected herd was depopulated in September 2004. Texas initiated 310 TB investigations in FY 2005: 1 adult slaughter trace, 32 feedyard slaughter traces, and 277 traces associated with affected herds and dairy-calf-raising operations in New Mexico, Arizona, Texas, and Minnesota. Fourteen new dairy operations with 4,358 cattle were tested and classified negative. The total Texas dairy surveillance in FY 2004–05 was 786 herds, and 339,305 cattle were tested. With 1,244 beef seedstock herds containing 70,240 cattle tested and classified negative in FY 2005, the total beef surveillance in FY 2004–05 was 1,574 herds, and 102,092 cattle were tested. About 500 registered beef herds remained to be tested within the State to meet the surveillance objective. In April 2005, Texas changed its approach from voluntary recruitment to mandatory by random selection.

**Minnesota Update**—After a 34-year period of having no positive bovine TB cases, Minnesota had three positive beef herds detected in FY 2004, and two additional herds were found in FY 2005. The index herd was a commercial purebred beef herd, which has since been depopulated. Epidemiologic traces are underway in Minnesota and additional States. As of February 3, 2006, investigations in Minnesota had led to quarantines of 92 herds in that State. Quarantines were removed from 68 of those herds after they completed the required testing. Remaining herds are in the process of having exposed animals removed and/or whole-herd tests completed. In September 2005, the State discovered through its investigation that 2 cattle operations (300–350 head each) having fenceline contact with the index herd were also affected. The fourth (600 head) and fifth (1,000 head) herds were detected in October 2005. USDA paid indemnity for all affected herds, and, as of February 1, 2006, the herds had been depopulated by the State of Minnesota. The State conducted surveillance in affected areas during fall 2005 to determine the presence of infection in the wild deer population. As a result of that surveillance, two positive wild, white-tailed deer were identified close to the index herd. Minnesota is currently making plans for additional surveillance in wildlife.

**Slaughter Surveillance**—In FY 2005, 40 cases of *M. bovis* were found at slaughter, which is an increase from 35 cases the year before. Five of the 40 cases were in adult cattle (greater than 2 years of age), and the remaining 35 were in feedlot steers. The national granuloma submission rate for adult cattle at the end of 2005 was 16.2 submissions per 10,000 adult cattle killed. This rate represents a continued improvement in adult-cattle submission rates as compared with adult-cattle rates in past years.

Of the 35 *M. bovis* cases identified in feedlot steers by slaughter surveillance, 32 (91 percent) involved Mexican steers or exposure to them.

**Cervids**—No TB-infected captive or farmed cervid herds were found in 2005. During 2004, a working group of State and Federal personnel developed a surveillance plan for captive cervids that was presented to, and conditionally approved by, cervid industry leadership. This input was incorporated into a draft of the Uniform Methods and Rules (UM&R) document specifically for captive Cervidae. This will be the first such document for captive cervids and has long been anticipated. The draft UM&R was presented at the 2005 USAHA meeting to both the Committee on Tuberculosis and the Committee on Captive Wildlife and Alternative Livestock. If a consensus can be reached on this document, a final UM&R is expected to be published in 2006. Some aspects of this document will not immediately go into

effect, however, because they will be dependent on similar changes being made in the Code of Federal Regulations; these portions will be clearly identified in the document itself.

**Challenges**—The cooperative State–Federal–industry effort to eradicate bovine TB from the United States has made significant progress toward eradication, markedly decreasing the prevalence of the disease. The goal of eradication, however, has been elusive despite renewed efforts. Remaining challenges (infected wildlife, large affected dairies and calf-raising facilities, and infected cattle entering the country from Mexico) hinder eradication. In reviewing the current TB eradication program in the United States, previous tuberculosis planning documents, and the 2004 USAHA TB strategic plan, the VS working group concluded that eradication of bovine TB remains biologically and economically feasible and helps to protect human health and international trade of livestock. A new strategic plan providing a more aggressive approach to eradicating TB is expected to be released in 2006. APHIS is considering mitigations for those Mexican States that produce cattle at higher risk for TB. Such mitigations may include limiting cattle that originate in Accreditation Preparatory-equivalent Mexican States to approved feedlots only once they enter the United States.

## **Pseudorabies in Swine**

**Disease and Program History**—Until 1962, in the United States pseudorabies virus (PRV) was considered to cause a mild and often subclinical infection except in baby pigs. However, in 1962 a virulent strain of PRV appeared in Indiana and spread across pig farms in the Midwest. By the mid-1970s, pseudorabies was widespread with concentrated outbreaks in the Midwest's major pork-producing States. Pork producers demanded that infected herds be quarantined and that movement of infected pigs be controlled. As a result, States without pseudorabies wanted to be classified as PRV free to facilitate the interstate movement of their hogs.

The Livestock Conservation Institute (now the National Institute for Animal Agriculture) set up a task force in the 1980s that defined two State stages and established the National Pseudorabies Control Board to oversee the stages and determine the status of each State. In 1989, USDA–APHIS published the program standards for an eradication plan.

The main goal of the program was to eradicate pseudorabies from commercial swine production by 2000. By 1999, the U.S. infection rate was down to less than 1 percent of all swine herds, or about 1,000 herds. With the market for pork severely depressed in 1999,

the Accelerated Pseudorabies Eradication Program was established to remove the last infected domestic commercial herds through depopulation by the end of 2004.

**Current U.S. Program**—Conducted in cooperation with State governments and swine producers, the National Pseudorabies Eradication Program eliminated pseudorabies from domestic commercial herds in all States, Puerto Rico, and the U.S. Virgin Islands by the end of 2004. Pseudorabies program measures (see <<http://www.aphis.usda.gov/vs/nahps/pseudorabies>>) are based on prevention, vaccination (now largely discontinued), disease surveillance, and eradication, and primary activities include surveillance, herd certification, and herd cleanup. These are minimum standards developed by VS and endorsed by swine health practitioners and State animal health officials in cooperation with the USAHA. Active surveillance components include testing market and cull swine, breeding animals moved interstate, imported breeding swine, and feral and transitional swine being moved. The program also has passive and outbreak surveillance components. If an infected swine herd is identified, pseudorabies is eliminated by complete depopulation, as documented in the Pseudorabies Program Standards (see <<http://www.aphis.usda.gov/vs/nahps/pseudorabies>>).

There are five stages in the eradication program, beginning with a preparatory phase in stage I and culminating in the pseudorabies-free stage V. States in stages I, II, or III demonstrate progress in herd cleanup consistent with the goal of eradication. In stage I, States develop the basic procedures to control and eradicate pseudorabies such as establishing a committee and formulating plans to estimate pseudorabies prevalence. After 24 to 28 months, States must indicate that they continue to meet the stage I requirements or certify that they meet the requirements of a subsequent stage. States in stages II, III, IV, and V must be recertified at 12- to 14-month intervals. Beginning in 2004, each State must file a Feral-Transitional Swine Management Plan that outlines its plans for dealing with PRV threats from feral swine.

**Disease Status: 2004–05**—In FY 2005, all 50 States, Puerto Rico, and the Virgin Islands filed annual reports with VS National Center for Animal Health Programs swine staff for review by the PRV control board as part of the status renewal process. These filings were analyzed to ensure testing of the breeding herd population was adequate and that the Feral-Transitional Swine Management Plan was complete, as required by pseudorabies program standards.

As of December 31, 2005, there were no known domestic production swine herds infected with PRV in the United States. Nationally, four transitional herds

were disclosed through surveillance as infected with PRV during FY 2005.

**Challenges**—The greatest challenge to eliminating PRV is the sporadic appearance of the virus in feral pigs as well as transitional herds (primarily in the South) that are exposed to feral swine. Research conducted by the Southeastern Cooperative Wildlife Disease Study, funded through a cooperative agreement with USDA, showed the distribution of feral swine in the United States has increased from 475 counties in 17 States in 1982 to 1,014 counties in 28 States in 2004. Currently, an estimated 3 to 4 million feral swine are located in at least 30 States. Although the expanding distribution of feral swine could increase opportunities for contact between domestic and feral swine, exclusion plans are part of good biosecurity protocol on most commercial production farms, and evidence over the past 3 years suggests that no commercial production farms have been infected.

## Brucellosis in Swine

**Disease and Program History**—Brucellosis of swine is an infectious disease, caused by *Brucella suis*, that occurs in most parts of the world where pigs exist in the wild or domesticated state. In the United States, porcine brucellosis caused considerable economic loss from the 1920s to the 1950s. Since then, changes in management combined with regulatory programs to eradicate the disease have gradually eliminated brucellosis as a major disease problem from large areas of the country. All States now participate in the Federal eradication program, and regions where the majority of pigs are raised are free of brucellosis.

**Current U.S. Program**—The current brucellosis eradication program in the United States is a joint State-Federal and livestock industry program. The program is administered, supervised, and funded by cooperative efforts between State and Federal animal-health regulatory agencies. The livestock industries are represented on advisory committees that ultimately advise changes in the UM&R for brucellosis eradication, the principal guideline for conducting the program (for details, see <[http://www.aphis.usda.gov/vs/nahps/swine\\_bruc/pdf/sbruumr.pdf](http://www.aphis.usda.gov/vs/nahps/swine_bruc/pdf/sbruumr.pdf)>).

One important component of the program to eliminate swine brucellosis has been the use of confinement systems and closed herds to eliminate many opportunities for interfarm spread of disease. Additionally, production on a large scale and use of artificial insemination have reduced one avenue of disease spread—the “community boar.”

An integral part of the swine brucellosis eradication program has been the establishment and maintenance of validated brucellosis-free herds—especially purebred

herds or herds selling breeding stock. Surveillance programs, such as identification and testing of market sows and boars, have located and led to elimination of large numbers of infected herds.

When a herd is, or appears to be, infected with *B. suis*, three alternative plans are recommended. Plan 1 entails depopulating the entire herd, which is the most successful and economical approach. Plan 2 is designed to salvage irreplaceable bloodlines and basically consists of marketing the adult pigs for slaughter and retaining weanling pigs for breeding stock; this plan is not always successful and necessitates considerable isolation and retesting. Plan 3 involves removing only serologic reactors and retesting the herd as many times as necessary. Though rarely successful if the herd is actually infected, Plan 3 is the approach of choice for a herd with only one reactor or a very low proportion of reactors and in which there is reasonable doubt that brucellosis exists in the herd.

The swine brucellosis eradication program has evolved to recognize that *B. suis* bacteria will continue to exist indefinitely in feral swine and associated transitional swine populations. Efforts are now concentrated on effective separation of commercial production swine from transitional and feral swine with adequate surveillance and testing of at-risk populations to ensure compliance. The Pseudorabies Eradication Program now requires each State to file a Feral-Transitional Swine Management Plan outlining a process for dealing with feral swine PRV threats. Each State's plan will also address swine brucellosis infection threats from feral swine populations. Swine brucellosis will be considered but one of many swine pathogens to be controlled by effective management and biosecurity measures to prevent transmission from feral and/or transitional swine.

**Disease Status: 2005**—As of December 31, 2005, all States and U.S. territories, except Texas, were in stage III (Free) status of the Swine Brucellosis Control and Eradication Program, and there were no known commercial production swine herds infected with swine brucellosis in the United States. For several years, all outbreaks of infection in transitional herds, including those in Texas, have been attributed to feral swine exposure. Texas will likely gain equal status once the UM&R is revised to reflect Federal-State-industry consensus to remove loosely managed feral-exposed domestic herds from commercial herd classification.

During FY 2005, swine brucellosis infections were identified in three transitional herds. One case was a very small transitional herd in Texas. The second, in Georgia, was a seed-stock herd with extremely poor biosecurity protocols that allowed intrusions of feral swine into the breeding herd. The third case, which occurred in Iowa, was identified when the herd owner was diagnosed and hospitalized with *B. suis* infection, leading to diagnosis

of infection in his herd. Feral swine, apparently new to the area, were sighted in a pasture breeding operation in summer 2004 before the onset of reproductive problems in the affected herd. None of the adjacent commercial production herds became infected.

**Challenges**—The greatest challenge to eliminating brucellosis is the sporadic appearance of the bacteria in feral pigs as well as transitional herds (primarily in the South) that are exposed to feral swine. As reported above in the pseudorabies section, the distribution of feral swine in the United States has expanded in recent decades, and an estimated 3–4 million feral swine are located in at least 30 States. Exclusion plans will continue to be vital in preventing or minimizing contact between domestic and feral swine.

## Brucellosis in Cattle and Bison

**Disease and Program History**—Since 1934, the goal of the Cooperative State-Federal Brucellosis Eradication Program has been to eliminate brucellosis from the domestic livestock population of the United States. The program's UM&R sets forth minimum standards for States to achieve eradication (for details, see <<http://www.aphis.usda.gov/vs/naahps/brucellosis>>).

In 1957, testing disclosed 124,000 brucellosis-infected cattle herds in the United States. By 1992, only 700 herds were known to be affected, and as of December 31, 2005, only 1 known brucellosis-affected domestic cattle herd was under quarantine.

**Current Program**—The brucellosis eradication program is based on active surveillance of cattle and bison herds by States. States are designated as being free of brucellosis when none of their cattle or bison are found to be infected for 12 consecutive months while under an active surveillance program.

The Market Cattle Identification (MCI) program and the brucellosis milk surveillance test (BMST), using the brucellosis ring test, are the two main components of the national brucellosis surveillance program. Each State is required to maintain surveillance at certain levels to maintain its brucellosis State status (table 9). Each State must test at least 95 percent of test-eligible cattle (cows and bulls 2 years of age and older) going to slaughter with at least 90-percent traceback of any animals that respond positively to testing (reactors) and successful case closure on at least 95 percent of these tracebacks. These specifications apply to both Class Free and Class A States. BMST surveillance must be conducted at least two times per year in all commercial dairy herds in Class Free States and at least four times per year in Class A States. In addition, Class A States must conduct first-point testing (market testing).



TABLE 9. **Brucellosis accreditation categories and State Status—2005**

Designation	Infection rate	No. States with designation
Class Free	No cattle or bison found to be infected for 12 consecutive months while under an active surveillance program	47 States, Puerto Rico, U.S. Virgin Islands
Class A	Herd infection rate less than 0.10 percent. [1 herd per 1,000]	3 (Idaho, Texas, and Wyoming)
Class B	Herd infection rate between 0.10 percent and 1.0 percent	0

Note: States or Areas not having at least Class B status are considered 'No Status.'



The program regulations stipulate that, if a single affected herd is found in a Class Free State, that State may retain its Class Free status if it meets two conditions that must be satisfied within 60 days of the identification of the affected animal. First, the affected herd must be immediately quarantined, tested for brucellosis, and depopulated as soon as practicable. Second, an epidemiologic investigation must be performed, and the investigation must confirm that brucellosis has not spread from the affected herd. All adjacent herds, source herds, and contact herds must be epidemiologically investigated, and each of those herds must receive a complete herd test with negative results.

**Disease Status: 2005**—As of December 31, 2005, 47 States, Puerto Rico, and the U.S. Virgin Islands were officially declared free of brucellosis (table 9). Three States—Idaho, Texas and Wyoming—had an infection rate of less than 0.10 percent and earned Class A status. Texas achieved Class A State status in August 1994 and has been working to attain Class Free State status. Wyoming lost its Class Free State status in February 2004 after the disclosure of a second brucellosis-affected herd within a 12-month (consecutive) period. Formal loss of Class Free State status for Idaho was pending at the end of 2005 because of the finding of two brucellosis-affected cattle herds in November 2005.

Discussions of activities in specific States follow.

**Texas**—Texas disclosed two brucellosis-affected herds during 2005 (one in January and another in August). The herd disclosed in January 2005 was depopulated. The herd disclosed in August 2005 was not depopulated and remains under quarantine pending completion of the required number of negative herd tests and completion of the epidemiologic investigation.

**Idaho**—The two brucellosis-affected herds disclosed were both depopulated. The index herd likely became infected through exposure to free-ranging elk in the Greater Yellowstone Area that are known to be infected with

brucellosis. It was through the epidemiologic investigation on the index herd and the associated trace-out herd testing that the second brucellosis-affected herd was disclosed. DNA fingerprinting of *Brucella* cultures from the infected cattle and from the known affected elk herd in the area is being conducted.

About 8.7 million cattle were tested for brucellosis in FY 2005. Of these, about 640,000 (7.4 percent) were sampled on farms or ranches, and about 8.06 million (92.6 percent) were tested under the MCI program (table 10).

MCI surveillance continues to be effective in finding reactor animals; new affected herds have been identified primarily through market testing. Of the 8.061 million MCI blood tests conducted in FY 2005, about 5.2 million (64.2 percent) were collected at slaughter plants, and roughly 2.9 million (35.8 percent) were collected during first-point testing at livestock markets (table 10). First-point testing at markets is conducted primarily in the Nation's Central and Southern regions, where the majority of States that have recently attained Class Free status and one Class A State are located. Class A States are required to conduct first-point testing as part of their efforts toward achieving Class Free status; therefore, Idaho and Wyoming must conduct first-point testing as well as Texas.

Surveillance using the BMST detected no brucellosis-affected dairy herds in FY 2005. About 171,000 BMSTs were conducted in FY 2005; roughly 200 of those BMSTs yielded suspicious results on initial screening. All suspicious BMSTs in FY 2005 were confirmed negative by subsequent epidemiologic investigations and additional herd testing.

In FY 2005, 4.061 million calves were vaccinated for brucellosis with RB51. The national calfhood vaccination policy recommends proper calfhood vaccination in high-risk herds and areas. It also recommends the elimination of mandatory vaccination in all States and that adult vaccination be reserved for cattle herds in high-risk areas.

TABLE 10. **Number of cattle tested for brucellosis (million head)—2004 and 2005**

FY	Total	Farm/Ranch	MCI Program	
			Slaughter plants	Markets
2004	9.1	0.8	5.5	2.8
2005	8.7	0.6	5.2	2.9

**Challenges**—The only known focus of *Brucella abortus* infection left in the Nation is in bison and elk in the Greater Yellowstone Area. APHIS is cooperating with State and Federal agencies to implement a management plan for Yellowstone National Park bison that will maintain a wild, free-ranging bison population while minimizing the risk of transmitting brucellosis from Yellowstone National Park bison to domestic cattle on public and private lands in Montana adjacent to Yellowstone National Park. The U.S. Department of the Interior; Idaho, Montana, and Wyoming; and USDA are working toward the goal of eliminating brucellosis from the Greater Yellowstone Area while maintaining a free-roaming bison herd.

APHIS has assisted Wyoming with funding to vaccinate elk on elk feeding grounds in an effort to reduce the prevalence of brucellosis. APHIS has also provided funds for habitat improvement to keep elk dispersed and away from cattle and cattle feeding grounds. Eliminating brucellosis from elk and bison remains a high priority for APHIS. Efforts to develop new, safe, and effective vaccines as well as vaccine delivery systems for bison and elk are continuing.

APHIS is cooperating with, and assisting States in, the development of herd plans for individual livestock herds in the Greater Yellowstone Area. The individual livestock herd plans will address concerns of brucellosis transmission from wild bison and elk and provide suggested mitigation measures to prevent transmission. When requested by the States, APHIS is also consulting and cooperating with State wildlife agencies in their development of herd unit management plans for wild elk and bison. APHIS has also cooperated with the Grand Teton National Park and the National Elk Refuge in drafting an environmental impact statement about management alternatives for elk and bison on the refuge.

Montana has initiated a bison hunt as part of its effort to address the issue of Yellowstone National Park bison movement from the park into Montana.

## Control and Certification Programs

### Chronic Wasting Disease (CWD) in Cervids

**Disease and Program History**—First recognized in 1967 as a clinical “wasting” syndrome in mule deer at a wildlife research facility in northern Colorado, CWD was identified as a TSE in 1978. There is no known relationship between CWD, which occurs in cervids, and any other TSE of animals or humans.

In the mid-1980s, CWD was detected in free-ranging deer and elk in contiguous areas of northeastern Colorado and southeastern Wyoming. In May 1999, CWD was found in free-ranging deer in the southwestern corner of Nebraska (adjacent to Colorado and Wyoming) and later in other areas in western and central Nebraska. Since 2002, CWD has also been detected in wild deer, elk, or both in south-central Wisconsin, southwestern South Dakota, the western slope of the Rocky Mountains in Colorado, southern New Mexico, northern Illinois, eastern and central Utah, central New York, the eastern arm of West Virginia, and northwestern Kansas. (Note: The Kansas positive deer was harvested in late 2005, but test results were not completed and confirmed until early 2006.) The first infected free-ranging moose was detected in Colorado in 2005.



The first CWD-positive farmed elk herd in the United States was detected in 1997 in South Dakota. Through December 31, 2005, 31 additional CWD-positive farmed elk herds and 8 CWD-positive farmed deer herds have been found, for a total of 40 infected farmed cervid herds.

**Current Program**—APHIS–VS and State CWD surveillance in farmed animals began in late 1997 and has increased each year since. APHIS–VS pays laboratory costs for all surveillance testing of farmed cervids. Responses to onfarm CWD-positive cases include depopulation with indemnity or quarantine. Additionally, VS conducts traceforward and traceback epidemiologic investigations.

A proposed rule for a CWD herd-certification program for farmed-cervid operations was published for comment in the Federal Register on December 24, 2003. Program goals are to control and eventually eradicate CWD from farmed cervid herds. The program would certify herds that demonstrate 5 years of CWD surveillance with no evidence of disease. The proposed program requirements include fencing, identification, inventory, and surveillance. The rule is intended to limit interstate movement of farmed cervids to herds enrolled in the herd-certification program. State programs meeting or exceeding Federal standards will be included in the Federal program. The final rule for this program will be published and the program implemented in 2006.

APHIS–VS has also supported CWD surveillance in wildlife beginning in 1997. Since the national “Plan for Assisting States, Federal Agencies, and Tribes in Managing Chronic Wasting Disease in Wild and Captive Cervids” was adopted in June 2002, APHIS–VS has cooperated with the International Association of Fish and Wildlife Agencies to promote uniform, nationwide surveillance while allowing flexibility to meet individual State situations and needs.

Since beginning to receive line-item funding for CWD in FY 2003, APHIS–VS has been providing assistance to State wildlife agencies and tribes through cooperative agreements to address the disease in free-ranging deer and elk. This funding has covered surveillance testing for some 90,000 hunter-killed and targeted animals in the 2002–03 and the 2003–04 hunting seasons. Similar numbers were projected for 2004–05 and 2005–06. All 50 States participated in the first 2 years of the program, and 47 States requested and received funding in FY 2005. Funding is distributed through a tiered system based on risk of disease developed in consultation with the International Association of Fish and Wildlife Agencies. In addition to individual tribal assistance, an agreement with the Native American Fish and Wildlife Society funds five regional CWD tribal biologists to assist tribes with CWD activities.

TABLE 11. **Number of CWD-positive farmed cervid herds, by State, 1997–2005**

State	1997–2004	2005	Total (1997–2005)
Colorado	12	2	14
Kansas	1	—	1
Minnesota	2	—	2
Montana	1	—	1
Nebraska	4	1	5
New York	—	2	2
Oklahoma	1	—	1
South Dakota	7	—	7
Wisconsin	6	1	7
Total	34	6	40

**Disease Status**—In FY 2005, 15,628 farmed cervids were tested for CWD as compared to more than 15,000 animals in FY 2004 and more than 12,000 in FY 2003. From 1997 through 2005, CWD had been found in 32 farmed elk herds and 8 farmed deer herds in 9 States (table 11).

Of the 40 positive herds identified as of December 31, 2005, 6 (4 in Colorado and 2 in Wisconsin) remained under State quarantine and 33 had been depopulated. The quarantine was lifted from one herd that underwent rigorous surveillance for more than 5 years with no further evidence of disease.

**Challenges**—The key challenges in managing CWD result from the fact that cervids fall under multiple jurisdictions. In 2002, at the request of Congress, an interagency group was convened to develop a management plan to assist States, Federal agencies, and Native American tribes in managing CWD in captive and wild herds. Currently, this plan is implemented by State and Federal agencies, as budgets permit. A progress report on the implementation of the plan was completed and presented to Congress in May 2004.

Additional challenges are related to the difficulties associated with testing wild cervids. High sample throughput and more rapid test technology were needed to meet the needs of wildlife agencies. By expanding its contract group of State and university laboratories, NVSL now has 26 laboratories approved to conduct CWD testing. In addition, the Center for Veterinary Biologics has approved four CWD antigen test kits based on enzyme-linked immunosorbent assay (ELISA), allowing faster testing and greater throughput for surveillance testing of wild cervids.

## Johne's Disease in Cattle

**Disease and Program History**—Bovine paratuberculosis (Johne's disease) is caused by the bacterium *Mycobacterium avium* subspecies *paratuberculosis* (MAP). In addition to cattle and other ruminants, many species of domestic and wild animals worldwide have been diagnosed with Johne's disease. Clinical signs of Johne's disease include weight loss, diarrhea, and decreased milk production.

In 1993, USAHA proposed a Johne's disease herd-certification program, but the program was not adopted because of the costs associated with testing all animals in a herd and other issues. In 1997, the USAHA's national Johne's disease working group appointed a committee to design a more affordable and flexible program based on sound scientific knowledge. The result was the U.S. Voluntary Johne's Disease Herd Status Program for cattle. Instead of trying to certify herds free of Johne's disease, the program provides minimum requirements to identify low-risk herds. These guidelines were used as a model for the Uniform Program Standards of the Voluntary Bovine Johne's Disease Control Program (VBJDCP) approved by VS in 2002 and were updated in 2005 (see <<http://www.aphis.usda.gov/vs/naahps/johnes/johnes-umr.pdf>>).

**Current Program**—The VBJDCP is a cooperative State–Federal–industry effort administered by States and supported by the Federal Government and industry. The program's objective is to provide national standards for controlling Johne's disease. The program has three basic elements:

1. Educating producers about the cost of Johne's disease and providing information about management strategies that prevent, control, or eliminate it;

2. Working with producers to establish good management strategies on their farms; and
3. Testing and classifying herds to help separate test-positive herds from test-negative herds. Herd classification is determined by the number and years of testing for MAP in the herd.

The goal of the VBJDCP is to reduce the spread of MAP to noninfected herds and decrease disease prevalence in infected herds.

**Program Status: 2004–05**—Forty-seven States participate fully in the VBJDCP. More than 1,600 herds are enrolled in the test-negative component of the program. More than 6,400 herds have enrolled in the Johne's disease control program (table 12).

There are 46 States with laboratories approved for Johne's disease serology testing, and 30 States have laboratories approved for MAP fecal culture or DNA testing. In 2005, these laboratories conducted 697,264 enzyme-linked immunosorbent assay (ELISA) tests and 105,685 fecal cultures.

**Challenges**—Increasing producer participation in the VBJDCP is difficult for several reasons. Because firm data on the true economic costs of the disease are unavailable, many producers are reluctant to spend large amounts of money without knowing the benefits. Additionally, discrepant test results can be confusing and become a deterrent for producers not familiar with the disease and testing issues.

TABLE 12. **Johne's disease control program statistics, 2000–05**

Number of . . .	2000	2001	2002	2003	2004	2005
States in full compliance with VBJDCP	NA	NA	22	35	43	47
Herds in Johne's control programs	1,952	1,925	3,248	3,268	6,189	6,448
Johne's test-negative herds	390	514	631	543	972	1,632
ELISA tests performed	359,601	342,045	592,350	480,586	673,299	697,264
Cultures performed	44,961	43,218	98,094	96,222	101,786	105,685

## Trichinae in Swine

**Disease and Program History**—In the mid-1980s, three factors provided a powerful rationale for developing industry-supported programs to improve food safety in the U.S. pork industry. First, the prevalence of *Trichinella* in U.S. swine had reached such a low level (less than 1 percent) that disease-free status could be envisioned. Second, U.S. pork industry leaders recognized that international markets were closed to U.S. pork products because of the inaccurate perception that U.S.-produced pork had a comparatively high risk of harboring *Trichinella spiralis*. Finally, the development of a rapid, ELISA-based diagnostic test provided a relatively inexpensive tool that could be used for verification testing in a control program.

In the United States, the prevalence of *T. spiralis* in pigs has dropped sharply because of changes in swine-production practices. The National Animal Health Monitoring System's (NAHMS) 1990 National Swine Survey and Swine '95 study reported *T. spiralis* infection rates in the United States of 0.16 percent and 0.013 percent, respectively. The NAHMS Swine 2000 study reported a 0.007-percent infection rate. Because modern pork-production systems have all but eliminated trichinae as a food-safety risk, alternatives to individual carcass testing to demonstrate that pork is free of *T. spiralis* were explored via trichinae pilot programs.

**Current Program**—The U.S. Trichinae Certification Program (USTCP), initiated as a pilot program in 1997, is based on scientific knowledge of *T. spiralis* epidemiology and numerous studies demonstrating how specific "good production practices" can prevent pigs' exposure to this zoonotic parasite. The program is consistent with recommended methods for control of *Trichinella* in domestic pigs, as described by the International Commission on Trichinellosis.

Three USDA agencies (APHIS, the Food Safety and Inspection Service [FSIS], and the Agricultural Marketing Service [AMS]) collaborate to verify that certified pork-production sites manage and produce pigs according to the requirements of the program's "good production practices." USDA also verifies the identity of pork from the certified production unit through slaughter and processing.

Production sites participating in the USTCP may be certified as "trichinae safe" if sanctioned production practices are followed. The onfarm certification mechanism establishes a process for ensuring the quality and safety of animal-derived food products from farm through slaughter and is intended to serve as a model for the development of other onfarm quality and safety initiatives.

Uniform program standards detailing the requirements of this certification program have been developed, and additional Federal regulations in support of the program are being developed. The completion of the pilot phase described here will lead to implementation of a federally regulated program throughout the United States.

Program pilot sites (swine nurseries and growers or finishers) are located in Colorado, Illinois, Iowa, Kansas, Minnesota, Missouri, Oklahoma, and South Dakota, but site enrollment continues. States were selected based on their willingness to participate and on market locations.

**Program Status: 2002–05**—On the basis of risk factors related to swine exposure to *T. spiralis*, an objective audit that could be applied to pork-production sites was developed for onfarm production practices. USDA regulates the audits to ensure that program standards are met and certifies that specified good production practices are in place and maintained on the audited pork-production sites. The onfarm audit includes aspects of farm management, biosecurity, feed and feed storage, rodent control programs, and general hygiene.

In the pilot study, objective measures of these good production practices were obtained through review of production records and an inspection of production sites. Production site audits were performed by veterinarians trained in auditing procedures, *Trichinella* risk-factor identification, and *Trichinella* good production practices. From 2000 to 2005, more than 500 audits have been completed on farms, and a great majority of these have indicated compliance with the good production practices as defined in the program. These compliant sites were granted status as "enrolled" or "certified" in the program (see table 13 for 2002–05 data).

Program sites will be audited on a regular status-determined schedule as established by official standards of the pilot USTCP. USDA oversees the auditing process by qualifying program auditors and by conducting random spot audits. Spot audits verify that the program's good production practices are maintained between scheduled audits and ensure that the audit process is conducted with integrity and consistency across the program.

Early in the pilot study, an ELISA was conducted on meat-juice samples collected at slaughter to perform verification testing of swine raised on certified sites. Verification testing entailed random testing of a statistically valid sample of swine from trichinae-certified production sites. The entire certified population delivered annually to the slaughter plant was used to determine the total number of samples needed. This testing was performed to verify that swine coming from trichinae-certified production sites were free of *Trichinella*. Trained laboratory technicians at the slaughter plant performed the early-stage verification testing. Verification testing of 11,713 swine from farms

TABLE 13. **Numbers of veterinarians trained in audit procedures and *Trichinella* good production practices, and site audits conducted, 2002–05**

	2002	2003	2004	2005
Newly trained and qualified accredited veterinarians	7	7	25	4
Site audits performed	200	81	82	60

in the pilot USTCP resulted in 11,712 negatives and 1 positive by ELISA. The one positive ELISA result was determined to be a false positive when a 5-gram sample of diaphragm from the carcass was tested by artificial digestion.

The program calls for swine slaughter facilities to segregate pigs and edible pork products originating from certified sites from pigs and edible pork products received from noncertified sites. This process is verified by FSIS. Swine slaughter facilities processing pigs from certified sites are responsible for conducting verification testing to confirm the trichinae-free status of pigs originating from certified production sites. On a regular basis, statistically valid samples of pigs from certified herds are tested at slaughter to verify that practices to reduce onfarm trichinae-infection risks are working. This process verification testing is performed using a USDA-approved tissue or blood-based postmortem test and is regulated by AMS.

**Challenges**—The program’s current challenge is the approval process and publication of the USDA regulation that will establish trichinae certification as an official USDA voluntary program for onfarm risk-mitigation certification in the U.S. pork industry.

### Swine Health Protection Inspection Program

**Disease and Program History**—The Swine Health Protection Act, Public Law 96–468, serves to regulate food waste and ensure that all food waste fed to swine is properly treated to kill disease organisms. Raw meat is one of the primary media through which numerous infectious or communicable diseases of swine can be transmitted—especially exotic animal diseases such as foot-and-mouth disease, African swine fever, classical swine fever, and swine vesicular disease.

**Current Program**—In accordance with Federal regulations, food waste may be fed to swine only if it has been treated to kill disease organisms. Treatments must be made at facilities possessing valid permits issued by VS or by the chief agricultural or animal health official of the State (if the State permits feeding food waste to swine). In 2005, 24 States prohibited feeding food waste to swine; 26 States and Puerto Rico allowed and issued permits to operate garbage treatment facilities. Licensed operations must follow regulations regarding the handling and treatment of garbage, facility standards (rodent control, equipment disinfection), cooking standards, and recordkeeping. In addition, licensed operations are required to allow Federal and State inspections.

**Program Status**—During FY 2005, there were on average 2,557 licensed food-waste cooking and feeding premises in the United States (table 14). During the year, 9,631 routine inspections were made on licensed premises in States that permitted the treatment and feeding of food waste to swine.

Because of increased awareness and threats of potential incursions of foreign animal diseases, most States increased efforts to ensure that all food-waste feeders were properly licensed. To this end, 28,845 searches for nonlicensed food-waste feeders were made by field personnel. Through these efforts, 101 nonlicensed feeders were found; information about the disposition of these cases was not available at press time.

TABLE 14. **Statistics on licensing of facilities feeding food waste to swine, 2004 and 2005**

Number	FY 2004	FY 2005
States allowing food-waste feeding <sup>1</sup>	30	26
Licensed premises	2,757	2,557
Routine inspections	12,723	9,631
Searches for nonlicensed feeders	25,422	28,845
Nonlicensed feeders found	239	101

<sup>1</sup> Puerto Rico also allowed food-waste feeding.



## CHAPTER 4

# Animal Health Initiatives

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This chapter brings special attention to particular animal health initiatives of 2005, including the National Aquatic Animal Health Plan (NAAHP), the National Veterinary Accreditation Program (NVAP), and the continuing development of the National Animal Identification System (NAIS).

### NAAHP

Under the auspices of the Joint Subcommittee on Aquaculture (JSA), the Animal and Plant Health Inspection Service (APHIS) is developing the NAAHP in partnership with the two other Federal agencies that have primary authority for U.S. aquatic-animal health: the Department of Commerce's U.S. National Oceanic and Atmospheric Administration (NOAA) and the Department of the Interior's U.S. Fish and Wildlife Service (FWS). The JSA is authorized by the National Aquaculture Act of 1980 (16 U.S.C. 2801 *et seq.*) and is composed of representatives from Federal agencies that participate in aquaculture activities in the United States. The JSA functions under the direction of the Office of Science and Technology Policy and the Science Adviser to the President of the United States. The purpose of the JSA is to ensure communication, cooperation, and collaboration among Federal agencies on matters related to aquaculture. The JSA has commissioned task forces to address and assist member agencies on critical issues for aquaculture such as research, aquaculture facility-effluent

regulations, registration of pesticides and medications used in aquaculture, and shrimp diseases. In 2001, the JSA directed APHIS, NOAA Fisheries, and FWS to establish a National Aquatic Animal Health Task Force on Aquaculture. The task force would be responsible for drafting the NAAHP.

The purpose of the NAAHP is to foster and support effective and efficient aquaculture, to protect the health of wild and cultured aquatic resources in the United States, and to meet U.S. national and international trade obligations. The NAAHP is being developed in partnership and cooperation with industry; regional organizations; State, local, and tribal governments; and other stakeholders. In December 2001, the task force brought stakeholders together in Washington, DC, to receive input on aquatic-animal health needs and to give direction on the necessary elements of the NAAHP. A second meeting was convened in June 2002 in Tucson, AZ, to further define the objectives of the plan. In April 2003, the outline and development process of the NAAHP was approved by the Federal Executive Committee of the task force.

The task force has continued its work in developing the NAAHP by convening a series of task-force-associated working groups. Working groups consist of 10 to 20 experts, each representing a sector of the aquaculture community. Each working group focuses on a specific element of the NAAHP, such as the roles and responsibilities of health professionals, laboratory



methodologies, and species-specific issues. Several working groups have met and provided recommendations for the NAAHP.

The first complete draft of the NAAHP is expected in spring 2007 with refining and implementation to follow. The NAAHP in itself will not be codified into regulation; however, implementation of certain elements, such as import requirements, may require revisions to existing laws, regulations, or policies.

## NVAP

The NVAP was instituted in 1921 by APHIS–Veterinary Services (VS) to foster collaboration among accredited veterinarians, Federal and State animal health officials, and colleges of veterinary medicine. The goal was to improve the overall health and marketability of the U.S. domestic animal population while preventing the introduction of exotic disease agents.

The responsibilities of NVAP are to

- Form the first line of surveillance for reportable domestic and foreign animal diseases (FADs),
- Assist with interstate and international movement of animals and animal products,
- Ensure national uniformity of regulatory programs, and
- Participate in State–Federal–industry cooperative programs.

Recently, NVAP dealt only with initial certification of participating veterinarians. However, increasing world trade and international travel have heightened the risks the United States faces from disease introductions capable of threatening animal and human health. Therefore, the NVAP is being enhanced to provide accredited veterinarians with the tools needed to meet U.S. disease prevention, preparedness, and response challenges.

The new revisions to the NVAP will emphasize the lifetime education of accredited veterinarians via training modules that provide the latest information on the transmission, recognition, and reporting of exotic diseases, emerging diseases, and program policy and procedures.

To meet these requirements, the program will require participating veterinarians to renew their accreditation status as either Category-I or Category-II veterinarians by completing a specified number of training modules within each renewal period. Those seeking accreditation in companion animals only (excluding equids or food-animal species) will be classified as Category-I veterinarians and will be required to complete four supplemental training modules every 3 years. Category-II veterinarians will be required to complete nine supplemental training modules

for equids, food animals, and companion animals every 3 years. Category II veterinarians who wish to specialize can pursue additional training.

Key elements being implemented as part of the new NVAP include the following:

- Development of a two-tiered category system of accreditation for veterinarians;
- Renewal of accreditation status every 3 years;
- Completion of a series of supplemental training modules within the 3-year renewal cycle via the Internet;
- Opportunity for participating veterinarians to obtain specialized accreditation in areas such as quality control and certification programs, testing, Johne's disease, aquaculture, etc.; and
- Use of the electronic Veterinary Accreditation Program (eVAP) to provide up-to-date accreditation information.

The eVAP is a module within the VS Process Streamlining Web-based system that will offer a single access point for electronic forms, applications, and certification processes required for interstate or international movement of animals and animal products. The eVAP will serve as a gateway to other modules in the Process Streamlining system, including the electronic certificate of veterinary inspection (eCVI), electronic import, and electronic export. The eCVI, planned for release in 2006, will allow accredited veterinarians to access State regulations, request permits for entry, send electronic certificates of veterinary inspection directly to State officials, attach test charts and vaccination records, and interface with premises identification databases.

The improvements in the NVAP will provide accredited veterinarians with access to current animal health, food safety, and regulatory issues; greater awareness of national and international health events; and increased service marketability through specialization. Overall, the program will improve integration of the national veterinary community by providing a cohesive safeguarding and emergency response network through increased quality and accuracy of accreditation program activities, thus improving the quality and marketability of U.S. animals and animal products.

## NAIS

USDA–APHIS is charged with developing and implementing a practical, cost-effective, and reliable NAIS to consolidate and standardize animal identification systems currently in use nationwide. Standardization of these systems will enable USDA and State animal health officials to respond more quickly and effectively to animal disease outbreaks.

The development and implementation of the NAIS has been, and continues to be, an evolutionary process. In May 2005, USDA published its draft strategic plan and program standards outlining a proposal for implementing and integrating the three components of the NAIS: premises identification, animal identification, and animal tracking. Through the NAIS, USDA hopes to have the capacity to identify all premises and animals that have had contact with an FAD or domestic animal disease of concern within 48 hours after discovery.

Since publication of the draft documents on the NAIS Web site, APHIS has received several hundred comments from interested stakeholders and continues to receive more each week. APHIS used this feedback in the development of an implementation plan for the program that sets an aggressive timeline for ensuring full deployment of the NAIS by 2009. It establishes benchmarks for incrementally accomplishing the remaining implementation goals to enable the NAIS to be operational by 2007 and to achieve full producer participation by 2009.

While the NAIS is being developed and refined, APHIS is implementing NAIS on a voluntary basis. Voluntary participation by producers and stakeholders during development and testing of the program will help provide practical solutions to any problems and challenges encountered.

### **Premises Identification**

Identifying locations or premises where livestock reside or are managed is essential to meeting USDA's goal of completing animal tracebacks within 48 hours. By the end of 2005, nearly 170,000 premises had been registered within 50 States, 5 tribes, and 2 U.S. territories.

### **Animal Identification**

In November 2004, APHIS published an interim rule adopting the use of a 15-character animal identification number as an alternate numbering system for identifying animals in interstate commerce and cooperative disease control and eradication programs. This new numbering system is a key element of the NAIS, and publication of this rule allows producers to convert gradually to the use of a one-number-for-one-animal system.

In 2005, APHIS finalized the testing of an animal identification number management system that allocates and tracks the use of these numbers. APHIS has also developed a training program for its State partners, who will play a significant role in implementing animal identification.



Other accomplishments include the integration of these numbers into existing animal disease programs (e.g., scrapie, chronic wasting disease, and bovine tuberculosis).

### **Animal Tracking**

In August 2005, the Secretary of Agriculture announced that, under the NAIS, animal-movement tracking information will be held in a database maintained by industry. This decision was in keeping with USDA's commitment that the NAIS be a true Federal-State-industry partnership.

In response to questions and comments on the potential for the development of several different tracking databases, USDA is proceeding with a portal solution that would allow the agency to access animal tracking data stored in multiple private and State databases when needed for animal disease-control purposes. Concurrent with the release of the NAIS implementation plan, USDA released general technical standards for animal-tracking databases that will enable integration of private systems with the NAIS. Additionally, private database owners were invited to submit data for system evaluation to USDA and offer feedback as the final technical requirements are established. In moving the program forward, USDA's objective is to support privatization of the animal-tracking component of the NAIS in the most practical and timely and least burdensome manner.



## CHAPTER 5

# Emergency Management and Response

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Foreign animal disease (FAD) outbreaks involving pathogens that harm livestock and crops can have a profound impact on the Nation's infrastructure, economy, and export markets. Veterinary Services (VS) is charged with preventing FADs in the United States, rapidly detecting FADs should they occur (see chapter 2), and responding effectively to control or eradicate them.

### Prevention Methods

VS has the authority and responsibility to prevent and exclude FADs by prohibiting imports of animals, animal products, veterinary biologics, and other materials that pose a risk of introducing diseases. VS bases its FAD exclusion activities on the results of risk assessments that examine the disease status of the exporting country, information about the country's surveillance systems and other infrastructure, and documentation from site visits (see chapter 6). U.S. import requirements and provisions of the Bioterrorism Act are enforced at ports-of-entry by agriculture specialists from U.S. Customs and Border Protection (CBP). Every day, these specialists screen thousands of passengers, all types of cargo, and international mail at more than 140 ports-of-entry. At some ports, detector dogs search for hidden items. At other ports, officials use low-energy x rays that detect the presence of organic materials such as fruits and meats. As a component of CBP, agriculture is also an integral part of various automated targeting systems used to identify and

track the contents of containers before they reach U.S. shores. Personnel from the U.S. Department of Agriculture (USDA), the Food and Drug Administration (FDA), and CBP work together at the National Targeting Center to analyze information based on scientific risk-assessment and pathway analysis and identify shipments for further inspection. In addition, VS veterinarians conduct point-of-entry inspections and require quarantines of live animals and birds offered for import.

Constant monitoring of international FAD events and conditions that might lead to disease emergence is vital in preventing disease incursions. This global animal health information is collected from many sources, including the following:

- International organizations such as the World Organization for Animal Health (OIE) and the Food and Agriculture Organization of the United Nations;
- Overseas U.S. Government personnel such as those from APHIS, the Foreign Agricultural Service, and the Food Safety and Inspection Service;
- Ongoing monitoring of news reports; and
- Other U.S. Government agencies such as the Armed Forces Medical Intelligence Center, which gathers information on the status of both human and animal diseases throughout the world.

APHIS' International Services (IS) unit is implementing the International Safeguarding Information Program, which is designed to place IS personnel in jobs at many new duty stations around the world, to gather specific pest and disease information.

VS personnel scan open-source electronic information for FAD information and then assess, analyze, and process risk events for agency decisionmakers. VS also prepares impact worksheets for new occurrences of disease in foreign countries and examines an affected country's production and trade in potentially infective products, the potential for U.S. exposure, and trade implications.

## FAD Emergency Response

The U.S. emergency response to FAD events involves a partnership between various Federal, State, tribal, local, and private-sector cooperators. Written response plans and guidelines address all areas of an emergency response such as the initial field investigation; local disease control and eradication activities; emergency management, including line of command, planning, logistics, and resources; and interagency coordination. An effective emergency response requires extensive preparation and coordination. Emergency preparedness includes activities such as monitoring response plans, workforce training, and test exercises.

### Overview

Most disease incidents begin with a suspicious event or unusual situation. In the animal health arena, the first lines of defense and detection are the individuals who work directly with livestock on a routine basis such as brand inspectors, market workers, owners, producers, private veterinarians, and accredited veterinarians. Findings suggestive of FADs are reported to the Federal Area Veterinarian-in-Charge (AVIC) or the State Veterinarian, who initiate investigations.

The State and Federal counterparts work cooperatively using standard procedures for investigating suspect and confirmed FADs. The Federal AVIC or State Veterinarian in that State will immediately assign the most readily available FAD diagnostician to conduct a complete investigation. Trained at the USDA research center at Plum Island, NY, these diagnosticians are skilled in recognizing clinical signs of FADs and in collecting appropriate samples to send to the National Veterinary Services Laboratories in Ames, IA, the Foreign Animal Disease Diagnostic Laboratory, or both.

If the field diagnosis indicates that the incident is highly likely to be an FAD, initial response activities include State quarantining of the premises, interviewing the producer, instituting biosecurity measures, assessing the most probable source of infection, and determining the possible spread of disease through contact, movement, and inventory records. The initial response will be activated using the local, State, and Federal agricultural authorities of the affected States. The Secretary of Agriculture has broad authority and discretion for responding to and eliminating animal disease. When needed, USDA authorities will be used to augment those of the States and to provide a portion of the funding for the response.

National policy for FAD eradication is coordinated using the National Animal Health Emergency Management System (NAHEMS) guidelines. These guidelines are designed for use at any of three levels of response commensurate with the severity of the outbreak, including a local or limited response, a regional response, and a national response. VS evaluates the disease situation in the United States and works to implement controls or "regionalize" any remaining affected areas. In this way, disease eradication resources are focused in key areas, and animals in other parts of the country can be classified disease free, making them eligible for interstate movement, slaughter, and export. VS also works with agricultural officials in other countries and with OIE to relay critical disease-monitoring information and to keep export markets open for animals or regions certified disease free.

### NAHEMS Topics

Topics covered in the guidelines include the following:

- Field investigations of animal health emergencies,
- Implementation of an animal emergency response using the Incident Command System,
- Disease control and eradication strategies and policies,
- Operational procedures for disease control and eradication,
- Site-specific emergency management strategies for various types of facilities,
- Administrative and resource management, and
- Educational resources.

After the disease has been eradicated from the country, APHIS officials meet with Federal, State, tribal, and local cooperators to assess FAD response activities. Such assessments aid in the development of new strategies for sharing resources and improving response efforts.



## The Changing World of Emergency Management

### Structure of Emergency Management System

APHIS created the Emergency Management System (EMS) in response to concern from animal industry groups and State animal health officials about the Nation's ability to prepare for, and respond to, emergency animal disease situations.

The EMS focuses on preventing the introduction of animal diseases of foreign origin by responding to outbreaks quickly and efficiently at the Federal, State, and local levels; developing and implementing mitigation strategies to minimize the impact of negative animal health events on the Nation's food supply or its livestock and poultry industries; developing procedures to handle negative animal health events in an environmentally safe way; identifying resources locally, regionally, and nationally capable of mounting these responses; developing streamlined avenues for animal producers to obtain assistance during the recovery phase of an emergency; and educating and training veterinarians, producers, and the general public about the threats regarding FADs.

The Emergency Management and Diagnostics (EMD) division within VS develops strategies and policies for effective incident management and coordinates incident responses. As a liaison with outside emergency management groups, EMD ensures that VS emergency management policies, strategies, and responses are current with national and international standards. This structure helps deliver services better tailored to Homeland Security Presidential Directives 5, 7, 8, and 9; the National Response Plan; USDA regulations; and VS mandates. To these ends, EMD has three functional divisions: Interagency Coordination Staff (ICS), Preparedness and Incident Coordination (PIC), and the National Veterinary Stockpile (NVS) staff.

The ICS is responsible for creating partnerships with Federal, State, and local entities to strengthen early disease detection and rapid response at all levels. The ICS takes the lead role for the implementation of the National Incident Management System. The group has staff liaisons working directly with Department of Homeland Security, U.S. Department of Health and Human Services, Centers for Disease Control, and the Department of Defense to ensure that subject matter expertise is available within these agencies for all necessary planning and communications activities.

The PIC staff develops agency response plans for the most dangerous animal diseases that pose a risk to U.S. agriculture. The group works closely with industry and stakeholders to identify the highest risk diseases, resource availability, and best strategies in disease mitigation.

The NVS is tasked with providing the best possible protection against an intentional or unintentional FAD introduction or the occurrence of a natural disaster affecting animal agriculture and the food system. The NVS staff is tasked with establishing methodology needed to address the most important FADs and has begun to stockpile identified supplies, vaccines, and materials needed for a response to these FADs. The NVS is discussed in more detail later in this chapter.

### **Emergency Management Activities and Accomplishments in 2005**

ICS efforts in 2005 include establishing a uniform operational policy and guidelines for animal health emergency management and in particular the role of the Area Emergency Coordinator (AEC) program. This ensures that AEC functions and activities reinforce a uniform approach to animal health emergency planning and response.

APHIS AECs work as outreach and liaison officers with States, tribes, local governments, and industry to enhance their emergency response systems and preparedness for responding to disease incursions or acts of bioterrorism and to respond effectively and efficiently to all hazardous animal-health incidents. APHIS currently has 17 AECs in place.

EMD took the lead in the creation and management of the APHIS National Avian Influenza (AI) Response Team. EMD reviewed AI-related documents for the Secretary of Agriculture during his Farm Bill Forum visits to Alaska, Georgia, North Carolina, and Washington and material for the Under Secretary's AI briefing book. In November 2005, EMD staff also participated in a USDA workshop on highly pathogenic AI (HPAI) to determine gaps in USDA policies, plans, and technological capabilities related to that disease. EMD identified personnel for training to qualify for performing diagnostic capability assessments as requested by countries preparing for, or responding to, AI outbreaks.

Other notable accomplishments by EMS include the following:

- Working with Plant Protection and Quarantine in advancing the Offshore Pest Information System, which expanded in 2005 to include animal health;

- Helping establish credential standards for veterinary responders to animal emergencies;
- Helping coordinate agricultural and veterinary assistance and restoration of areas affected during the hurricane season;
- Assembling training options from States, universities, and Federal agencies to continue to improve National Animal Health Emergency Response Corps capabilities;
- Leading the initial APHIS headquarters response to an outbreak of rabbit hemorrhagic disease in Indiana;
- Developing a strategic plan for increasing awareness of public practice careers;
- Implementing an online Exotic and Emerging Animal Disease course available to all 28 veterinary schools; and
- Participating in an interagency working group on agroterrorism training.

## **NVS**

### **Background**

In February 2004, the President issued the Homeland Security Presidential Directive-9 (HSPD-9), which led to the establishment of the NVS. The NVS is to contain animal vaccines, antivirals, therapeutic products, and other supplies to respond to an intentional or unintentional introduction of FADs and biological threat agents that would affect agriculture, the Nation's food system, human health, and the Nation's economy.

Stockpiling vaccines, reagents, personal protective equipment, and other supplies and materials represents a change in USDA's approach to managing animal and plant disease outbreaks by providing rapidly available supplies of vaccines, therapeutics, and countermeasures for use against naturally occurring animal disease outbreaks or agroterrorism. The NVS is designed to address current shortfalls in the U.S. supplies by acquiring, configuring, and maintaining critical veterinary equipment and supplies to ensure that systematic measures are in place to eradicate multiple introductions of the most damaging livestock and poultry diseases and to deploy veterinary resources and essential logistics within 24 hours of an adverse agricultural event.

The United States currently stockpiles vaccines against foot-and-mouth disease (FMD) and AI. The North American FMD Vaccine Bank is managed through an agreement between USDA and its Mexican and Canadian counterparts, and the AI Vaccine Bank is part of USDA's low-pathogenicity AI (LPAL) national program. In addition,

with sufficient long-term funding, the NVS will contain a repository of ready-to-use veterinary supplies for at least eight other priority FADs.

Functional requirements address the following:

- The threat diseases or agents (including vectors) for which the NVS Program must stockpile, maintain, and deliver countermeasures;
- The comparative priority of each threat disease and causative agents;
- Animal industries potentially affected by each agent and geographic centers or distributions of those industries;
- The number of animals at risk with each agent and animal densities typical for each type of industry as needed to determine the size and characteristics of animal populations the NVS Program must protect;
- The response time required to counter emergency outbreaks and expected durations of response measures; and
- Policy, economic, research, surveillance, and epidemiology needs and the respective priorities of these and other needs related to the functional capabilities of the NVS.

The NVS Steering Committee advises APHIS' Deputy Administrator for VS on any animal vaccine, antiviral, therapeutic product, or other supplies (personal protective equipment, disinfectants, syringes, and pesticides) needed to respond quickly and appropriately to the most damaging animal diseases affecting human health and the economy. The steering committee organizes and integrates advisory panels (working groups) to make recommendations to the Deputy Administrator. The steering committee also develops national strategies for NVS functional requirements, policies, and investment strategies needed to meet NVS responsibilities.

### **NVS Achievements in 2005**

The NVS Steering Committee identified eight FADs that pose a significant threat to American animal agriculture, and this action in turn provides guidance in identifying supplies to be stockpiled.

An FMD outbreak training exercise was held in 2005 with Rapid Response Teams, incident management actions, and interagency coordination at an Incident Command. Management and actions related to movement and quarantine, appraisal, vaccination, euthanasia, and disposal were employed and evaluated.





A draft business plan for the NVS was presented to the NVS Steering Committee in October 2005. The plan was designed to provide a common understanding of the mission, capabilities, and concept of operations for the NVS.

The NVS Steering Committee identified an additional antigen for the North American FMD Vaccine Bank.

## NAHLN

The NAHLN is part of a national strategy to coordinate the capabilities of Federal, State, and university laboratories. By combining Federal laboratory capacity with the facilities, professional expertise, and support of State and university laboratories, the NAHLN will enhance the response to animal health emergencies, including bioterrorist events, emerging diseases, and FADs.

The NAHLN is a cooperative effort between the American Association of Veterinary Laboratory Diagnosticians (AAVLD), APHIS, and the Cooperative State Research, Education, and Extension Service (CSREES). The NAHLN is directed by a steering committee made up of representatives from these three organizations and the National Assembly of Chief Livestock Health Officials.

Key elements of the NAHLN include the following:

- Standardized, rapid diagnostic techniques that can be used at the State, regional, and national levels;
- Secure communications, alert, and reporting systems;
- Modern equipment and experienced personnel trained in the detection of emergent and foreign diseases, including outbreaks initiated by bioterrorists;
- National training, proficiency testing, and quality assurance programs;
- Upgraded facilities to meet biocontainment and physical security requirements; and
- Support of regional and national animal health emergency training exercises that test and evaluate the communication and reporting protocols of the network.

In 2002, 12 State and university diagnostic laboratories were selected to enter into cooperative agreements funded by the DHS. These agreements formally initiated the network and focused on rapid assays for eight FADs: African swine fever, AI, classical swine fever (CSF), contagious bovine pleuropneumonia, exotic Newcastle disease (END), FMD, lumpy skin disease, and rinderpest.

The NAHLN has evolved into a multifaceted laboratory network. Each facet focuses on a different disease but uses a common platform for testing. Since 2002, State and university laboratories have been added to the NAHLN to assist with chronic wasting disease, scrapie, and END testing. By the end of 2005, the NAHLN encompassed 49 State and university laboratories in 41 States (fig. 31).

APHIS has provided support and various services to NAHLN State and university laboratories, including lab equipment, training in diagnostic techniques, proficiency tests, reference reagents, electronic communication-reporting tools, and fee-for-service testing. CSREES has proposed continued and increased merit-based infrastructure funding for the network. State and university laboratories have enhanced laboratory biosecurity and physical security, collaborated in the design of reporting and emergency tools, and, with facilitation from the AAVLD, improved laboratory quality assurance.

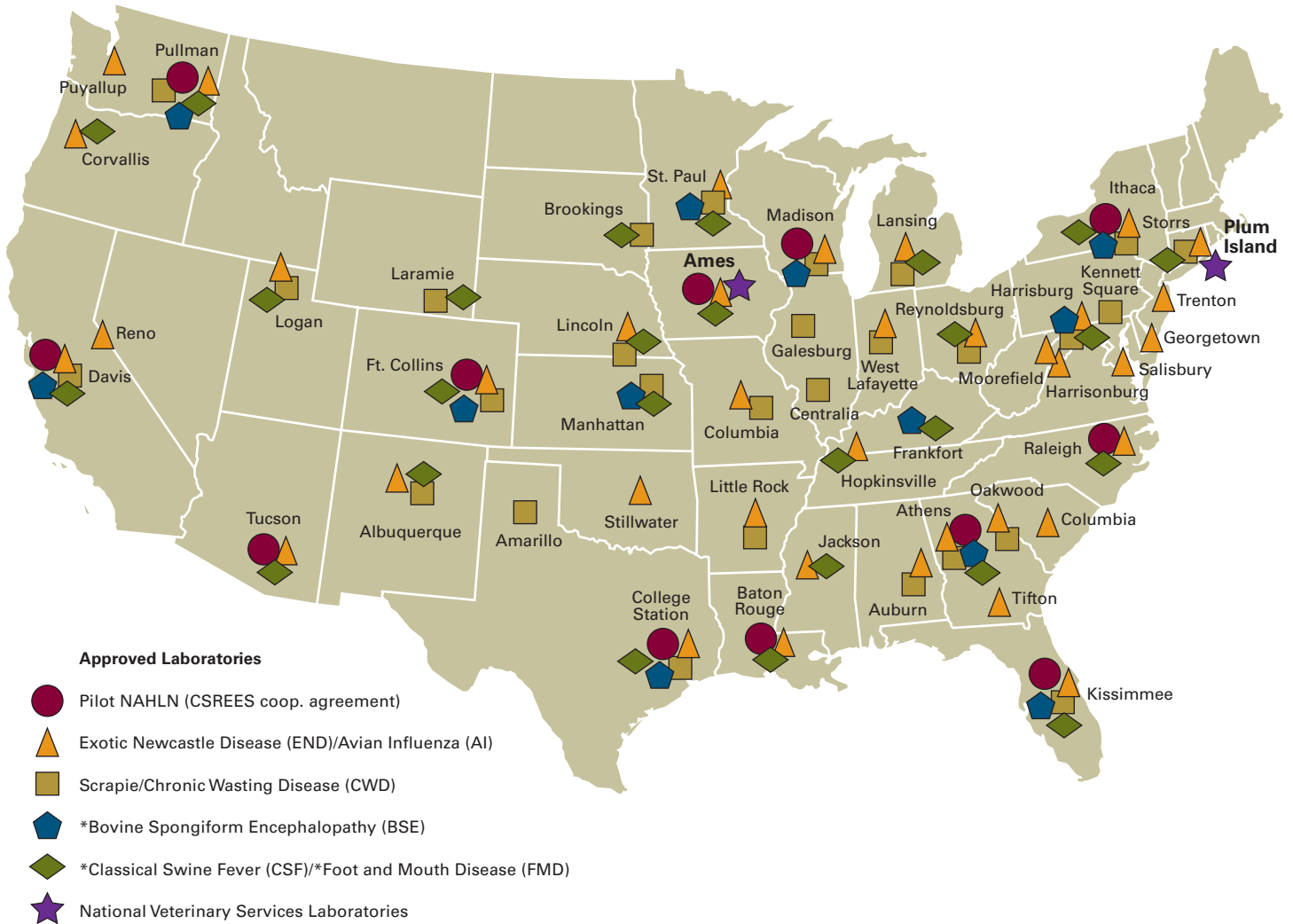
### NAHLN Achievements in 2005

A “Train the Trainer” program has been developed and implemented to train NAHLN personnel to conduct, and then provide training for, the FMD and CSF rapid assays. In April and May 2005, classes were provided at four NAHLN laboratories (Davis, CA; Athens, GA; College Station, TX; and Madison, WI). Twenty-eight participants completed the course and were proficiency tested in June 2005 to assess their ability to perform the real-time PCRs for CSF and FMD. Those passing the proficiency test have provided training to others in their laboratories. This program has increased the number of laboratories trained to conduct the CSF and FMD assays from 14 to 29 and has increased the number of certified individuals from 24 to over 100.

APHIS and its NAHLN partners can now test up to 10,000 samples per week for bovine spongiform encephalopathy; 4,800 samples per week for chronic wasting disease; and 4,800 samples per week for scrapie. AI and END surveillance programs using the NAHLN have been developed and implemented in 39 laboratories with the capacity to test 18,000 samples each day.

FIGURE 31: **NAHLN network.**

February 2006



\*For specified agents, not all laboratories are currently participating in surveillance testing.



## CHAPTER 6

# Animal Disease Status and Trade

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### Background

Foreign Animal Disease (FAD) outbreaks can have a profound impact on U.S. trade markets. For example, when some U.S. export markets were closed to U.S. beef and ruminant products due to restrictions implemented because of bovine spongiform encephalopathy (BSE), and when additional markets were closed because of restrictions implemented because of avian influenza (AI), U.S. exports of livestock, poultry, and their products fell approximately 15 percent (from \$12.2 billion in 2003 to \$10.4 billion in 2004). Guidelines issued by the World Organization for Animal Health (OIE) have been instrumental in reopening these markets.

The OIE is recognized by the World Trade Organization (WTO) as the international standards-setting body for developing health-related standards, guidelines, and recommendations for animal health worldwide. By focusing on OIE guidelines, the U.S. Department of Agriculture's (USDA) Animal Plant and Health Inspection Service (APHIS) and Foreign Agricultural Service (FAS) worked with many partners to facilitate trade of certain products—such as boneless beef, milk and milk products, hides and skins, semen, and embryos—as safe despite current U.S. BSE status. Adhering strictly to OIE guidelines was equally important in regaining poultry markets lost in the wake of the 2004 detection of high-pathogenicity AI (HPAI) in the United States because many countries initially imposed restrictions that exceeded those supported by OIE guidelines.

### Import Regionalization

#### Background

Before a foreign country is allowed to export most live animals or unprocessed animal-origin commodities to the United States, Veterinary Services (VS) personnel carefully evaluate the animal-disease status of the exporting country and the risk of introducing FADs into the United States. This evaluation is often referred to as a regionalization process. This process provides a systematic method for evaluating the likelihood of whether an exporting country, a specific region within the country, or a region consisting of several countries present a danger of introducing FADs into the United States through trade. The presence of an FAD in an exporting country does not necessarily preclude trade with that country if the country employs effective regionalization controls among its own regions or processes its products in a manner known to inactivate the FAD agent of concern. Before a market is opened, APHIS specialists evaluate the country according to regionalization criteria defined in Title 9 Code of Federal Regulations (CFR), Part 92.2, conduct a risk assessment, and define suitable mitigation measures based on the risk. If the risk of introducing an FAD through importation is determined to be sufficiently low, then VS initiates a rulemaking process that defines the appropriate mitigations and culminates in trade of the animals or products.



## Initiation of the Regionalization Process

The regionalization process begins when the Deputy Administrator in charge of APHIS' VS receives a request from the chief veterinary officer of a foreign government seeking authorization to export animals, unprocessed animal products, or both to the United States. The request may refer to the entire country or region or may define subregions within the larger region. The request must be accompanied by information addressing the 11 risk factors defined in Title 9 Code of Federal Regulations (CFR), Part 92.2, as they pertain to each subregion under consideration. These risk factors are

- Authority, organization, and infrastructure of the veterinary services organization in the region;
- Disease status of the region;
- Status of adjacent regions with respect to the agent;
- Extent of an active disease-control program;
- Vaccination status of the region;
- Degree to which the region is separated from adjacent regions of higher risk through physical or other barriers;
- Extent to which movement of animals and animal products is controlled from regions of higher risk and the level of biosecurity regarding such movements;
- Livestock demographics and marketing practices in the region;
- Type and extent of disease surveillance in the region;
- Diagnostic laboratory capabilities; and
- Policies and infrastructure for animal disease control in the region (e.g., emergency response capacity).

VS published its new approach to regionalization in the "regionalization rule and policy statement" (APHIS Policy Regarding Importation of Animals and Animal Products. 62 Federal Register 56027–56033, October 28, 1997). The rule stated that regionalization requests would be considered on a region-by-region and commodity-by-commodity basis (Importation of Animals and Animal Products. 62 Federal Register 56000–56026, October 28, 1997). VS also made a commitment to stakeholders to provide guidance regarding its approach. These procedures are explained in more detail in the document "Process for Foreign Animal Disease Status Evaluations, Regionalization, Risk Analysis and Rulemaking," available at <<http://www.aphis.usda.gov/vs/ncie/reg-request.html>>.

The regionalization policy states that the United States will recognize the animal health status of (1) regions within countries or (2) regions composed of groups of countries rather than recognizing only regions defined by national boundaries, as the United States has done in the past.

## Data Evaluation Process

The regionalization request and supporting data are forwarded to Regionalization Evaluation Services–Import (RESI), National Center for Import and Export (NCIE). NCIE is the VS unit with primary responsibility for international trade issues. These responsibilities include issuing import permits for animals and animal products, participating in negotiations with foreign governments on provisions for animal-health certificates for animals and animal products, providing a liaison with OIE. RESI is responsible primarily for coordinating the evaluation of animal health status with the import risk analyses for regionalization requests. Case managers coordinate responses to individual requests and serve as primary contact for the requesting countries.

After receiving the initial information, the case manager assembles a review team. Team members are drawn from various sources to obtain a wide range of technical expertise and program representation. Sources include

APHIS' International Services (IS) unit, VS' Centers for Epidemiology and Animal Health and National Veterinary Services Laboratories, and other program staff as appropriate. The team includes individuals with technical expertise on the disease, commodity, and the country making the request.

Team members evaluate submitted information and provide comments to the case manager based on the evaluation and application of the 11 risk factors. Comments (1) address issues related to the risk of exporting disease agents to the United States, (2) identify both the strengths and weaknesses of the requesting country's veterinary system, and (3) identify and define gaps in the information.

The case manager synthesizes the team comments and coordinates an official response to the designated contact in the requesting country. Often, the initial response amounts to a request for additional information.

### **Verification Through Site Visits**

Once the initial review team deems the submitted information sufficient to justify proceeding with the evaluation, a site visit is planned to verify and complement the information provided and review local conditions. The team visits the site prior to completing the risk assessment. When possible, the site-visit team includes members of the initial review team. In addition, when the request is submitted simultaneously to Mexico, Canada, and the United States, the team may include veterinary officials from all three countries. A representative from the office of a State Veterinarian also participates.

### **Risk Assessments**

Risk assessments are conducted using information provided by the requesting country, scientific literature, and information gathered during the site visit. The assessment can be either quantitative or qualitative and is compatible with the general guidelines provided by OIE (Terrestrial Animal Health Code, Part 1, Chapter 1.3.2).

The choice of approach depends on the nature of the request. In this regard, VS historically has conducted qualitative assessments when evaluating a country or region for a particular disease-free status and in many cases for commodity assessments. The qualitative approach is often more appropriate when data are inadequate for numerical evaluation or risk calculations would imply false precision. When appropriate data are available and the situation lends itself to numerical evaluation, the qualitative assessment may be further supported by a quantitative assessment. For example, VS has developed a quantitative model to assess the risk of

introducing foot-and-mouth disease (FMD) virus in beef from countries that practice vaccination. The practice of vaccination in a region may mask the active presence of a given disease, and so the quantitative assessment incorporates the influence of vaccination. However, the assessment is conducted against the background of a satisfactory result from an 11-factor qualitative analysis.

### **Rulemaking**

Once a risk assessment is complete, the rulemaking process begins. This process is coordinated by the Regulatory Analysis and Development branch of APHIS' Policy and Program Development unit. The draft rule undergoes legal and policy reviews within APHIS, other USDA offices, and, occasionally, external groups such as the Food and Drug Administration (FDA) and the Office of the U.S. Trade Representative. A proposed rule is published for public comment, and APHIS personnel consider those comments in the next part of the rulemaking process. As part of U.S. obligations under the WTO–Sanitary and Phytosanitary Measures (SPS) agreement, the WTO is notified of all proposed rules that may affect trade to allow U.S. trading partners the opportunity to comment prior to implementation. However, if there is a need to implement an emergency SPS measure to prevent the transmission of a disease or pest from a foreign country, the United States may notify the WTO after implementation.

A proposed rule's provisions usually are implemented by a final rule in which APHIS' analysis of the public comments is presented and the content of the comments is addressed. For a more detailed description of the process, visit the VS–NCIE Web site: <<http://www.aphis.usda.gov/vs/ncie/country.html>>.

### **Export (Domestic)**

VS is responsible for certifying that animals, animal germplasm, and many animal products exported from the United States meet the animal health requirements of the importing country, including freedom from specific diseases. VS' ability to certify exports is sometimes dependent on the regionalization or zoning of the United States with respect to the animal health status of different geographic areas. Trading partners concerned about animal diseases in the United States often request detailed reports on the occurrence and distribution of a specific disease, including results of epidemiologic investigations, control and surveillance measures in place, laboratory testing methods, quarantine procedures, veterinary infrastructure at the Federal and State level, and regionalization of the disease to defined areas.

The Domestic Regionalization Staff, a unit within the NCIE, has as its mission to gather, analyze, and interpret data relating to specific diseases and to identify epidemiologic, environmental, ecologic, geographic, and other factors associated with the animal health status of regions within the United States. At the request of importing countries seeking information about a specific disease, or proactively in the event of an animal-disease occurrence, the Domestic Regionalization Staff develops information packages describing the veterinary infrastructure of the United States. These packages document surveillance activities, diagnostic procedures, biosecurity measures, and control and eradication efforts for diseases that impact trade.

Table 15 lists the affected commodities and the importing countries for which animal-disease-related issues threatened the continuation of U.S. exports during 2005. Concerns about AI and BSE dominate the list. The information packages prepared by the Domestic Regionalization staff as well as additional efforts of APHIS' VS and IS units and USDA's FAS contributed to "retaining," or continuing, the flow of U.S. exports when disease-related issues were raised by importing countries.

TABLE 15. **Commodities and countries included in disease-related trade issues addressed during 2005**

Commodity	Importing country
Aquaculture (finfish and mollusks)	European Union
Beef and beef products	Chile, Colombia, Egypt, Israel, Hong Kong, Jamaica, Japan, Jordan, Kuwait, Lebanon, Oman, Panama, Peru, Philippines, Romania, St. Lucia, St. Vincent, Singapore, Taiwan, Thailand, United Arab Emirates, Vietnam
Bovine semen and embryos	China, Colombia, European Union, Peru
Bovine serum products	Taiwan
Feeder cattle	Canada
Eggs	Russia, Singapore
Pet food	India, Turkey
Poultry and poultry products	Argentina, China, Costa Rica, Cuba, Hong Kong, India, Indonesia, Israel, Japan, Jordan, Kazakhstan, Kenya, Korea, Kosovo, Kyrgyzstan, Lebanon, Macedonia, Mexico, New Caledonia, Nicaragua, Peru, Qatar, Russia, Singapore, Sri Lanka, Taiwan, Thailand, Ukraine, United Arab Emirates, Uruguay
Rendered fats	Russia
Ruminant and ruminant products	Guatemala
Swine products	India, Taiwan

## Trade Rules in 2005

Add Argentina to the List of Regions Considered Free of Exotic Newcastle Disease.

Proposed rule published: August 23, 2005

Federal Register, Vol. 70, No. 162, p. 49200–49207

Importation of Swine and Swine Products from the European Union [Rule proposed new approach, recognizing much of the European Commission CSF regionalization decisions in the 15 original EU Member States.]

Proposed rule published: April 8, 2005

Federal Register, Vol. 70, No. 67, p. 17928–17940

Notice of Availability of Draft Document Concerning the Identification of EU Administrative Unit

Notice published: April 21, 2005

Federal Register, Vol. 70, No. 76, p. 20733–20734

[This was notice that a draft document was available for public comment.]

Notice of Availability of a Risk Analysis Evaluating the Exotic Newcastle Disease Status of Denmark

Notice published: May 5, 2005

Federal Register, Vol. 70, No. 86, p. 23809–23810

Notice of Availability of a Document Concerning the Identification of EU Administrative Units

Notice published: July 29, 2005

Federal Register, Vol. 70, No. 145, p. 43838–43839

[This was notice that the administrative units defined previously could now be considered final and effective.]

Classical Swine Fever Status of Mexican States of Campeche, Quintana Roo, Sonora, and Yucatan

Final rule published: March 28, 2005, effective April 12, 2005

Importation of Whole Cuts of Boneless Beef from Japan

Proposed rule published: August 18, 2005

Federal Register, Vol. 70, p. 48494–48500

Bovine Spongiform Encephalopathy: Minimal-Risk Regions and Importation of Commodities

Final rule and notice: January 4, 2005

Federal Register, Vol. 70, No. 2, p. 459–553

## U.S. Export Certification Procedures

### Overview

VS oversees the export of live animals, their germplasm (including embryos and semen), and also many animal products. VS' export functions include inspections of live animals and products at ports, inspection of export isolation facilities, and certification of live animals, veterinary biologics, and animal products intended for export.

VS also negotiates export protocols with foreign countries for the exportation of U.S. live animals and animal products. APHIS' International Regulation Retrieval System (IREGS) compiles information on foreign country requirements. This information is available online at

- <http://www.aphis.usda.gov/NCIE/iregs/products> (for animal products), and
- <http://www.aphis.usda.gov/NCIE/iregs/animals> (for live animals).

U.S. exporters can and should verify that the foreign country's import requirements listed in the IREGS system are current by contacting their State's VS area office at:

- [http://www.aphis.usda.gov/vs/area\\_offices.htm](http://www.aphis.usda.gov/vs/area_offices.htm), and
- The FAS officer located at the U.S. Embassy in the importing country (see [http://www.fas.usda.gov/scripts/sw/fasfield/ovs\\_directory\\_search.asp](http://www.fas.usda.gov/scripts/sw/fasfield/ovs_directory_search.asp).)

Exporters should also consult the Food and Agricultural Import Regulations and Standards reports issued by FAS for more than 60 countries, found on the Web at:

- [http://www.fas.usda.gov/itp/ofsts/fairs\\_by\\_country.asp](http://www.fas.usda.gov/itp/ofsts/fairs_by_country.asp).

For live-animal shipments, a veterinarian accredited by VS conducts required tests and prepares an export health certificate. For animal-product shipments, company officials complete the required export documents. Then the documents are forwarded to the VS area office for review and certification by either the Area Veterinarian-in-Charge or the export veterinary medical officer. However, if the exporter cannot meet all of the importing country's requirements, VS may contact the country's import officials in an attempt to clarify the protocols in question. If a failure to clear customs is due to a new or changed inspection procedure or standard, the exporter is encouraged to contact APHIS–IS or USDA–FAS field officers for the respective country (see [http://www.fas.usda.gov/scripts/sw/fasfield/ovs\\_directory\\_search.asp](http://www.fas.usda.gov/scripts/sw/fasfield/ovs_directory_search.asp).)



VS also provides technical support when an exported U.S. product is detained at a foreign port. IS officials stationed overseas and FAS officers attempt to verify why the product is being detained to determine what, if anything, can be done to facilitate the shipment and to assist the exporter in obtaining any necessary documentation. Usually the matter is resolved and a waiver issued, allowing the shipment to be released to the importer. In some cases, however, the shipment is returned to the United States or destroyed and disposed of overseas.

### **Export Health Certificates and Health Statements**

Generally, export certificates are issued by the VS Area Office nearest the exporter. Staff at those offices undergo training to ensure consistency in the certification process and to make certain that the import protocols of foreign countries are understood and followed.

VS issues export certificates for many types of products. Normally, certification statements cover issues of particular animal species or diseases. For instance, a statement may document that the United States is free of FMD. Statements also may include limited remarks about if and how a product was processed to eliminate microorganisms of concern to the importing country.

Embryos, semen, cattle, horses, bison, cervids, sheep, goats, swine, poultry, and pet birds fall under USDA export protocols. Established requirements must be met to export these animals and animal products (see Title 9 Code of Federal Regulations [CFR], Part 91). Except for animals transported by land to Canada and Mexico, cattle, horses, bison, cervids, sheep, goats, and swine must be exported from the United States via an approved port and be accompanied by an export health certificate. In addition, these animals must be transported to the port in vehicles that have been cleaned and disinfected according to APHIS regulations. If for any reason the animals have to be unloaded while en route to the port, unloading must be done under APHIS supervision at cleaned and disinfected facilities approved by VS to ensure that the animals are not exposed to any infectious agents. At the port, animals must enter an approved export inspection facility and remain there for at least 5 hours. While at the export inspection facility, and within 24 hours of export, all animals are inspected by an APHIS veterinarian.

Export health certificates for livestock and poultry must be issued by an accredited veterinarian. Certificates identify each individual animal and include species, breed, sex, age, and, if applicable, breed registration name and number, tag number, tattoo markings, or other natural or acquired markings. The certificate also must state that the animals were inspected and declared healthy. All test results and certification statements required by the importing country must be listed in the export health certificate, and the certificate must be endorsed by an authorized APHIS veterinarian.

When requested, APHIS also provides certification for dogs, cats, and laboratory animals leaving the country. Pertinent regulations appear in 9 CFR 91. VS helps exporters meet the receiving country's import requirements and certifies that the exporter has done so. These export health certificates can be issued by a licensed veterinarian unless the importing country requires specifically that an accredited veterinarian issue the certificates. These certifications also must include proper identification of the animals and animal products in question and must contain testing results and certification statements as required by the importing country.

Many countries require both public-health and animal-health statements before a product is imported. U.S. agencies work together to facilitate this process when jurisdictions overlap. USDA's Agricultural Marketing Service certifies many different types of dairy products and table eggs. USDA's Food Safety and Inspection Service (FSIS) inspects meats, meat products, poultry, poultry products, and different types of egg products intended for human consumption. Again, VS approves the animal-health statements and then FSIS certifies inspected products for export. The FDA and/or the States certify most other types of food for compliance with their laws. The U.S. Department of the Interior's U.S. Fish and Wildlife Service certifies some wild animals and wild-animal products. The U.S. Department of Commerce's National Marine Fisheries Service provides certification for fish meal and some aquaculture and seafood products; FDA and USDA-APHIS certify other aquaculture products.



## Biologics and Diagnostics

VS' Center for Veterinary Biologics (CVB) issues Certificates of Licensing and Inspection to biologics manufacturers as an aid to foreign product registration. These certificates confirm that manufacturers are licensed with USDA under the Virus–Serum–Toxin Act, that facilities and products have been inspected by USDA, and that there are no restrictions on the distribution of the manufacturers' products.

CVB licensed two new diagnostic test kits in 2005 with improved ability to detect piroplasmosis in horses. These kits are used as part of an overall testing strategy to ensure that only noninfected horses are imported into the United States. Additionally, CVB specialists reviewed and approved more than 300 export certificates for biologics in 2005, supporting the export of individual serials of product. In 2005, CVB reviewed and approved 2,400 certificates of licensing, facilitating the registration of these U.S.-manufactured veterinary biologics products in more than 50 countries.

CVB partners with IS and the NCIE to facilitate the exportation of veterinary biologics. Foreign governments, in response to the United States' BSE case, restricted importation of U.S.-manufactured veterinary biologics. The CVB Trade Issues Resolution Manager worked with foreign regulators, providing information and participating in onsite audits of licensed U.S. manufacturers. This interaction played a significant role in reducing the trade restrictions imposed.



## CHAPTER 7

# Animal Health Events in 2005

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This chapter documents important animal-health events that occurred in the United States in 2005, including the bovine spongiform encephalopathy (BSE) case in Texas; the animal component of the U.S. hurricane response; and incidents of vesicular stomatitis virus, anthrax, bluetongue, and equine herpesvirus.

### Texas BSE Case

On June 24, 2005, the U.S. Department of Agriculture (USDA) announced that the Veterinary Laboratories Agency in Weybridge, England, confirmed that a sample from an animal that did not enter the food supply in November 2004 had tested positive for BSE. Of the more than 375,000 animals USDA tested to that point as part of its enhanced BSE surveillance program, 3 animals tested inconclusive and were subsequently subjected to immunohistochemistry, or IHC, testing.

USDA's Office of Inspector General—which had been partnering with the Animal and Plant Health Inspection Service (APHIS), the Food Safety and Inspection Service, and the Agricultural Research Service by impartially reviewing BSE-related activities and making recommendations for improvement—recommended that all three samples be subjected to a second internationally recognized confirmatory test, the World Trade Organization-recognized SAF immunoblot test, often referred to as the Western blot test. Two of the samples

were negative, and the third, which was reactive, was sent to the Weybridge lab for further confirmatory testing.

USDA's investigation determined that the positive animal, known as the index animal, was born and raised on a ranch in Texas. It was a cream-colored Brahma cross approximately 12 years old at the time of death. It was born prior to the implementation of the 1997 feed ban instituted by the Food and Drug Administration (FDA) to help minimize the risk that a cow might consume feed contaminated with the agent thought to cause BSE. The animal was sold through a livestock sale in November 2004 and transported to a packing plant. The animal was dead upon arrival at the packing plant and was then shipped to a pet-food plant, where it was sampled for BSE. The plant did not use the animal in its product, and the carcass was destroyed in November 2004.

During the course of the investigation, USDA removed and tested 67 “animals of interest” from the farm where the index animal's herd originated. Test results were negative for BSE for all 67. Two hundred adult animals of interest were determined to have left the index farm. Of these 200, APHIS officials determined that 143 had gone to slaughter, 2 were found alive (1 was determined not to be of interest because of its age, and the other tested negative), 34 were presumed dead, 1 was known dead, and 20 were classified as untraceable. In addition to the adult animals, APHIS traced two calves born to the index animal. Due to recordkeeping and identification issues,

APHIS had to trace 213 calves. Of these 213 calves, 208 entered feeding and slaughter channels, 4 were presumed to have entered feeding and slaughter channels, and 1 calf was untraceable.

To determine whether contaminated feed could have played a role in the index animal's infection, the FDA and the Texas Feed and Fertilizer Control Service conducted a feed investigation with two main objectives: (1) to identify all protein sources in the animal's feed history that could potentially have been the source of the BSE agent, and (2) to verify that cattle leaving the herd after 1997 were identified by USDA as animals of interest and were rendered in compliance with the 1997 BSE/ruminant feed rule.

The feed history investigation identified 21 feeds or feed supplements that were used on the farm since 1990. These feed ingredients were purchased from three retail feed stores and were manufactured at nine feed mills. This investigation found that no feed or feed supplements used on the farm since 1997 were formulated to contain prohibited mammalian protein.

The FDA investigation into the disposition of herdsmates from this farm involved visits to nine slaughter plants and eight rendering plants. The investigation found that all of the rendering plants were operating in compliance with the BSE/ruminant feed rule. A review of the inspection history of each of these rendering firms found no violations of the FDA feed-ban rule.

## **Hurricane Response (Animal Health Component)**

APHIS was presented with unique animal-health and -welfare challenges in Louisiana and Mississippi following back-to-back hurricanes in the gulf region in 2005. The aquaculture, cattle, dairy, and poultry industries experienced significant management hardships due to storm damage, loss of power, and negative economic impacts from market losses in New Orleans and on the Mississippi gulf coast. After each hurricane, town hall meetings were held with owners of dairy and cattle operations to assess their needs that would ensure continued operations, including fencing, generators, hay, and medicine. APHIS, as well as the American Veterinary Medical Association and the veterinary medical associations within the affected States, also assisted the State and veterinary medical-assistance teams in efforts to reestablish veterinary clinics that were not operational.

Nearly 50 APHIS veterinarians, wildlife specialists, and other experts worked with the States, veterinary medical-assistance teams, The Humane Society of the United States, and other animal-rescue groups to rescue, shelter, and feed displaced and vulnerable livestock, companion animals, and research animals in Louisiana and Mississippi. More than 11,000 small animals and nearly 3,000 large animals were recovered and supported from storm-ravaged areas of Louisiana and Mississippi.

The first animal rescue as part of the Federal-State response in Louisiana was the removal of 64 horses found stranded in a stable next to the New Orleans airport. APHIS also helped rescue 2,300 head of cattle in Cameron Parish, one of the parishes hit hardest by Hurricane Rita, using specialized machines, airboats, and pontoons.

Research primates, rabbits, dogs, cats, and transgenic mice were rescued from Tulane Medical Center and Louisiana State University Health Science Center. Eight sick and distressed dolphins that had been swept out of an aquarium into the Mississippi Sound were recovered, cared for, and relocated. Of the 9,000 poultry houses in Mississippi, approximately 2,400 sustained damage, and 300 were devastated. APHIS assisted in carcass disposal efforts with the cooperation of USDA's Natural Resources Conservation Service and the Army Corps of Engineers.

## **Vesicular Stomatitis**

Vesicular stomatitis is a disease that primarily affects cattle, horses, and swine, and occasionally sheep and goats. Humans can be exposed to the virus when handling affected animals but rarely become infected.

In affected livestock, vesicular stomatitis causes blisterlike lesions in the mouth and on the dental pad, tongue, lips, nostrils, hooves, and teats. Animals usually recover within 2 weeks. While vesicular stomatitis can cause economic losses to livestock producers, it is a particularly important disease because its outward signs are similar to—although generally less severe than—those of foot-and-mouth disease, a foreign animal disease of cloven-hoofed animals that was eradicated from the United States in 1929. The clinical signs of vesicular stomatitis are also similar to those of swine vesicular disease, another foreign animal disease. The only way to distinguish among these diseases is through laboratory tests.

The mechanisms by which vesicular stomatitis spreads are not fully known; insect vectors, mechanical transmission, and movement of animals are probably responsible. Once introduced into a herd, the disease apparently moves from animal to animal by contact or exposure to saliva or fluid from ruptured lesions.

Historically, outbreaks of vesicular stomatitis in domestic livestock occur in the southwestern United States during warm months and particularly along riverways. However, outbreaks are sporadic and unpredictable. In 2005, nine States reported quarantined vesicular stomatitis premises (Arizona, Colorado, Idaho, Montana, Nebraska, New Mexico, Texas, Utah, and Wyoming) (table 16).

Control of vesicular stomatitis spread occurs via State quarantine of affected premises and control of movement of animals from affected areas. Insect control also helps prevent occurrences of the disease on the premises. Because vesicular stomatitis occurs randomly, accredited and regulatory veterinarians and producers strive to detect the disease quickly, quarantine affected premises and animals, and control future outbreaks.

## Anthrax

Cases of anthrax, caused by the spore-forming bacterium *Bacillus anthracis*, occurred in unusual numbers and locations in the United States during 2005. Although anthrax cases are reported almost every year, North Dakota and South Dakota both experienced relatively high numbers of cases in 2005, and Texas reported the disease in a county that had not had a confirmed case for 20 years.

Information available from the North Dakota Department of Agriculture indicates that more than 100 cases of anthrax occurred, involving 16 counties in the eastern half of the State. Most of the affected animals were cattle, with some cases occurring in horses, bison, farmed cervids, sheep, and llamas. Herds with infected animals were quarantined, and animals were vaccinated. Heavy rains early in the summer might have created conditions conducive to increased exposure of animals to the bacterium.

In South Dakota, more than 50 cases of anthrax were confirmed, resulting in the deaths of hundreds of animals in the northeastern and central parts of the State.

According to the South Dakota Animal Industry Board, in 1 instance nearly 300 unvaccinated bison and rodeo bulls were exposed to the anthrax bacterium, and almost 40 animals died. The remaining animals in the pasture were treated with antimicrobials and vaccinated.

In Texas, confirmed cases of anthrax occurred in horses, deer, and cattle. Although anthrax cases occur almost every year in the southwestern region of the State, the cases in 2005 occurred in the west-central part of the State in a county that had not reported a case for 2 decades.

TABLE 16. **Vesicular stomatitis outbreaks**

	2005	2004
States affected	9	3
Positive premises quarantined	445	294
Animals found positive	786	470
Bovine	202	63
Equine	584	405
Ovine	0	0
Llamas	0	2

Anthrax spores are extremely resistant and can remain viable in the soil for many decades. Outbreaks in grazing animals tend to occur after extreme weather conditions. Drought or severely wet conditions can force buried spores to the surface, where they can easily be ingested by grazing animals. Vaccination effectively prevents anthrax in livestock, and antibiotics may be effective in treating exposed animals if administered very soon after exposure.

Anthrax is a notifiable disease in the United States, so occurrences must be reported to State health authorities.

## Bluetongue Serotype 1 in Louisiana

Bluetongue is a noncontagious, infectious disease of sheep and wild ruminants. Cattle are generally asymptotically infected and considered an amplifying host of the causative agent, bluetongue virus (BTV). In the United States, the principal BTV vector is *Culicoides sonorensis*, except in Florida, where *C. insignis* is also present and a factor in BTV transmission. Of the 24 types of BTV that are recognized globally, 5 are considered endemic in the United States: BTV-2, BTV-10, BTV-11, BTV-13, and BTV-17.

BTV-1 was isolated from a deer in St. Mary Parish, LA, in fall 2004. BTV-1 had not previously been identified in the United States, although it had been recognized in the Caribbean. Like BTV-2, *C. insignis* is a competent vector for BTV-1. The introduction of BTV-1 into the gulf coast region of the United States could have occurred as a result of wind-borne vectors, particularly in light of the numerous hurricanes and tropical storms that occurred in 2004.



In spring 2005, a total of 549 domestic ruminants in St. Mary Parish were sampled and tested for evidence of exposure to BTV-1. The group included 460 cattle, 47 sheep, and 42 goats. None of the animals was reported to have a history of illness associated with BTV, and none had been vaccinated against BTV.

Serum was screened by competitive enzyme-linked immunosorbent assay (cELISA) for antibodies to any BT serotype. Sixty-one samples (11 percent) tested positive in the screening cELISA. The cELISA-positive samples were examined further in virus neutralization (VN) assays to detect neutralizing antibodies to BTV-1 and BTV-2. Among the 24 BT serotypes, BTV-1 is most closely related to BTV-2. Of the 61 samples tested by VN, 20 demonstrated detectable neutralizing antibodies to BTV-1. Of these, six animals (five cattle, one sheep) had significantly higher titers to BTV-1 compared to BTV-2. Presence of BTV-1-specific antibody titers in the serum from the six animals is evidence of a prior exposure to BTV-1. Additional studies of domestic and wild ruminants as well as *Culicoides* spp. are in progress. These studies will continue to investigate whether BTV-1 has become established in the study area.

### Equine Herpesvirus Type 1 (EHV-1)

Although chiefly a respiratory pathogen, EHV-1 is associated with a variety of clinical manifestations in equids, including abortion and paralysis. The virus is enzootic throughout the world, and almost all horses over 2 years of age have been exposed. After an equid's initial exposure, EHV-1 can cause a latent infection, which provides a reservoir of virus for continual transmission. Nationally, reports of neurologic EHV-1 have increased in recent years, which might be attributable in part to a strain of virus that encodes for a particularly robust replicase enzyme. This strain of virus can reproduce rapidly and has a predilection for the blood vessels of tissue of the nervous system.

During 2005 and early 2006, seven episodes of neurological EHV-1 in the United States were reported by State animal health officials. Five of the disease events involved racing venues in Kentucky, Michigan, Pennsylvania, and Maryland, and two occurred in boarding facilities in New York and Maryland.

- Starting in December 2004 and continuing through February 2005, an outbreak of neurologic EHV-1 occurred at the Northville Downs Standardbred racetrack in Michigan. Of four horses considered affected, three were euthanized. Additional information

indicated that 12 horses with contact to the case horses were vaccinated against EHV-1 in December 2004 as a precautionary measure.

- In February 2005, a mare at the Meadows racetrack in Pennsylvania was euthanized after being diagnosed with neurologic EHV-1.
- During March 2005, 10 cases of EHV-1 paralysis were reported from the Columbia Horse Center in Columbia, MD. Five animals either died or were euthanized due to complications of their clinical conditions.
- In early March 2005, three horses at a boarding facility in Tioga County, NY, died or were euthanized after being diagnosed with a combination of neurologic and respiratory forms of EHV-1 infection. Three additional horses that showed clinical signs consistent with EHV-1 infection fully recovered.
- Another outbreak of EHV-1 neurological disease began in May 2005 at Churchill Downs in Louisville, KY. Two horses housed in separate barns were euthanized after they developed progressive paralytic disease associated with EHV-1 infection. Movement restrictions were placed on 3 barns, but the outbreak was mainly confined to 1 stable, where 9 of 37 horses developed signs consistent with neurologic EHV-1. For this outbreak, a relatively new nested polymerase chain reaction (PCR) assay for detecting viral deoxyribonucleic acid (DNA) was used to determine the extent of viral spread and to help manage the outbreak. By mid-June, the quarantine on all three barns was lifted following a period of 27 days without evidence of clinical disease.
- In December 2005, a 3-year-old filly at Turfway Park in Florence, KY, developed progressive rear-limb ataxia. Following confirmation of EHV-1 infection, regulatory and testing measures were instituted for exposed animals at the racetrack. The investigation documented the occurrence of EHV-1 in horses housed in three barns at Turfway Park and an additional training facility in Henderson, KY. During the investigation, more than 132 horses considered at risk were tested using the nested PCR assay for EHV-1. Of these, positive test results were obtained on buffy coat specimens for approximately 42 animals. Of three horses diagnosed with the neurologic form of EHV-1, two were euthanized.

In all instances, regulatory authorities used movement controls and a variety of biosecurity measures to prevent viral spread. In some cases, races were cancelled because of continuing transmission of virus within the exposed population and insufficient numbers of nonexposed horses to compete. Overall, use of a quarantine period of at least 21 days appeared to prevent further spread of virus; however, in most of these situations, the criteria used to determine the beginning timeframe were not defined.

From a regulatory perspective, State agencies vary in their requirements for veterinary practitioners to report cases of EHV-1 to State animal health authorities. Most States encourage reporting under general regulations for reporting of communicable diseases, yet few specifically designate cases of EHV-1 as a reportable disease. With the exceptions of required statements of disease-free status of horses intended for export and of the condition for States to participate in the National Animal Health Reporting System, there is no federally mandated reporting of disease conditions attributable to equine herpesvirus.

From a diagnostic perspective, EHV-1 is difficult to isolate, and the most commonly requested serologic tests indicate only prior exposure to viral antigen without differentiating antibody response attributable to vaccination from that associated with disease exposure. Likely, the numbers of cases of neurologic EHV-1 are underreported nationwide, and the cases that reach the attention of animal health authorities are those that occur in public venues or settings where large numbers of horses are stabled.





# Appendix 1: Statistics on Major Commodities

TABLE A1.1: **Major commodity surveys conducted by NASS**

Commodity	Month conducted	Approximate sample size	No. States
Cattle and calves	January	50,000	50
	July	10,000	50
Sheep and lambs	January	22,000	50
	July	2,800	50
Cattle on feed	Monthly	2,200 (1,000 head or more feedlot capacity)	17
Hogs and pigs	December	12,800	50
	March, June, September	10,600 each	30
Catfish	January, July	1,200 each	13
Trout	January	700	20
Livestock slaughtered	Monthly	806 federally inspected plants, 2,087 State-inspected or custom-exempt plants	50
Poultry slaughtered	Monthly	319 federally inspected plants	50
Turkeys raised	December	1,000	32
Chickens and eggs	December	900 (30,000 or more layers)	50
Broiler hatchery production	Weekly	NA	19
Honey	January	6,600	49

NA = not available.

TABLE A1.2: **Value of production for selected agricultural commodities for 2004 and 2005**

<b>Commodity</b>	<b>2004 (\$1,000)</b>	<b>Percent of total value</b>	<b>2005 (\$1,000)</b>	<b>Percent of total value</b>
Cattle	34,830,872	16.4	36,739,445	17.4
Milk from milk cows	27,567,726	13.0	26,903,822	12.8
Poultry	28,857,215	13.6	28,241,351	13.4
Swine	13,072,025	6.1	13,643,568	6.5
Catfish and trout	551,220	0.3	556,316	0.3
Sheep, including wool	441,199	0.2	482,298	0.2
Honey	196,259	0.1	157,795	0.1
<i>Total of preceding livestock and products<sup>1</sup></i>	<i>105,516,516</i>	<i>49.7</i>	<i>106,724,595</i>	<i>50.7</i>
Field and miscellaneous crops	80,671,272	38.0	76,784,412	36.4
Fruits and nuts	15,004,161	7.1	16,027,929	7.6
Commercial vegetables	11,097,062	5.2	11,086,505	5.3
<i>Total value of preceding crops</i>	<i>106,772,495</i>	<i>50.3</i>	<i>103,898,846</i>	<i>49.3</i>
<b>All commodities above</b>	<b>212,289,011</b>	<b>100.0</b>	<b>210,623,441</b>	<b>100.0</b>

<sup>1</sup> Production data for equids were not available.

TABLE A1.3: **Cattle and calves production, 2004 and 2005**

	2004	2005
<b>January 1 following-year inventory (1,000 head)</b>		
All cattle and calves	95,438	97,102
All cows	41,920	42,311
Cattle on feed	13,745	14,132
<b>Operations with cattle and calves</b>	989,460	982,510
<b>Size of operation</b>	<b>Percentage operations (percentage inventory)</b>	
1–49 head	62.5 (11.3)	62.3 (11.0)
50–99 head	16.6 (11.6)	16.7 (11.6)
100–499 head	18.0 (35.4)	18.1 (35.0)
500 or more head	2.9 (41.7)	2.9 (42.4)
<i>Total</i>	<i>100.0 (100.0)</i>	<i>100.0 (100.0)</i>
<b>Calf crop (1,000 head)</b>	37,505	37,780
<b>Deaths—cattle (1,000 head)</b>	1,711	1,718
<b>Deaths—calves (1,000 head)</b>	2,292	2,335
<b>Commercial calves slaughter (1,000 head)</b>		
Federally inspected	823	718
Other	19	17
<i>Total commercial</i>	<i>842</i>	<i>734</i>
<b>Commercial cattle slaughter (1,000 head)</b>		
Federally inspected		
Steers	16,192	16,797
Heifers	10,345	9,761
All cows	5,069	4,775
Bulls and stags	550	498
Other	573	556
<i>Total commercial</i>	<i>32,728</i>	<i>32,388</i>
<b>Farm cattle and calves slaughter (1,000 head)</b>	185	189
<b>Total cattle and calves slaughter (1,000 head)</b>	<b>33,755</b>	<b>33,311</b>
<b>Value of production (\$1,000)</b>	34,830,872	36,739,445

Source: USDA–NASS.

<sup>1</sup> May not total due to rounding.

TABLE A1.4: **Milk cow production, 2004 and 2005**

	2004		2005	
<b>January 1 following-year inventory (1,000 head)</b>				
Milk cows	9,005		9,058	
Milk replacement heifers	4,118		4,278	
<b>Operations with milk cows</b>	81,520		78,295	
<b>Size of operation</b>	<b>Percentage operations (percentage inventory)</b>			
1–29 head	29.2	(2.1)	28.7	(2.0)
30–49 head	19.0	(6.6)	19.0	(6.4)
50–99 head	29.5	(17.8)	29.6	(17.1)
100–199 head	12.8	(15.1)	12.8	(14.6)
200–499 head	5.8	(15.5)	6.0	(15.4)
500 or more head	3.7	(42.9)	3.9	(44.5)
<i>Total</i>	<i>100.0 (100.0)</i>		<i>100.0 (100.0)</i>	
<b>Cows slaughtered (1,000 head), federally inspected</b>				
Dairy cows	2,363		2,252	
Other cows	2,706		2,523	
<i>All cows</i>	<i>5,069</i>		<i>4,775</i>	
<b>Milk production</b>				
Average number of milk cows during year (1,000 head)	9,012		9,041	
Milk production per milk cow (lb)	18,967		19,576	
Milk fat per milk cow (lb)	696		716	
Percentage of fat	3.67		3.66	
Total milk production (million lb)	170,934		176,989	
<b>Value of milk produced (\$1,000)</b>	27,567,726		26,903,822	

Source: USDA–NASS.

TABLE A1.5: **Beef cow production, 2004 and 2005**

	2004	2005
<b>January 1 following-year inventory (1,000 head)</b>		
Beef cows	32,915	33,253
Beef replacement heifers	5,691	5,905
<b>Operations with beef cows</b>	<b>774,930</b>	<b>770,170</b>
<b>Size of operation</b>	<b>Percentage operations (percentage inventory)</b>	
1–49 head	77.7 (28.1)	77.5 (27.9)
50–99 head	12.3 (19.1)	12.3 (19.0)
100–499 head	9.3 (38.3)	9.5 (38.5)
500 or more head	0.7 (14.5)	0.7 (14.6)
<i>Total</i>	<i>100.0 (100.0)</i>	<i>100.0 (100.0)</i>
<b>Cows slaughtered (1,000 head), federally inspected</b>		
Dairy cows	2,363	2,252
Other cows	2,706	2,523
<i>All cows</i>	<i>5,069</i>	<i>4,775</i>

Source: USDA–NAASS.

TABLE A1.6: **Cattle-on-feed production, 2004 and 2005**

	2004	2005
<b>January 1 following-year inventory (1,000 head) for all lots</b>	<b>13,745</b>	<b>14,132</b>
<b>January 1 inventory (1,000 head) for lots 1,000+ capacity</b>		
Steers and steer calves	7,175	7,570
Heifers and heifer calves	4,046	4,147
Cows and bulls	78	87
<i>Total</i>	<i>11,299</i>	<i>11,804</i>

Feedlot capacity (head)	Number of feedlots		January 1, 2006, inventory (1,000 head)		Marketed (1,000 head)	
		%		%		%
<1,000	86,000	97.5	2,328	16.5	3,620	14.0
1,000–1,999	855	1.0	506	3.6	811	3.2
2,000–3,999	547	0.6	777	5.5	1,307	5.1
4,000–7,999	350	0.4	1,009	7.1	1,780	6.9
8,000–15,999	184	0.2	1,363	9.6	2,609	10.1
16,000–31,999	137	0.2	2,438	17.3	4,574	17.7
≥ 32,000	126	0.1	5,711	40.4	11,091	43.0
<i>All feedlots</i>	<i>88,199</i>	<i>100.0</i>	<i>14,132</i>	<i>100.0</i>	<i>25,792</i>	<i>100.0</i>

Source: USDA–NAASS.

TABLE A1.7: **Hog and pig production, 2004 and 2005**

	2004		2005	
<b>December 1 inventory (1,000 head)</b>				
Breeding	5,969		6,011	
Market	55,005		55,438	
<i>All hogs and pigs</i>	<sup>2</sup> 60,975		61,449	
<b>Operations with hogs and pigs</b>	69,500		67,330	
<b>Size of operation</b>	<b>Percentage operations (percentage inventory)</b>			
1–99 head	60.6	(1.0)	60.3	(1.0)
100–499 head	14.9	(4.0)	15.0	(4.0)
500–999 head	7.4	(6.0)	7.1	(6.0)
1,000–1,999 head	6.4	(10.0)	6.3	(10.0)
2,000–4,999 head	7.4	(26.0)	7.8	(26.0)
≥ 5,000 head	3.3	(53.0)	3.5	(53.0)
<i>Total</i>	100.0 (100.0)		100.0 (100.0)	
<b>Pig crop (1,000 head)</b>				
December–November <sup>1</sup>	102,780		103,965	
<b>Pigs per litter</b>				
December–November <sup>1</sup>	8.94		9.01	
<b>Deaths (1,000 head)</b>	7,462		7,757	
<b>Slaughter (1,000 head), federally inspected</b>				
Barrows and gilts	98,831		99,123	
Sows	3,271		3,116	
Stags and boars	259		280	
Other	1,103		1,063	
Total commercial	<sup>2</sup> 103,463		103,582	
Farm slaughter	114		109	
<i>Total slaughter</i>	103,577		<sup>2</sup> 103,691	
<b>Value of production (\$1,000)</b>	13,072,025		13,643,568	

Source: USDA–NASS.

<sup>1</sup> December of the preceding year.

<sup>2</sup> May not total due to rounding.

TABLE A1.8: **Sheep production in the United States, 2004 and 2005**

	2004	2005
<b>January 1 following-year inventory (1,000 head)</b>		
Ewes 1 year old and older	3,573	3,657
Rams 1 year old and older	190	196
All sheep and lambs	6,135	6,230
<b>Operations with sheep</b>	67,580	68,280
<b>Size of operation</b>	<b>Percentage operations (percentage inventory)<sup>1</sup></b>	
1–99 head	92.0 (30.3)	90.8 (28.7)
100–499 head	6.5 (22.0)	7.6 (24.0)
500–4,999 head	1.4 (33.5)	1.5 (33.8)
≥ 5,000	0.1 (14.2)	0.1 (13.5)
<i>Total</i>	<i>100.0 (100.0)</i>	<i>100.0 (100.0)</i>
<b>Lamb crop (1,000 head)</b>	4,096	4,125
<b>Deaths—sheep (1,000 head)</b>	215	216
<b>Deaths—lambs (1,000 head)</b>	385	384
<b>Slaughter (1,000 head), federally inspected</b>		
Mature sheep	147	129
Lambs	2,529	2,425
Other	163	143
Total commercial	2,839	<sup>2</sup> 2,698
Farm slaughter	65	65
<i>Total slaughter</i>	<i>2,904</i>	<i>2,763</i>
<b>Wool production</b>		
Sheep shorn (1,000 head)	5,073	5,072
Shorn wool production (1,000 lb)	37,622	37,232
Value of wool production (\$1,000)	29,921	26,272
<b>Value of production (\$1,000)</b>	411,278	456,026

Source: USDA–NASS.

<sup>1</sup> End-of-year survey for breeding sheep (inventory).

<sup>2</sup> May not total due to rounding.



TABLE A1.9: **Poultry production in the United States, 2004 and 2005**

	2004	2005
<b>December 1 total layers (1,000 head)</b>	343,922	347,917
Annual average number of layers (1,000 head)	341,956	343,501
Eggs per layer	261	262
Total egg production (million eggs)	89,091	89,960
<b>Number of broilers produced (1,000 head)</b>	8,740,650	8,870,350
<b>Number of chickens lost (1,000 head)</b>	100,616	92,867
<b>Number of turkeys raised (1,000 head)</b>	263,207	256,270
Young turkeys lost as a percentage of total poults placed	10.4	10.4
<b>Number slaughtered (1,000 head)</b>		
Chickens—young	8,752,436	8,853,809
Chickens—mature	143,312	146,664
<i>Chickens—total</i>	<i>8,895,748</i>	<i>9,000,473</i>
Turkeys—young	251,563	245,642
Turkeys—old	2,745	2,452
<i>Turkeys—total</i>	<i>254,308</i>	<i>248,094</i>
<i>Ducks</i>	<i>25,967</i>	<i>27,890</i>
<b>Value of production (\$1,000)</b>		
Broilers	20,446,086	20,901,939
Eggs	5,299,185	4,042,282
Turkeys	3,054,329	3,232,576
Chickens (value of sales)	57,615	64,554
<i>Total</i>	<i>28,857,215</i>	<i>28,241,351</i>

Source: USDA–NASS.

TABLE A1.10: **Equine production in the United States, 1997, 1998, and 2002**

	1997 <sup>1</sup>	1998 <sup>1</sup>	2002 <sup>2</sup>
<b>January 1 following-year inventory (1,000 head)</b>			
All equine	5,250	5,317	
On farms	3,200	NA	<sup>2</sup> 3,750
On nonfarms	2,050	NA	
<b>Number sold</b>	540	558	
<b>Value of sales (\$1,000)</b>	1,641,196	1,753,996	

<sup>1</sup> USDA–NASS (March 2, 1999).

<sup>2</sup> The 2002 Census of Agriculture reported 3,644,278 head of horses and ponies located on 542,223 farms. In addition, there were 105,358 mules, burros, and donkeys reported. The combination rounds to 3,750,000.

TABLE A1.11: **Catfish and trout production in the United States, 2004 and 2005**

	2004	2005
<b>Catfish</b>		
Number of fish on January 1, following year (1,000)		
Foodsize	344,085	327,680
Stockers	643,280	778,205
Fingerlings	654,660	1,039,415
Broodfish	1,034	1,106
Number of operations on January 1, following year	1,158	1,035
<b>Sales (\$1,000)</b>		
Foodsize	450,873	449,879
Stockers	6,260	5,994
Fingerlings	22,175	24,107
Broodfish	867	2,145
<i>Total sales</i>	<i>480,175</i>	<i>482,125</i>
<b>Trout</b>		
Number of fish sold (1,000)		
≥ 12 inches	49,591	55,501
6–12 inches	5,518	4,785
1–6 inches	5,550	7,059
Sales (\$1,000)		
≥ 12 inches	59,397	62,554
6–12 inches	5,852	5,180
1–6 inches	966	1,320
<i>Total</i>	<i>66,215</i>	<i>69,054</i>
Eggs sold		
Number of eggs (1,000)	289,620	307,472
Total value of sales (\$1,000)	4,831	5,136
Total value of fish sold plus value of eggs sold (\$1,000)	171,045	174,191
Number of operations selling trout	365	346
Number of operations selling or distributing trout, or both	592	601

Source: USDA-NASS.

<sup>1</sup> May not total due to rounding.

TABLE A1.12: **Honey production<sup>1</sup> in the United States, 2004 and 2005**

	2004	2005
<b>Honey-producing colonies (1,000)</b>	2,556	2,410
Yield per colony (lb)	71.8	72.5
Production (1,000 lb)	183,582	174,643
Stocks on December 15 (1,000 lb)	61,222	62,406
<b>Value of production (\$1,000)</b>	196,259	157,795

Source: USDA-NASS.

<sup>1</sup> For producers with five or more colonies.

TABLE A1.13: **Production data on miscellaneous livestock, 2002**

Commodity	Number of farms	Inventory	Number sold
Milk goats	22,389	290,789	113,654
Angora goats	5,075	300,753	91,037
Meat and other goats	74,980	1,938,924	1,109,619
Mules, burros, donkeys	29,936	105,358	17,385
Mink	310	1,113,941	2,506,819
Rabbits	10,073	405,241	886,841
Ducks	26,140	3,823,629	24,143,066
Geese	17,110	173,000	200,564
Pigeons	4,405	449,255	1,160,364
Pheasants	4,977	2,267,136	7,206,460
Quail	3,742	4,888,196	19,157,803
Emus	5,224	48,221	15,682
Ostriches	1,643	20,560	16,038
Bison	4,132	231,950	57,210
Deer	4,901	286,863	43,526
Elk	2,371	97,901	16,058
Llamas	16,887	144,782	18,653

Source: USDA-NASS 2002 Census of Agriculture.

TABLE A1.14: **Slaughter statistics, 2005**

Commodity	Federally inspected plants (no.)	Slaughter in federally inspected plants (1,000 head) <sup>1</sup>	Slaughter in State-inspected or custom-exempt plants (1,000 head)
Cattle	657	31,832	556
Calves	227	718	17
Hogs	630	102,519	1,063
Sheep and lambs	496	2,555	143

Source: USDA-NASS Livestock Slaughter 2005 Summary, March 2006.

<sup>1</sup> Includes data from week ending January 8 through December 31, 2005.

# Appendix 2: Tables on FAD Investigations

TABLE A2.1: **FAD Investigations by State, 2005**

AK	Alaska	3	NC	North Carolina	6
AL	Alabama	2	ND	North Dakota	1
AR	Arkansas	10	NE	Nebraska	27
AZ	Arizona	57	NH	New Hampshire	0
CA	California	25	NJ	New Jersey	11
CO	Colorado	146	NM	New Mexico	44
CT	Connecticut	4	NV	Nevada	4
DE	Delaware	0	NY	New York	2
FL	Florida	16	OH	Ohio	13
GA	Georgia	25	OK	Oklahoma	10
HI	Hawaii	2	OR	Oregon	5
IA	Iowa	8	PA	Pennsylvania	9
ID	Idaho	20	PR	Puerto Rico	11
IL	Illinois	12	RI	Rhode Island	0
IN	Indiana	4	SC	South Carolina	4
KS	Kansas	10	SD	South Dakota	7
KY	Kentucky	10	TN	Tennessee	11
LA	Louisiana	11	TX	Texas	47
MA	Massachusetts	7	UT	Utah	144
MD	Maryland	5	VA	Virginia	15
ME	Maine	1	VT	Vermont	4
MI	Michigan	6	WA	Washington	31
MN	Minnesota	6	WI	Wisconsin	11
MO	Missouri	3	WV	West Virginia	1
MS	Mississippi	9	WY	Wyoming	130
MT	Montana	45	<i>Total</i>		<i>995</i>

TABLE A2.2: **Complaints, by species disclosed in FAD investigations, 2005**

Complaints	Totals	Species	Counts
Central nervous system	41	Avian (birds)	5
		Bovine (cattle)	12
		Canine (dogs)	1
		Chicken, egg-type	2
		Chicken, meat-type	0
		Equine (e.g., horses, donkeys, mules)	11
		Feral swine	1
		Game fowl	0
		Porcine (hogs)	7
		Poultry (chickens and turkeys)	0
		Rabbit	2
		Waterfowl, exhibition poultry, and game birds	0
Diarrhea and discharge	10	Avian (birds)	1
		Bovine (cattle)	1
		Chicken, egg-type	2
		Game fowl	0
		Ovine (sheep)	1
		Porcine (hogs)	1
		Poultry (chickens and turkeys)	1
		Rabbits	2
Waterfowl, exhibition poultry, and gamebirds	1		
Epidemic abortion	0	Ovine (sheep)	0
		Porcine (hogs)	0
Hemorrhagic vessels	7	Avian (birds)	0
		Bovine (cattle)	1
		Canine (dogs)	1
		Caprine (goats)	0
		Porcine (hogs)	2
		Rabbit	3
High death rate	54	Avian (birds)	15
		Bison	0
		Bovine (cattle)	4
		Caprine (goats)	1
		Cervidae	1
		Chicken, egg-type	7
		Chicken, meat-type	2
		Crustacean	0
		Elk	0
		Equine (e.g., horses, donkeys, mules)	2
		Fish	1
		Game fowl	1
		Ovine (sheep)	1
		Porcine (hogs)	6
		Poultry (chickens and turkeys)	5
		Rabbit	5
		Turkey	1
Waterfowl, exhibition poultry, and gamebirds	2		

TABLE A2.2: **continued**

Complaints	Totals	Species	Counts
Illegal Import—surveillance	0	Avian (birds)	0
Maggots or ticks	11	Bovine (cattle)	5
		Canine (dogs)	4
		Equine (e.g., horses, donkeys, mules)	0
		Feline (cats)	1
		Reptiles	1
Positive surveillance sample	6	Avian (birds)	0
		Bovine (cattle)	3
		Crustacean	0
		Equine (e.g., horses, donkeys, mules)	3
		Fish	0
Respiratory	18	Avian (birds)	5
		Bison	0
		Bovine (cattle)	0
		Caprine (goats)	0
		Chicken, egg-type	5
		Chicken, meat-type	0
		Exotic Bovidae	0
		Porcine (hogs)	0
		Poultry (chickens and turkeys)	6
		Rabbit	2
Septicemia	2	Bovine (cattle)	1
		Equine (e.g., horses, donkeys, mules)	1
		Fish	0
		Porcine (hogs)	0
Skin other than muzzle and feet	29	Avian (birds)	1
		Bovine (cattle)	6
		Caprine (goats)	6
		Cervidae	0
		Chicken, egg-type	1
		Equine (e.g., horses, donkeys, mules)	14
		Ovine (sheep)	1
		Porcine (hogs)	0
Vesicular—skin of muzzle and feet	817	Alpaca	4
		Bison	1
		Bovine (cattle)	146
		Camelidae	0
		Caprine (goats)	37
		Cervidae	0
		Deer	0
		Equine (e.g., horses, donkeys, mules)	603
		Exotic Bovidae	0
		Marine mammals	0
		Ovine (sheep)	14
		Porcine (hogs)	12
<i>Total</i>			995

TABLE A2.3: **United States of America's status of the occurrence of OIE<sup>1</sup>-reportable diseases in 2005**

Disease	Status	Date of last occurrence/Notes
<b>Multiple-species diseases</b>		
Anthrax	Present	Sporadic/limited distribution
Aujeszky's disease	Present	Sporadic (feral)/limited distribution, national eradication program
Echinococcosis/Hydatidosis	Present	Sporadic (uncommon in all species)
Heartwater	Free	Never occurred
Leptospirosis	Present	
Q fever	Present	Sporadic
Rabies	Present	
Paratuberculosis	Present	National control program
New World screwworm	Free	1982
Old World screwworm	Free	Never occurred
Trichinellosis	Present	Sporadic (wild animals)/limited distribution/national control program
Foot-and-mouth disease	Free	1929
Vesicular stomatitis	Seasonal	2005 Sporadic/limited distribution
Lumpy skin disease	Free	Never occurred
Bluetongue	Present	Limited distribution
Rift Valley fever	Free	Never occurred
<b>Cattle diseases</b>		
Bovine anaplasmosis	Present	
Bovine babesiosis	Present	Limited distribution (endemic in the territories of Puerto Rico and the U.S. Virgin Islands; last occurrence on the U.S. mainland was in 1943)
Bovine brucellosis	Present	Sporadic/limited distribution/national eradication program
Bovine genital campylobacteriosis	?	
Bovine tuberculosis	Present	Sporadic/limited distribution/national eradication program
Bovine cysticercosis	Present	Limited distribution
Dermatophilosis	Present	Limited distribution
Enzootic bovine leucosis	Present	
Hemorrhagic septicemia	?	Sporadic/limited distribution (bison)
Infectious bovine rhinotracheitis/infectious pustular vulvovaginitis	Present	
Theileriosis	Free	Never occurred
Trichomonosis	Present	
Trypanosomosis	Free	Never occurred
Malignant catarrhal fever	Present	Sporadic (sheep-related form only)
Rinderpest	Free	Never occurred
Bovine spongiform encephalopathy	One case	2005 (Texas)
Contagious bovine pleuropneumonia	Free	1892
<b>Sheep and goat diseases</b>		
Ovine epididymitis ( <i>Brucella ovis</i> )	Present	
Caprine and ovine brucellosis (excluding <i>B. ovis</i> )	Free	1999
Caprine arthritis/encephalitis	Present	
Contagious agalactia	Present	Sporadic (non-Mediterranean form)
Contagious caprine pleuropneumonia	Free	Never occurred
Enzootic abortion of ewes (ovine chlamydiosis)	Present	Limited distribution

TABLE A2.3: **continued**

<b>Disease</b>	<b>Status</b>	<b>Date of last occurrence/Notes</b>
Ovine pulmonary adenomatosis	Present	2005 Sporadic/limited distribution
Nairobi sheep diseases	Free	Never occurred
Salmonellosis ( <i>S. abortusovis</i> )	Present	Sporadic/limited distribution
Scrapie	Present	National eradication program
Maedi-visna	Present	Sporadic/limited distribution
Peste des petits ruminants	Free	Never occurred
Sheep pox and goat pox	Free	Never occurred
<b>Equine diseases</b>		
Contagious equine metritis	Free	1978
Dourine	Free	1934
Epizootic lymphangitis	Free	Never occurred
Equine encephalomyelitis (Eastern and Western)	Present	Sporadic/limited distribution
Equine infectious anemia	Present	National control program (very low prevalence)
Equine influenza	Present	
Equine piroplasmiasis	Present	Limited distribution (limited to Puerto Rico and the U.S. Virgin Islands)
Equine rhinopneumonitis	Present	
Glanders	Free	1942
Horse pox	Free	Never occurred
Equine viral arteritis	Present	
Japanese encephalitis	Free	Never occurred
Horse mange	?	Sporadic/limited distribution
Surra ( <i>Trypanosoma evansi</i> )	Free	Never occurred
Venezuelan equine encephalomyelitis	Free	1971
African horse sickness	Free	Never occurred
<b>Swine diseases</b>		
Atrophic rhinitis of swine	Present	
Porcine cysticercosis	Free	
Porcine brucellosis	Present	Sporadic (feral)/limited distribution/national control program
Transmissible gastroenteritis	Present	
Enterovirus encephalomyelitis	Free	Never occurred
Porcine reproductive and respiratory syndrome	Present	
Swine vesicular disease	Free	Never occurred
African swine fever	Free	Never occurred
Classical swine fever	Free	1976
<b>Avian diseases</b>		
Avian infectious bronchitis	Present	
Avian infectious laryngotracheitis	Present	Sporadic (primarily vaccine-related)
Avian tuberculosis	Present	Sporadic (backyard poultry; prevented in commercial flocks by continuous replacement of birds)
Duck viral hepatitis	Free	1998
Duck viral enteritis	?	Sporadic/limited distribution
Fowl cholera	Present	
Fowl pox	Present	
Fowl typhoid	Free	1981
Infectious bursal disease (gumboro disease)	Present	



TABLE A2.3: **continued**

Disease	Status	Date of last occurrence/Notes
Marek's disease	Present	
Avian mycoplasmosis ( <i>M. gallisepticum</i> )	Present	All commercial poultry breeding flocks are under a surveillance program to confirm infection-free status. Commercial table-egg layers may be vaccinated.
Avian chlamydiosis	?	Sporadic (wild birds, pet birds, backyard poultry)
Pullorum disease	?	Sporadic (Commercial production flocks are free; disease may occur in some backyard poultry.)
High-pathogenicity avian influenza	Free	2004
Newcastle disease (neurotropic and viscerotropic strains)	Free	2003
<b>Lagomorph diseases</b>		
Myxomatosis	?	
Tularemia	Present	Sporadic (wild animals)/limited distribution
Rabbit hemorrhagic disease	Present	2005/sporadic/limited distribution
<b>Bee diseases</b>		
Acarapisosis of honey bees	Present	
American foulbrood of honey bees	Present	
European foulbrood of honey bees	Present	
Varoosis of honey bees	Present	
Tropilaelaps infestation of honey bees	Free	
<b>Other listed disease</b>		
Leishmaniasis	?	Sporadic (canine)/limited distribution
<b>Fish diseases</b>		
Viral hemorrhagic septicemia	+?	
Spring viremia of carp	Free	2004
Infectious hematopoietic necrosis	Present	
Epizootic hematopoietic necrosis	Free	Never occurred
Oncorhynchus masou virus disease	Free	Never occurred
<b>Mollusc diseases</b>		
Bonamiosis ( <i>Bonamia exitiosus</i> , <i>B. ostreae</i> , <i>Mikrocytos roughleyi</i> )	Present	Limited distribution
MSX disease ( <i>Haplosporidium nelsoni</i> )	Present	Limited distribution
Perkinsosis ( <i>Perkinsus marinus</i> , <i>P. olseni/atlanticus</i> )	Present	Limited distribution
Marteiliosis ( <i>Marteilia refringens</i> , <i>M. sydneyi</i> )	Free	Never occurred
Mikrocytosis ( <i>Mikrocytos mackini</i> )	Present	Limited distribution
<b>Crustacean diseases</b>		
Taura syndrome	Free	
White spot disease	Free	
Yellowhead disease	+?	

Sporadic = occurring only occasionally.

Limited distribution = limited geographic distribution.

? = presence of the disease suspected but not confirmed.

+? = identification of the presence of infection/infestation.

Free = negative occurrence of the disease.

<sup>1</sup> OIE stands for L'Office International des Epizooties, which recently changed its name to the World Animal Health Organization.

# Appendix 3: Animal Health Infrastructure in the United States

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## Introduction

The U.S. animal health infrastructure is a complex network of activities, programs, and people that includes but is not limited to

- Livestock producers and markets,
- Transporters,
- Veterinarians,
- Processors,
- Stakeholder organizations,
- Diagnostic and research laboratories,
- Manufacturers of animal drugs and vaccines,
- Importers and exporters,
- Colleges and universities, and
- Multiple regulatory agencies.

This network responds to animal health issues; scientific, economic, and political conditions pertinent to consumers; public-health issues; and trade interests, as well as environmental, wildlife, food-safety, and animal-welfare concerns.

By implementing measures that mitigate risks and deter hazardous activities, the U.S. animal health infrastructure works to ensure healthy animal populations, wholesome and safe food supplies, rapid response to animal-health emergencies, effective disease-control programs, functional surveillance and reporting systems, and the expansion of export markets. Among the key components of the infrastructure are

- Federal animal health services,
- State animal health authorities,
- Diagnostic laboratories,
- Federally accredited veterinarians,

- The United States Animal Health Association (USAHA) and other animal health organizations, and
- The global animal health infrastructure.

These organizations and facilities directly improve animal health, work toward eliminating disease risks, and limit transmission of diseases from animal to animal and from animals to people. Success requires cooperation across the network.

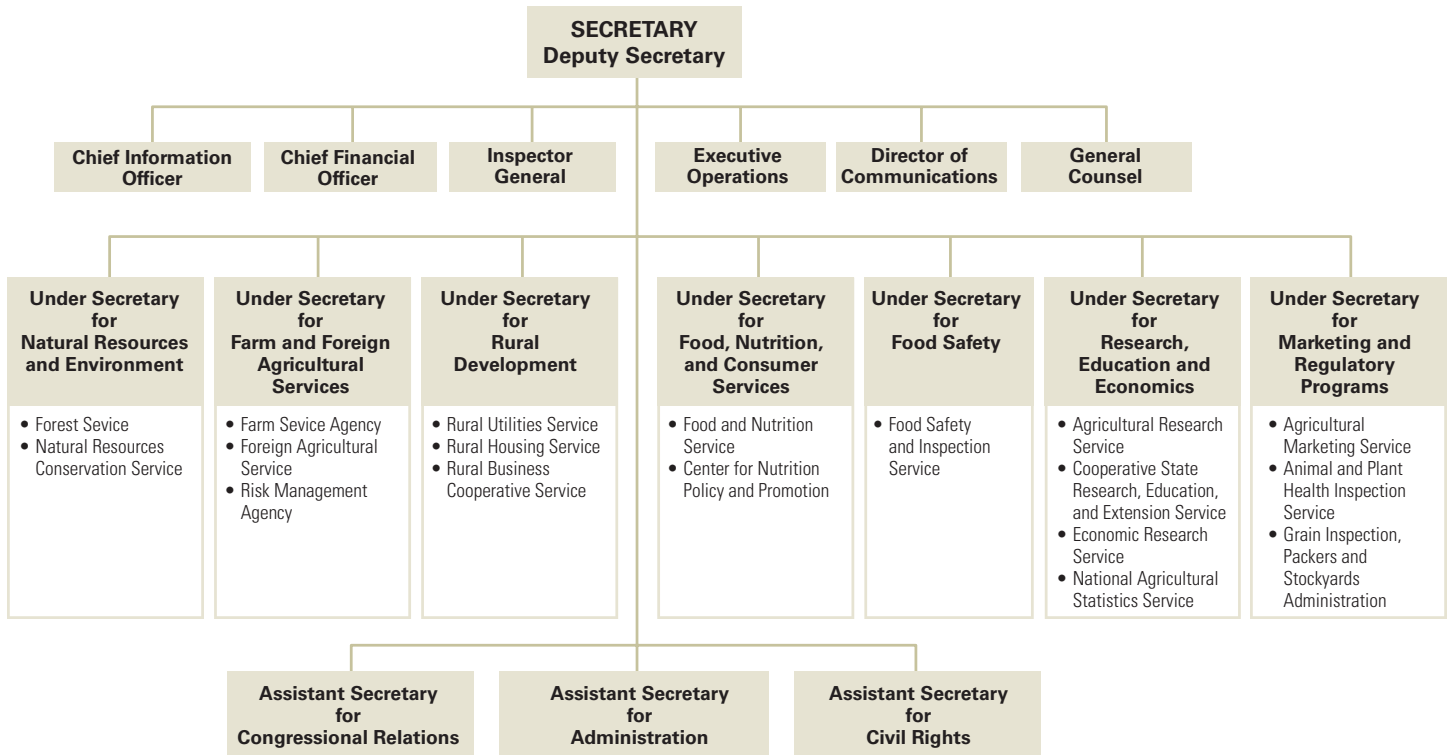
## Federal Animal Health Services

Ensuring the health of U.S. livestock is the responsibility of many Federal agencies, most of which are part of the U.S. Department of Agriculture (USDA) (fig. 32). Each agency is charged with specific tasks and responsibilities, and all work to protect the health and vitality of U.S. agriculture through established rules and regulations.

Federal animal-health and food-safety regulations are outlined in the U.S. Code of Federal Regulations (CFR). The CFR, which is revised annually, codifies regulations developed by Government agencies under laws passed by Congress and signed by the President. Animal-health and food-safety regulations are detailed in Titles 9 and 21 of the code (9 CFR, 21 CFR). Before adoption, proposed regulations appear for public review and comment in the Federal Register, which is published each business day. All proposed rules that may impact U.S. trade in livestock and animal health products are also provided to the World Trade Organization (WTO) to allow for comment by foreign governments and overseas suppliers. Further, VS publishes Uniform Methods and Rules, which are minimum program standards for the implementation of specific animal-health programs covered by regulations.

FIGURE 32: **USDA organizational chart. APHIS falls under the Marketing and Regulatory Programs branch of the Department.**

Updated April 2003



**Animal and Plant Health Inspection Service (APHIS)**

USDA-APHIS plays a lead role in animal health matters through its legal authorities, national perspectives, and role as the Nation’s representative in international livestock issues. There are six program units within APHIS: Animal Care (AC), Biotechnology Regulatory Services (BRS), International Services (IS), Plant Protection and Quarantine (PPQ), Veterinary Services (VS), and Wildlife Services (WS).

**AC** is responsible for administering the Animal Welfare and the Horse Protection Acts and for providing leadership in establishing acceptable standards of humane animal care and handling.

**BRS** regulates the field-testing (confined release of genetically engineered organisms into the environment), interstate movement, and importation of genetically engineered organisms through a permit and notification process. BRS assesses the agricultural and environmental safety of genetically engineered organisms and evaluates petitions to USDA to cease the regulation of specific engineered organisms.

**IS** provides animal- and plant-health experts overseas and in Washington, DC, who enhance USDA’s capacity to safeguard American agricultural health and promote agricultural trade.

**PPQ** develops regulations, policies, and guidelines to safeguard agricultural and natural resources from the risks associated with the entry, establishment, or spread of plant pests and noxious weeds.

**WS** provides leadership for managing wildlife damage and resolving wildlife-related conflicts involving human activities, agricultural production, and natural-resource protection.

**VS** plays a lead role in protecting and improving the health, quality, and marketability of U.S. livestock, animal products, and veterinary biologics by preventing, controlling, and eradicating animal diseases and monitoring and promoting animal health and productivity.

VS employs nearly 1,700 people with a wide range of scientific, technical, and administrative skills (table A3.1). The VS workforce includes veterinarians, animal health technicians, animal caretakers, budget analysts, biological technicians, computer specialists, economists, entomologists, epidemiologists, geographers, management analysts, microbiologists, pathologists, statisticians, spatial analysts, and other scientists, and administrative and animal-health support professionals.

VS maintains headquarters facilities in Riverdale, MD, and Washington, DC, where much of the program policy and regulatory development for the organization is established (fig. 33). These offices also provide liaison with other

TABLE A3.1: **Veterinary Services permanent workforce, 2005**

Occupation	Number	Percent of workforce
Veterinarians	526	29.9
Animal health technicians	337	19.2
Administrative and clerical support	395	22.5
Biological sciences	222	12.6
Information technology	73	4.2
Other	200	11.6
<b>Total</b>	<b>1,753</b>	<b>100.0</b>

Federal agencies, members of the executive branch, and congressional offices.

The VS field infrastructure is distributed nationally. VS maintains area offices in most of the 50 States and major ports-of-entry, although some area offices serve multiple States. VS also has personnel and offices in Puerto Rico and in U.S. territories. VS disease-eradication and -control activities, export certification, and surveillance actions take place primarily out of these field-office sites. Regional

offices located in Raleigh, NC, and Fort Collins, CO, oversee the field offices.

The emergency management arm of VS is comprised of three groups: Emergency Management and Diagnostics (EMD), the National Veterinary Services Laboratories (NVSL), and the Center for Veterinary Biologics (CVB).

EMD is responsible for preventing, preparing for, and coordinating the response to animal health emergencies caused by foreign or emerging animal diseases and pests and natural disasters. In the event of an emergency, EMD reacts immediately to minimize the adverse effects on the health of animal and human populations.

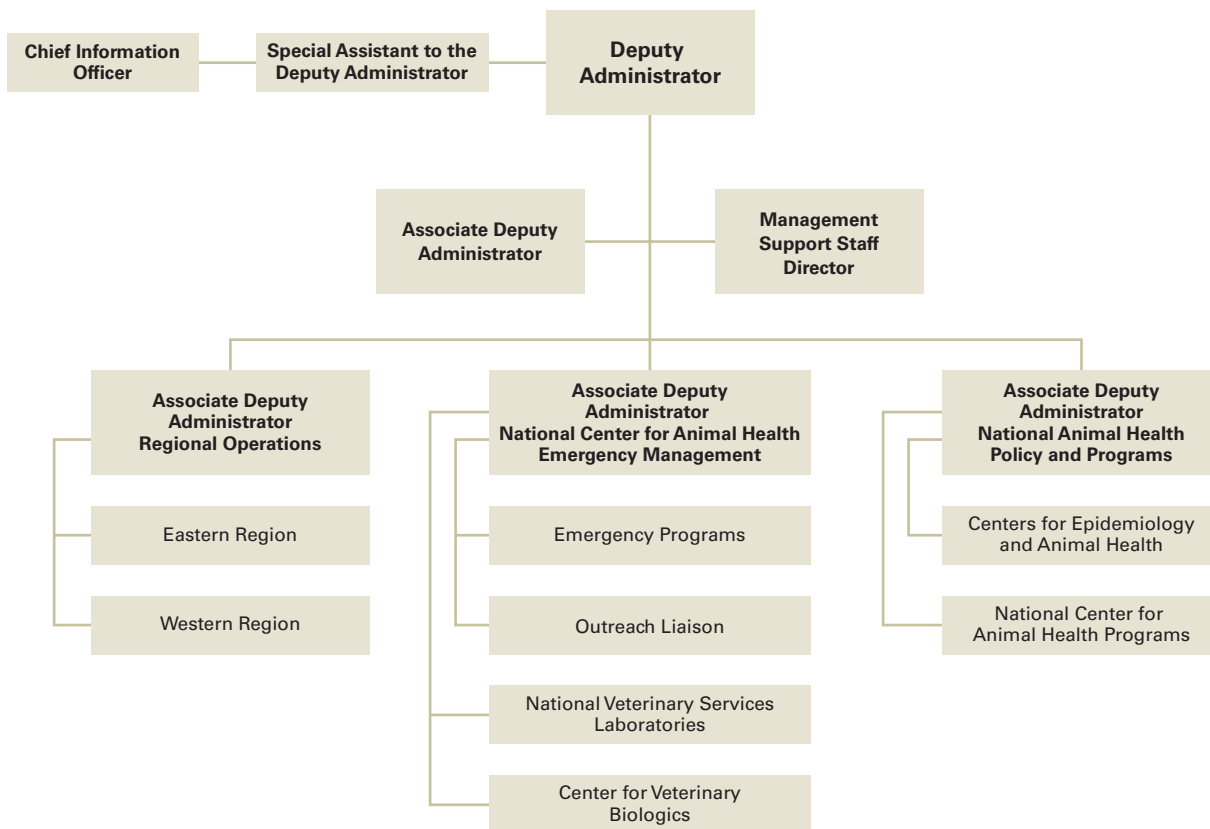
NVSL are divided into two campuses located in Ames, IA, and Plum Island, NY. The Ames campus houses the Diagnostic Bacteriology Laboratory, the Diagnostic Virology Laboratory, and the Pathobiology Laboratory. The Foreign Animal Disease Diagnostic Laboratory is located at the Plum Island campus.

NVSL's responsibilities include

- Diagnosing domestic and foreign animal diseases;
- Providing diagnostic support for disease control, disease eradication, and animal-health monitoring programs;

FIGURE 33: **Organizational chart for APHIS-VS.**

March 3, 2006



- Testing samples from animals for import and export;
- Training APHIS and other U.S. and international personnel;
- Certifying laboratories in the United States to handle the testing for selected diseases; and
- Acting as a comprehensive reference laboratory.

CVB regulates animal vaccines, bacterins, diagnostic test kits, and other veterinary biologics used to prevent, treat, or diagnose animal diseases. CVB implements the Virus–Serum–Toxin Act to ensure the availability of safe and effective veterinary biologics.

CVB’s responsibilities include

- Reviewing biologics product license applications and associated studies;
- Issuing biologics product licenses and permits;
- Testing biologics products for purity and potency;
- Inspecting biologics product manufacturing facilities;
- Regulating the release of biologics products to the marketplace;
- Conducting postmarketing surveillance of biologics products, and;
- Certifying vaccines and diagnostics for export.

In the course of fulfilling its mission, CVB plays a key role in many of the VS activities noted in this report. For example, CVB is active in soliciting bids and evaluating technical proposals for the National Veterinary Stockpile vaccine banks. Without relaxing its rigorous licensing standards, CVB expedites the evaluation of vaccines and diagnostics for national disease-eradication or -control programs.

Both NVSL and CVB are collaborating centers of the World Organization of Animal Health for the diagnosis of animal disease and vaccine evaluation in the Americas.

Within VS, two groups—Animal Health Programs (AHP) and the Centers for Epidemiology and Animal Health (CEAH)—are associated with VS’ National Animal Health Policy and Programs. AHP initiates, leads, coordinates, and facilitates national certification and eradication programs that promote, protect, and improve U.S. animal health by preventing, minimizing, or eradicating animal diseases of economic and public-health concern. AHP includes four subunits: the National Center for Import and Export (NCIE), National Center for Animal Health Programs (NCAHP), professional development staff, and information systems support staff. NCIE is discussed in detail in chapter 6.

The NCAHP includes three subunits: Ruminant Health Programs (RHP); Aquaculture, Swine, Equine, and Poultry Health Programs (ASEPHP); and Surveillance and Identification Programs (SIP).

RHP and ASEPHP are responsible for campaigns to eradicate the following diseases:

- Bovine brucellosis,
- Swine brucellosis,
- Bovine tuberculosis,
- Swine pseudorabies, and
- Scrapie.

The RHP and ASEPHP also are responsible for the following disease-control programs and activities:

- Johne’s disease program,
- National Low-Pathogenicity Avian Influenza Program,
- Aquaculture disease programs,
- Chronic wasting disease efforts,
- Equine disease programs,
- Exotic Newcastle disease surveillance,
- Classical swine fever surveillance, and the
- National Poultry Improvement Plan and
- Slaughter Horse Transport Program.

SIP helps coordinate national surveillance, animal identification, veterinary accreditation, and livestock markets.

CEAH includes three subunits: the Center for Emerging Issues (CEI), the Center for Animal Disease Information and Analysis (CADIA), and the National Center for Animal Health Surveillance (NCAHS).

The CEI is responsible for

- Rapidly assessing the impacts of foreign and domestic disease outbreaks, economic events, and natural disasters;
- Developing surveillance approaches for emerging diseases; and
- Providing geographic information systems support to VS activities.

The CADIA is responsible for

- Import and domestic risk analysis, and
- Program disease support via database development and maintenance.

The NCAHS is responsible for

- Coordinating national animal-health surveillance, and
- Providing baseline information on health, disease, and production through the National Animal Health Monitoring System.

For animal-disease information systems and risk analysis, CEAH is a collaborating center of the World Organization for Animal Health (formerly called the International Office of Epizootics and still using “OIE” as its acronym). CEAH personnel also develop technology applications, maintain key databases, and conduct epidemiologic, economic, and spatial analyses.

The Web site for VS is <<http://www.aphis.usda.gov/vs>>. The site provides updates on VS programs and electronic copies of various VS forms.

### Other Federal Agencies Providing Animal Health Services

In addition to APHIS, several other Federal agencies exercise authority and responsibility for maintaining domestic animal health. These agencies include, but are not limited to, the Food and Drug Administration (FDA), the U.S. Department of Homeland Security’s (DHS) Customs and Border Protection (CPB), the U.S. Department of Commerce’s National Marine Fisheries Service (NMFS), and four USDA agencies: the Agricultural Research Service (ARS), the Cooperative State Research, Education, and Extension Service (CSREES), the Food Safety and Inspection Service (FSIS), and the Foreign Agricultural Service (FAS).

**FDA** oversees the manufacture, importation, and use of human and animal pharmaceuticals, including antimicrobial and antiinflammatory drugs, and a variety of natural and synthetic compounds. FDA also regulates food labeling, food product safety (except meat, poultry, and certain egg products), livestock feed, and pet food.

**DHS** has responsibility for emergencies related to animal diseases. CBP, an agency of DHS, has agricultural inspection responsibility at the Nation’s borders and ports-of-entry to prevent the introduction of foreign animal and plant pests and diseases that could harm the country’s agricultural resources.

**NMFS** provides a voluntary inspection service to fisheries and aquaculture industries.

**ARS** is the primary research agency within USDA for livestock and crop-related production issues, including animal health and food safety.

**CSREES** seeks to advance knowledge for agriculture, the environment, human health and well-being, and communities by supporting research, education, and extension programs in the Land-Grant University System and other partner organizations.

**FSIS** inspects all meat, poultry, and egg products sold in interstate commerce to ensure that they are safe, wholesome, and properly labeled, and reinspects imported products.

**FAS** reports on outbreaks of animal diseases worldwide and on the quarantine and trade measures that countries adopt because of these outbreaks. FAS publishes Food and Agricultural Import Regulations and Standards (FAIRS) Reports, FAIRS Certificate Reports, and Sanitary and Phytosanitary Food Safety Reports that identify the entry requirements for livestock and livestock products. FAS also helps remove unfair trade barriers to U.S. products.

### State Animal Health Authorities

Animal health authorities in each State are responsible for monitoring and controlling diseases in its domestic livestock and poultry. States control diseases through inspections, testing, vaccinations, treatments, quarantines, and other activities. States have authority to prohibit the entry of livestock, poultry, aquaculture species, and animal products from other States if those animals or products are considered health risks to local animal populations. Consequently, each State develops its own respective domestic commerce regulations. VS cooperates with States at markets where interstate movements may occur and, in conjunction with States, conducts disease surveillance programs at slaughter plants and livestock concentration points. States and VS also cooperate in national and State animal disease-control and -education programs. In addition, States maintain veterinary diagnostic laboratories, provide animal disease information to veterinary practitioners, and encourage prompt reporting of specific conditions. Also, there is communication with departments of public health, colleges of veterinary medicine, and wildlife agencies within each State.

To participate in national programs, States must adhere to specific requirements. However, on the basis of individual States’ needs, State-specific requirements can be developed. Generally, State-specific requirements are more stringent than national program requirements.

In addition, States cooperate with Federal agencies to develop animal health emergency plans. States also implement producer education programs for disease management and control.

## Diagnostic Laboratories

Frequently, diagnosing livestock and poultry diseases requires laboratory tests. Diagnostic laboratories diagnose endemic and exotic diseases, support disease-control and -reporting programs, and meet expectations of trading partners. OIE reference laboratories confirm FADs.

In the United States, the American Association of Veterinary Laboratory Diagnosticians (AAVLD) accredits laboratories. Accreditation is dependent on several criteria, including promoting excellence in diagnostic service, establishing internal quality control, hiring and retraining qualified staff and professional personnel, developing innovative techniques, and operating adequate facilities to conduct laboratory diagnostic services. Additionally, laboratories can become certified by VS to conduct specific tests to certify animals for movement or to participate in disease-eradication programs.

Multiple APHIS-approved laboratories serve livestock and poultry producers (see <http://www.aphis.usda.gov/vs/nvsl/Labs/labcertification.htm>). To coordinate the capabilities of Federal, State, and university laboratories, a laboratory network has been created. See chapter 4 for more information on the APHIS laboratory network.

## Federally Accredited Veterinarians

Private veterinary practitioners are an integral part of the U.S. veterinary infrastructure. Through their interactions with producers, practitioners function as a key resource for the enhancement of U.S. animal health. VS' National Veterinary Accreditation Program (NVAP) is a voluntary program that certifies private veterinary practitioners to work cooperatively with Federal veterinarians and State animal health officials. Since 1921, the United States has used these private practitioners, known as accredited veterinarians, as representatives of the Federal Government. Accredited veterinarians identify and inspect animals, collect specimens, vaccinate livestock, and prepare point-of-origin health certificates for interstate movement and export. VS grants national accreditation to private veterinary practitioners only after specific training and eligibility requirements are met.

In 2005, there were more than 72,000 accredited veterinarians in the NVAP database. This number represents more than 80 percent of all U.S. veterinarians. Accredited veterinarians enhance the capability of the United States to perform competent health certifications (including inspecting, testing, and certifying the health of animals) and to effectively maintain extensive disease surveillance, including timely monitoring and reporting of changes in animal health status.

## USAHA and Other National Associations

USAHA provides a forum for communication and coordination among State and Federal governments, universities, industry, and other groups on issues of animal health and welfare, disease control, food safety,



and public health. USAHA also serves as a clearinghouse for new information and methods. USAHA develops solutions to animal health issues based on science, new information and methods, and public-policy risk-benefit analysis.

USAHA works to develop consensus among varied groups for changing laws, regulations, policies, and programs. Committees are formed within USAHA dedicated to specific topics and issues. USAHA provides input to, and makes requests of, VS and other Federal agencies in the form of resolutions from the committees.

Other nationally oriented associations with important roles in U.S. animal health are

- The National Institute for Animal Agriculture, which functions as a forum for building consensus and advancing solutions for animal agriculture and provides continuing education and communication linkages for animal agriculture professionals;
- The American Veterinary Medical Association, which advances veterinary medicine and its role in public health, biological science, and agriculture and serves as an advocate for the veterinary profession by presenting views to government, academia, agriculture, and other concerned publics;
- The AAVLD, which works to establish uniform diagnostic techniques as well as to develop and improve them, to coordinate activities of diagnostic laboratories, and to disseminate animal disease diagnostic information.
- The Animal Agriculture Coalition, which is an alliance of livestock, poultry, and aquaculture trade associations and the veterinary and scientific communities, all of which monitor and influence animal health, the environment, food safety, research, and education issues; and
- The National Association of State Departments of Agriculture, which represents the State and U.S. Territory departments of agriculture in the development, implementation, and communication of public policy and programs related to the agriculture industry.

## Working With Other Nations' Animal Health Infrastructures

The United States is a signatory country of the WTO and is obligated to comply with the WTO's Agreement on the Application of Sanitary and Phytosanitary Standards (SPS Agreement). The SPS Agreement's main intent is to facilitate trade while recognizing the right of countries to protect the life and health of humans, animals, and plants. To prevent the use of SPS measures as unjustified trade

barriers, the SPS Agreement dictates that all protective measures be scientifically based and not unnecessarily restrictive.

The WTO assigned standards-setting authority to the OIE for international trade-related animal-health issues, to the International Plant Protection Convention (IPPC) for plant-health issues, and to the Codex Alimentarius Commission of the United Nations for food safety.

For more than 25 years, VS has reported to OIE data from State officials, veterinary journals, diagnostic test results, and disease surveillance programs and, since 1998, data from the National Animal Health Reporting System (NAHRS). NAHRS is a joint effort of USAHA, AAVLD, and APHIS. NAHRS assimilates data from chief State animal health officials on the presence of confirmed OIE-reportable diseases in specific commercial livestock, poultry, and aquaculture species in the United States. This information is used by the United States and OIE member countries to

- Improve livestock and public-health strategies,
- Prioritize animal-health programs and research activities,
- Strengthen border security,
- Provide a basis for trade negotiations, and
- Certify point-of-origin health status of exported animals, poultry, and related products.

USDA agencies (including APHIS, the Foreign Agricultural Service, and FSIS) regularly send representatives to negotiate animal-health issues in bilateral, regional (such as the North America Free Trade Agreement), and multilateral forums, including the WTO. These representatives also work in dozens of specialized animal-health and food-safety committees under the OIE, IPPC, and Codex Alimentarius. Working together, U.S. specialists promote sound science, transparent rulemaking, and effective monitoring to reduce the risk of exposure to animal disease, while at the same time promoting fair and safe trade.

Animal-health officials from Canada, Mexico, and the United States have created the North American Animal Health Committee, which meets regularly to discuss common animal health issues. Similarly, U.S. animal-health officials meet regularly with their Australian, New Zealand, and Canadian counterparts in the Quadrilateral Animal Health Committee.



# Appendix 4: Animal Health Contacts in the United States



## **USDA National Animal Health Policy and Programs**

Dr. Jere Dick, Associate Deputy Administrator  
4700 River Rd., Unit 33  
Riverdale, MD 20737-1231  
Phone: (301) 734-5034  
Fax: (301) 734-8818

## **OIE Delegate**

Dr. Peter Fernandez  
Minister, Regional Director  
Europe, Middle East, Africa  
United States Mission to the European Union  
Boulevard du Regent, 27  
1000 Brussels, Belgium  
Phone: (32-2)508-2762  
Fax: (32-2)511-0918

## **International Standards Team**

Dr. Michael David, Director  
4700 River Rd., Unit 33  
Riverdale, MD 20737-1231  
Phone: (301) 734-5324  
Fax: (301) 734-8818

## **National Veterinary Services Laboratories**

Dr. Elizabeth Lautner, Director  
1800 Dayton Rd.  
P.O. Box 844  
Ames, IA 50010  
Phone: (515) 663-7301  
Fax: (515) 663-7397

## **Center for Veterinary Biologics**

Dr. Richard Hill, Director  
510 South 17th St., Suite 104  
Ames, IA 50010  
Phone: (515) 232-5785  
Fax: (515) 232-7120

## **Centers for Epidemiology and Animal Health**

Director  
2150 Centre Ave., Bldg. B, MS 2W3  
Fort Collins, CO 80526-8117  
Phone: (970) 494-7200  
Fax: (970) 472-2668

## **United States Animal Health Association**

Dr. Bret Marsh  
Indiana State Board of Animal Health  
800 Beachway Drive, Suite 50  
Indianapolis, IN 46224  
Phone: (317) 227-0300  
Fax: (317) 227-0330

## **USDA-APHIS Eastern Region**

Dr. Jack Shere, Regional Director  
Venture II Building, Centennial Campus  
North Carolina State University  
920 Main Campus Dr., Suite 200  
Raleigh, NC 27606  
Phone: (919) 855-7250  
Fax: (919) 855-7295

## **USDA-APHIS Western Region**

Regional Director  
2150 Centre Ave., Bldg. B, MS 3E13  
Fort Collins, CO 80526-8117  
Phone: (970) 494-7400  
Fax: (970) 494-7355

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## USDA Area Veterinarians-in-Charge

### *Alabama*

Dr. O. W. Hester  
Phone: (334) 223-7141

### *Indiana*

Dr. Francisco Collazo-Mattei  
Phone: (317) 290-3300

### *Nevada*

Dr. Kevin Varner  
Phone: (916) 857-6170

### *South Dakota*

Dr. Lynn A. Tesar  
Phone: (605) 224-6186

### *Alaska*

Dr. Gary L. Brickler  
Phone: (360) 753-9430

### *Iowa*

Dr. Kevin L. Petersburg  
Phone: (515) 284-4140

### *New Hampshire*

Dr. William G. Smith  
Phone: (508) 865-1421

### *Tennessee*

Dr. Allen M. Knowles  
Phone: (615) 781-5310

### *Arizona*

Dr. Hortentia Harris  
Phone: (480) 491-1002

### *Kansas*

Dr. David F. Vogt  
Phone: (785) 235-2365

### *New Jersey*

Dr. Jonathan Zack  
Phone: (609) 259-8387

### *Texas*

Dr. Paul O. Ugstad  
Phone: (512) 916-5551

### *Arkansas*

Vacant  
Phone: (501) 224-9515

### *Kentucky*

Dr. Kathleen Burda  
Phone: (502) 227-9651

### *New Mexico*

Dr. Michael T. Greenlee  
Phone: (505) 761-3160

### *Utah*

Dr. Robert A. DeCarolis  
Phone: (801) 524-5010

### *California*

Dr. Kevin Varner  
Phone: (916) 857-6170

### *Louisiana*

Dr. Joel Goldman  
Phone: (225) 389-0436

### *New York*

Dr. Roxanne Mullaney  
Phone: (518) 869-9007

### *Vermont*

Dr. William G. Smith  
Phone: (508) 865-1421

### *Colorado*

Dr. Roger Perkins  
Phone: (303) 231-5385

### *Maine*

Dr. William G. Smith  
(508) 865-1421

### *North Carolina*

Dr. Eric Coleman  
Phone: (919) 855-7700

### *Virginia*

Dr. Terry L. Taylor  
Phone: (804) 771-2774

### *Connecticut*

Dr. William G. Smith  
(508) 865-1421

### *Maryland*

Dr. Steven N. Finch  
Phone: (410) 349-9708

### *North Dakota*

Dr. Larry A. Schuler  
Phone: (701) 250-4210

### *Washington*

Dr. Gary L. Brickler  
Phone: (360) 753-9430

### *Delaware and District of Columbia*

Dr. Steven N. Finch  
Phone: (410) 349-9708

### *Massachusetts*

Dr. William G. Smith  
Phone: (508) 865-1421

### *Ohio*

Dr. Susan Skorupski  
Phone: (614) 469-5602

### *West Virginia*

Dr. Susan Skorupski  
Phone: (614) 469-5602

### *Florida*

Dr. Robert E. Southall  
Phone: (352) 333-3120

### *Michigan*

Dr. Reed Macarty  
Phone: (517) 324-5290

### *Oklahoma*

Dr. Burke Healey  
Phone: (405) 427-9413

### *Wisconsin*

Dr. Thomas Varty  
Phone: (608) 270-4000

### *Georgia*

Dr. Edgardo Arza  
Phone: (770) 922-7860

### *Minnesota*

Dr. Michael L. Stine  
Phone: (651) 290-3691

### *Oregon*

Dr. Don Herriott  
Phone: (503) 399-5871

### *Wyoming*

Dr. Bret A. Combs  
Phone: (307) 432-7960

### *Hawaii*

Dr. Gary L. Brickler  
Phone: (360) 753-9430

### *Mississippi*

Dr. Charles P. Nettles  
Phone: (601) 965-4307

### *Pennsylvania*

Dr. Gary Ross  
Phone: (717) 782-3442

### *Idaho*

Dr. Cynthia Gaborick  
Phone: (208) 378-5631

### *Missouri*

Dr. David Hopson  
Phone: (573) 636-3116

### *Puerto Rico*

Dr. Miguel A. Borri-Diaz  
Phone: (787) 766-6050

### *Illinois*

Dr. Lennis Knight  
Phone: (217) 241-6689

### *Montana*

Dr. Paul Scigliabaglio  
Phone: (406) 449-2220

### *Rhode Island*

Dr. William G. Smith  
(508) 865-1421

### *Nebraska*

Dr. Kathleen Akin  
Phone: (402) 434-2300

### *South Carolina*

Dr. Delorias Lenard  
Phone: (803) 788-1919

# Appendix 5: Key U.S. Animal Health Web Sites



Agricultural Marketing Service  
<http://www.ams.usda.gov>

Agricultural Research Service  
<http://www.ars.usda.gov>

American Association of Bovine Practitioners  
<http://www.aabp.org>

American Association of Equine Practitioners  
<http://www.aiep.org>

American Association of Swine Veterinarians  
<http://www.aasp.org>

American Sheep Industry Association  
<http://www.sheepusa.org>

American Veterinary Medical Association  
<http://www.avma.org>

Animal and Plant Health Inspection Service  
<http://www.aphis.usda.gov>

Centers for Disease Control and Prevention  
<http://www.cdc.gov>

Centers for Epidemiology and Animal Health  
<http://www.aphis.usda.gov/vs/ceah>

Center for Veterinary Biologics  
<http://www.aphis.usda.gov/vs/cvb>

Code of Federal Regulations  
<http://www.gpoaccess.gov/nara>

Commodity Credit Corporation  
<http://www.fsa.usda.gov/cc>

Economic Research Service  
<http://www.ers.usda.gov>

Environmental Protection Agency  
<http://www.epa.gov>

Exotic Wildlife Association  
<http://www.exoticwildlifeassociation.com>

Federal Emergency Management Agency  
<http://www.fema.gov>

Federal Register  
[http://www.archives.gov/federal\\_register](http://www.archives.gov/federal_register)

Food Animal Residue Avoidance Databank  
<http://www.farad.org>

Food Safety and Inspection Service  
<http://www.fsis.usda.gov>

Foreign Agricultural Service  
<http://www.fas.usda.gov>

Grain Inspection, Packers and Stockyards Administration  
<http://www.gipsa.usda.gov>

Holstein Association USA, Inc.  
<http://www.holsteinusa.com>

International Organization for Standardization  
<http://www.iso.ch/iso/en/ISOOnline.openpage>

National Agricultural Statistics Service  
<http://www.usda.gov/nass>

National Animal Health Emergency Management System  
<http://www.usaha.org/NAHEMS>

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National Cattlemen's Beef Association  
<http://www.beef.org>

U.S. Department of Homeland Security  
<http://www.dhs.gov/dhspublic>

National Center for Animal Health Surveillance  
<http://www.aphis.usda.gov/vs/ceah/ncahs>

U.S. Fish and Wildlife Service  
<http://www.fws.gov>

National Center for Import and Export  
<http://www.aphis.usda.gov/vs/ncie>

U.S. Food and Drug Administration  
<http://www.fda.gov>

National Marine Fisheries Service  
<http://www.nmfs.noaa.gov>

Veterinary Services  
<http://www.aphis.usda.gov/vs>

National Pork Producers Council  
<http://www.nppc.org>

World Animal Health Organization  
<http://www.oie.int>

National Poultry Improvement Plan  
<http://www.aphis.usda.gov/vs/npip>

World Trade Organization  
<http://www.wto.org>

National Veterinary Services Laboratories  
<http://www.aphis.usda.gov/vs/nvsl>

North American Deer Farmers Association  
<http://www.nadefa.org>

North American Elk Breeders Association  
<http://www.naelk.org>

Plant Protection and Quarantine  
<http://www.aphis.usda.gov/ppq>

United States Animal Health Association  
<http://www.usaha.org>

U.S. Department of Agriculture  
<http://www.usda.gov>

U.S. Department of Defense  
<http://www.defenselink.mil>

U.S. Department of Health and Human Services  
<http://www.hhs.gov>

# Appendix 6: Acronyms and Abbreviations



<b>AAVLD</b>	American Association of Veterinary Laboratory Diagnosticians	<b>CVB</b>	Center for Veterinary Biologics
<b>AEC</b>	Area Emergency Coordinator	<b>CWD</b>	Chronic wasting disease
<b>AHT</b>	Animal Health Technician	<b>eCVI</b>	Electronic certificate of veterinary inspection
<b>AI</b>	Avian influenza	<b>EHV</b>	Equine herpesvirus
<b>AMS</b>	Agricultural Marketing Service	<b>ELISA</b>	Enzyme-linked immunosorbent assay
<b>APHIS</b>	Animal and Plant Health Inspection Service	<b>EMD</b>	Emergency Management and Diagnostics
<b>AVIC</b>	Area Veterinarian-in-Charge	<b>EMS</b>	Emergency Management System
<b>BMST</b>	Brucellosis milk surveillance test	<b>END</b>	Exotic Newcastle disease
<b>BSE</b>	Bovine spongiform encephalopathy	<b>EPA</b>	Environmental Protection Agency
<b>BTV</b>	Bluetongue virus	<b>eVAP</b>	Electronic Veterinary Accreditation Program
<b>CAHFSE</b>	Collaboration on Animal Health and Food Safety Epidemiology	<b>eVe</b>	Emerging veterinary event
<b>CBP</b>	Customs and Border Protection	<b>FAD</b>	Foreign animal disease
<b>CEAH</b>	Centers for Epidemiology and Animal Health	<b>FADDL</b>	Foreign Animal Disease Diagnostic Laboratory
<b>CEI</b>	Center for Emerging Issues	<b>FAS</b>	Foreign Agricultural Service
<b>cELISA</b>	Competitive enzyme-linked immunosorbent assay	<b>FDA</b>	Food and Drug Administration
<b>CFR</b>	U.S. Code of Federal Regulations	<b>FMD</b>	Foot-and-mouth disease
<b>CNS</b>	Central nervous system	<b>FSIS</b>	Food Safety and Inspection Service
<b>CSF</b>	Classical swine fever	<b>FWS</b>	U.S. Fish and Wildlife Service
<b>CSREES</b>	Cooperative State Research, Education, and Extension Service	<b>HPAI</b>	High-pathogenicity avian influenza

<b>ICS</b>	Interagency Coordination staff	<b>OIE</b>	World Organization for Animal Health
<b>IREGS</b>	International Regulation Retrieval System	<b>PCR</b>	Polymerase chain reaction
<b>IS</b>	International Services	<b>PRV</b>	Pseudorabies virus
<b>ISA</b>	Infectious salmon anemia	<b>RESI</b>	Regionalization Evaluation Services—Import
<b>JSA</b>	Joint Subcommittee on Agriculture	<b>RSSS</b>	Regulatory Scrapie Slaughter Surveillance
<b>LBMS</b>	Live-bird market system	<b>SFCP</b>	Scrapie Flock Certification Program
<b>LPAI</b>	Low-pathogenicity avian influenza	<b>SPS</b>	Sanitary and Phytosanitary
<b>MAP</b>	<i>Mycobacterium avium paratuberculosis</i>	<b>TB</b>	Tuberculosis
<b>MCI</b>	Market Cattle Identification	<b>TBT</b>	Tropical bont tick
<b>NAAHP</b>	National Aquatic Animal Health Plan	<b>TSE</b>	Transmissible spongiform encephalopathy
<b>NAHEMS</b>	National Animal Health Emergency Management System	<b>UM&amp;R</b>	Uniform methods and rules
<b>NAHLN</b>	National Animal Health Laboratory Network	<b>USAHA</b>	United States Animal Health Association
<b>NAHMS</b>	National Animal Health Monitoring System	<b>USDA</b>	U.S. Department of Agriculture
<b>NAHRS</b>	National Animal Health Reporting System	<b>USTCP</b>	U.S. Trichinae Certification Program
<b>NAHSS</b>	National Animal Health Surveillance System	<b>VBJDPCP</b>	Voluntary Bovine Johne's Disease Control Program
<b>NAIS</b>	National Animal Identification System	<b>VMO</b>	Veterinary Medical Officer
<b>NASS</b>	National Agricultural Statistics Service	<b>VS</b>	Veterinary Services
<b>NCAHS</b>	National Center for Animal Health Surveillance	<b>WTO</b>	World Trade Organization
<b>NCIE</b>	National Center for Import and Export		
<b>NOAA</b>	National Oceanic and Atmospheric Administration		
<b>NPIP</b>	National Poultry Improvement Plan		
<b>NSU</b>	National Surveillance Unit		
<b>NVAP</b>	National Veterinary Accreditation Program		
<b>NVS</b>	National Veterinary Stockpile		
<b>NVSL</b>	National Veterinary Services Laboratories		







