



# 2006 UNITED STATES Animal Health Report

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Animal and Plant Health Inspection Service

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# Foreword

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We are pleased to present the 2006 annual report on the status of animal health in the United States. This is the third such report that provides a wide-ranging review of the health of our Nation's domestic animal resources.

The report highlights significant epidemiologic events of 2006 and provides insight into the Nation's animal health surveillance activities. In addition, the report presents an update on programs, both new and existing, that strive to maintain healthy livestock, poultry, and aquaculture populations.

This year, we are introducing two new chapters—animal health research and international collaboration. Animal health research is an important component of the U.S. animal health infrastructure. A description of this infrastructure—a complex network of Federal, State, and industry partners—is again included in the report as a reference tool. Chapter 8 (page 97) presents additional information on some of the research under way by agencies of the U.S. Department of Agriculture (USDA) and America's schools of veterinary medicine. We hope this new chapter will not only enhance your understanding

of the animal health infrastructure but also provide a foundation to promote discussion and exchange of knowledge, both internationally and domestically, on these important research areas.

We also dedicate a chapter (chapter 9, page 105) to APHIS-wide international collaboration and capacity-building projects. We in Veterinary Services, and APHIS employees in other units, are proud of the roles we play in numerous training, education, and outreach programs under way throughout the world to safeguard and improve animal and human health globally.

I believe you will find the 2006 Animal Health Report a helpful resource on the status of U.S. livestock, poultry and aquaculture, as well as programs and strategies that are in place to ensure their continued health. As always, I invite and encourage your comments and ideas, as well as suggestions on how we can improve next year's report. You will find information on how to provide feedback and contact details on page 159. Thank you for reading.

—John Clifford  
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CHAPTER 1





# Animal Health Events in 2006

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The Veterinary Services (VS) branch of the U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS) is responsible for protecting and improving the health and quality of the Nation's agricultural animals, animal products, and veterinary biologics. As part of its mission, VS practices preventive veterinary medicine and epidemiology on a broad scale and monitors and responds to animal health events of statewide, regional, national, and international importance.

This chapter documents several important animal health events that occurred in the United States during 2006. These events included the bovine spongiform encephalopathy (BSE) case in Alabama and incidents of vesicular stomatitis, anthrax, viral hemorrhagic septicemia (VHS), honey bee colony collapse disorder (CCD), contagious equine metritis (CEM), equine herpesvirus type 1 (EHV-1), and equine viral arteritis (EVA).

## BSE Case in Alabama

On March 15, 2006, USDA-APHIS confirmed that a sample from an Alabama cow tested positive for BSE. The cow was euthanized and buried on the farm and did not enter the animal feed or human food supply.

APHIS and the U.S. Department of Health and Human Services' Food and Drug Administration (FDA) completed their investigations in collaboration with the Alabama Department of Agriculture and Industries. The animal tested positive on the World Animal Health Organization (OIE)-recognized scrapie-associated fibrils immunoblot test, often referred to as the Western blot, and by immunohistochemistry. Tests were conducted at the USDA-Agricultural Research Service's National Animal Disease Center and APHIS' National Veterinary Services Laboratories (NVSL) in Ames, IA.

USDA's investigations indicated that the positive animal, the index animal, was a red crossbreed.

The cow was nonambulatory on the farm and was examined and treated by a local, private veterinarian. The following day, the cow remained nonambulatory. The veterinarian euthanized the animal and collected a sample, which was submitted for BSE testing. The animal was then buried on the farm.

The age of the affected cow was determined through dentition to be more than 10 years at the time of death; therefore, she was born prior to the FDA's ban on feeding recycled ruminant protein to other ruminants. FDA implemented the ban in 1997 to help minimize the risk that a cow may consume feed contaminated with the agent thought to cause BSE.

APHIS and Alabama State officials investigated 36 farms and 5 auction houses and conducted DNA testing on herds that may have included relatives of the index animal. APHIS and State investigators were unable to find any related animals except for the two most recent calves of the index animal. The most recent calf was located at the same farm as the index animal; the second calf died in 2005. No other animals of interest were located. The living calf of the BSE-positive animal is currently being held at the NVSL for observation.

APHIS' investigation did not reveal the BSE-positive animal's herd of origin. Experience worldwide has shown that it is highly unusual to find BSE in multiple animals in a herd or in an affected animal's offspring.

The FDA conducted an investigation into local feed mills that may have supplied feed to the index animal after the 1997 feed ban was implemented. This investigation showed that adequate controls were in place in feed facilities in the immediate geographic area of the index farm and that local feed mills that handle prohibited materials were in compliance with FDA's feed ban.

## Vesicular Stomatitis

Vesicular stomatitis is a viral disease that primarily affects cattle, horses, and swine and occasionally

affects sheep, goats, llamas, and wildlife. Humans can be exposed to the virus that causes the disease when handling affected animals but rarely become infected.

Historically, outbreaks of vesicular stomatitis in domestic livestock occur in the Southwestern United States during warm months and particularly along river ways. However, outbreaks are sporadic and unpredictable. In 2006, the United States reported vesicular stomatitis in one State, Wyoming (table 1). The previous outbreak, in 2005, affected 445 premises in 9 States (Arizona, Colorado, Idaho, Montana, Nebraska, New Mexico, Texas, Utah, and Wyoming). Because the 2006 isolate was closely related to viruses isolated from animals in Montana and Wyoming in 2005, VS scientists suspect that the 2006 cases resulted from an overwintering of the 2005 vesicular stomatitis viruses in the area.

In affected livestock, vesicular stomatitis causes blisterlike lesions in the mouth and on the dental pad, tongue, lips, nostrils, coronary band, teats, vulva, and prepuce. Animals usually recover within several 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 primary way to distinguish among these diseases is through laboratory tests.

The mechanisms by which vesicular stomatitis virus spreads are not fully known; insect vectors, mechanical transmission, and movement of animals

are probably responsible. Once introduced into a herd, the virus apparently moves from animal to animal primarily by contact or exposure to saliva or fluid from ruptured lesions.

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 in livestock on the premises. 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*, are reported in the United States almost every year, but Minnesota experienced its second-largest anthrax outbreak in the State's history in 2006.

Information available from the Minnesota Board of Animal Health indicates that 91 animals, including cattle, bison, and horses, died of anthrax. The outbreak began in mid-June and involved 28 farms in 6 counties in the northwestern part of the State. Before 2000, anthrax had not been diagnosed in any of these counties and had occurred primarily in southern areas of the State.

Among other suggestions, the Minnesota Board of Animal Health recommended that all cattle grazed in northwestern Minnesota be vaccinated against anthrax and that farm managers not graze livestock on previous anthrax sites or flooded land in anthrax-endemic areas.

Spores of *B. anthracis* can remain viable in the soil for many decades. Outbreaks of anthrax in

**TABLE 1: Vesicular stomatitis outbreaks**

	2004	2005	2006
States affected	3	9	1
Positive premises quarantined	294	445	13
Animals found positive	470	786	29
Bovine	63	202	12
Equine	405	584	17
Ovine	0	0	0
Camelid (1 llama, 1 alpaca)	2	0	0



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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 animal-health authorities.

## Viral Hemorrhagic Septicemia

VHS is an OIE-reportable disease that affects fish worldwide. VHS has long been considered a serious disease of rainbow trout and a few other cultured freshwater fish species in Europe. Known as “Egtved virus” in European fish populations, VHS virus causes high mortality and can have severe economic consequences.

Prior to 2005, four genotypes of VHS virus had been identified. Genotypes I, II, and III are found mainly in Europe and Japan, while isolates of genotype IV have been recovered only from fish in North America, Japan, and Korea. VHS virus was first reported in the United States in 1988 in spawning salmon in the Pacific Northwest. VHS is now endemic among Pacific herring and Pacific cod populations off the coast of Alaska, Canada, and Washington State. In the Atlantic Ocean, the virus has been isolated from Atlantic herring and Greenland halibut.

VHS was first detected in the Great Lakes region in the Bay of Quinte, Lake Ontario, in 2005 and was subsequently detected in an archived sample originally taken from Lake St. Clair in 2003. VHS virus also was detected from samples collected from a variety of fish species between 2005 and 2006 in lakes St. Clair, Ontario, and Huron and the St. Lawrence River. Since 2005, a number of large die-offs have occurred. These die-offs are being caused by a new, presumably mutated VHS virus type IV strain, referred to as strain IVb, which is affecting multiple genera of fish in new environments in Canada and the United States. VHS IVb is now

known to affect at least 23 freshwater species in the United States, including a number of ecologically and recreationally important fish. It is not known how VHS virus was transferred to the Great Lakes or how long it has been in the ecosystem. One possible scenario suggests the virus may have mutated from a marine form and become pathogenic to naïve freshwater fish species. A genotype of VHS IVb also has recently been reported in Atlantic coastal environments in Canada.

On October 5, 2006, VS received information regarding diagnostic surveillance activities from wild fish in the St. Lawrence River and subsequent testing via quantitative reverse-transcriptase–polymerase chain reaction (RT–PCR), which indirectly detects replicating viable virus. This information indicated that samples from channel catfish (*Ictalurus punctatus*) and Coho salmon (*Oncorhynchus kisutch*) were positive for VHS virus. VS presumed that these two species of great importance to U.S. aquaculture were now able to harbor the virus.

On October 24, 2006, the Administrator of APHIS issued a Federal Order that immediately prohibited the movement of 37 species of live fish into the United States from Ontario and Quebec, Canada, the two Provinces that reported VHS outbreaks. This order also prohibited the interstate movement of the same fish species from eight States (New York, Pennsylvania, Ohio, Michigan, Indiana, Illinois, Minnesota, and Wisconsin) that have reported occurrence of VHS or are at immediate risk of acquiring the disease.

Following stakeholder feedback, the Federal Order was amended on November 14, 2006, to allow for restricted movements under certain conditions out of the States affected by the original Federal Order. The basis for limiting this Federal Order to these States is that no VHS activity has been diagnosed or reported outside of the Great Lakes watershed or in any cultured populations of known susceptible species.

## Honey Bee Colony Collapse Disorder

University and Federal researchers, animal health officials, cooperative extension educators, and



## Contagious Equine Metritis

CEM is a foreign animal disease not present in the United States. It is caused by *Taylorella equigenitalis*, a highly contagious bacterium that is transmitted venereally. The CEM organism is transmitted by either carrier stallions or mares during breeding. Stallions show no signs of disease; thus, it is difficult to detect the carrier stallions based on physical findings alone. Though some mares may show no signs of disease, most will show clinical signs of acute purulent metritis and temporarily be infertile.

Transmission most commonly occurs during mating, but the bacteria may be transmitted in semen via artificial insemination or by fomites, such as contaminated instruments.

An outbreak in Kentucky in 1978 that devastated the Thoroughbred breeding industry, followed by an outbreak in Missouri in 1979, precipitated efforts to eradicate CEM within the United States.

In November 2006, two Lipizzaner stallions in Dane County, WI, were found to have CEM. The two stallions were imported from Germany in 2004 and had resided at an equine breeding and research facility in Dane County. These horses and 16 others kept at the home farm were immediately quarantined by the State Veterinarian. Exposed horses were tested; none was found positive for CEM. The stallions were treated for the *Taylorella* infection.

National surveillance of CEM is not conducted in the United States. Routine screening is standard, however, at U.S. CEM quarantine facilities in States approved by USDA to accept mares and stallions from CEM-affected countries. CEM is endemic in European Union countries (including Scandinavia), Japan, and Morocco. Evaluation of the reproductive tract is standard veterinary practice prior to purchase and as part of breeding soundness examinations. Several PCR tests have been developed and show promise because of high sensitivity for the CEM

industry representatives are investigating reports of a large number of honey bee colony die-offs in 2006. The condition known as CCD might be affecting honeybees across all of North America.

Currently no cause or etiology has been identified. CCD is characterized by the sudden loss of a colony's population of adult bees. In all cases, few, if any, adult bees were found in or near the dead colonies. In colonies that still have bees, small clusters were reported with evidence of a laying queen.

A diverse group of institutions—including the honeybee industry, USDA and other government agencies, researchers, universities, and State agriculture departments—has been formed to investigate the causes of the sudden losses and to develop management strategies and recommendations for beekeepers. Additional information and tentative recommendations for beekeepers experiencing CCD can be found at the CCD Web site at <http://maarec.cas.psu.edu/ColonyCollapseDisorder.html>.

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organism. The gold-standard method now includes test breeding, the complement fixation test, and bacterial cultures from swabs of the prepuce (and surface of the penis), fossa glandis, and urethral sinus of the stallion and the clitoral fossa and sinuses and cervix (when applicable) of the mare. However, a diagnostic lab must be experienced in this culture as the organism is difficult to grow and isolate. CEM is not a zoonotic disease and is not a concern to public health.

## Equine Herpesvirus Type 1

EHV-1 is primarily a respiratory pathogen associated with a variety of clinical manifestations in horses. In addition to being a significant cause of respiratory illness and abortion in horses, EHV-1 can cause paralytic neurological disease. EHV-1 is enzootic throughout the world, and almost all horses older than 2 years have been exposed to it. After an equid's initial exposure, EHV-1 can develop into an inapparent, latent infection. The virus' ability to reside as a silent and persistent infection in horses provides a reservoir of virus for continual transmission.

In recent years, increased numbers of cases of the neurologic form of EHV-1 have been reported, and high-profile outbreaks have occurred, affecting several sectors of the U.S. equine industry. These outbreaks are the first reported EHV-1 outbreaks at large facilities or events involving neurologic cases that resulted in euthanasia. The increased number of cases combined with the outbreaks at large facilities have raised concerns that the neurologic form of equine herpesvirus may be increasing in prevalence and/or morbidity and mortality and thus constitute an emerging disease in the United States.

Prior to 2003, reports of neurologic EHV-1 outbreaks in the United States were sporadic, with typically none to a few outbreaks identified annually. In 2005, six outbreaks of neurologic EHV-1 were reported in four States. In 2006, the number of reported outbreaks grew to 12 and involved 9 States. The outbreaks have been primarily concentrated in the Eastern United States, with a few Midwestern and Western States experiencing outbreaks.

The apparent increase of neurologic EHV-1 cases in the United States in recent years may be attributable to a strain of EHV-1 with a mutation that encodes for a particularly robust replicase enzyme. The result of this mutation is that the virus can reproduce rapidly with a predilection for nervous system tissue; therefore, the viremia occurs earlier, reaches a higher peak,

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Recent outbreaks of the neurologic form of equine herpesvirus have raised concerns that it may be increasing in prevalence and/or morbidity and mortality and thus constitute an emerging disease in the United States.

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and lasts longer. Beginning with the Ohio outbreak during January 2003, the progression of the disease in a population as well as in individual cases has been much more rapid than in the past.

Response to currently available vaccines for EHV-1 does not appear to be strong enough to protect all immunized animals against the disease induced by the mutated strain of EHV-1. In some outbreaks, such as the Ohio outbreak of 2003, well-vaccinated populations of horses have experienced severe disease outbreaks, and some animals have died. It is still unknown what factors are involved in the emergence and/or maintenance of the viral mutants. It is also unclear at this time what role the poor immunogenic response to the mutated strain is playing in the outbreaks that have occurred in recent years. In many of the reported outbreaks of neurologic EHV-1, the cases may not have been typed for the mutation, and there was not a standard case definition across the time period.

The question of whether neurologic EHV-1 is an emerging disease can be evaluated using standard definitions of disease emergence. A disease is considered to be "emerging" when it meets at least one of the following criteria:

- It is identified for the first time;

- It evolves and changes in virulence, host capable of being infected, or other pathogen behavior;
- It changes in geographic range or incidence within a range.

The current EHV-1 outbreaks appear to fit the criterion for a disease that is evolving and changing in virulence and behavior. It is possible, though, that the disease has not changed in incidence or character and that, instead, awareness of the disease has grown because testing and/or reporting has increased interest or the affected animals are higher profile.

Another factor that might be involved in the apparent increase of cases is horse movement, which could introduce the disease to new populations and lead to transport stress. Stress might suppress the immune system and allow the disease to express itself or the virus to reemerge from the latent phase.

More data are needed to evaluate whether the number and severity of cases actually are increasing. Variations in EHV-1 reporting requirements and case definitions make it difficult to identify the true number of cases accurately.

## Equine Viral Arteritis

EVA is an infectious viral disease of horses that causes a variety of clinical signs, most significantly abortions. The disease is transmitted through both the respiratory and reproductive systems. Many horses are either asymptomatic or exhibit flulike symptoms for a short period. An abortion in pregnant mares is often the first—and in some cases, the only—sign of the disease. EVA has been confirmed in a variety of horse breeds, with the highest seropositive rate found in Standardbreds.

In 2006, multiple outbreaks of EVA were detected in New Mexico and several other States. The situation began on a large quarter horse breeding farm in New Mexico with four breeding stallions. Significant pregnancy losses (up to 50 percent) prompted the owner to contact the M. H. Gluck Equine Research Center at the University of Kentucky. Specialists there suggested that EVA was a likely cause of the abortions. Laboratory testing confirmed serologic evidence of equine arteritis virus infection in 24 of 26 sera,

mostly from mares that had aborted. In addition, the equine arteritis virus was detected in semen samples from two of the breeding stallions. The New Mexico State Veterinarian was notified, and the farm was quarantined by the State.

Fresh-cooled semen collected from one of the breeding stallions on the index premises together with mares (both donor and recipients) that visited the premises during the same period were traced to premises in 18 States: Alabama, Florida, Indiana, Kentucky, Minnesota, Mississippi, California, Colorado, Idaho, Kansas, Louisiana, Missouri, Montana, Oklahoma, South Dakota, Texas, Utah, and Wyoming.

Upon testing, horses from six States showed recent infection with equine arteritis virus. Those States were Kansas, Montana, New Mexico, Oklahoma, Utah, and Alabama. Strongly suggestive but not confirmatory proof of recent infection with equine arteritis virus was found in horses in an additional four States (California, Colorado, Idaho, and Texas), each with one or more animals with epidemiologic links to the index premises in New Mexico and high antibody titers to the virus. No evidence of equine arteritis virus infection related to the shipped semen or mares that had visited the index premises in New Mexico was found in the nine remaining States (Florida, Indiana, Kentucky, Louisiana, Minnesota, Missouri, Mississippi, South Dakota, and Wyoming).

At the height of the occurrence, 8 premises, with a total of 428 horses, were under official quarantine in New Mexico. Additionally, 15 other New Mexico premises, housing some 653 equids, were placed under voluntary quarantine by the respective attending veterinarians and/or the premises owners. The last laboratory-confirmed evidence of equine arteritis virus infection on any premises in the State was July 29, 2006. Restrictions were lifted from all but one of these premises effective August 14, and the quarantine was lifted from the last premises in New Mexico on December 5, 2006.

In Utah, an estimated 591 horses on some 21 affected premises were quarantined. Of the known outbreaks of EVA, 14 (66 percent) were secondary/tertiary occurrences of the disease linked not directly to the New Mexico premises, but to the 7 affected

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premises in Utah that had direct exposure to the index premises in New Mexico. An additional 350 horses on 6 premises were also quarantined, but restrictions were lifted once absence of equine arteritis virus infection in these animals was confirmed. As of November 26, the quarantine had been removed from the last remaining known EVA-affected premises.

This outbreak increased awareness of a disease with significant financial repercussions, especially for the breeding sector of the equine industry.

The outbreak presented several important features:

- This was the first widespread dissemination of equine arteritis virus in quarter horses;
- Semen from one infected stallion readily spread the virus among an unprotected population;
- Movement of donor/recipient mares and the widespread practice of embryo transfer were recognized as important factors in the epidemiology of EVA;
- The intensive management of mares on many of the affected breeding farms facilitated virus transmission by the respiratory route; and
- The lack of a national program for prevention and control of EVA and differences among States in reporting hampered efforts to define more accurately equine arteritis virus spread in certain States.





CHAPTER 2



# Animal Health Initiatives

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This chapter focuses special attention on particular animal health initiatives, including the continuing development of the National Animal Identification System (NAIS) and the National Veterinary Accreditation Program (NVAP).

## NAIS

The Animal and Plant Health Inspection Service (APHIS) is charged with developing and implementing a practical, cost-effective, and reliable NAIS to complement and, when possible, consolidate animal identification programs nationwide. These efforts will enable animal health officials to respond more quickly and effectively to animal disease outbreaks and help producers in affected areas to take the measures necessary to protect their animals, their communities, and their livelihoods.

From its inception, the NAIS has been a State–Federal–industry partnership that has evolved to meet producer needs. That partnership continued to grow in 2006.

### The “NAIS Draft User Guide”

In late November 2006, APHIS released the “NAIS Draft User Guide,” the linchpin of 2006 NAIS outreach and the major programmatic document released that year. The Guide supersedes all previously published implementation plans and guidelines. It summarizes programmatic developments in NAIS that occurred throughout the year, provides practical “how to” information to producers interested in participating in the components of NAIS that are currently available, and outlines a proposal for integrating all three components of NAIS into a unified communications network for producers and animal health officials alike.

Since publication of the “Draft User Guide” on the NAIS Web site, APHIS has received several hundred comments from interested stakeholders. APHIS will continue to revise the Guide in order to respond to these comments. The NAIS Web site is available at <<http://animalid.aphis.usda.gov/nais>>.

### NAIS Program Update

NAIS has three components, all of which are voluntary at the Federal level: premises registration, animal identification, and animal tracing. Through NAIS, APHIS’ ultimate, long-term goal is to have the capacity to identify all premises and animals that have had contact with a foreign animal disease (FAD) or domestic animal disease of concern within 48 hours after its discovery.

**Premises Registration**—Registering premises, or locations where livestock are housed or kept, is key to providing animal health officials with the information they need to conduct disease investigations quickly and efficiently. Indeed, without a solid baseline of premises registered, APHIS’ goal of 48-hour traceback cannot be met. For this reason, States, tribes, and territories devoted much of 2006 to registering premises within their regions. By the end of January 2007, more than 350,000 premises had been registered within 50 States, 5 tribes, and 2 U.S. territories. This represents slightly more than 25 percent of the estimated number of premises nationwide.

**Animal Identification**—In 2006, APHIS established guidelines for animal identification devices that would be used within the NAIS. These guidelines ensured that any approved device would be referenced to an animal identification number (AIN), would be easily readable and have a high



retention rate, and would be imprinted with the U.S. shield. Later in the year, APHIS began to approve such devices in response to multiple applications from manufacturers. By the end of 2006, five different devices from three different manufacturers had been approved for program use in cattle, cervids, bison, swine, sheep, and goats. All five devices were low-frequency, radio-frequency identification eartags.

In October 2006, APHIS also announced that distribution records for animal identification devices would no longer be held on USDA's AIN Management System database but, instead, on animal identification device distribution databases (ADDDs) operated by States or private companies. State and Federal animal health officials will have access to the records held on these databases only when necessary, based upon the same criteria for access as with animal movement records.

Following this announcement, APHIS worked extensively with industry to develop these databases, and deployment of the ADDDs is expected in 2007. APHIS believes this decision will ultimately encourage participation in the voluntary animal identification component of NAIS by enhancing the confidentiality of producer information. At the end of 2006, more than 1 million NAIS-approved animal identification devices had been distributed for use in the United States.

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The National Animal Identification System will enable animal health officials to respond more quickly and effectively to animal disease outbreaks and help producers in affected areas take the measures necessary to protect their animals, their communities, and their livelihoods.

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**Animal Tracing**—In keeping with APHIS' commitment that NAIS be a true Federal–State–industry partnership, the Secretary of Agriculture announced that, under the NAIS, animal movement tracing information could also be held in databases maintained by the States. This was in addition to databases already being maintained by industry.

### **NAIS Outreach**

APHIS initiated another NAIS communications campaign in May 2006. This campaign focused on encouraging livestock producers and related stakeholders to register their premises. The campaign was implemented in conjunction with State and Tribal Animal Identification Coordinators and included proven research steps, strategies, tools, and tactics.

The program kickoff was held October 31–November 1, 2006, at a 2-day briefing and media training event in Kansas City. This event provided a venue for all partners in the NAIS community outreach effort to learn the strategic direction of the campaign, obtain tools for encouraging premises registration, share information, and learn from each other.

Other highlights of NAIS outreach for 2006 are described below:

- The NAIS Web site was redesigned to improve its visual appeal and to make the content, especially premises registration information, more easily accessible.
- Species-specific premises registration brochures were developed for six major species industries (beef cattle, dairy cattle, poultry, swine, equine,





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and cervid), and more than 300,000 brochures were distributed.

- Premises registration drives, in coordination with industry and State representatives, were conducted at events such as the 2006 World Pork Expo and the 2006 World Dairy Expo.

## NVAP

The NVAP was instituted in 1921 by APHIS–Veterinary Services to foster collaboration among private veterinarians, Federal and State animal health officials, and colleges of veterinary medicine. The goal is to ensure the overall health of the U.S. livestock and animal population while preventing the introduction of exotic disease agents.

The responsibilities of NVAP are to:

- Develop the first line of surveillance for reportable domestic and foreign animal diseases,
- 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.

Until 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. Also, countries to which the United States exports are seeking greater oversight on exported animals and animal products. Therefore, the NVAP is being enhanced to provide accredited veterinarians with the tools needed to meet U.S. disease-prevention, preparedness, oversight, and response challenges.

The new enhancements 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 Category I would be authorized to perform accredited duties on nonregulated animals—animals other than food and fiber animals, horses, farm-raised fish, poultry, all other livestock, birds, and zoo animals that could transmit exotic animal diseases to livestock—and will be required to complete three supplemental training modules every 3 years. Category II veterinarians will be required to complete six supplemental training modules for equids, food animals, and companion animals every 3 years. Veterinarians accredited at the Category II level will be authorized to perform accredited duties on nonregulated and regulated animals.

Other key elements being implemented as part of the new NVAP include

- Opportunity for participating veterinarians at the Category II level 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.

eVAP—the Electronic Veterinary Accreditation Program—is a module within the Veterinary Services Process Streamlining (VSPS) Web-based information system and was deployed in 2006. eVAP allows veterinarians to apply for accreditation and update their contact information. The VSPS system offers an online single-access point for electronic forms, applications, and certification processes required for interstate or international movement of animals and animal products. Other VSPS modules include the Interstate, Import, and Export programs. The VSPS–Interstate module allows accredited veterinarians to access State regulations, print hard-copy certificates of veterinary inspection (CVIs), transmit electronic CVIs directly to State officials,

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attach test charts and vaccination records, transmit “sighting” information to the NAIS, and interface with the national premises repository.

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 animal 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.







CHAPTER 3





# National Animal Health Surveillance System (NAHSS)

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The NAHSS was designed to integrate existing animal-health monitoring programs and surveillance activities into a comprehensive and coordinated system. NAHSS, coordinated by Veterinary Services' (VS) National Surveillance Unit (NSU), 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 disease outbreaks and identify cases of endemic disease.

The strategic plan for national animal-health surveillance—established in 2004 by the NAHSS Steering Committee, the National Surveillance Coordinator, and the NSU—outlined 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.

The NAHSS Strategic Plan is available on the Web at [http://www.aphis.usda.gov/vs/nahss/docs/NAHSS\\_Strategic\\_Plan\\_2005\\_0216.pdf](http://www.aphis.usda.gov/vs/nahss/docs/NAHSS_Strategic_Plan_2005_0216.pdf).

Since the inception of the NAHSS, substantial strides have been made to enhance the system's effectiveness in achieving its animal-health surveillance goals. This chapter describes in detail several of the products, functions, and surveillance plans that have been developed to meet the four strategic goals.

In 2006, the NSU collaborated with multiple units at the Centers for Epidemiology and Animal

Health (CEAH) to develop the first version of the Surveillance and Data Standards for VS. The manual provides standards and guidelines for the construction and operation of a surveillance system and represents an essential element of the NAHSS. A primary objective of the NAHSS is to provide greater protection from endemic, emerging, and foreign animal diseases through enhanced information. Standardization will help introduce consistency in the way data are collected, stored, and made available and will streamline the integration of a vast number of data sources from multiple entities and locations.

The standards establish a foundation for building surveillance and data-management systems that better ensure integration and aggregation of surveillance data to facilitate analyses that will inform decisionmakers.

Appendixes included with the document provide specific codes for commonly used data classes, including diseases and conditions, species, and breeds. Revisions, additions, and updates to the

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The strategic plan for the National Animal Health Surveillance System lists objectives regarding foreign animal diseases, including enhancing domestic and global surveillance to identify elevated risks and encouraging the development and application of new technologies for early and rapid disease detection.

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standards will be ongoing, and new versions of the document will be released periodically.

## 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 the current status for each is provided in chapter 4.

### FAD Surveillance and Programs

An FAD is defined as a transmissible livestock or poultry disease believed to be absent from the United States and its territories that has a potential significant health or economic impact. The Animal and Plant Health Inspection Service (APHIS) works with State animal-health officials and veterinary professionals to identify, control, and eradicate these animal diseases and diminish their impact.

### FAD Surveillance and Investigations

The NAHSS strategic plan contains specific objectives regarding FADs. 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.

Efforts to detect FAD events in the United States include surveillance in disease-specific programs, reporting by producers and private veterinarians, and field investigations conducted by specially trained Federal, State, and private accredited veterinarians. In addition, detection efforts include State diagnostic laboratory surveillance, in which routine cases that are subsequently considered "suspicious" for FADs by specially trained laboratory diagnosticians are reported to Federal and State animal health authorities for further investigation.

The National Animal Health Laboratory Network (NAHLN) was developed to screen routine and specific-risk samples for FADs. More detailed information on the NAHLN is provided in chapter 5.

From 1997 through 2006, the number of investigations per year ranged from a low of 254 in 1997 to a high of 1,013 in 2004 (fig. 1). The high number of investigations in both 2004 and 2005 reflects the occurrence of a widespread vesicular stomatitis outbreak. In 2006, a vesicular stomatitis outbreak that was much smaller and more localized occurred.

In 2006, APHIS conducted 491 investigations of suspected FADs or emerging disease incidents in 45 States, Puerto Rico, and the U.S. Virgin Islands (table A2.1 in appendix 2). Tennessee and Texas reported

the most investigations (46 and 47, respectively). Eleven of Tennessee’s investigations and 28 of Texas’ investigations were in response to a vesicular stomatitis outbreak that ultimately was identified only with positive vesicular stomatitis samples from animals in Wyoming. Twenty-eight other States, and Puerto Rico, conducted five or more FAD investigations in 2006. Most of the cases suspected of being FADs are first reported by private veterinary practitioners and livestock producers.

Of the 491 investigations conducted in 2006, 12 resulted in a confirmed FAD finding with all 12 diagnosed positive for vesicular stomatitis. Early identification and quick response ensured that the FAD investigations were resolved, minimizing further spread.

In 2006, vesicular conditions (painful, blisterlike lesions) of the muzzle and feet were the most common complaint investigated. There were 305 vesicular complaints: 204 in equids (horses, donkeys, and mules), 60 in cattle, 20 in goats, 11 in sheep, 5 in pigs, 1 in a bison, and 1 in a hedgehog (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. The 2001 FMD outbreak in the United Kingdom demonstrated the rapidity of disease spread and its devastating effect on the livestock population in that country.

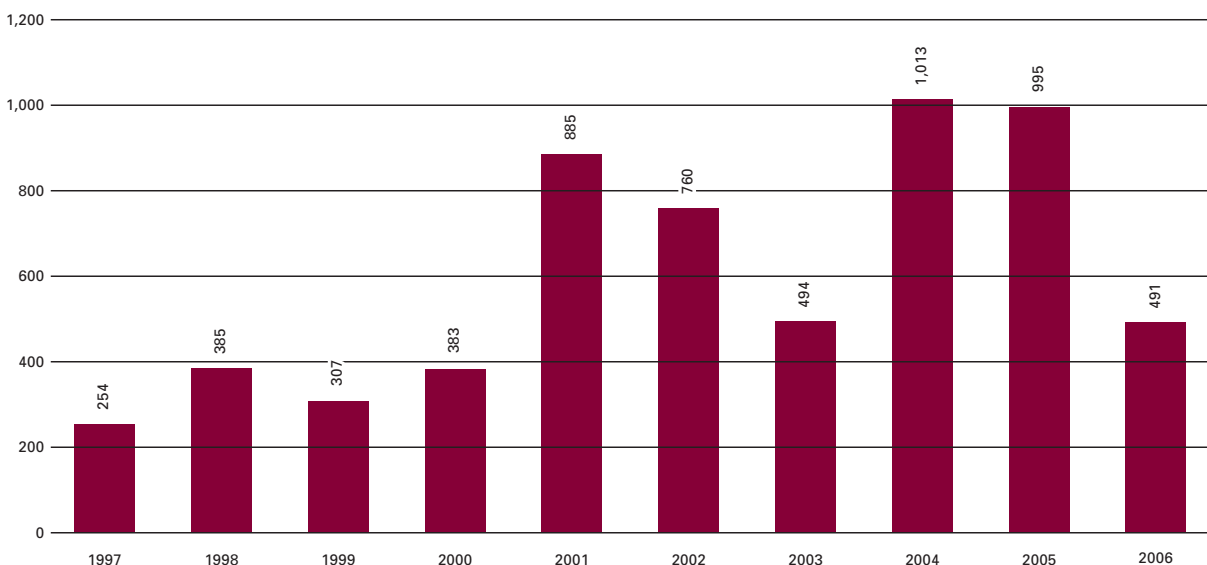
### Surveillance in Disease-Control Programs

APHIS conducts surveillance specifically for avian influenza (AI), bovine spongiform encephalopathy (BSE), exotic Newcastle disease (END), infectious salmon anemia (ISA), cattle fever ticks, classical swine fever (CSF), tropical bont ticks (TBTs), and screwworm to improve detection of disease and to document that the United States is free from these specific diseases. Brief descriptions of the programs’ surveillance are provided below.

### National Poultry Improvement Plan (NPIP)—

Through participation in the voluntary 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

**FIGURE 1: Number of investigations into possible foreign animal diseases and emerging diseases, by year, 1997–2006.**



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operations—and many multiplier poultry-breeding operations—are monitored for the organisms that cause 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*. NPIP also monitors breeder flocks as well as commercial meat and egg production flocks for AI.

**AI Surveillance**—The ongoing outbreaks of highly pathogenic AI (HPAI) subtype H5N1 in Asia, Europe, and Africa have focused increased attention on AI surveillance in the United States. Due to heightened animal- and human-health concerns, the poultry industry and State and Federal animal health regulatory agencies are making concerted efforts to increase biosecurity measures and conduct extensive surveillance for HPAI as well as H5/H7 low-pathogenic AI (LPAI) in commercial poultry, live-bird markets, and poultry raised in nonconfinement operations.

APHIS has partnered with other Federal and State agencies and the commercial poultry industry in conducting surveillance efforts for notifiable avian influenza (NAI) for many years. In 2006, APHIS conducted a comprehensive review of its AI surveillance efforts that included a thorough description, summary, and analysis of surveillance that has been successful in identifying AI early in previous outbreaks. Concurrently, throughout 2006 APHIS implemented strategies to strengthen existing NAI surveillance where necessary.

The surveillance plan resulting from the review focuses on early detection of HPAI, including Asian HPAI H5N1 viruses, as well as low-pathogenic NAI viruses that pose a risk of mutating into forms that may cause more-devastating disease. This plan can be viewed on the Web at <[http://www.aphis.usda.gov/vs/nahss/poultry/ai/avian\\_influenza\\_surveillance\\_plan\\_062907.pdf](http://www.aphis.usda.gov/vs/nahss/poultry/ai/avian_influenza_surveillance_plan_062907.pdf)>.

Four methods of surveillance are conducted in domestic poultry: passive surveillance, active observational surveillance, active serologic surveillance, and active antigen surveillance. The AI surveillance plan addresses the following

populations: the large-volume commercial poultry industry, the small-volume but high-value commercial poultry industry, the live-bird marketing system (LBMS), and backyard poultry flocks. These categories are based primarily on risk of disease introduction and the level of management practices and commercial characteristics. Nonpoultry populations, including migratory waterfowl and zoo or exhibition birds, also are included in the plan.

In addition, in partnership with the U.S. Department of the Interior's U.S. Geological Survey and U.S. Fish and Wildlife Service, APHIS monitors wild birds for AI. APHIS is continuing to implement actions to further increase surveillance sensitivity and ensure rapid and efficient detection of future outbreaks of AI.

**AI Surveillance Data**—NSU and other units at CEAH developed a Web site ([www.aphis.usda.gov/vs/nahss/poultry/index.htm](http://www.aphis.usda.gov/vs/nahss/poultry/index.htm)) that presents summary surveillance data collected from various avian health surveillance systems. APHIS works closely with States and the commercial poultry industry to monitor and test domestic poultry for AI. One such industry partner is the National Chicken Council, which represents the U.S. broiler industry and conducts rigorous testing for AI. The Council's Avian Influenza Monitoring Plan focuses on extensive private laboratory testing in which every participating company tests all broiler flocks before slaughter. That regimen exceeds the minimum national standards established by the U.S. Department of Agriculture (USDA) for AI surveillance. Companies participating on the Council account for 98 percent of U.S. broiler production.

APHIS collaborates with the Council to maintain secure data-reporting systems that allow its testing data to be used in national AI surveillance. This information also demonstrates to international partners that U.S. AI surveillance ensures the safety of poultry exports to other countries.

**Commercial Industry Program**—In 2000, APHIS published its final rule for a U.S. Avian Influenza Clean classification for primary egg- and meat-



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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 37<sup>th</sup> biennial conference ratified the addition of a provision in the Code of Federal Regulations (final rule published September 26, 2006) that provides for participation by commercial table-egg layer, broiler, and meat-turkey operations. The code contains provisions for U.S. H5/H7 LPAI-monitored classification for participating flocks and slaughter plants.

The increased AI surveillance continued to show that the United States remained free from H5 and H7 subtypes in commercial poultry in fiscal year (FY) 2006.

**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 identified in the LBMS. In October 2004, APHIS published uniform standards for H5 and H7 LPAI to establish a more consistent approach to controlling LPAI in the LBMS. States that volunteered to participate in the program enacted regulations to ensure compliance within their LBMS, including producer, distributor, and retail market components. APHIS provides training to State and Federal animal health technicians, veterinary medical officers, and other stakeholders working with the H5/H7 LPAI Program in the LBMS.

In FY 2006, 101,435 samples from 12 States (Connecticut, Florida, Georgia, Massachusetts, Maine, Missouri, North Carolina, New York, Pennsylvania, Texas, Virginia, and Vermont) were tested for the presence of AI antibodies on agar gel immunodiffusion. In addition, 24,455 samples (each sample representing up to 5 individual swabs pooled for a composite single sample) from 7 States (Massachusetts, Maryland, Maine, New Jersey, New York, Pennsylvania, and Texas) were tested for the presence of AI virus by virus isolation. Further, 19,857 tracheal/oral pharyngeal

swab samples (each sample representing up to 5 individual swabs pooled for a composite single sample) from 15 States were submitted to be tested for the presence of AI virus by reverse-transcriptase–polymerase chain reaction (RT–PCR). The States were Connecticut, Delaware, Florida, Massachusetts, Maryland, Missouri, North Carolina, New Jersey, New York, Ohio, Pennsylvania, South Carolina, Texas, Virginia, and Vermont. In addition, 31,786 birds were sampled in California through the California Avian Health Program, which included testing of birds in backyard flocks and at auctions, swap meets, and live-bird markets. All positive specimens were submitted to the National Veterinary Services Laboratories (NVSL) for confirmation.

Of the 8,437 specimens submitted to NVSL, either directly or for confirmation, the H7N2 virus was isolated from 134. In addition to H7N2, the H5N2 subtype AI virus was isolated from three specimens, as well as an H5N8 and H5N? subtype of AI virus. Pathogenicity of representative H5 and H7 AI virus isolates was determined by the chicken pathogenicity test and amino-acid profile at the hemagglutinin cleavage site; all viruses were of low pathogenicity.

A marked decline in the incidence of LPAI viruses in the LBMS in the United States, particularly in New Jersey and New York, may be due to recent efforts by APHIS, the States, and producers. In New Jersey's retail live-bird markets, of the 189 sampling visits (test events) to 36 markets in FY 2006, only 2 markets were positive at least once, compared to 23 markets positive in FY 2005. In the New York live-bird markets, of the 884 sampling visits to 100 markets in which more than 12,000 pooled samples were collected, only 18 markets were positive at least once during FY 2006, compared to 40 markets positive in FY 2005.

**Biosecurity for Birds Program**—The Biosecurity for Birds outreach and education program was established in response to the END outbreak of 2002–03 and continued in 2006. One of the major accomplishments was a series of four stakeholder briefings held during the fall of 2006 in Georgetown, DE, Tacoma, WA,



Madison, WI, and Gainesville, GA. The briefings, which received widespread local media coverage, covered steps taken at the Federal, State, and local levels to address HPAI should it be discovered in domestic poultry or wild bird populations. APHIS again collaborated with the national FFA organization and 4-H to distribute information at more than 160 county and State fairs throughout the year.

To reach the program's target audience, feed sacks with information about biosecurity for birds were distributed nationwide. 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 a biosecurity guide, a calendar, brochures, posters, giveaways, displays, videos, and a Web site: <<http://www.aphis.usda.gov/vs/birdbiosecurity/hpai.html>>.

Materials were distributed at State and county fairs, poultry shows, veterinary conferences, universities, and 4-H meetings. Two mailings with order forms for informational products were sent to backyard poultry owners, using National Agricultural Statistics Service (NASS) mailing lists (131,000 for each mailing), resulting in a return rate of close to 10 percent. Additionally, more than 50 countries around the world have requested information about the campaign.

**END**—The development of a national END surveillance system began in late 2003. The two primary goals of END surveillance are to (1) facilitate

early detection of END, should it occur in commercial or noncommercial poultry populations across the United States; and (2) identify at-risk populations to enhance targeted surveillance activities. Surveillance relies on owners' reporting sick birds and on vigilant scrutiny for illegally imported birds at our borders.

**END Surveillance in 2006**—The NVSL has approved 30 laboratories to perform real-time RT-PCR assays for END virus. Surveillance is conducted by testing samples from the LBMS, shows, and fairs as well as samples submitted to diagnostic laboratories. Under the program, 7,449 specimens from 26 States were tested for END in FY 2006, with all test results negative. In addition, the California Avian Health Program tested about 100,000 birds for END in California. That program included commercial, noncommercial, and live-bird market testing.

**BSE Surveillance**—When veterinarians examine cattle and find central nervous system (CNS) signs, such as changes in temperament, abnormal posture, and ataxia, BSE is one of the differential diagnoses of concern. APHIS has conducted surveillance for BSE since 1990. From June 2004 through August 2006, APHIS conducted an enhanced surveillance effort. It was designed to estimate the level of BSE present in the national herd and provide input for designing a long-term surveillance plan.

Using data from surveillance efforts over the past 7 years—including the period of enhanced surveillance—APHIS completed an estimate of the prevalence of BSE in the United States. This analysis concluded that BSE is likely to occur in this country at extremely low levels, less than 1 case per million adult cattle, and that the most likely number of cases is between 4 and 7 infected animals out of 42 million adult cattle.

In August 2006, USDA began transitioning to ongoing surveillance that is more commensurate with the extremely low level of risk in the United States yet continues to exceed surveillance guidelines set by the World Organization for Animal Health (OIE).

Ongoing surveillance in the BSE program will sample roughly 40,000 animals each year from the cattle populations where the disease is most likely

to be found. The targeted population for ongoing surveillance focuses on cattle exhibiting signs of CNS disorders or any other signs that may be associated with BSE, including emaciation or injury. Dead cattle, as well as nonambulatory animals, will also be targeted. Healthy slaughter animals are not included in the sampling because the likelihood of detecting BSE in them has been shown to be extremely low. Therefore, this population includes three of the four surveillance streams as recommended by OIE.

Data collected from the 40,000 samples will exceed the 7-year cumulative number of points to qualify as Type A surveillance per Article 3.8.4 of the OIE Code. Further, this level of sampling allows the United States to assess any change in the BSE status of U.S. cattle, and identify any significant rise in BSE prevalence in this country.

**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.

During the initial 2-year period, disease-control standards were developed and published as final standards. Biosecurity was identified as 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.

Surveillance is a mandatory activity at all Maine aquaculture sites where salmon are raised and is performed by the site veterinarian at a frequency dictated by the ISA status of the site but at least monthly. These inspections 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 with the salmon 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, recommend 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 (DMR), continued through 2006. In 2006, the Eastport, ME, area received over 3 million smolts on 6 sites, at least twice as many fish as in earlier stockings under USDA oversight. In 2006, 807 samples were collected during 95 inspections at 13 cage sites (table 2). These samples bring the total number collected to 11,343

**TABLE 2: ISA inspections**

	2002	2003	2004	2005	2006	Total
Samples	1,963	3,187	3,933	1,453	807	11,343
Inspections	189	369	387	178	95	1,218
Site audits	22	21	13	11	12	79
Vessel audits	8	11	0	2	0	21
Cages confirmed positive	0	5	17	19	1	42
Confirmed cages removed	0	5	17	19	1	42
Newly confirmed sites	1	2	6	0	1	10
Previously confirmed sites	0	0	1	5	0	N/A
Sites in water	20	23	21	12	13	N/A

during 1,218 inspections throughout the program. Twelve site audits were conducted, for a total of 79 audits conducted during the program.

In 2006, there was a single newly confirmed site with ISA. Only one cage was confirmed positive for ISA on this second-year site (January–February 2006), and that cage was immediately removed. By the end of 2006, 4 different genotypes of the virus that causes ISA had been detected in Maine; all of these had also been identified in New Brunswick, Canada, which has detected a total of 15 genotypes.

A new bay management strategy was implemented in 2006, based on hydrographic exchange during a single complete tidal cycle and encompassing all of the Maine and New Brunswick sites in the immediate vicinity of Eastport. As of early spring, no ISA disease had been detected in the newest-year classes (2006–07).

The APHIS Eastport, ME, ISA staff published findings from several epidemiologic ISA studies in 2006. Topics included the identification of husbandry and spatial variables important to ISA outbreaks on Maine farms, evaluation of the efficacy of emamectin benzoate in the treatment of sea lice (a potential vector for ISA virus), and the importance of bilateral program harmonization to the efficient and successful control of ISA in Maine and New Brunswick.

USDA is currently sharing surveillance costs evenly with the Maine DMR and the salmon industry.

**Cattle Tick Surveillance**—The Cattle Fever Tick Eradication Program began in 1906 with the objective of eradicating endemic 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 immunologically 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.

Sixty-one 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 2006, eradication personnel apprehended 97 stray and smuggled animals (42 cattle and 55 horses) from Mexico, 28 of which were infested with fever ticks. In FY 2006, 65 new premises were found to be infested with fever ticks, with 50 premises located inside the quarantine zone and 15 premises located outside it. In comparison, 117 total infestations were detected in 2005, with 78 premises located inside the quarantine zone and 39 premises located outside it (table 3).

**TABLE 3: Cattle tick surveillance**

	2004	2005	2006
Premises infested	94	117	65
Premises infested outside quarantine zone	20	39	15
Animals apprehended	60	35	97
Apprehended animals infested	21	9	28

While the 2006 figures seem to represent a 35-percent decrease in the quarantine zone infestations over 2005 levels, an analysis of changes in cattle population density in the area between 2005 and 2006 conveys a different story. A cattle population-density study revealed that between 2005 and 2006, there was a substantial decrease across all work areas in both the number of cattle herds (down 41 percent) and the total number of cattle (down 45 percent) present within the quarantine zone. The decrease means fewer herds are available to become infested in the quarantine zone. Consequently, the level of infestation within the quarantine zone in FY 2006

was effectively about the same as in FY 2005 despite the decrease in the actual number of infestations.

Although fever-tick infestation rates tend to spike cyclically over a period of several years, the current infestation rates within the quarantine zone in both 2005 and 2006 are higher than have ever been recorded. There is an apparent increase in the maintenance of ticks on wildlife—most notably on white-tailed deer and nilgai.

**TBT Surveillance**—The TBT, *Amblyomma variegatum*, is an important vector of *Cowdria ruminantium*, which causes heartwater disease in ruminants, and of *Dermatophilus congolensis*, which causes dermatophilosis. The TBT was first reported on six adjoining farms at the western end of the island of St. Croix, U.S. Virgin Islands, in 1967. The number of TBT-infested farms had increased to 11 by March 1968. The U.S. Virgin Islands Department of Agriculture (USVIDOA) began an aggressive eradication effort, and in 1972 St. Croix was declared free of the TBT. However, free status lasted only 15 years.

In an attempt to eradicate the TBT in St. Croix again, USDA–APHIS–VS entered into a cooperative agreement with USVIDOA in 2003. A program was designed to attain eradication in 24 months. It began with an 18-month period that involved spraying all susceptible animals with the acaricide Coumaphos.<sup>®</sup> The treatment phase was followed by a 6-month surveillance period. Confirmation of complete eradication was to be done through continued surveillance activities on infested and later vacated premises (cleared of all susceptible host livestock) for a period after the last tick was seen.

The TBT program on St. Croix started on October 1, 2004. On July 26, 2006, 11 premises in the quarantine zone had been identified as infested, or had been infested and were still under the 3-year quarantine, with the TBT on livestock or horses. Currently, nine of these premises are vacated; a few of these have been vacated for almost 3 years. Based on the biology of the TBT, vacating pastures for 3 years after the last tick is seen is the recommended waiting period before pastures can be populated again. A new infestation was discovered in the buffer zone of the island. The source of this TBT

infestation was traced back to hand-cut grass that had been taken from roadsides and vacant garden grounds in the quarantine zone and into the premises in the buffer zone.

The current APHIS–VS eradication and surveillance efforts are funded through December 31, 2007.

**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. Before eradication in the United States (1966 in the Southwestern United States), screwworms were an important pest of U.S. livestock, with annual livestock production losses estimated at about \$750 million.

A permanent barrier for screwworm prevention was established along with the permanent barrier for FMD in the Province of Darien and the provincial-level comarca of Kuna Yala in Panama. The goal to eradicate screwworm in the United States, Mexico, and Central America has been realized with the establishment of this barrier 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.

NVSL personnel perform identifications for suspected screwworm infestations in the United States. Table 4 lists the number of submissions NVSL received for myiasis and suspected screwworms from 2001 through 2006.

**TABLE 4: Screwworm submissions tested by NVSL**

Year	Number of Submissions	Number of Positives
2001	161	0
2002	102	0
2003	74	0
2004	74	0
2005	49	1
2006	44	0



**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.

The comprehensive surveillance plan for CSF is an example of objectives-based surveillance developed according to the surveillance standards of the NSU. The plan is available on the CSF surveillance Web site at <<http://www.aphis.usda.gov/vs/nahss/swine/csf/index.htm>>.

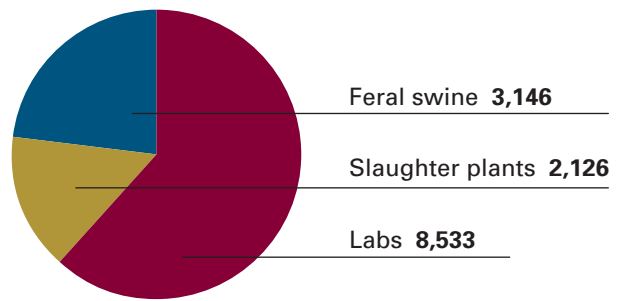
Implementation of this plan began in early 2006. Training was conducted via Web casts and distribution of the CSF Surveillance Manual. Only through the cooperation of State, tribal, and Federal Government agencies with producers and private practitioners can we hope to rapidly detect any incursion of CSF into the United States and mitigate the dramatic impacts of a large-scale outbreak.

In 2006, VS implemented several surveillance systems designed to rapidly detect the introduction of CSF virus into the United States. The first is a reporting system through which private practitioners, producers, diagnosticians, and slaughter inspectors report animals that display clinical signs similar to those of CSF. In 2006, there were 24 swine cases reported and investigated, 20 of which were in CSF high-risk States.

A cooperative agreement was established with industry associations and Iowa State University to develop the CSF awareness campaign to enhance the effectiveness of the CSF surveillance system. Publication materials to increase awareness of the surveillance activities in the CSF program were created with the ultimate goal of increased reporting of suspicious cases.

CSF surveillance activities in 2006 centered on implementation of the laboratory-based surveillance program via the NAHLN. Nasal swabs and tonsil specimens from sick pigs were submitted to the NAHLN for CSF testing, using real-time RT-PCR. Domestic specimens were collected at 14 participating veterinary diagnostic laboratories and 11 slaughter plants; other specimens were collected from feral pigs by 18 APHIS–Wildlife Services biologists. In all, 13,805 specimens were collected—8,533 from labs, 2,126 from slaughter plants, and 3,146 from feral swine (fig. 2). There were 7,948

**FIGURE 2: Number of samples tested for CSF in 2006.**



nasal swabs and 5,823 tonsil specimens tested for CSF in 12 NAHLN labs. All specimens tested were negative.

### **New Surveillance Plans and Evaluations**

To fulfill the objectives of the NAHSS, the NSU develops and enhances animal health surveillance by evaluating existing surveillance, designing new surveillance systems, and integrating surveillance conducted by various partners into national systems. This section highlights some of the surveillance planning and evaluation efforts of 2006.

**Bovine Brucellosis Surveillance**—The primary rationale for brucellosis eradication is the economic benefits to the cattle industry and consumers of its products. The first campaign to control brucellosis in the United States began in 1934. By 1954, a comprehensive State–Federal brucellosis eradication program was launched.

In 2006, APHIS initiated a review of existing bovine brucellosis surveillance activities and began developing a plan for a more efficient, cost-effective surveillance system for the brucellosis eradication program. The detected number of brucellosis-affected cattle herds in this country has substantially declined since the eradication effort began. States are designated brucellosis free when none of their cattle or bison is found to be infected, under active surveillance in accordance with the program’s Uniform Methods and Rules, for 12 consecutive months. In the United States, 48 States are classified as brucellosis free. Of the 48 States, 38 have remained in that classification for 10 or more years, and

22 of those States have remained in the “class-free” category for 20 years or more. In most respects, the intensity of surveillance has remained at the same level for more than 20 years.

An APHIS-appointed working group consisting of VS representatives, State Veterinarians, and cattle industry representatives is conducting the surveillance planning and implementation efforts. The working group is reviewing current levels of surveillance for bovine brucellosis in beef and dairy cattle, risk-factor assessments, cost–benefit analyses of current testing and surveillance protocols, laboratory processes, methods for tracing infected animals, and determination of statistical standards for brucellosis surveillance. The group has identified several goals, including reducing redundancies of sampling, balancing the intensity of surveillance between dairy and beef cattle, maintaining current surveillance activities (i.e., slaughter surveillance and brucellosis ring testing), and maintaining a high degree of protection against bovine brucellosis. The group’s recommendations are expected to be phased into operation beginning in FY 2008.

With the majority of the United States considered free of bovine brucellosis, transmission risk of this zoonotic disease from wildlife to cattle and cattle to wildlife is low, with the exception of the brucellosis reservoir in the Greater Yellowstone Area (GYA).

In the GYA, brucellosis in bison and elk presents a risk to livestock. This risk is monitored through multiagency jurisdictional management agreements. A number of Federal, State, and nongovernmental organizations focus on the long-term risk management of, surveillance for, and eventual elimination of brucellosis in elk and bison while maintaining the health of cattle herds in and around the GYA.

**Vesicular Disease Surveillance**—In 2006, vesicular disease surveillance in the United States was reviewed by the NSU. While the longstanding passive surveillance system has been successful, today’s globalization trends warrant some modification to ensure continued success in excluding vesicular diseases from this country. The design of a national surveillance plan that

enhances existing infrastructure and integrates new surveillance components will be completed in 2007.

### **Viral Hemorrhagic Septicemia (VHS)**

**Surveillance**—The recent emergence of VHS virus IVb, which causes an OIE-reportable disease, in freshwater fish in the Great Lakes region prompted the Canadian Food Inspection Agency (CFIA), USDA, and U.S. Fish and Wildlife Service (FWS) to task the collaborative development of a bilateral VHS virus surveillance plan. A working group including representatives from these organizations and the bilateral Great Lakes Fish Health Commission was convened in November 2006 to structure a surveillance approach to support risk assessment and management decisions for harmonized use in aquaculture and wild freshwater systems of both the United States and Canada.

A growing number of fish species, and consequently a wide range of industries, are susceptible to clinical or economic impacts of VHS virus IVb. Freshwater industries at stake include commercial and government producers of fish moved live for consumption, bait, sport, feed, or stock enhancement. Because freshwater fish industries move live fish extensively, whether for brood stock, feed, or final use, the current and future distribution of the virus could potentially extend well beyond the Great Lakes. The goals of this surveillance effort are to efficiently and effectively (1) evaluate the current distribution of VHS virus in both aquaculture





and wild susceptible freshwater fish populations of the United States and Canada and (2) implement a surveillance framework to facilitate detections of future VHS virus outbreaks.

The scope of the effort includes any strain of VHS virus from wild or cultured fish populations; however, only freshwater systems will be sampled. Surveillance methods that juxtapose diagnostic testing data with alternative complex data sources (e.g., expert opinion and observational surveillance) will be considered. Planning and development are continuing. CFIA and the FWS will begin implementing various stages of the plan in 2007.

**Pseudorabies Surveillance**—A comprehensive surveillance plan for pseudorabies virus (PRV), specifically for rapid detection of PRV introduction into commercial swine, is under development and expected to be completed in 2007. Although pseudorabies has been eradicated from commercial production swine, it is still endemic in feral swine and can 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. Reintroduction of PRV into commercial swine would most likely occur via either direct exposure to free-roaming feral hogs, indirect exposure to wild boar at hunting clubs, or exposure to transitional swine infected by feral swine.

Several surveillance activities are being employed. First, as with other FADs, is a passive surveillance system for reporting of suspicious cases. Second is the laboratory-based surveillance of submissions that feature high mortality in pigs, CNS symptoms in suckling pigs, abortions, and other signs of reproductive failure. This system will be integrated into the NAHLN surveillance program for CSF (i.e., same laboratories, same cases, different PCR test used). In addition, serum samples submitted to the five swine-predominant diagnostic laboratories will be selected from respiratory cases, or from serum routinely submitted for sero-profiling or for determining PRV-monitored herd status for PRV surveillance testing.

Herds shipped interstate from counties with feral swine will be eligible for postmovement testing. Herds will be sampled based on risk of exposure to feral swine. In States that have relatively few counties with feral swine, the population under surveillance will be herds raised on outdoor production facilities in counties adjacent to commercial farms. Onfarm PRV testing will be conducted routinely in these selected areas and also in response to reported “direct exposure” events of commercial swine to feral swine. The case definition for a “direct exposure” event would be physical contact (feral swine that have gained access to the swine facilities or pens) or fenceline contact (feral swine spotted along the fence).

Another objective of PRV surveillance is to monitor the risk of PRV introduction into commercial swine, including the distribution of the feral swine population and the size of the population at risk of exposure (i.e., outdoor production sites). Specialized software for data mining of electronic information sources will help rapidly identify and analyze information related to PRV outbreaks in other countries.

### **Surveillance Reporting**

Analysis, reporting, and dissemination of the resulting national surveillance data for action planning and risk analysis purposes are also key elements of the NAHSS mission. This section describes some of these reporting efforts and activities.



### National Animal Health Reporting System

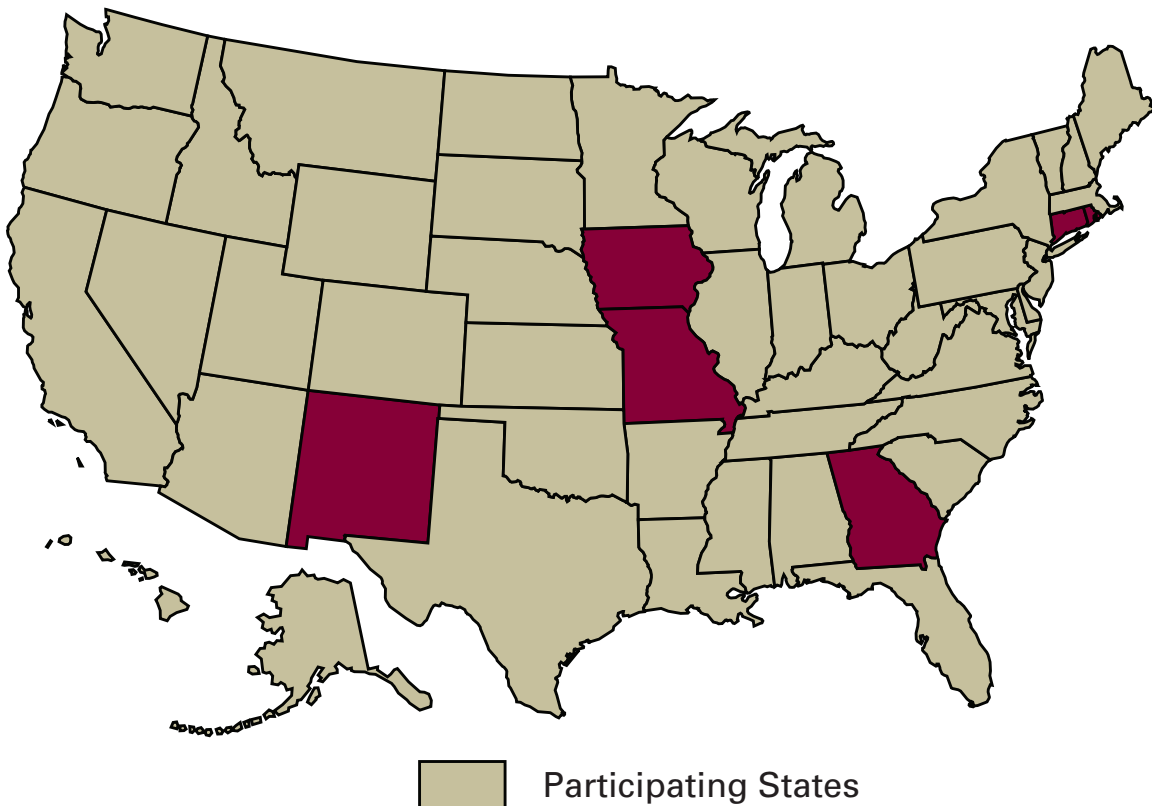
**(NAHRS)**—The United States is a signatory country of the World Trade Organization (WTO). Member Countries are obligated to comply with the WTO’s Agreement on the Application of Sanitary and Phytosanitary Measures. The WTO assigned standards-setting authority to the OIE for international trade-related animal-health issues. For more than 25 years, VS has reported the occurrence of OIE-notifiable diseases in the United States. The United States meets its OIE reporting obligations using a variety of sources, including the NAHRS, FAD reports, and national program disease surveillance reports, among others. The U.S. status of the occurrence of OIE-reportable diseases is listed in table A2.3 in appendix 2.

NAHRS is a voluntary, cooperative system for reporting animal diseases. It is designed to collect monthly data through State animal-health officials on the presence or absence of 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 APHIS–VS national program disease surveillance data systems.

In 2006, 44 States reported disease information to NAHRS (fig. 3). Several nonparticipating States are preparing to report to NAHRS. The States participating in NAHRS in 2006 accounted for approximately 91 percent of U.S. cattle production, 71 percent of U.S. swine production, 90 percent of U.S. sheep production, 84 percent of U.S. poultry production, and 99 percent of U.S. catfish production.

**FIGURE 3: States participating in NAHRS in 2006.**



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**The U.S. Animal Health and Productivity Surveillance Inventory**—In 2006, the NSU and other units at CEAH implemented the U.S. Animal Health and Productivity Surveillance Inventory. This inventory is an online, searchable database with summary information about surveillance and monitoring systems, epidemiologic studies, and other activities related to animal health and productivity in the United States. The inventory provides an easy-to-use tool for finding information about animal-health surveillance systems and activities of many different U.S. Government agencies. The online database also provides links to resources about specific surveillance programs and studies and presents a national overview of animal-health and productivity surveillance and monitoring activities, studies, and related data-collection efforts. The inventory can be accessed from <http://nsu.aphis.usda.gov/inventory>.

**Equine Arboviral Web Reporting**—An enhanced system was implemented in 2006 for reporting confirmed equine cases of arbovirus-related diseases to the NAHSS Web site. The Web site <http://www.aphis.usda.gov/vs/nahss/equine> provides weekly updates on the number of cases of diseases associated with West Nile virus (WNV) and eastern and western equine encephalitis, including U.S. distribution maps for each disease and tables showing the counties where the cases were reported.

The NSU and the VS Equine Program Staff worked collaboratively to develop this system to improve reporting of equine arboviral diseases and provide a Web resource for current information on the status of eastern and western equine encephalitis in the United States. The project was also part of a broader effort to respond to requests from the USAHA Infectious Diseases of Horses Committee and the American Horse Council to develop a Web site for reporting equine disease surveillance. The Web site is intended as a source of information for individuals associated with the horse industry, including horse owners, animal health professionals, and regulatory officials, as well as public health officials and those in related academic and research fields.

## Emerging Diseases and Issues

Emerging and foreign animal diseases represent an increasing threat to animal and human health. APHIS–VS expects emerging and foreign animal diseases to continue to be of major concern due to globalization, increased trade, and increased movement of people, animals, and pathogens. Therefore, surveillance is a critical component of the NAHSS to ensure early detection and support global risk analysis for emerging and foreign animal diseases, two of the four primary goals established for the NAHSS.

Within VS' CEAH, the Center for Emerging Issues (CEI) provides global intelligence about emerging and foreign animal diseases and issues. CEI uses a multifaceted approach for gathering information for analysis to provide actionable intelligence to VS decisionmakers and to inform others involved in agriculture.

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 can be 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.

Severe acute respiratory syndrome and HPAI H5N1 are recent international examples of zoonotic emerging diseases caused by a newly identified pathogen and a newly identified strain, respectively. The recent emergence of bluetongue serotype 8 in Europe is an example of a known pathogen in a new location. VHS, equine herpesvirus type 1 neurological form, and canine influenza virus are recent examples of emerging animal diseases occurring domestically. Honey bee colony collapse disorder is an example of an emerging disease that affects animal health and production but has not to date been related to a specific pathogen.

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## Identification and Tracking of Emerging Animal Health Issues

VS has a process to identify emerging animal diseases and issues, as well as FAD outbreaks, through electronic scanning of open-source media and text mining. This process helps provide early warning of animal health events and creates a corporate awareness of the global animal-health situation. The information is analyzed and stored in a central system, the Emerging Veterinary Events (eVe) database, and is prioritized by analysts using an algorithm developed by the CEI to gauge the relative importance of events. High-priority events are monitored for further developments and reported to VS management. Records are maintained in the eVe database for future trend analysis. In addition to monitoring electronic surveillance of open-source information, the CEI staff maintains contacts with international peers, industry, and academia to exchange information about emerging animal diseases and issues.

International animal-disease events of interest identified by the CEI's open-source scanning are also entered into the Offshore Pest Information System (OPIS). OPIS is an APHIS-level database designed to improve risk management of offshore pests and diseases by communicating timely information on offshore outbreaks of plant and animal diseases and changes in pest or disease distribution patterns. The CEI coordinates the review and analysis of VS information entered into OPIS.

**Assessment and Analysis of Emerging Animal Diseases**—After identifying a potential emerging animal disease, CEI analysts verify the authenticity and accuracy of the reported event and then determine the type of report to prepare. Examples of reports include information sheets about specific outbreaks, emerging disease notices, quarterly summaries of selected international and domestic disease events, and special reports. Emerging disease and foreign animal disease outbreak reports prepared by the CEI are available from this Web site: <<http://www.aphis.usda.gov/vs/ceah/cei>>.

In 2006, the CEI issued “APHIS Info Sheets” about HPAI and FMD in several countries; Newcastle disease

in the United Kingdom, Brazil, and Azerbaijan; bluetongue in The Netherlands; CSF in Croatia; lumpy skin disease in Israel; and *Brucella melitensis* in Bulgaria. Due to uncertainty about the modes of international spread of HPAI, the CEI also issued an “APHIS Info Sheet” entitled “Recent Spread of Highly Pathogenic (H5N1) Avian Influenza in Birds.”

**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 methods 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 has developed a disease-emergence risk-assessment tool for quantifying the disease emergence potential in the U.S. food-fish aquaculture industries.

Developing the disease-emergence risk-assessment tool 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 elements. The first, disease emergence and evolution, examines the potential for novel pathogens to develop or for existing pathogens to evolve. The second element, transboundary pathways, examines the potential for known or new pathogens to move from country to country. The third element, intracountry spread, examines the potential for newly emerged, evolved, or introduced pathogens to spread from the point of emergence, evolution, or introduction.

This disease-emergence assessment tool can identify areas of vulnerability and mitigation measures and monitor how changes in the dynamics



associated with an industry increase or decrease disease-emergence potential. A detailed description of the tool and results from its application to the aquaculture industry will be available in 2007.

#### **Selected Domestic Emerging Issues in 2006**

VS monitored domestic emerging issues such as canine influenza virus, porcine circovirus type 2, and bovine viral diarrhea (BVD) virus in 2006. In addition, the CEI issued Emerging Disease Notices entitled “Equine Herpes Virus Myeloencephalopathy: A Potentially Emerging Disease” [[see http://www.aphis.usda.gov/vs/ceah/cei/taf/emergingdiseasenotice\\_files/ehv1final.pdf](http://www.aphis.usda.gov/vs/ceah/cei/taf/emergingdiseasenotice_files/ehv1final.pdf)] and “Viral Hemorrhagic Septicemia in the Great Lakes, July 2006,” available at [http://www.aphis.usda.gov/vs/ceah/cei/taf/emergingdiseasenotice\\_files/vhsgreatlakes.htm](http://www.aphis.usda.gov/vs/ceah/cei/taf/emergingdiseasenotice_files/vhsgreatlakes.htm).

**Porcine Circovirus Type 2 (PCV2)**—PCV2 has been identified in both healthy and sick pigs worldwide since the mid-1990s. A new strain of PCV2 called PCV2 321 most likely originated in Europe in the late 1990s, spread to Canada in 2004, and emerged in the United States in 2005. During 2006, this emerging strain of PCV2 occurred in many of the swine-producing States. Previously, PCV2 was primarily associated with disease in nursery pigs, causing low mortality. In contrast, the new PCV2 321 strain is associated with finisher pigs and leads to high mortality rates, in the range of 20 to 40 percent. This high mortality rate is causing great economic loss for affected producers.

The transmission, epidemiology, and pathogenesis of PCV2 are not well understood. Clinical signs include one or more of the following: anorexia, rapid weight loss, unthrifty pigs, respiratory problems, central nervous system signs, jaundice, diarrhea, and skin discoloration. PCV2 suppresses a pig’s immune system and plays a cofactor role in a group of diseases recently designated by the American Association of Swine Veterinarians as porcine circovirus-associated diseases, which includes postweaning multisystemic wasting syndrome, porcine dermatitis and nephropathy syndrome, porcine reproductive and respiratory syndrome (PRRS), porcine parvovirus, and porcine respiratory disease complex. Currently, prevention and control of PCV2 is based on good biosecurity and production management practices, including reducing stress and controlling the environment and secondary diseases. Vaccines for PCV2 are in development at several universities.

**Canine Influenza Virus (CIV)**—The influenza virus is one of the most important respiratory disease agents in humans and animals, in part due to its ability to infect new host species and to change its genetic structure. Since its detection in 2004 in racing greyhounds experiencing a severe respiratory disease outbreak in Florida, CIV has also been detected in pet dogs and at shelters. Although CIV was diagnosed in pet dogs and a few shelters in 2005, many more cases of CIV were recognized in shelters throughout the



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country in 2006. CIV outbreaks were reported in shelters in Denver; Pittsburgh; Miami; Cheyenne, WY; and the San Francisco Bay Area. No vaccine is currently available, but research has shown that canarypox-vectored equine influenza virus (EIV) vaccines create substantial antibody response. Implementation of biosecurity measures is imperative in the prevention and control of this disease.

This newly identified CIV is 96 percent identical to the H3N8 EIV that infects horses, suggesting that the virus made a direct jump from horses to dogs. Most dogs experience only a mild form of the disease similar to flu symptoms in humans, although a small percentage develop acute and severe respiratory disease that results in death. EIV H3N8 has existed in horse populations for more than 40 years, and there have been no reports of it infecting humans.

**BVD Virus**—BVD virus is an endemic viral pathogen of cattle and other ruminants throughout the world. Despite its endemic status, BVD is an emerging animal health issue of concern in the United States due to its potentially large economic impact on cattle herds. Monetary losses due to BVD in U.S. cow–calf operations are estimated to be approximately \$15 to \$20 per cow and in U.S. feedlot operations, approximately \$40 per head.

The main source of introduction and transmission of BVD virus is persistently infected (PI) cattle, which shed high levels of virus into the environment. One PI animal housed with susceptible cattle under close confinement can infect about 90 percent of pen mates before they are 4 months old.

Both the Academy of Veterinary Consultants and the National Cattlemen’s Beef Association have moved toward voluntary control of BVD in the United States, and the American Association of Bovine Practitioners has adopted a position of not allowing PI cattle into commerce. Several States have initiated voluntary control programs. In 2006, for example, Colorado had 80 herds enrolled in one of 3 stages of its control program. Montana is currently in the second year of a 3-year effort to screen cow–calf operations for PI animals. In 2006, the State enrolled 65 herds, approximately 38,500 head of cattle.

## 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 Animal Health Monitoring System (NAHMS) Program Unit is responsible for coordinating surveillance and monitoring activities. This unit has designed, analyzed, and reported results from national studies since 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 studies. 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. The information also helps to define at-risk 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 (four studies) and dairy (three studies), poultry (two), feedlot (two), beef cow and calf (two), sheep (two), equine (two), and catfish (two). Reports from these studies are available on the NAHMS Web site at <<http://nahms.aphis.usda.gov>>.

To fill the time 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 and bulk tank somatic cell count (BTSCC). 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 also receives data from States and analyzes and reports results on an ongoing basis for the Johne's Demonstration Herd Project.

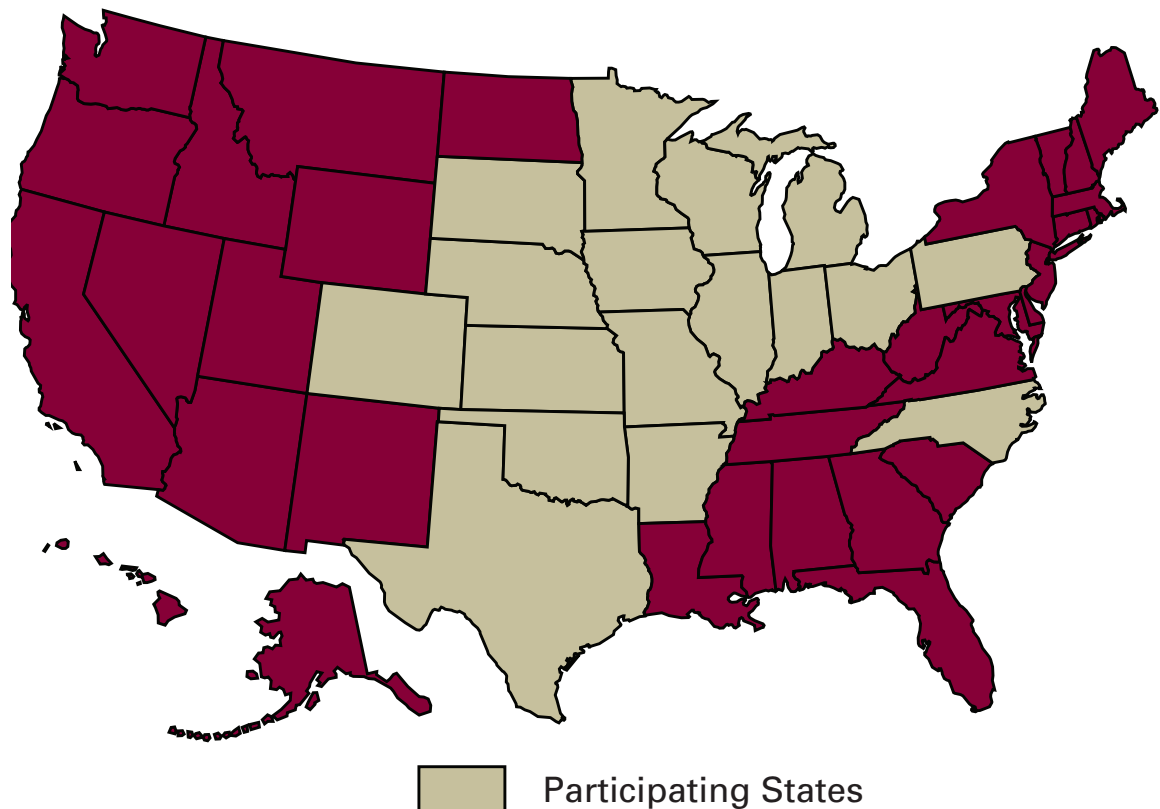
### Swine 2006 Study

The Swine 2006 study was NAHMS' fourth national study of the U.S. swine industry. The first study, the 1990 National Swine Survey, focused on health and health management of farrowing sows and preweaned piglets. Swine '95 was NAHMS' second swine study and provided an indepth look at more than 90 percent of the U.S. swine herd, focusing on the grower/finisher phase of production. NAHMS' third national swine study, Swine 2000, provided valuable data on nearly 94 percent of the U.S. swine herd on operations with 100 or more pigs.

Seventeen States participated in the Swine 2006 study (fig. 4). These States account for 94 percent of swine operations and inventory on operations with 100 or more pigs.

Between July 17 and September 15, 2006, an onsite questionnaire was administered to swine producers by NASS enumerators. Veterinary medical officers administered followup questionnaires and took biological and

**FIGURE 4: States participating in the Swine 2006 study.**



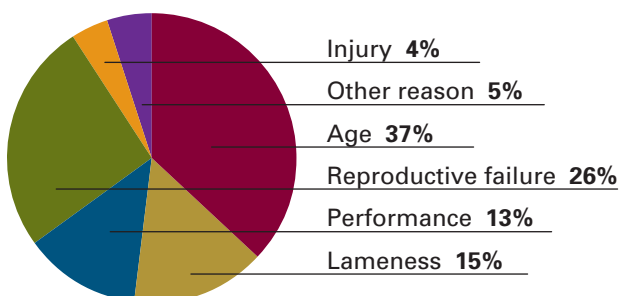
environmental samples during two visits that fell between September 5 and November 17, 2006, and December 4, 2006, and March 15, 2007. The following results are based on a subset of the data collected at the initial visits.

**Culling and Death Loss**—The percentage of the sow and gilt inventory on June 1, 2006, that died or were culled over the 6-month period of December 1, 2005, through May 31, 2006, was 4.3 percent and 19.5 percent, respectively. Of these culls, age and reproductive failure were the two most common reasons when expressed as a percentage of the number culled (fig. 5). It is likely that age, reproductive failure, and performance are interrelated and together account for nearly 76 percent of all culled females nationally.

**Introduction of Breeding Animals**—The practice of isolating new herd additions varies significantly between small and large producers. More than twice as many large sites (61.1 percent of sites) always isolated herd additions when new female breeding stock were brought in, compared to small sites (which isolated additions on only 26.5 percent of sites). Overall, 67.1 percent of sites vaccinated new breeding stock.

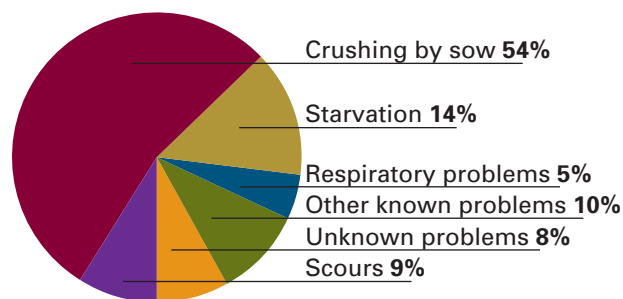
**Farrowing Productivity and Death Loss**—Overall, the average number of piglets born alive per litter was 10.5. The number weaned, at 9.4 per litter overall, differed between the large and small size groups by about 1 piglet. Preweaning deaths averaged 1.1 pigs per litter.

**FIGURE 5: Percentage of culled breeding-age female pigs, by reason culled, from December 1, 2005, through May 31, 2006.**



Nearly 55 percent of preweaning deaths were caused by sow crushing in the 6-month period from December 1, 2005, through May 31, 2006 (fig. 6).

**FIGURE 6: Percentage of preweaning piglet deaths by producer-identified cause, December 1, 2005, through May 31, 2006.**



**Nursery Death Loss**—Overall, 2.9 percent of pigs that entered the nursery died in the nursery. Most (44.2 percent) of all nursery deaths on all sites were related to respiratory problems, which may include PRRS.

**Grower/Finisher Death Loss**—As with nursery pig deaths, the percentage of deaths in the grower/finisher phase was similar for small, medium, and large herds between December 1, 2005, and May 31, 2006. Overall, 3.9 percent died in the grower/finisher phase.

Respiratory disease-related deaths were the most often reported, at 61.1 percent, for all sites in grower/finisher pigs during the 6-month period.

**Equine 2005 Part II: Changes in the U.S. Equine Industry, 1998–2005 Report**

Part II of the NAHMS Equine 2005 study provided a comprehensive look at trends in the U.S. equine industry. Section I of the report presents demographic changes of the U.S. equine population from a historical perspective using data provided by NASS, Census of Agriculture, and U.S. Bureau of the Census. Section II includes historical data regarding equine infectious anemia (EIA), WNV, and vesicular stomatitis. Results of the NAHMS’ 1998 and 2005



equine studies in Section III provide an overview of changes in U.S. equine management and health from 1998 through 2005.

For the Equine 2005 study, NAHMS collected data on equine health and management practices from a representative sample of operations with 5 or more equids in 28 States. For the evaluation of changes and trends in the U.S. equine industry, the data used to generate estimates based on the Equine '98 study were reanalyzed to represent operations with five or more equids present on January 1, 1998. Therefore, estimates for comparing 1998 and 2005 estimates are based on 3 points of commonality: The same 28 States, data collection performed by NASS enumerators, and similar reference population of 5 or more equids per operation.

Onfarm equine estimates are conducted every 5 years as part of the Census of Agriculture.<sup>1</sup> Census onfarm horse and pony numbers peaked in 1910 at 19.8 million head. By 1950, the number of horses and ponies was only about one-third of what it was in 1925. As of 2002, the latest year for which figures are available, there were 3.6 million horses and ponies in the United States, the highest number since 1954.

Data exist from 1972 to 2005 on the number of EIA tests performed by each State annually and the percentage of those tests that were positive. The annual number of EIA tests in the United States has generally increased, with more than 2 million tests performed in 2005. The percentage of positive EIA test results declined steadily from nearly 4 percent in 1972 to less than 0.1 percent in 2005.

The percentage of operators that had at least heard of EIA increased from 1998 to 2005. VS began an educational initiative regarding EIA in 1996, which included an educational video and brochure. It is possible that this initiative, along with other EIA educational efforts, improved operators' familiarity with the disease. The average cost of an EIA test increased from \$22.95 in 1998 to \$27.33 in 2005, a \$4.38 (19.1-percent) difference but only a 3-percent increase when adjusted for inflation.

The percentages of operations that administered any vaccine to resident equids during the previous 12 months were similar in 1998 and 2005: about three-fourths had given at least some type of vaccine to resident equids during the previous 12 months.

### **Equine Events 2005**

The NAHMS Equine Events 2005 study was designed to provide participants, industry, and animal-health officials with information on equine health-management strategies employed at equine events in six selected States.

When animals from multiple locations or sources are brought together for various events, there is a possibility for the spread of infectious and contagious disease agents. Examples of events where equids

<sup>1</sup> The current definition of a farm, first used in 1974, is a place that could or did actually sell \$1,000 of agricultural products annually. In addition, as of 1987 any operation that has five or more equids (other than commercial enterprises such as race tracks) qualifies as a farm, even if it has no other agricultural activity.



congregate include sales or auctions, shows, horse trials, western events, fairs, rodeos, race meets, polo matches, organized trail rides, and training clinics.

The study’s objective was developed by exploring existing literature, attending equine industry meetings to learn about information gaps, and soliciting input regarding priorities for equine health from animal-health officials. The objective focused on describing health-management factors at events that could impact the occurrence of equine infectious diseases.

NAHMS developed a list of equine events for the six participating States (California, Colorado, Florida, Kentucky, New York, and Texas). This list served as the sampling frame for the study. A probability-based sample was selected, allowing for inferences to be made to major equine events in the State. Events likely to have a small number of local equids—such as jackpot roping, local lessons, or shows—were excluded from the study. The study sample yielded 252 participating events representative of the 3,227 events on the list. These events occurred between January 1, 2005, and April 9, 2006.

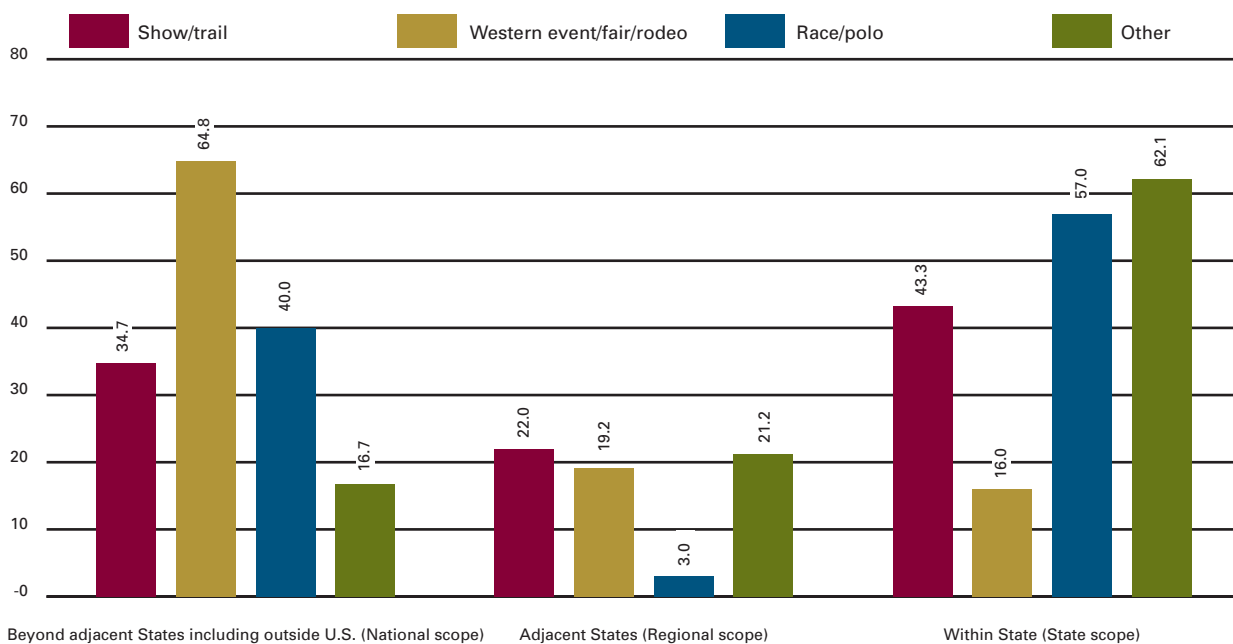
The most common event type was show/trial (57.7 percent), followed by western event/fair/

rodeo (21.9 percent). Races and polo matches represented 6.1 percent of events. Event types in the “other” category (14.3 percent) included trail rides, endurance rides, training clinics, and shooting events.

For approximately 80 percent of events, all participating equids came from either within State or beyond adjacent States (40 percent each). The remaining 20 percent of events had equids that came from adjacent States. Western event/fair/rodeo events had the lowest percentage of events with equids from within the State (16 percent) and the highest percentage of events with equids from beyond adjacent States (64.8 percent) compared to all other event types (fig. 7). About 1 of 10 events (9.6 percent) had any participating equids from outside the United States.

Overall, 57.1 percent of events did not require a health certificate for equids attending the event. Managers of events that required a health certificate may have set up the requirement for more than one reason. More than 8 of 10 events (84.6 percent) required health certificates for interstate movement, while 41.9 percent required certificates for the event itself. In 32.3 percent

**FIGURE 7: Equine events of various types, plotted against the geographic scope of participating animals, by percentage, 2006.**



of events, there was a requirement by the State for intrastate movement. Overall, nearly two of three events (64.7 percent) required an EIA (Coggins) test for attending equids. For those events, the most common reasons for requiring the test were State requirement for interstate movement, event requirement, and State requirement for intrastate movement.

Overall, approximately 9 of 10 events recorded participant/owner name, address, and phone number. About 7 of 10 events recorded equine registration or ID number, participant/owner e-mail, and trainer name and address.

In about half of events (55.3 percent), equids left the State following the event, and in 1 in 10 events (9.7 percent), equids left the United States after the event.

### Determining U.S. Milk Quality Using Bulk Tank Somatic Cell Counts, 2006

APHIS' Centers for Epidemiology and Animal Health—in conjunction with USDA's Agricultural Marketing Service and the NMC's (formerly the National Mastitis Council) Milk Quality Monitoring Committee—monitor U.S. milk quality using BTSCC data provided by 4 of the Nation's 10 Federal Milk Marketing Orders (FMOs<sup>2</sup>) (fig. 8).

BTSCC refers to the number of white blood cells (leukocytes) and secretory cells per milliliter of raw milk and is used as a measure of milk quality and as an indicator of overall udder health. High BTSCCs can negatively impact cheese yield and reduce the quality and shelf life of pasteurized fluid milk. To ensure high-quality dairy products, BTSCCs are monitored in milk shipments from producers, using minimum standards outlined in the U.S. Pasteurized Milk Ordinance. The legal maximum BTSCC for milk shipments from Grade A producers is 750,000 cells/mL. There were 406,177 milk shipments monitored in 2006 (table 5). The Upper Midwest FMO accounted for 43.7 percent of the milk

monitored and 20.1 percent of milk produced in the United States.

The milk-weighted geometric BTSCC mean in 2006 was 249,000, compared to 258,000 in 2005 (fig. 9). The milk-weighted BTSCC takes into account the amount of milk shipped by a producer, resulting in an overall BTSCC mean of monitored milk. The producer shipment BTSCC—which is a geometric, nonmilk-weighted mean of all shipments—remained at 293,000 in 2006.

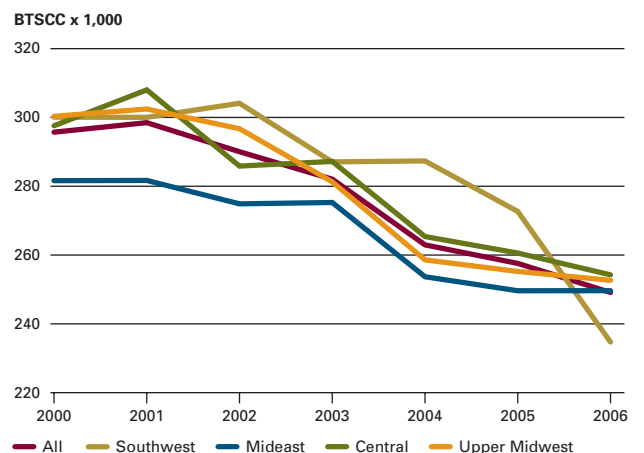
Figure 10 shows the relationship between percentage of shipments at various BTSCC levels and FMO. Almost 50 percent of shipments in all FMOs were between 200,000 and 399,000 BTSCC. Less than

**TABLE 5: Pounds of milk and shipments monitored in 2006**

FMO <sup>1</sup>	Milk		Shipments		
	Billion lb	Pct.	Pct., U.S.	Number (1,000)	Pct.
Upper Midwest	36.5	43.7	20.1	230.2	56.7
Central	14.8	17.7	8.1	62.4	15.4
Mideast	17.8	21.4	9.8	102.9	25.3
Southwest	14.3	17.2	7.9	10.7	2.6
Total	83.4	100.0	45.9	406.2	100.0

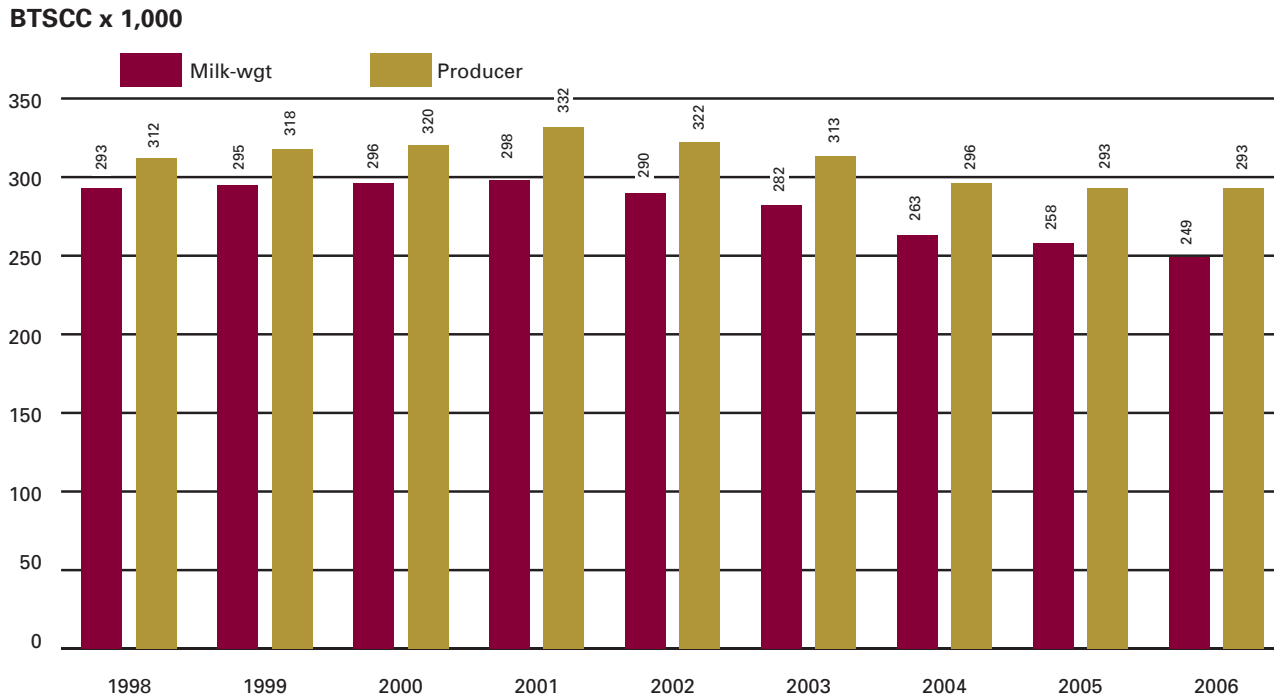
<sup>1</sup> FMO=Federal Milk Marketing Order

**FIGURE 8: Milk-weighted BTSCCs by Federal Milk Marketing Order and by year.**

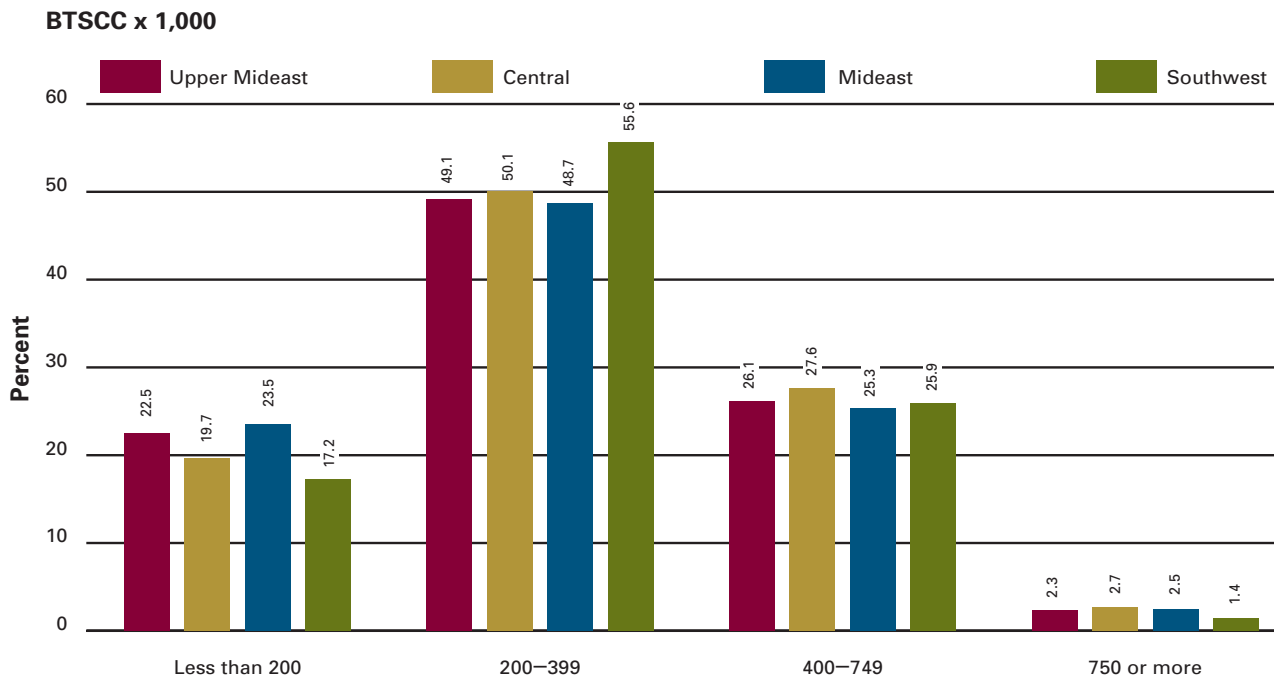


<sup>2</sup> FMOs are administrative units made up of groups of States and were established under the authority of the Agricultural Marketing Agreement Act of 1937, as amended. Their purpose is to stabilize markets by placing requirements on the handling of milk; data are collected to provide accurate information on milk supplies, utilization, and sales. Monitored orders were Central, Mideast, Southwest, and Upper Midwest.

**FIGURE 9: Milk-weighted and producer BTSCC, 1998–2006.**



**FIGURE 10: Percentage of shipments at various BTSCC levels, by region.**

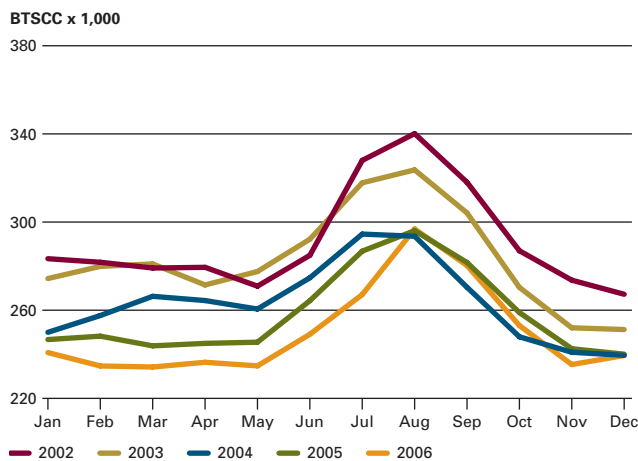


2.8 percent of shipments from each FMO were above 750,000 BTSCC.

Figure 11 shows milk-weighted BTSCCs for monitored FMOs during the last 5 years. The milk-weighted BTSCC takes into account the amount of milk shipped by a producer, resulting in an overall BTSCC mean of monitored milk. Note the general decline over the 5-year period.

Monthly monitoring of BTSCCs continues to show that BTSCCs peak during July through September and tend to be lowest in the winter and spring months. In 2006, monthly milk-weighted BTSCCs were highest during August (296,856 cells/mL) and lowest in March (234,222 cells/mL).

**FIGURE 11: Milk-weighted BTSCC, by year and by month, 2002–06.**



BTSCCs from monitored FMOs are a measure of the quality of the Nation's milk supply. The overall average BTSCCs from the four FMOs declined during each of the past 5 years, and all FMOs showed stable or declining BTSCCs between 2005 and 2006. Of the four monitored FMOs, the Mideast FMO had the lowest milk-weighted BTSCCs for 2000–05, while the Southwest FMO had the lowest BTSCCs in 2006. The downward trend of BTSCCs during the last 5 years suggests that producers are actively working to improve milk quality.

### Sentinel Feedlot Surveillance

The Sentinel Feedlot program was initiated in 1993 as a program to monitor death loss among cattle in feedlots. The program relies on information reported by consulting veterinarians who work with multiple feedlots throughout the United States. Currently, the veterinary consultants' monthly reports document information from inventories totaling about 1.5 million to 2 million cattle.

Veterinarians provide death-loss and other information to VS on a monthly basis. The deaths are attributed to one of three categories of disease: respiratory, digestive, or other. It is an option for the veterinary consultants to provide subcategory death-loss information that identifies type of cattle (beef or dairy), sex of cattle, and risk category (high or low). Also provided are current inventories, number of cattle shipped, and number of cattle received.

The information provided by the veterinarians is confidential and is submitted and reported using a code-number identifier. Aggregated information is reported back to the consultants, along with the results for their clients' individual feedlots. The results are provided in tabular and graphic forms. The reports also provide previous-year and previous-month data for internal comparison over time. Occasionally, summary information is included in general reports of U.S. animal health. Individual feedlot information is reported only to the participating veterinarian.

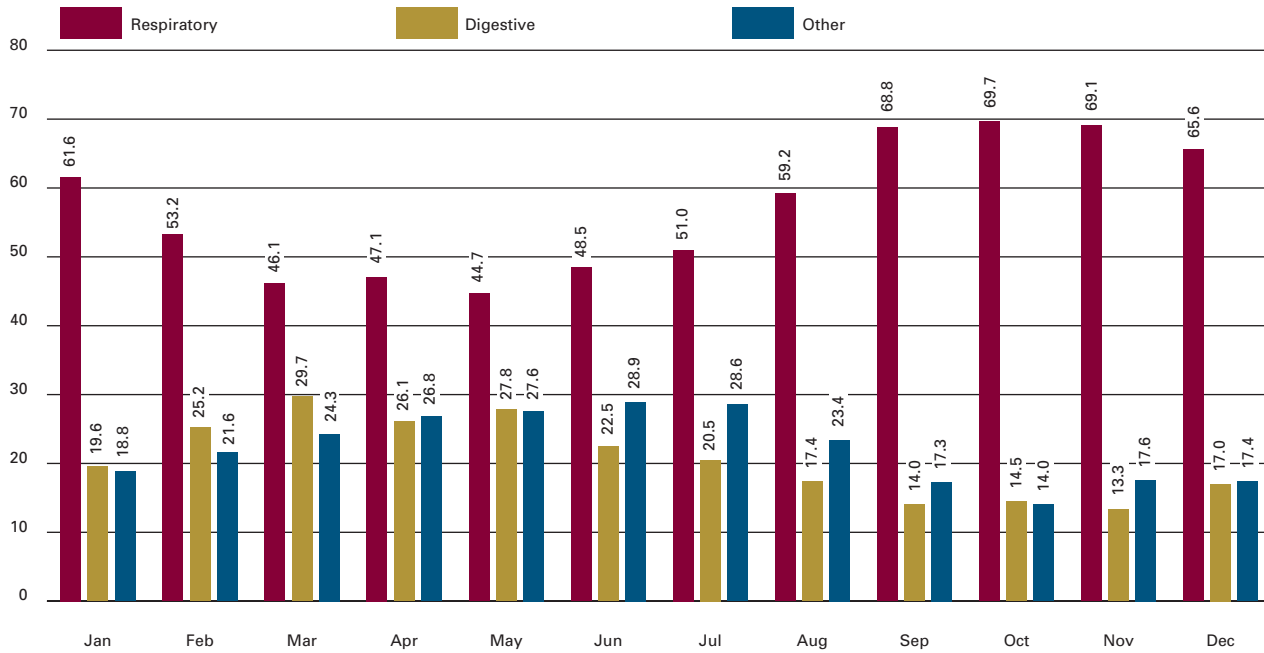
VS and the consultants are currently testing an Internet-based reporting tool. The Web-based reporting form will allow participating veterinary consultants to provide data directly to the database for analysis. In addition, the tool allows participants to check their data for calculation errors prior to submission and lets them make corrections immediately. This tool will create a more seamless program and produce more accurate reports. In addition, monthly reports will be available to the consultants via the same Web portal, speeding the return of information and eliminating the cost of paper transactions.



In 2006, respiratory deaths were consistently reported as the highest percentage of overall death loss each month, while digestive and other causes alternated as the second-leading cause of death (fig. 12). Respiratory disease accounted for as much as 69.7 percent of all deaths (October). Digestive

disorders contributed to a high of 29.7 percent of total death loss in March. Other disorders were at their highest percentage, 28.9 percent, in June. Total death loss ranged between 0.18 percent (April) and 9.40 percent (October) of average monthly inventory.

**FIGURE 12: Percentage death loss in the sentinel feedlot program, by cause.**





CHAPTER 4



# Animal Disease Eradication Programs and Control and Certification Programs

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 that are moving in slaughter channels. As of October 2, 2006, 118,668 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 twice, once for each species.) Of these premises, 96,755 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) (table 6).

**TABLE 6: Scrapie national database—sheep and/or goat premises counts**

	Sept. 30, 2004	Sept. 30, 2005	Sept. 30, 2006
Total	90,322	103,580	118,668
Requested official tags	64,040	73,807	96,755

**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. Other than the targeted black-faced sheep and suspect animals, the RSSS program samples only animals with some form of identification (e.g., United States Department of Agriculture [USDA]-approved eartags, electronic ID, backtags, and tattoos or lot identification). Sampling animals with identification allows for tracing positive animals back to the farm of origin.

During fiscal year (FY) 2006, as part of the RSSS program, 37,111 sheep and goat samples, collected from 72 slaughter plants in 22 States, were tested for scrapie using immunohistochemistry on brain and/or lymph node (table 7). Of the 37,076 sheep sampled, 51 percent were mottle-faced, 38 percent were black-faced, and 11 percent were white-faced. Of the 70 sheep diagnosed as positive for scrapie, 62 were black-faced and 8 were mottle-faced. Of the 35 goats sampled as part of the RSSS program in FY 2006, 32 were tested and diagnosed as negative for scrapie; 3 samples were unable to be tested.

Under the scrapie program, an animal with positive test results is traced back to its flock of origin, and the flock is placed under movement restrictions until a flock cleanup plan has been completed. High-risk animals that had been moved from these flocks before they were placed under movement restrictions also are traced and tested.

**TABLE 7: Regulatory scrapie slaughter surveillance, by fiscal year**

	FY 2004	FY 2005	FY 2006
Number of plants	34	78	72
Number of States	16	24	22
Number of samples tested	25,190	34,912*	37,111

\* Number changed from 2005 Animal Health Report to reflect updated data.

**Testing Summary**—In response to regulatory investigations of disease, APHIS’ field Veterinary Medical Officers collect samples from flocks for scrapie testing. Such cases are known as regulatory field cases. In addition to the 37,111 samples tested under the RSSS program in FY 2006, 5,262 additional tests were conducted for scrapie—either by third-eyelid testing or necropsy.

**Case and Infected Flock Summary**—In FY 2006, 116 newly identified infected flocks were reported, and 350 scrapie cases were confirmed and reported by the National Veterinary Services Laboratories (NVSL) (tables 8 and 9). 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 2006, three scrapie cases were reported in goats. Figure 13 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 8: Flocks newly infected with scrapie**

	2004	2005	2006
	100	165	116

**TABLE 9: Scrapie cases, FY 2003 through FY 2006**

Test or examination	FY 2003 <sup>1</sup>	FY 2004	FY 2005	FY 2006
<b>(Number of cases)</b>				
Necropsy	315	374	461	243
Regulatory third eyelid	32	20	31	37
Regulatory Scrapie Slaughter Surveillance	123	86	106	70
<b>Total</b>	<b>370</b>	<b>480</b>	<b>598</b>	<b>350</b>

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



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 2006, 99.3 percent were QQ at codon 171. Of these, 92.6 percent were AA at codon 136, 6.4 percent were AV at codon 136, and 1.0 percent were VV at codon 136. Of the remaining 0.7 percent that were not QQ at codon 171, all were AVQR at codons 136 and 171.

### Scrapie Flock Certification Program (SFCP)—

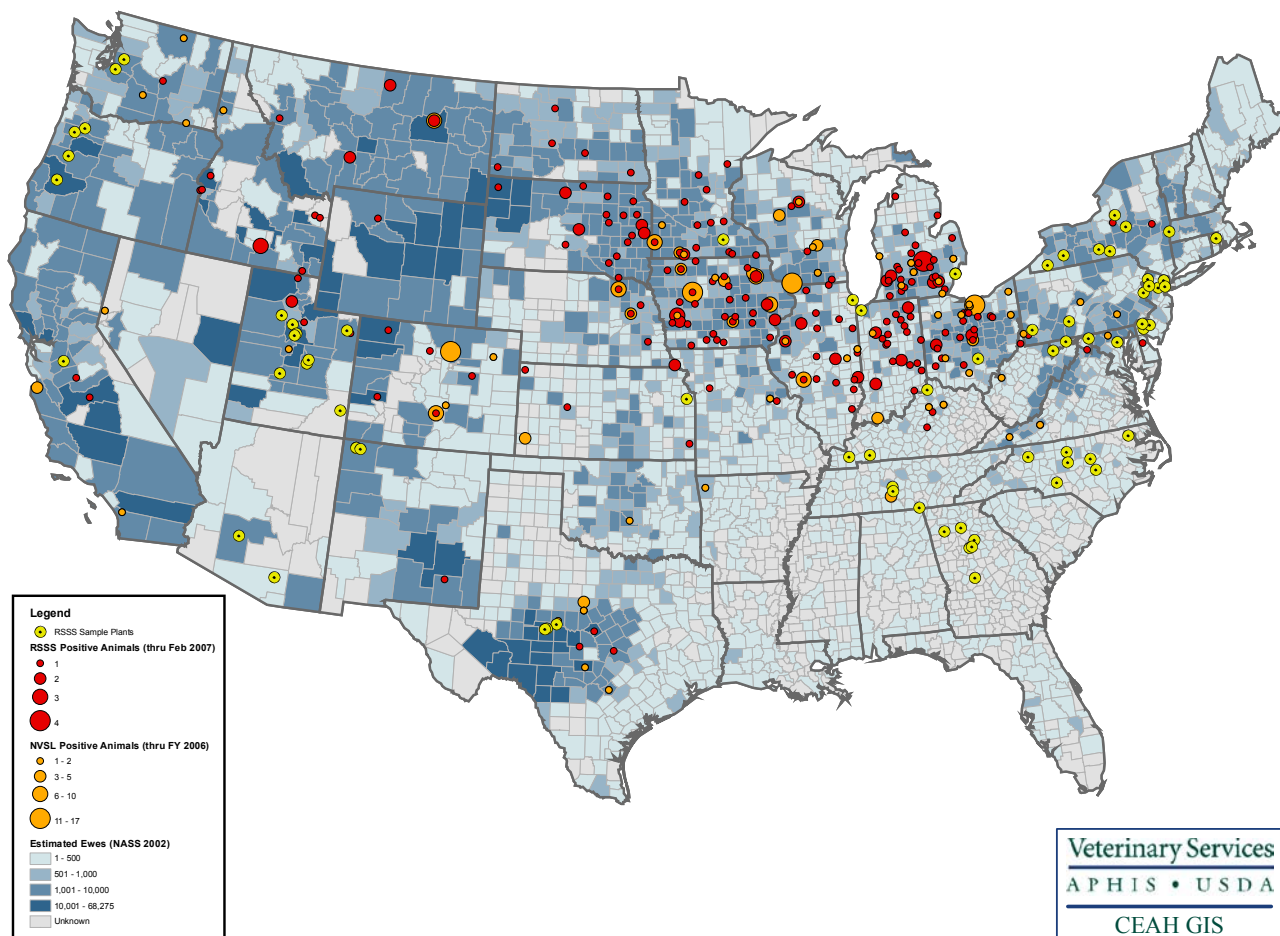
The SFCP is a cooperative effort among producers, State and Federal animal health agencies, and industry representatives. Through the SFCP, a flock becomes certified if, during a 5-year monitoring

period, no sheep in the flock are diagnosed with scrapie, no clinical evidence of scrapie is found in the flock, and there are no additions of female animals from flocks of lower status to 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.

**FIGURE 13: Distribution of mature ewe populations, by county, compared to scrapie-positive animals (October 2002–December 2006).**





**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 to submit for scrapie diagnosis a portion of the mature animals that are culled or die; the number of animals to submit is based on the flock’s size. 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, 2006, 2,027 flocks were participating, and of these, 297 were certified flocks (table 10). Enrollments have

**TABLE 10: Scrapie Flock Certification Program participation, 2002–06**

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
2006	2,027	1,727	297	3

slowed, which might be attributable to an increased reliance on genotype testing to reduce the risk of introducing scrapie.

**Challenges**—Efforts will continue to expand surveillance into underrepresented areas and to increase the traceability of sheep and goats presented for sampling. Additionally, work will continue on 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 is a joint, cooperative program administered by USDA–APHIS and State animal health agencies.

Although TB prevalence reached very low levels in the 1990s, eradication has proven 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 but not met.

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. 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 was released in 2006, “Veterinary Services Progressive Bovine Tuberculosis Eradication Strategic Plan.”

**Current Program**—In the current eradication program, States, zones, or regions are classified into five categories based on prevalence of TB in cattle and bison herds (table 11). 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.

**TABLE 11: Tuberculosis accreditation categories and status—end of calendar year 2006**

Category	Prevalence of TB	States (numbers as of 12/31/06)
Accredited Free	Zero for cattle and bison	49 U.S. States, Michigan’s Upper Peninsula, most of New Mexico, all of Puerto Rico, and the U.S. Virgin Islands
Modified Accredited Advanced	Less than 0.01 percent of total cattle and bison herds for each of recent years	Minnesota, part of Michigan’s Lower Peninsula, and part of two counties in eastern New Mexico
Modified Accredited (Regionalized)	Less than 0.1 percent of the cattle and bison herds	11 counties in northern Lower Michigan and parts of 2 other counties
Accredited Preparatory	Less than 0.5 percent of the total number of cattle and bison herds	—
Nonaccredited	Either unknown or 0.5 percent or more of the total number of cattle and bison herds	—

**Disease and Program Status: 2005–06**—In FY 2006, the number of cattle herds found to be TB affected increased relative to the previous year. In FY 2006, nine affected herds were found, an increase from four affected herds in FY 2005. Of these nine, seven herds were located in Michigan and were detected through annual testing (five herds), accreditation testing (one herd), and movement testing (one herd). Two herds were located in Minnesota and were detected as a result of epidemiologic investigations linked to FY 2005 affected herds.

At the end of 2006, 49 U.S. States, including Michigan’s Upper Peninsula and part of New Mexico, Puerto Rico, and the U.S. Virgin Islands, were considered Accredited TB Free (table 11). Minnesota, 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.

Activities in specific States follow.

**Michigan**—Seven new affected herds were detected in FY 2006; of these, five were beef and two were dairy herds. All herds were depopulated.

The Upper Peninsula was granted Accredited Free status late in 2005. Annual herd testing is ongoing in the Modified Accredited Zone. The prevalence of TB



in wild deer in the Modified Accredited Zone was 0.2 percent in 2005.

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 initial test. 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.

**New Mexico**—New Mexico is divided into two zones; a portion of two counties in eastern New Mexico is classified as Modified Accredited Advanced status, whereas the remainder of the State has TB Free status.

**Texas**—Texas achieved Accredited Free (AF) status in September 2006, after being downgraded to Modified Accredited Free in June 2002. As part of the effort to regain AF status, Texas conducted herd tests of all dairies in the State (850 herds) and 2,400 of 7,650 purebred beef herds. The last affected herd was depopulated in September 2004.

**Minnesota**—Minnesota had three positive beef herds detected in FY 2005. Two additional beef herds were found in FY 2006 and depopulated. Both new herds had epidemiologic links to FY 2005 affected herds. Minnesota’s status was reduced to Modified Accredited Advanced from AF in January 2006.

A total of 481 traces occurred as a result of these 2 new herds, with 131 exposed animals in 15 herds. All herds have been depopulated. Epidemiologic traces are under way in Minnesota and additional States. During fall 2006, Minnesota conducted surveillance in hunter-harvested wild deer for a second year in a 15-mile radius of the infected premises. As of March 2007, five positive wild white-tailed deer were identified close to the

affected area. During the first year (FY 2005), two infected deer were found.

**Slaughter Surveillance**—In FY 2006, 28 cases of *M. bovis* were found at slaughter, a decrease from 40 cases the year before (table 12). One of the 28 cases was in an adult cow (greater than 2 years of age), and the remaining 27 were in feedlot steers. The national granuloma submission rate for adult cattle for FY 2006 was 12.2 submissions per 10,000 adult cattle killed, exceeding the target rate of 5 submissions per 10,000 adult cattle killed.

**TABLE 12: Slaughter surveillance**

FY	<i>M. bovis</i> cases	Granuloma submissions	
		Total Submissions*	Number per 10,000 adult cattle slaughtered
2004	35	6,367	9.3
2005	40	9,439	16.2
2006	28	9,369	12.2

\* Primarily from adult cattle.

Of the 27 *M. bovis* cases identified in feedlot steers by slaughter surveillance, 25 (93 percent) involved Mexican steers.

**Cervids**—No TB-infected captive or farmed cervid herds were found in 2006. 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 & Rules (UM&R) document specifically for captive Cervidae, the first such document for captive cervids. 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 2007. Some aspects of this document will not immediately go



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into effect, however, because they will depend on similar changes being made in the Code of Federal Regulations. These portions will be clearly identified in the document.

**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 2005 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 was 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 are based on prevention, vaccination (now largely discontinued), disease surveillance, and eradication. Primary program 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. Transitional swine are defined as captured feral swine or domestic swine in contact (or potentially in contact) with feral swine. 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/prv-prgm-std.pdf>>).

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

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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 pseudorabies virus threats from feral swine.

**Disease Status: 2005–06**—In FY 2006, all 50 States, Puerto Rico, and the U.S. 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 that 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, 2006, there were no known domestic production swine herds infected with PRV in the United States. Nationally, nine transitional herds were disclosed through surveillance as infected with PRV during FY 2006. All nine herds were depopulated promptly. Complete epidemiologic investigations of all cases did not find evidence that infection had spread from the infected transitional herds to any contact herds.

**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 increased from 475 counties in 17 States in 1982 to 1,014 counties in 28 States in 2004. Currently, an estimated 3 million to 4 million feral swine are located in at least 32 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. 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 a 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

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## APHIS' efforts to eradicate swine brucellosis concentrate on effective separation of commercial production swine from transitional and feral swine, with adequate surveillance and testing of at-risk populations.

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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, which are defined as those feral swine that are captive or swine that have reasonable opportunities to be exposed to feral swine. 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 pseudorabies virus threats. Each State's plan will also address swine brucellosis infection threats from feral swine populations. Swine brucellosis is 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: 2006**—As of December 31, 2006, all States and U.S. territories, except Texas, remained 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 transitional herds from program herd classification.

During FY 2006, 14 swine brucellosis infections were identified in transitional herds, with 4 being mixed PRV and swine brucellosis infections. Thirteen cases were in small transitional herds in Texas. The fourteenth, in South Carolina, was a small herd with extremely poor biosecurity protocols that allowed intrusions of feral swine into the pens. Animal health officials vigorously traced animal movements in all cases, but that process failed to disclose any movement or evidence of spread from the infected herds to contact transitional or commercial swine herds.

**Challenges**—The greatest challenge to eliminating brucellosis is the sporadic appearance of the bacteria in feral pigs and 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, with an estimated 3 million to 4 million feral swine located in at least 32 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/nahps/brucellosis/umr\\_bovine\\_bruc.pdf](http://www.aphis.usda.gov/vs/nahps/brucellosis/umr_bovine_bruc.pdf)>).

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, 2006, there were no known brucellosis-affected domestic cattle herds under quarantine. The last known brucellosis-affected cattle herd was released from quarantine in September 2006 after successfully completing the required three consecutive negative whole-herd tests over a period of 12 consecutive months. Since that time, no new brucellosis-affected cattle herds have been disclosed.

**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 is 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 13). A minimum of 95 percent of all test-eligible cattle (cows and bulls

2 years of age and older) going to slaughter must be sampled for brucellosis surveillance testing. At least 90 percent of any animals that respond positively to testing (reactors) must be successfully traced, and there must be a successful case closure on at least 95 percent of these tracebacks. These minimum requirements 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).

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: 2006**—As of December 31, 2006, 48 States, Puerto Rico, and the U.S. Virgin Islands were officially declared free of brucellosis (table 13). With an infection rate of less than 0.10 percent, Idaho and Texas qualified for Class A status. Texas achieved Class A State status in August 1994 and has been working to attain Class Free State status. Idaho was formally downgraded from Class Free status to Class A status in January 2006 after the disclosure of two brucellosis-affected cattle herds within a 12-month (consecutive) period.

Discussions of activities in specific States follow.

**Texas**—No new brucellosis-affected cattle herds were disclosed in Texas during 2006. The brucellosis-affected cattle herd disclosed in August 2005 that was not depopulated was held under quarantine and subjected to repetitive whole-herd testing. After successfully completing three consecutive negative

**TABLE 13: Brucellosis certification categories and State status—2006**

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	48 States, Puerto Rico, U.S. Virgin Islands
Class A	Herd infection rate less than 0.10 percent. [1 herd per 1,000]	2 (Idaho and Texas)
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.”



whole-herd tests over a period of 12 consecutive months, the herd was released from quarantine.

**Idaho**—The two brucellosis-affected cattle herds disclosed in Idaho in November of 2005 were both depopulated. The index herd likely became infected through exposure to free-ranging elk in the Greater Yellowstone Area (GYA) 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.

The national herd prevalence rate for bovine brucellosis was 0.00021 percent in FY 2006.

Approximately 7.921 million cattle were tested for brucellosis in FY 2006 under the MCI surveillance program (table 14). About 868,500 additional cattle were tested on farms or ranches during FY 2006, bringing the total cattle tested for brucellosis in FY 2006 to approximately 8.790 million head.

**TABLE 14: Number of cattle tested for brucellosis (million head)—2004, 2005, and 2006**

FY	Total	MCI Program		
		Farm/ Ranch	Slaughter plants	Markets
2004	9.1	0.8	5.5	2.8
2005	8.7	0.6	5.2	2.9
2006	8.8	0.9	4.7	3.2

MCI surveillance continues to be effective in finding reactor animals; new affected herds have been identified primarily through market testing. Of the approximately 7.9 million MCI blood tests conducted in FY 2006, about 4.7 million samples (59.5 percent) were collected at slaughter plants, and roughly 3.2 million (40.5 percent) were collected during first-point testing at livestock markets. 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 Texas must conduct first-point testing.

Surveillance using the BMST detected no brucellosis-affected dairy herds in FY 2006. Approximately 164,000 BMSTs were conducted in FY 2006; roughly 186 of those BMSTs yielded suspicious results on initial screening. All suspicious BMSTs in FY 2006 were confirmed negative by subsequent epidemiologic investigations and additional herd testing.

In FY 2006, 4.42 million calves were vaccinated for brucellosis with the *Brucella abortus* Strain RB51 vaccine. Since 2004, more than 4 million calves have been vaccinated each year. The national calfhood vaccination policy recommends proper calfhood vaccination in high-risk herds and areas. The policy also recommends the elimination of mandatory vaccination in all States and that adult vaccination be reserved for cattle herds in high-risk areas.

**Challenges**—The only known focus of *Brucella abortus* infection left in the Nation is in wild bison and elk in the GYA. APHIS is cooperating with State and Federal agencies on 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 the Park’s bison to domestic cattle on public and private lands in Montana adjacent to Yellowstone. The U.S. Department of the Interior, Idaho, Montana, Wyoming, and USDA are working toward the goal of eliminating brucellosis from the GYA while maintaining free-roaming bison and elk herds.

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 feeding grounds. Eliminating brucellosis from elk and bison in the GYA remains a high priority for APHIS. Efforts to develop new, safe, and more effective brucellosis 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 GYA. These 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 the movement of Yellowstone National Park bison from the park into Montana. During the bison hunt season, APHIS has transported bison that have been captured to slaughter facilities in Montana and Idaho.

## 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. 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, 2006, 31 additional CWD-positive farmed elk herds and 9 CWD-positive farmed deer herds have been found in 9 States, for a cumulative total of 41 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. 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 trace-back 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 was published on July 21, 2006. Subsequently, three organizations representing State agencies (Association of Fish and Wildlife Agencies, National Assembly of State Animal Health Officials, and United States Animal Health Association [USAHA]) filed petitions challenging certain interstate-movement provisions in the final rule and requesting a stay in the effective date. APHIS determined that the issues identified in the petitions merited further discussion and published a delay in implementation of the rule on September 8, 2006. On November 3, 2006, the petitions were published for public comment. APHIS will evaluate the comments to determine if changes in the rule are necessary so that it can be implemented as the cooperative State–Federal–industry program it is intended to be.

VS began supporting CWD surveillance in wildlife 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, VS has cooperated with the 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, elk, and now moose. This funding covered surveillance testing for some 90,000 hunter-killed and targeted animals in the 2002–03 and the 2003–04 hunting seasons and more than 122,000 in 2004–05. More than 95,000 tests were projected for 2005–06. All 50 States participated in the first 2 years of the program, 47 States requested and received funding in FY 2005, and 49 participated in FY 2006. Funding is distributed through a tiered system based on risk of disease developed in consultation with the 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.

**Disease Status**—In FY 2006, 14,913 farmed cervids were tested for CWD as compared to more than 15,000 animals in FY 2005 and FY 2004 and more than 12,000 in FY 2003. From 1997 through 2006, CWD had been found in 32 farmed elk herds and 9 farmed deer herds in 9 States (table 15).

Of the 41 positive herds identified as of December 31, 2006, 5 (4 in Colorado and 1 in

**TABLE 15: Number of farmed cervid herds with animals positive for chronic wasting disease, by State, 1997–2006**

State	1997–2004	2005	2006	Total (1997–2006)
Colorado	12	2	—	14
Kansas	1	—	—	1
Minnesota	2	—	1	3
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	1	41



Wisconsin) remained under State quarantine and 35 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.

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, VS' 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.

The lack of a live-animal test for CWD is also a major challenge for CWD management in farmed and captive cervids. Currently rectal biopsy is being evaluated as a CWD management tool for farmed and captive 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,

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 2006 (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: 2005–06**—Forty-nine States participate fully in the VBJDCP. There are 1,792 herds enrolled in the test-negative component of the program. More than 8,700 herds have enrolled in the Johne's disease control program (table 16).

There are 78 laboratories approved for Johne's disease serology testing, 51 approved for MAP fecal culture, and 15 approved for polymerase chain reaction/DNA testing. In 2006, these laboratories conducted 784,978 ELISAs and 125,336 fecal cultures,



**TABLE 16: Johne’s disease control program statistics, 2000–06**

	2000	2001	2002	2003	2004	2005	2006
States in full compliance with the Voluntary Bovine Johne’s Disease Control Program	NA	NA	22	35	43	47	49
Herds in Johne’s control programs	1,952	1,925	3,248	3,268	6,189	6,448	8,738
Johne’s test-negative herds	390	514	631	543	972	1,632	1,792
ELISA tests performed	359,601	342,045	592,350	480,586	673,299	697,264	784,978
Cultures performed	44,961	43,218	98,094	96,222	101,786	105,685	125,336

in addition to 4,077 pooled fecal samples (5 animals per pool) and 717 environmental samples.

**Challenges**—Efforts continue to increase producer participation in the VBJDCP. 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 can deter producers not familiar with the disease and testing issues.

### 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, along with additional Federal regulations in support of the program. 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: 2003–06**—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 2006, 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 17 for 2003–06 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

**TABLE 17: Numbers of veterinarians trained in audit procedures and *Trichinella* good production practices, and site audits conducted, 2003–06**

	2003	2004	2005	2006
Newly trained and qualified accredited veterinarians	7	25	4	1
Site audits performed	81	82	60	49

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 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. Consolidation in the industry has reduced the number of participants, and until the pilot program is formally established as an official voluntary program, participation is not likely to increase.

### 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 2006, 21 States prohibited feeding food waste to swine; 29 States and Puerto Rico allowed feeding food waste 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 2006, there were 2,078 licensed food-waste cooking and feeding premises in the United States (table 18). During the year, 9,889 routine inspections were made on licensed premises

in States that permitted the treatment and feeding of food waste to swine.

**TABLE 18: Statistics on licensing of facilities feeding food waste to swine, 2005 and 2006**

Number	FY 2005	FY 2006
States allowing food-waste feeding <sup>1</sup>	26	30
Licensed premises	2,557	2,078
Routine inspections	9,631	9,889
Searches for nonlicensed feeders	28,845	27,202
Nonlicensed feeders found	101	95

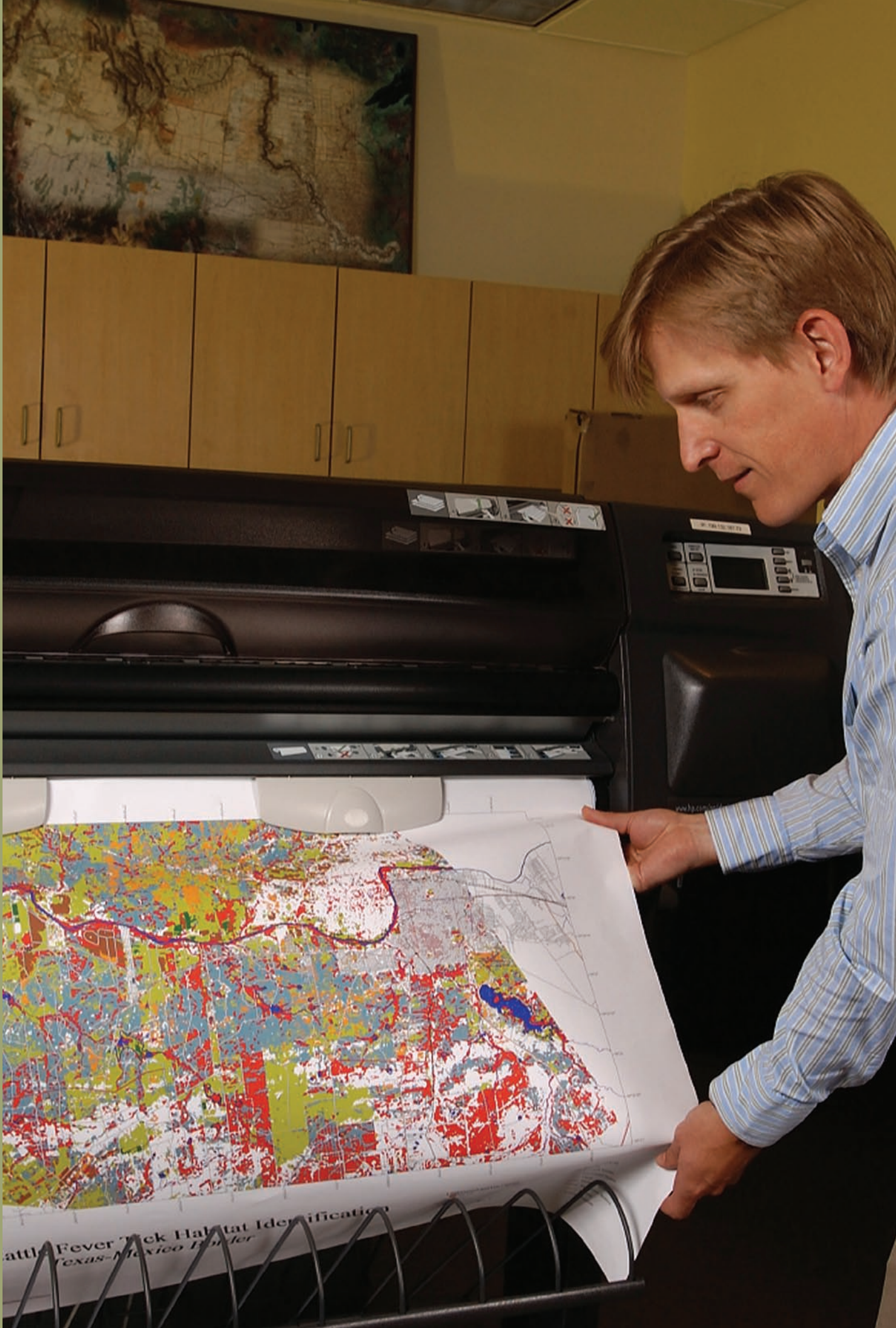
<sup>1</sup>Including Puerto Rico.

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, field personnel conducted 27,202 searches for nonlicensed food-waste feeders. Through these efforts, 95 nonlicensed feeders were found; information about the disposition of these cases was not available at press time (August 2007).





# CHAPTER 5



attle Fever Tick Habitat Identification  
Texas-Mexico Border



# Emergency Management and Response

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Animal health emergencies (AHEs) can have a major impact on America's infrastructure, animal and public health, food safety, economy, and export markets. AHEs can potentially come in many forms, including foreign animal disease (FAD) incursions, emerging disease incidents, and agroterrorism.

Veterinary Services' (VS) National Center for Animal Health Emergency Management (NCAHEM) is charged with preventing AHEs in the United States, rapidly detecting AHEs should they occur, and responding effectively to control or eradicate them.

VS experts continue to collaborate and work with State, Federal, tribal, industry, and private-sector partners to improve the four-pillar approach to emergency management: preparedness and communication, surveillance and detection, response and containment, and recovery and continuity of animal agriculture operations.

## Prevention Methods

VS has the authority and responsibility to prevent and exclude AHEs by prohibiting imports of animals, animal products, veterinary biologics, and other materials that pose a risk of introducing diseases. VS bases its AHE 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.

Agriculture specialists from U.S. Customs and Border Protection (CBP) enforce U.S. import requirements and provisions of the Bioterrorism Act at ports-of-entry. Every day, these specialists screen thousands of passengers, all types of cargo, and international mail at more than 140 ports-

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Veterinary Services bases its animal-health-emergency 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.

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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, 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 AHE 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

- International organizations such as the World Organization for Animal Health (OIE) and

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the Food and Agriculture Organization of the United Nations;

- Overseas U.S. Government personnel such as those from APHIS and USDA's Foreign Agricultural Service;
- Ongoing monitoring of news reports; and
- Other U.S. Government agencies, such as the Armed Forces Medical Intelligence Center, which gather 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 AHE information and then assess, analyze, and process risk events for agency decisionmakers. VS also prepares impact worksheets on 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.

### **AHE Response**

The U.S. emergency response to AHEs involves a partnership between various Federal, State, tribal, local, industry, and other 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, and private veterinarians. These individuals report findings that suggest FAD to the Federal Area Veterinarian-in-Charge (AVIC) or the State Veterinarian, either of whom can initiate an investigation.

The State and Federal counterparts work cooperatively using standard procedures for investigating suspected and confirmed AHEs. The Federal AVIC or State Veterinarian will immediately assign the most readily available AHE diagnostician to conduct a complete investigation. Instructed at the USDA training center at Plum Island, NY, these diagnosticians are skilled in recognizing clinical signs of AHEs and in collecting appropriate samples to send to the National Veterinary Services Laboratories (NVSL) in Ames, IA, and/or its Foreign Animal Disease Diagnostic Laboratory located at Plum Island.

If the field diagnosis indicates that the incident is highly likely to be an AHE, initial response activities include quarantining 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 in 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 AHE response 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

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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, APHIS officials meet with Federal, State, tribal, and local cooperators to assess AHE response activities. Such assessments aid in the development of new strategies for sharing resources and improving response efforts.

### **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, tribal, 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 public about the threats regarding AHEs.

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. Three functional divisions in EMD meet these roles and authorities: 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, tribal, and local entities to strengthen early disease detection and rapid response at all levels. The ICS takes the lead role for implementation of the National Incident Management System. The group has staff liaisons working directly with the Department of Homeland Security (DHS); U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; and Department of Defense to ensure that subject-matter expertise is available within these agencies for all necessary planning and communication 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

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diseases, resource availability, and best strategies in disease mitigation.

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

### **Emergency Management Activities and Accomplishments in 2006**

In 2006, ICS continued its efforts toward establishing a uniform operational policy and guidelines for animal-health emergency management and in particular the role of the Area Emergency Coordinator (AEC) program. The uniform policy and guidelines ensure 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. VS currently has 19 AECs stationed in the field, and plans are in place to add an additional 6 field positions.

A significant collaborative accomplishment in 2006 was the preparation of the draft summary of the National Highly Pathogenic Avian Influenza Response Plan, a “living document” constantly undergoing review and comment and available to the public on the APHIS Web site <[http://www.aphis.usda.gov/newsroom/hot\\_issues/avian\\_influenza/avian\\_influenza\\_summary.shtml](http://www.aphis.usda.gov/newsroom/hot_issues/avian_influenza/avian_influenza_summary.shtml)>.

In 2006, NCAHEM staff also participated in ongoing USDA workshops and outreach on highly pathogenic AI (HPAI) to further strengthen USDA policies, plans, and technological capabilities related to that disease threat. NCAHEM continued

to identify 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 NCAHEM include the following:

- Assisted in the creation and development of the “Implementation Plan for the National Strategy for Pandemic Influenza”;
- Supported activities related to AI planning, communication (departmental, public, congressional, White House), and Federal interagency coordination;
- Provided coordination and support for the response to the contagious equine metritis event in Wisconsin;
- Collaborated with the team developing the North American Animal Disease Spread Model to use the model to adjust to new challenges in 2006 (available online at <<http://www.naadsm.org>>); and
- Participated in development of “worst-case scenario” disposal plans for carcasses and agricultural products with USDA’s Natural Resources Conservation Service and Georgia Tech University, and in the application of new technologies.

## **NVS**

### **Background**

In February 2004, the President issued Homeland Security Presidential Directive–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 economy.

Stockpiling vaccines, reagents, personal protective equipment, and other supplies and materials represents a change in USDA’s approach



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to managing animal and plant disease outbreaks. The new approach involves 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 U.S. supplies by acquiring, configuring, and maintaining critical veterinary equipment and supplies. The goal is ensure that systematic measures are in place to eradicate multiple introductions of the most damaging livestock and poultry diseases and to activate 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 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 AHEs.

NVS' functional requirements address the following:

- The threat of 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, lab diagnostic tools, or other supplies (e.g., 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 2006**

The NVS began operations in 2006 with a mandate to augment State and local resources to respond to animal disease emergencies. In May 2006, the NVS was able to deliver push packs of personal protective equipment (PPE) anywhere in the country within 24 hours. Six months later, the NVS had contracts in place to deliver vaccines against highly pathogenic AI within 24 hours.

In July and October, the NVS held exercises with two States, North Carolina and Georgia. Both used computer-based models to generate HPAI disease scenarios to define outbreak conditions and to identify items that States might need from the NVS for a real response.

As the year closed, the NVS continued working on acquiring AI test kits and reagents, more PPE, satellite communications equipment, mobile command centers, and additional, geographically dispersed distribution centers. The centers will reduce time needed to have assistance onsite and prevent weather from delaying deployment.

## National Animal Health Laboratory Network (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 AHEs.

The NAHLN is a collaborative effort between the American Association of Veterinary Laboratory Diagnosticians (AAVLD), APHIS, and USDA's 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.



In 2002, 12 State and university diagnostic laboratories were selected to enter into cooperative agreements. Since 2002, several State and university laboratories have been added to the NAHLN to assist with chronic wasting disease, scrapie, and END testing. By the end of 2006, the NAHLN encompassed 56 State and university laboratories in 45 States.

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 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 2006

The NAHLN "Train the Trainer" program continues to grow. Not only has the program increased the number of laboratory personnel prepared to respond to a national AHE, but it also provides a cadre of trainers available to teach others. The program's continued success is significant for the network and its mission of ensuring sufficient diagnostic capability and capacity to address an AHE.

Forty-seven approved State universities and one Department of the Interior NAHLN laboratory conduct enhanced AI surveillance efforts for VS and APHIS–Wildlife Services. These laboratories determine if evidence of AI virus is present and whether it is an H5 or H7 subtype. These laboratories forward presumptive positive samples to the NVSL for confirmatory testing. NVSL personnel then conduct additional screening tests and confirmatory tests with research assistance from USDA's Southeast Poultry Research Laboratory to confirm genetic identification of isolated strains of the virus. The NVSL Diagnostic Virology Laboratory in Ames is the only internationally recognized AI reference laboratory in the United States.

NAHLN and AI supplemental funds were used in 2006 to increase the diagnostic testing capability of

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member laboratories by supporting the development and distribution of high-throughput equipment. This technology allows semiautomated processing of diagnostic samples and test methods to enhance the daily testing output of each laboratory. To determine the most appropriate placement of the high-throughput equipment within NAHLN laboratories, NAHLN requested the assistance of analytical epidemiologists within the VS Centers for Epidemiology and Animal Health (CEAH) and CEAH's Center for Animal Disease Information and Analysis. A risk-assessment model was developed to evaluate HPAI introduction and spread, as well as a prioritized ranking of States based on risk level. NAHLN has purchased high-throughput equipment to be distributed in 2007 to 31 NAHLN laboratories, located in the States rated at the highest risk for AI. Currently, APHIS is validating NAHLN methods for AI, classical swine fever (CSF), and FMD using this type of technology.

In January 2006, USDA developed and implemented phase one of a surveillance plan for CSF in States (and Puerto Rico) with a high risk for introduction of this disease. Twelve State/university NAHLN laboratories tested samples, and 18 other State/university NAHLN laboratories assisted with sample collection and processing. The number of State/university NAHLN laboratories participating in surveillance testing will increase to 33 in 2007. NVSL's Foreign Animal Disease Diagnostic Laboratory at Plum Island, NY, performs confirmatory testing for this disease.

USDA and DHS are continuing to develop a diagnostic roadmap to evaluate and prioritize gaps in available diagnostic technology for U.S. agriculture, and propose mechanisms to address and ultimately close them. A high-level strategic roadmap, applicable across a range of AHE threats, was developed, in addition to road maps specific for several high-consequence AHEs.

Since June 2004, seven State/university NAHLN laboratories have participated in enhanced BSE surveillance testing. As of December 1, 2006, analysts at these laboratories had completed more than 797,000 tests. Surveillance for chronic wasting disease and scrapie also occurs in 26 State/university NAHLN labs.

A critical aspect of NAHLN is the effort to standardize data, improve data quality, and maximize the efficiency of data transfer through the information technology (IT) infrastructure and data repository. The NAHLN IT system is being integrated with numerous existing animal-health and veterinary diagnostic data networks to allow seamless electronic transfer of information from the time diagnostic samples are collected in the field, to the addition of appropriate diagnostic test information from the NAHLN laboratories, and finally to the daily reporting of relevant information from each submission to the NAHLN repository database. The IT system enhances surveillance programs, increases the ability of analysts to recognize emerging issues, and provides automated alerts on defined AHEs to authorized personnel who support disease prevention and response.

The system allows NAHLN labs to securely transmit and store data using nationally recognized health information standards that improve data quality and allow data to be used in other systems such as the DHS National Biosurveillance Integration System. The NAHLN IT system has been pilot-tested in 5 laboratories and is currently expanding to 30 more. In 2006, USDA provided training courses on IT messaging to NAHLN laboratory personnel.

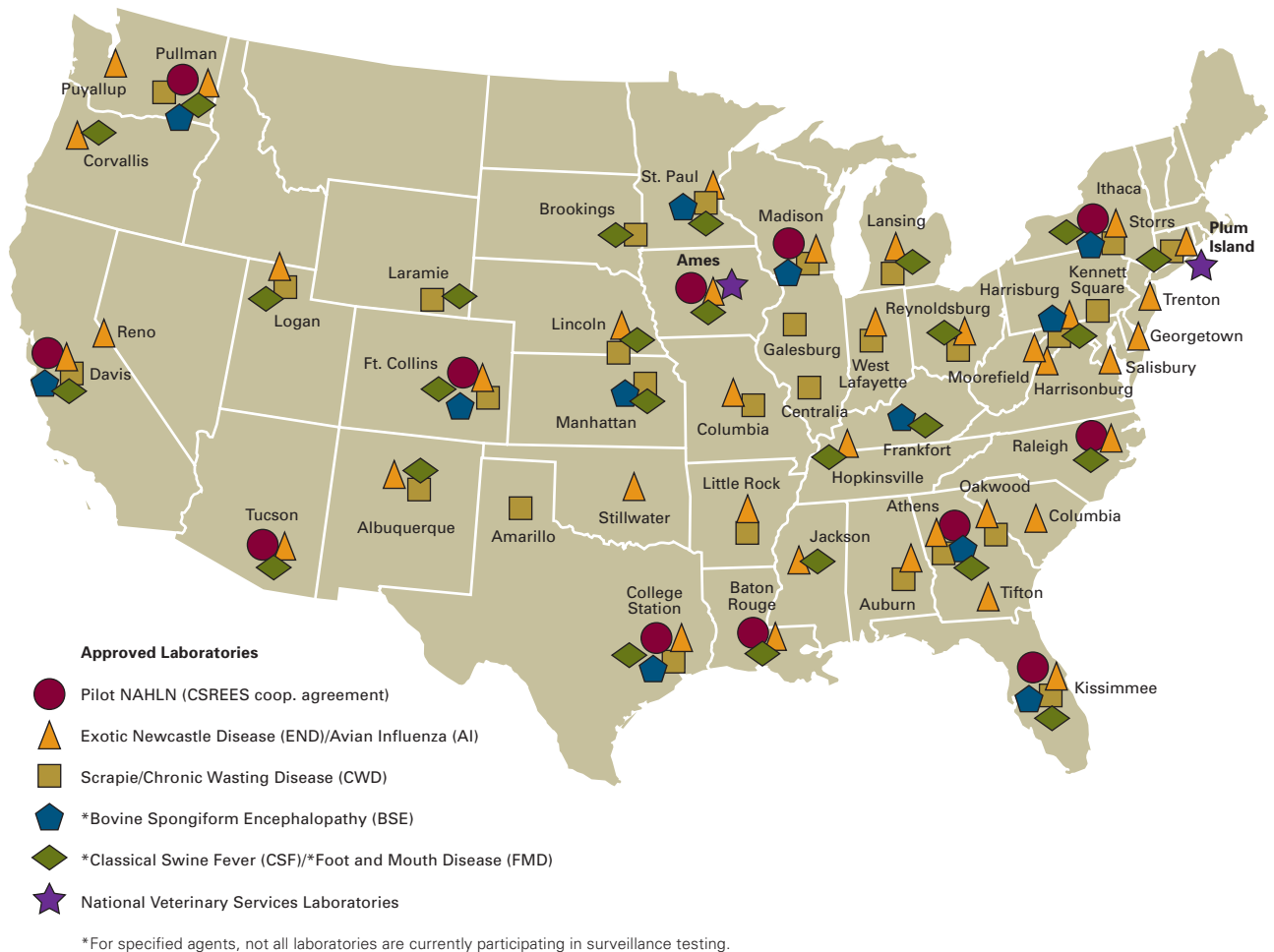
The NAHLN Methods Technical Working Group (established in July 2006) consists of personnel from NAHLN laboratories and NVSL. The working group provides input on various aspects of methods validation and approval of methods, including:

- Review of available methods and associated gaps,
- Identification of potential new technologies,
- Validation criteria,
- Dossier review,
- Assay approval process,
- Equivalency of modified methods for adaptation to new platforms,
- Continual performance assessment of assays,
- Development of performance characteristic summary documents for NAHLN assays, and

- Issues associated with transfer of existing and new technologies to laboratories.

NAHLN is a participating member of the Integrated Consortium of Laboratory Networks, which is a multidepartment and multiagency effort led by DHS. The Consortium includes public, animal, and plant health response networks. The Consortium also identifies gaps in surveillance and diagnostic efforts of national importance and develops mechanisms for collaboration and sharing of information and resources (fig. 14).

**FIGURE 14: NAHLN Network.**









CHAPTER 6



# Animal Trade

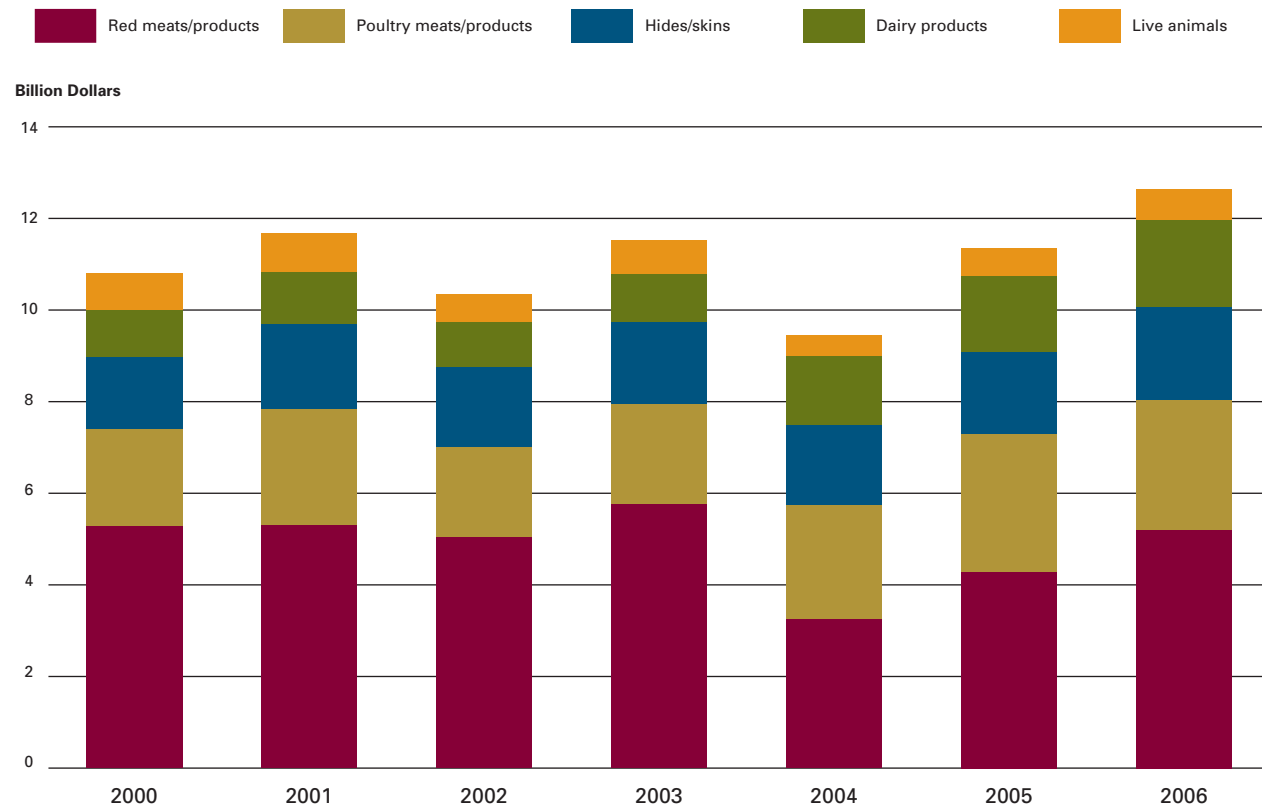
## Background

Foreign animal diseases are of specific concern to the Animal and Plant Health Inspection Service (APHIS) both domestically and internationally. Domestically, foreign animal disease outbreaks can have a profound impact on U.S. export markets (table 19). Most countries restricted imports of U.S. beef and ruminant products after the detection of bovine spongiform encephalopathy (BSE) in late 2003, and other export markets for poultry products have been closed due to low-pathogenic avian influenza (LPAI). However, efforts to address disease events contributed to a near 11-percent increase in U.S. exports of livestock, poultry, and their products—from \$11.4 billion in 2005 to

\$12.6 billion in 2006—recovering from a decline to \$9.5 billion in 2004 (fig. 15). Red meats and their products accounted for 41 percent of the value of 2006 exports, poultry meats and their products for 22 percent, hides and skins for 16 percent, dairy products for 15 percent, and live animals for 5 percent.

Mexico, Canada, Japan, and China represented the largest markets for exports of U.S. livestock, poultry and their products in 2006. Table 20 shows the value of these exports by commodity category. Mexico was the largest market by value for red meats and products, and thus, like Canada, was among the top four markets for red meats and products, dairy products, and poultry meats and products. Japan was one of the top four markets for red meats and

**FIGURE 15: U.S. exports by major commodity group.**



**TABLE 19: Commodities and countries included in disease-related trade issues addressed during 2006**

Disease	Country	Issue	Outcome
<b>EXPORT</b>			
<b>BSE</b>			
	Colombia	BSE risk status of the U.S.A. for import of all U.S. beef and beef products	Reopened market to all U.S. beef
		Bone-in beef and viscera imports from the U.S.A.	Retention of market
	Japan	Bone-in beef and cattle products	Retention of market
	Korea	BSE surveillance	Reopened market for U.S. beef
		Boneless beef	Retention of market
	Peru	BSE status of the U.S.A.	Reopened market for all U.S. beef
		Bone-in beef	Retention of market
	Russia	Beef and liver	Retention of market
	Taiwan	Boneless beef	Retention of market
<b>AI</b>			
	Columbia	AI surveillance in the U.S.A.	Ban lifted
		LPAI incident in New York	Ban lifted
	Japan	LPAI incident in Connecticut	Ban lifted
		LPAI incident in Pennsylvania live-bird market	Ban lifted
	Korea	LPAI in mute swans in Michigan	Ban lifted
		LPAI incident in a State	Ban lifted
	Mexico	LPAI in mute swans in Michigan	Ban lifted
	Peru	LPAI incidents in the U.S.A.	Reopened market to all U.S. poultry
		LPAI in Maryland wild birds	Ban lifted
		LPAI in Pennsylvania wild birds	Ban lifted
	Russia	LPAI in mute swans in Michigan	Ban lifted
		Poultry and poultry products	Expansion
	Taiwan	LPAI in New York	Ban lifted
		Bluetongue status of the U.S.A. for Canadian risk analysis	Proposed to remove all restrictions on all cattle categories, sheep, and deer
Bluetongue	Canada	Canadian draft risk analysis for importation of feeder cattle from U.S.A.; Canadian consultation paper reviewing the Canadian policy on bluetongue	Allowed U.S. cattle without any testing for bluetongue. Sheep, goats, and other small ruminants are allowed under certain conditions
Anaplasmosis	Canada	Anaplasmosis status of the U.S.A. for Canadian risk analysis	Reduced testing requirements for anaplasmosis
Other	China	Disease regionalization approaches/activities in the U.S.A.	Continuation of exports
	Russia	Bovine semen	Expansion
	Turkey	Pet food	Retention of market
<b>IMPORT</b>			
	Argentina	Poultry and poultry products	Access
	Australia	Feeder cattle	Access
	EU	Swine products	Expansion



products, while China was the largest market for hides and skins.

Figure 16 shows that the value of U.S. imports of livestock and products held steady in 2006 at approximately \$11 billion. As was true on the export side, red meats and products dominated imports, accounting for half of the total. Imports of dairy products and live animals were second and third in importance.

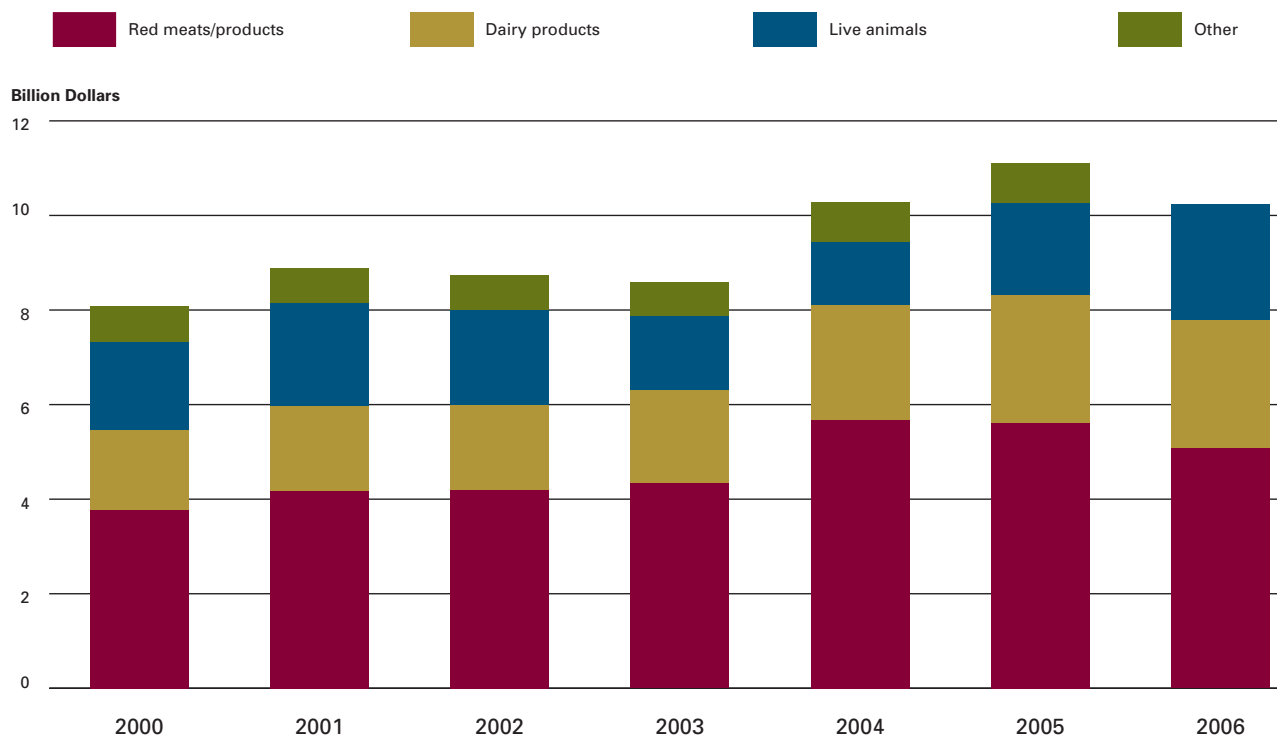
Guidelines issued by the World Organization for Animal Health (OIE) have been instrumental in the

recovery and retention of this trade. The World Trade Organization recognizes OIE as the international standards-setting body for animal health-related guidelines and recommendations worldwide. The U.S. Department of Agriculture's (USDA) APHIS and Foreign Agricultural Service (FAS) worked with many partners to facilitate trade and to reestablish markets of certain cattle products, such as boneless beef, milk and milk products, hides and skins, semen, gelatin, and embryos. Adhering to OIE guidelines was equally important in regaining poultry markets lost following

**TABLE 20: U.S. exports by destination (\$1,000)**

	Hides/skins	Dairy products	Poultry/products	Red meats/products	Live animals	Total, by destination
Canada	75,389	282,445	401,824	953,060	54,903	1,767,621
China	789,790	116,139	348,314	84,854	1,694	1,340,791
Japan	88,970	114,462	79,343	1,150,036	81,279	1,514,090
Mexico	110,919	437,919	511,357	1,791,680	41,058	2,892,933
Other	979,668	935,520	1,611,653	1,216,309	379,757	5,122,907

**FIGURE 16: U.S. imports by major commodity group.**



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detection of LPAI in the United States; many countries initially imposed restrictions that exceeded those supported by OIE guidelines.

## Export (Domestic)

APHIS' Veterinary Services (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 depends somewhat 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 levels, and regionalization of the disease of concern to defined areas.

Table 19 lists the affected commodities and the importing countries for which animal-disease-related issues threatened the continuation of U.S. imports and exports during 2006. Concerns about avian influenza (AI) and BSE dominate the list. The information packages prepared by APHIS' VS and International Services (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.

### Trade Restrictions Due to AI

Information about trade restrictions is forwarded to the Regionalization Evaluation Services—Export (RESE) in Riverdale, MD, through different channels, including APHIS-IS, the animal and animal products export staff at the National Center for Import and Export, and FAS.

In 2006, the RESE staff was notified of restrictions on U.S. poultry trade from Russia, Peru, Korea, and India due to LPAI in wild birds in the United States.

The LPAI detection resulted from the expanded wild-bird surveillance program established by USDA and the Department of the Interior for the early detection of AI. In other instances, several countries placed similar trade restrictions for detections of LPAI in live-bird markets.

After receiving initial ban information, the RESE staff coordinates official responses to individual trading partners to resolve pending trade-restriction issues. The process starts by providing the trading partner with a comprehensive technical report on the detection including: location of the incident, species involved, morbidity/mortality rates, pathogenicity testing results, control/eradication measures applied, and updated information on the epidemiologic investigations. In addition, the report provides incident information and maps and clarifies the distinction between wildlife and domestic commercial poultry. RESE may also provide other specific information on the veterinary infrastructure and organization, surveillance, emergency management, and laboratory capabilities. In certain situations, the trading partner may also submit specific requests for information on the incident. In such situations, RESE will provide the requested information in a timely manner.

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Veterinary Services 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.

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In the event of detections of H5 and H7 LPAI in commercial poultry, the RESE staff provides the trading partner with updates on quarantine removal and declaration of areas as LPAI free for the purpose of removing trade restrictions on the affected counties or States. Efforts are also made to clarify

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the position of such trade restrictions in reference to OIE guidelines.

## **Import Trade Rules in 2006**

Importation of Swine and Swine Products from the European Union

Final Rule Published: May 19, 2006, effective June 19, 2006

*Federal Register*, Vol. 71, No. 97, p. 29061–29072.

[This rule finalized a new approach recognizing many of the European Commission’s regionalization decisions about classical swine fever (CSF) in the 15 original Member States of the European Union.]

Importation of Swine and Swine Products from the European Union; Correction

Final Rule; Correction Published: June 1, 2006, effective June 19, 2006

*Federal Register*, Vol. 71, No. 105, p. 31069–31070.

[The final rule contained an error in the rule portion in the list of CSF-free regions and an error regarding the designation of a section being amended. This document corrected those errors.]

Add Denmark to the List of Regions Free of Exotic Newcastle Disease

Final Rule Published: July 6, 2006, effective July 6, 2006

*Federal Register*, Vol. 71, No. 129, p. 38259–38261.

[This rule restored Denmark to the list of regions considered to be free of exotic Newcastle disease.]

Change in Disease Status of Namibia with Regard to FMD and Rinderpest

Final Rule Published: October 26, 2006, effective November 24, 2006

*Federal Register*, Vol. 71, No. 205, p. 62198–62201





CHAPTER 7





# Overview of U.S. Livestock, Poultry, and Aquaculture Production in 2006

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## Available Statistics

Official statistics for U.S. livestock, poultry, and aquaculture populations are published by the National Agricultural Statistics Service (NASS) of the U.S. Department of Agriculture (USDA). 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. During spring 2008, the next Census of Agriculture (2007) will be conducted. Animal inventory levels will be collected as of December 31, 2007.

In NASS' ongoing sample survey and estimation programs, data are 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

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The number of cattle and calves in the United States steadily increased from 1869 until 1975 and then declined during the next two decades, turning upward recently.

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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 2005 animal health report for that year with statistics published in this year's version of the report for 2005, 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."

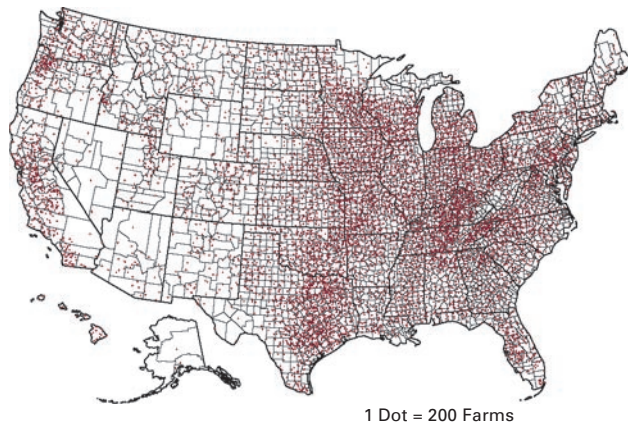
## Number of Farms

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 2006, there were 2.09 million farms, compared with 2.10 million in 2005. Total land in farms was 932.4 million acres in 2006, which represents a decrease from 933.2 million acres in 2005. The average farm size of 446 acres in 2006 was nearly the same as the average acreage in 2005.

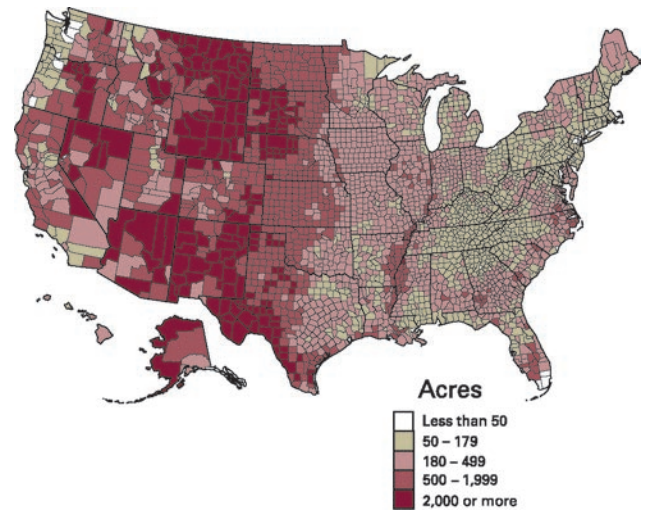
**MAP 1: Number of Farms: 2002**

United States Total: 2,128,982



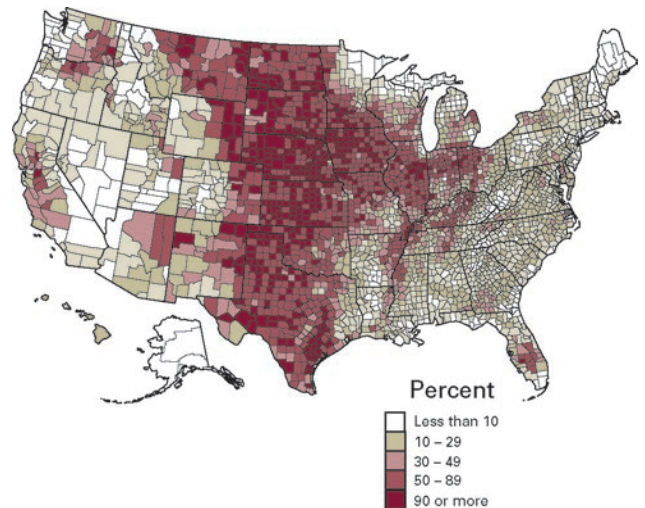
**MAP 2: Average Size of Farms in Acres: 2002**

United States Average: 441



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

United States: 41.4 Percent



## Relative Magnitude of Industries, by Value of Production

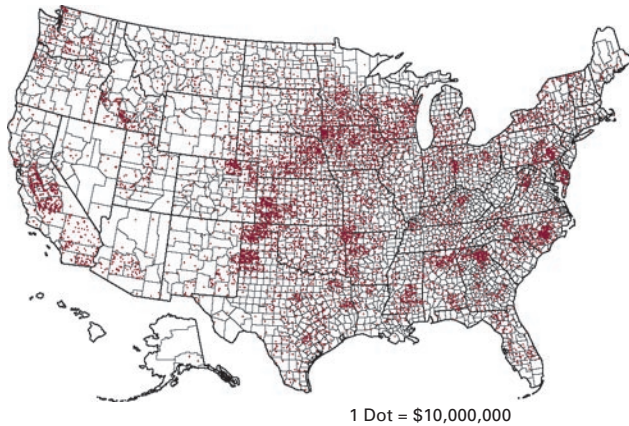
As shown in map 4, the Central and Eastern States had a higher concentration in value of livestock and poultry in 2002, compared with the Western States. In recent years, the total value of production has been split nearly equally between crop and livestock (and poultry) production. In the 2002 Census of Agriculture, 52.6 percent of the total market value of agricultural products sold 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.

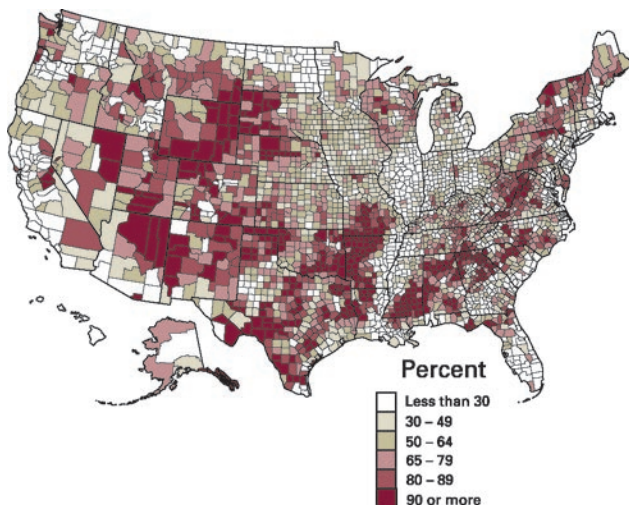
Table A1.2 in appendix 1 identifies specific major livestock, poultry, and crop commodity values for 2006. Figure 17a shows that livestock and poultry accounted for less than half the total value of production (45.0 percent). Note that poultry contributed 26.8 percent of the total value of livestock, poultry, and their products (fig. 17b).

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

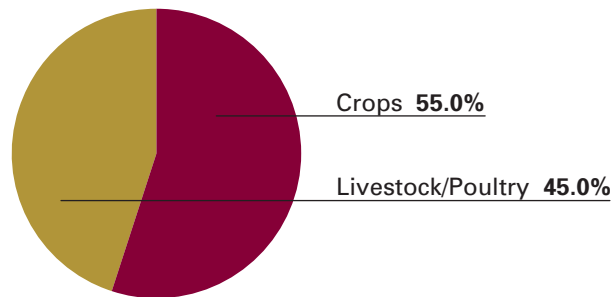
United States Total: \$105,494,401,000



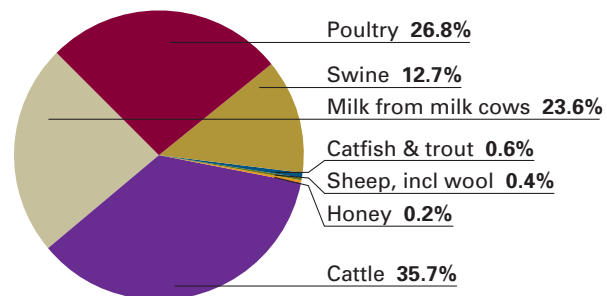
**MAP 5: Value of Livestock, Poultry, and Their Products as Percent of the Total Market Value of Agricultural Products Sold: 2002**



**FIGURE 17A: Value of production in 2006: Crops v. livestock and poultry as a percentage of total.**



**FIGURE 17B: Value of production in 2006: Specific commodities as a percentage of the respective total of livestock and poultry and their products, plus honey.**



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

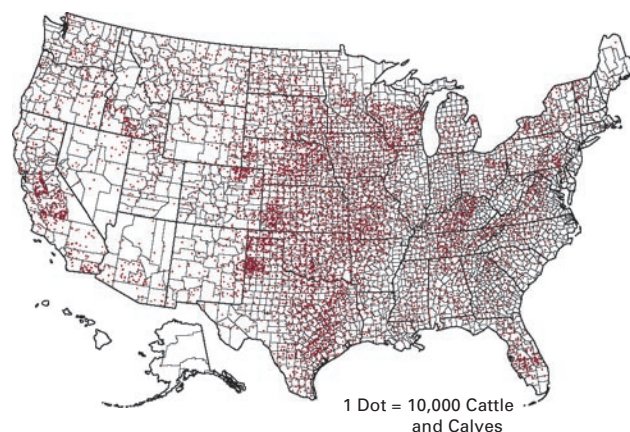
USDA defines a cattle operation as any place having one or more head of cattle on hand at any time during the year. In 2006, almost half the farms in the United States had cattle and calves, for a total of 971,400 cattle operations. Only a small number of these cattle operations (75,140) were dairies for milk production. The value of production for cattle and calves was roughly \$35.7 billion. In addition, the value of milk production was about \$23.6 billion. The poultry industries were the next largest commodity in the United States, with production valued at around \$26.8 billion. Numbers were very similar for operations with hogs and operations with sheep (65,540 and 69,090, respectively), although the comparative values of production were dissimilar (table 21). Note: Detailed statistics for each commodity are provided in tables A1.2 through A1.14 in appendix 1.

## 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).

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

United States Total: 95,497,994



**TABLE 21: Livestock, poultry, and aquaculture statistics for 2006**

Commodity	Inventory (1,000)	Operations	Value of production (\$1,000)	Appendix reference for detail
All cattle and calves	<sup>1</sup> 97,003	971,400	35,740,774	A1.3
Milk cows	<sup>1</sup> 9,129	75,140	<sup>2</sup> NA	A1.4
Beef cows	<sup>1</sup> 32,894	762,880	NA	A1.5
Cattle on feed	<sup>1</sup> 14,269	88,165	NA	A1.6
Hogs and pigs	<sup>3</sup> 62,149	65,540	12,703,842	A1.7
Sheep and lambs (plus wool)	<sup>1</sup> 6,185	69,090	392,598	A1.8
Poultry	<sup>4</sup> Detail	NA	26,842,833	A1.9
Equine	<sup>5</sup> 5,317	NA	NA	A1.10
Catfish	<sup>4</sup> Detail	<sup>6</sup> 1,023	480,820	A1.11
Trout	<sup>4</sup> Detail	604	74,855	A1.11
Honey	<sup>4</sup> Detail	NA	161,314	A1.12

<sup>1</sup> Inventory as of January 1, 2007.

<sup>2</sup> Not available.

<sup>3</sup> Inventory as of December 1, 2006.

<sup>4</sup> Detailed breakout of inventory is shown in respective appendixes.

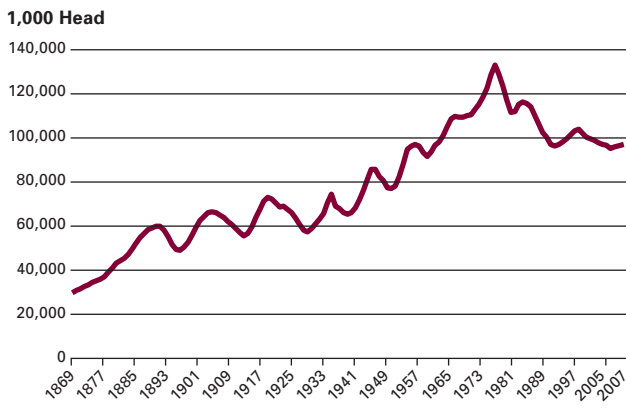
<sup>5</sup> Inventory as of January 1, 1999.

<sup>6</sup> Number of operations as of January 1, 2007.



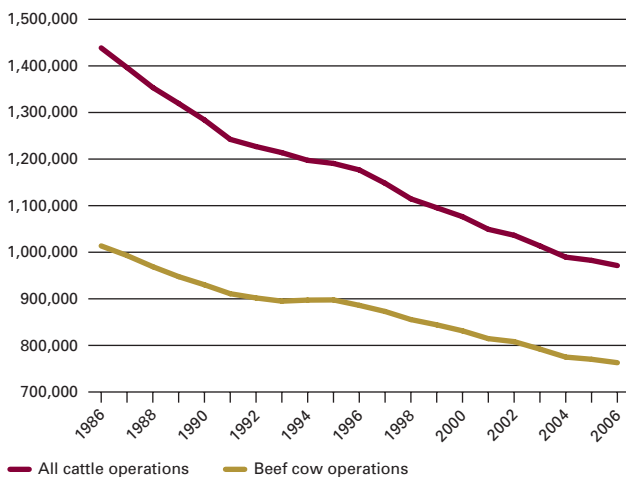
Overall, the number of cattle and calves in the United States steadily increased from 1869, via a cyclical or “wave” effect, until 1975 and then declined during the next two decades, despite a slight upturn in the mid-1990s. Historically, changes in the cattle cycle occur at roughly 10-year intervals. Recently, the Nation’s inventory of cattle and calves has shown an upward turn after several years of gradual decline (fig. 17c).

**FIGURE 17C: Cattle and calves: U.S. inventory on January 1 for selected years, 1869–2007.**



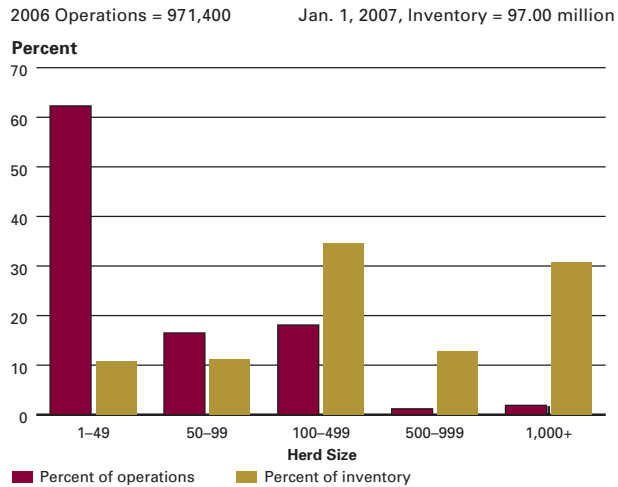
The number of cattle and calf operations has declined steadily during the past 15 years. A similar decline has also occurred in the number of beef operations (fig. 18). The decrease in the number of cattle and calves operations is due primarily to the decline in the number of small operations.

**FIGURE 18: Number of all cattle and beef cow operations, United States, 1986–2006.**



In 2006, small cattle operations (1–49 head) accounted for 62.3 percent of all operations but only 10.7 percent of the total inventory of cattle and calves. Large operations (500 or more head) accounted for just 3.1 percent of all operations but contained 43.6 percent of the total U.S. inventory of cattle and calves (fig. 19 and also table A1.3 in appendix 1).

**FIGURE 19: Cattle and calves: Percent operations and inventory, by herd size.**

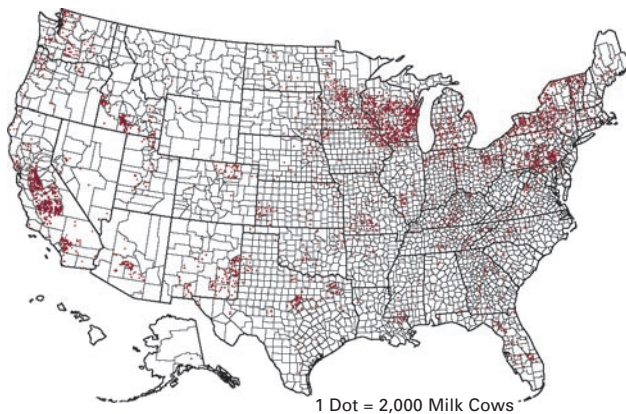


## Milk Cows—Dairy

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

**MAP 7: Milk Cows—Inventory: 2002**

United States Total: 9,103,959

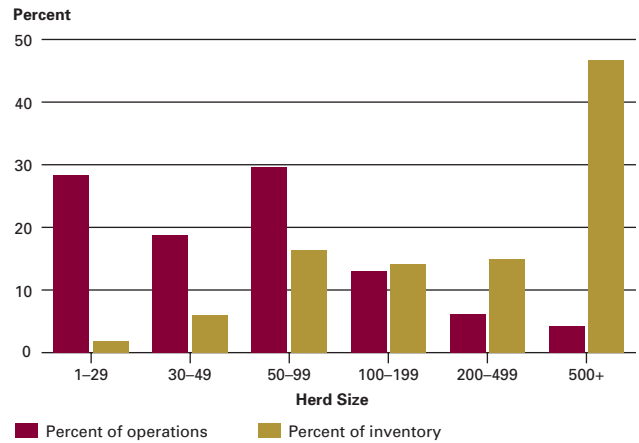


The overall U.S. population of milk cows has remained relatively stable over the last 10 years. In contrast, the number of operations with milk cows in 2006 was only 57.4 percent of the number of operations in 1996 (fig. 20). A small percentage of large operations (500 or more milk cows) had a large percentage of the total number of milk cows (fig. 21).

**FIGURE 21: Milk cows: Percent operations and inventory by herd size.**

2006 Operations = 75,140

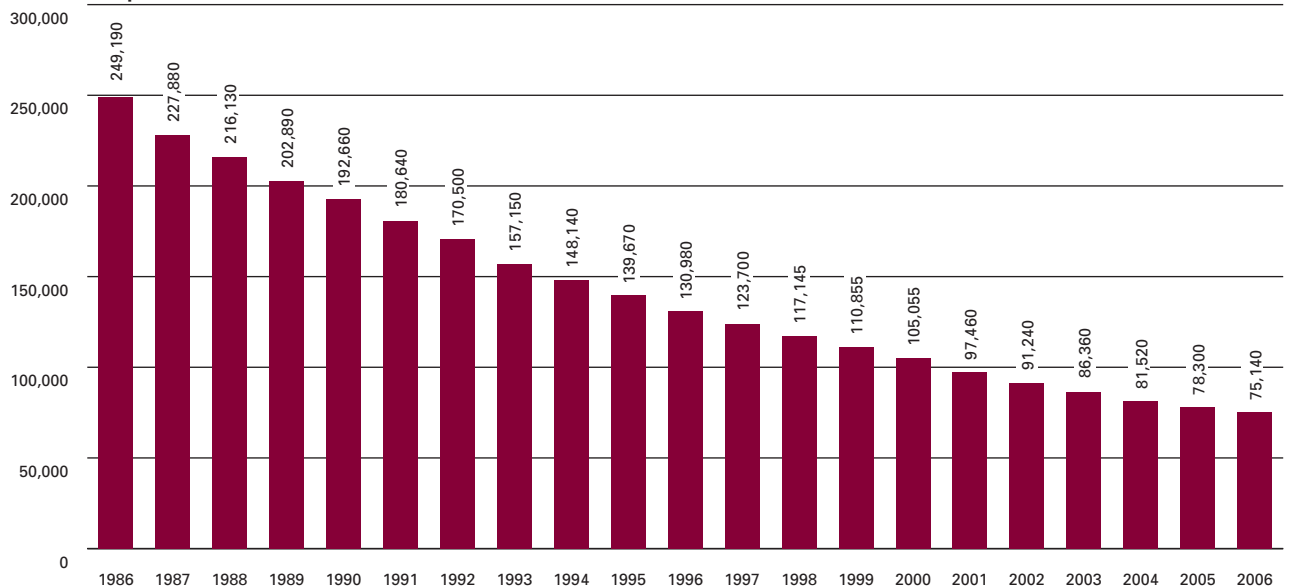
Jan. 1, 2007 Inventory = 9.13 million



Annual milk production per cow increased from 16,433 pounds in 1996 to 19,951 pounds in 2006—a 21-percent increase. Table A1.4 in appendix 1 documents dairy production for 2005 and 2006.

**FIGURE 20: Milk cows: Number of U.S. operations, 1986–2006.**

Number of Operations

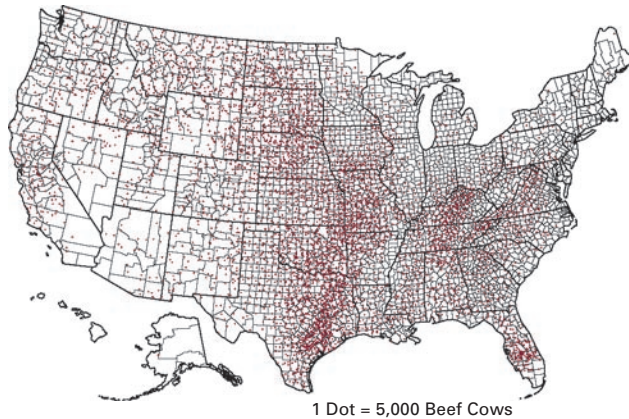


## Beef Cows

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

**MAP 8: Beef Cows—Inventory: 2002**

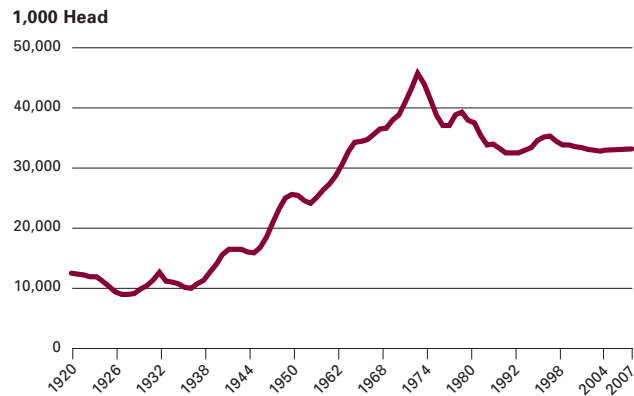
United States Total: 33,398,271



The overall trend in the number of beef cows (fig. 22) follows the trend shown for the total inventory of cattle and calves (fig. 17c). Essentially, inventory levels have remained stable over the last decade (fig. 23). Beef cows accounted for 78.3 percent of the total cow inventory on January 1, 2007.

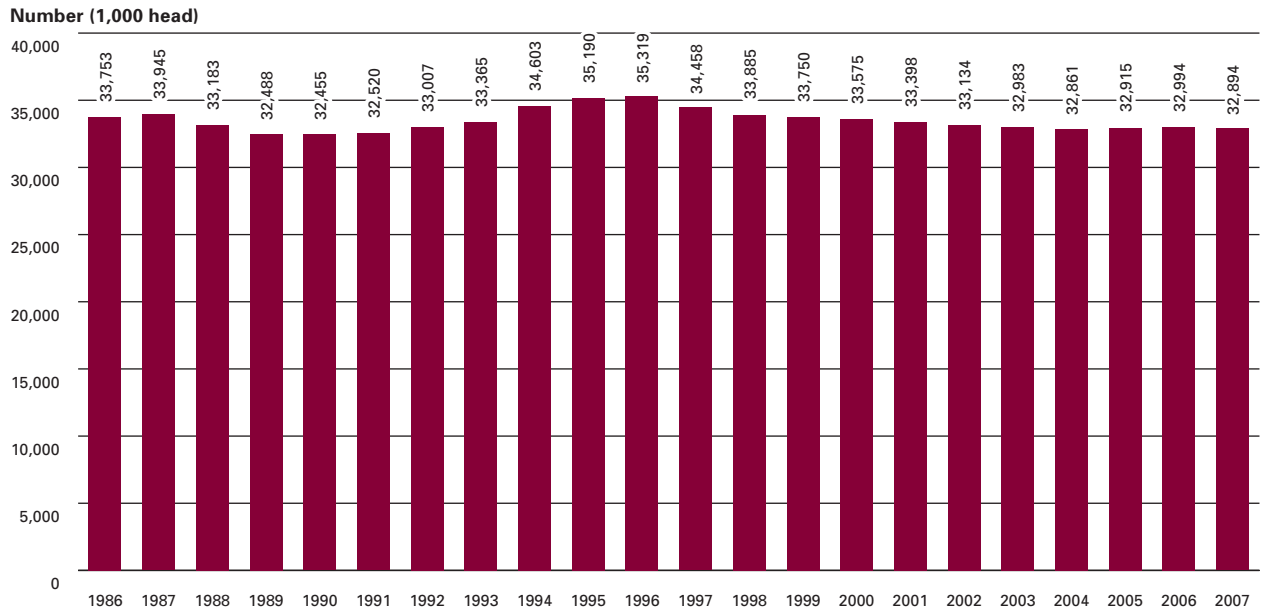
**FIGURE 22: Beef cows: U.S. inventory on January 1 for selected years, 1920–2007.**

2007 Inventory = 32.89 million



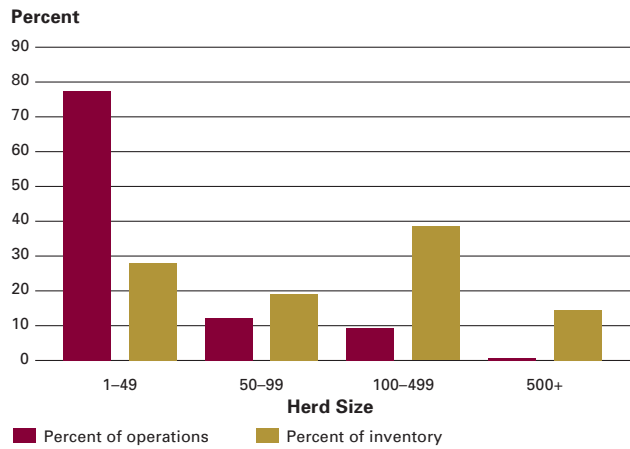
In 2006, a relatively large number of operations in the United States (762,880) had beef cows. However, the number of operations with beef cows has declined gradually since 1996 (1 to 2 percent per year, as shown in fig. 18). This decrease is most notable in small operations (1–49 head). Following a 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 53.8 percent of total U.S. beef cow inventory as of January 1, 2007 (fig. 24 and table A1.5 in appendix 1). These large operations account for only 10.3 percent of all beef cow operations in the United States but have more than half the total beef cow inventory.

**FIGURE 23: Beef cows: U.S. inventory on January 1 for selected years, 1986–2007.**



**FIGURE 24: Beef cows: Percent operations and inventory by herd size.**

2006 Operations = 762,880      Jan. 1, 2007, Inventory = 32.89 million



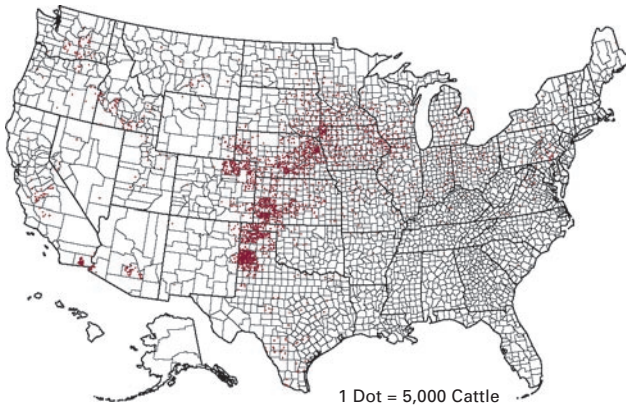


## Cattle on Feed

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).

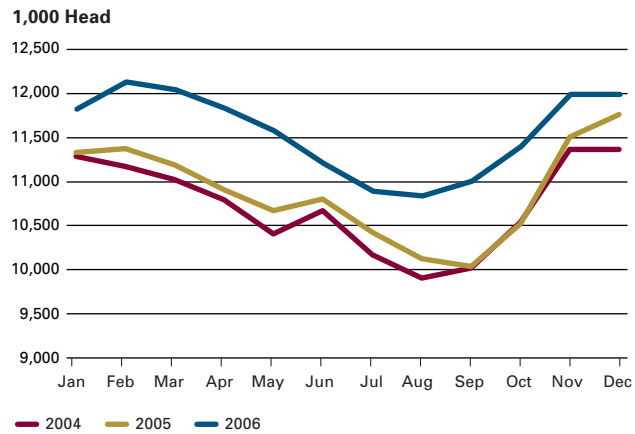
**MAP 9: Cattle on Feed—Inventory: 2002**

United States Total: 14,905,545

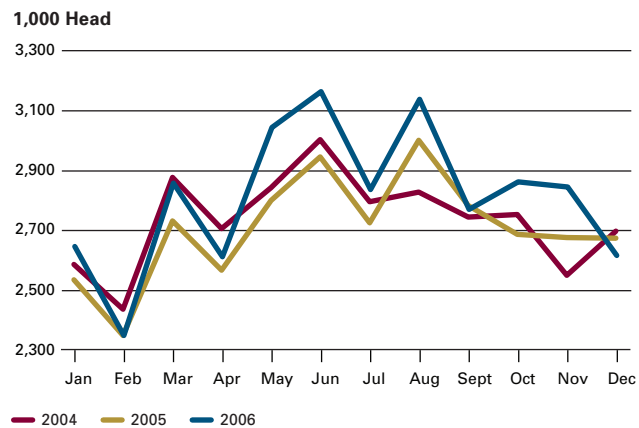


On January 1, 2007, three States (Kansas, Nebraska, and Texas) accounted for over half (57.5 percent) the inventory. Large numbers of cattle on feed are in relatively few feedlots; 126 feedlots (0.1 percent of all feedlots) accounted for 40.0 percent of the total U.S. cattle-on-feed inventory (table 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. 25a). As a result, commercial cattle slaughter typically reaches a high point in May and June (fig. 25b). Steers and heifers accounted for 82.4 percent of the federally inspected cattle slaughter in 2006. Federally inspected slaughter accounted for 98.4 percent of the 33.7 million head of commercially inspected cattle slaughter (table A1.6 in appendix 1).

**FIGURE 25A: U.S. cattle on feed at feedlots with capacity of 1,000 or more head, 2004–06.**



**FIGURE 25B: Cattle: U.S. commercial slaughter, by month, 2004–06.**

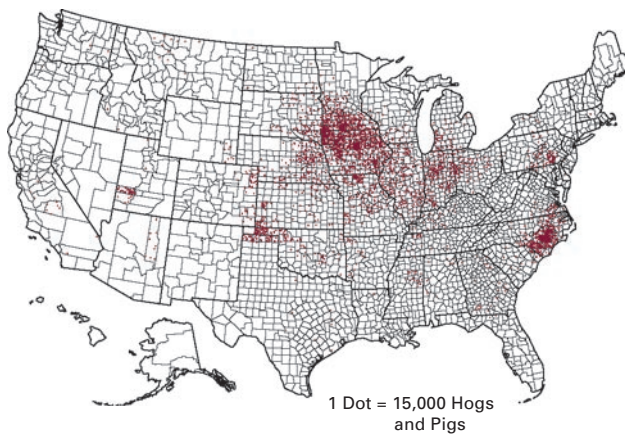


## Hogs

Historically, hog production has been most common in the upper Midwest (map 10). Iowa, the largest hog-producing State, had 27.7 percent of the U.S. inventory of all hogs and pigs on December 1, 2006. During the past two decades, North Carolina has increased its production and is now the Nation's second-largest hog-producing State, with 15.2 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 2006.

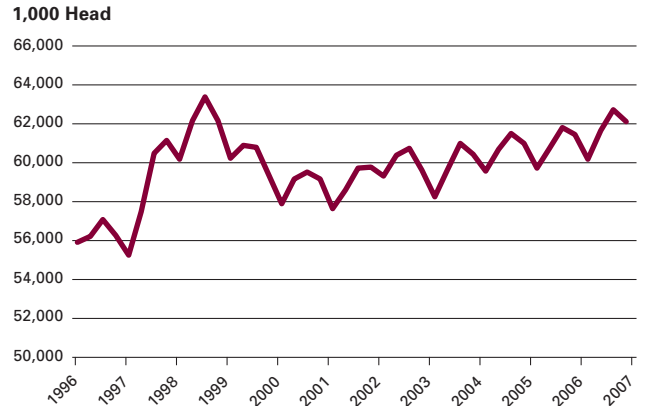
**MAP 10: Hogs and Pigs—Inventory: 2002**

United States Total: 60,405,103



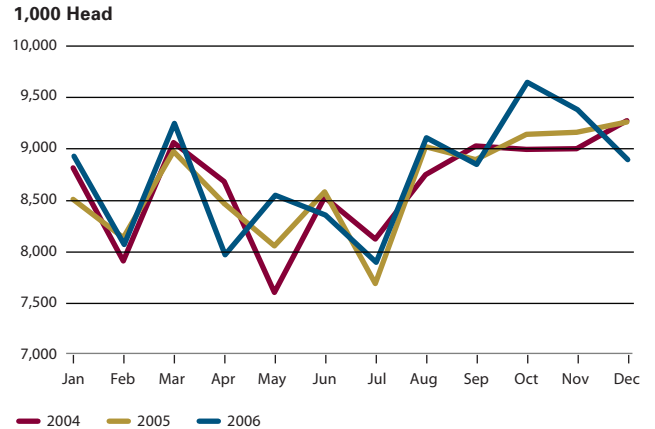
In the United States, inventory levels are estimated and published quarterly (December, March, June, and September). From quarter to quarter, the U.S. inventory of all hogs has fluctuated over the past decade. More change from quarter to quarter was shown in 1996–2001, compared with the quarter-to-quarter variation shown in the last 5 years. Historically, inventory numbers reach a low point on March 1 and peak on September 1 (fig. 26a). The number of hogs kept for breeding decreased by 7.4 percent during the last decade.

**FIGURE 26A: Hogs and pigs: U.S. inventory, by quarter, 1996–2007.**



The number of hogs slaughtered commercially typically reaches a low point in May or July, followed by increases until peaking in October (fig. 26b) in preparation for the holiday season. Commercial hog slaughter totaled 104.7 million head in 2006.

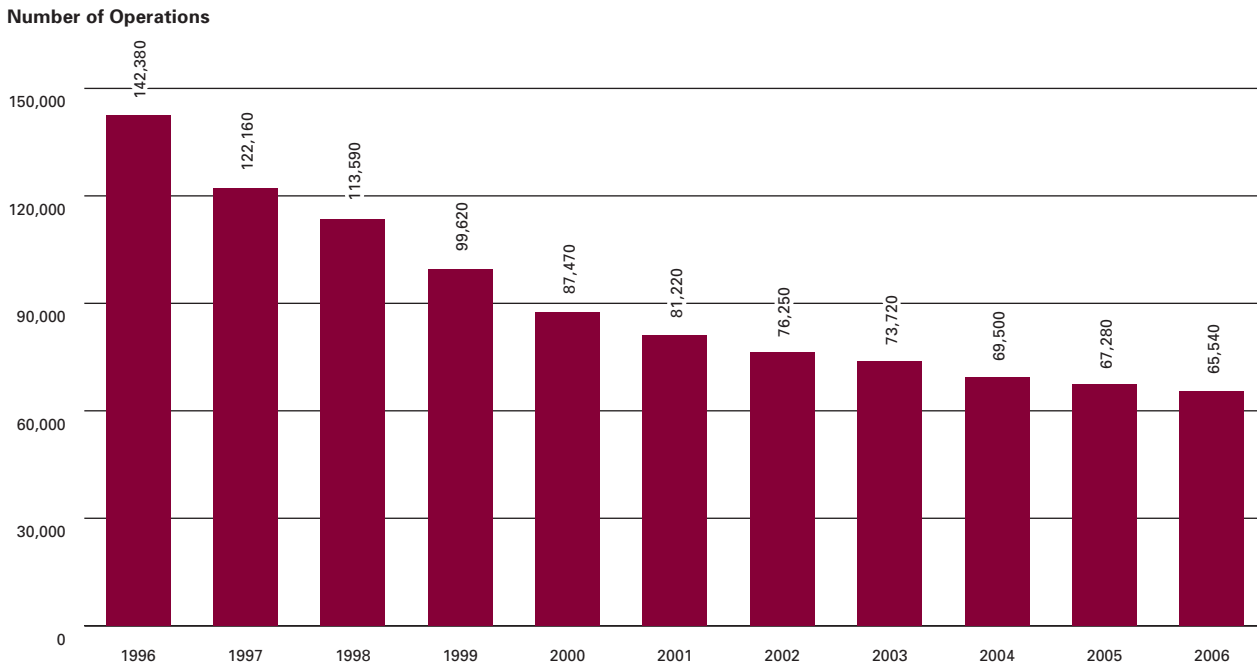
**FIGURE 26B: Hogs: U.S. commercial slaughter, by month, 2004–06.**



The number of operations with hogs declined steadily during the past decade, decreasing by 54 percent over the last 10 years (since 1996) (fig. 27). The majority of swine operations (60.2 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 (3.8 percent of all operations) now maintain more than half of the U.S. hog inventory.

In 2006, the United States had 65,540 hog operations, with a production value of \$12.7 billion (table A1.7 in appendix 1).

**FIGURE 27: Hogs and pigs: Number of U.S. operations, 1996–2006.**

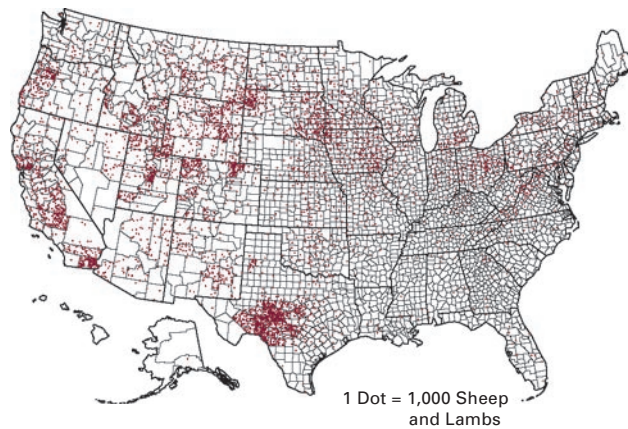


## Sheep and Goats

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.

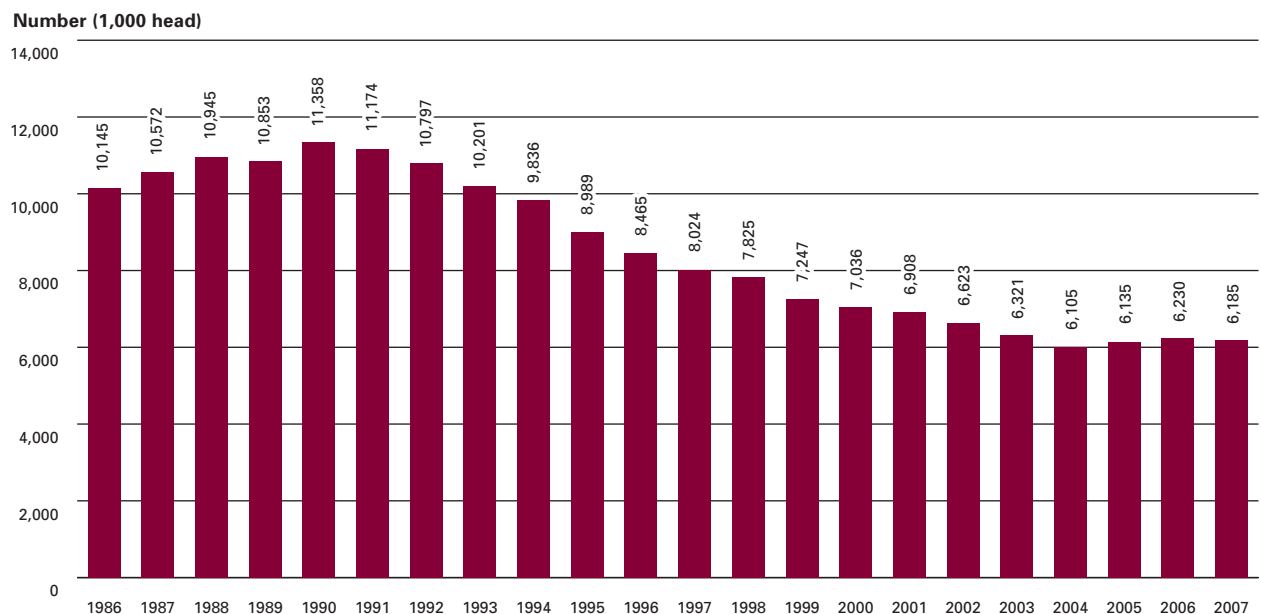
**MAP 11: Sheep and Lambs—Inventory: 2002**

United States Total: 6,341,799



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 noted on January 1, 2005, and a 1.5-percent increase on January 1, 2006, followed by a small decrease on January 1, 2007 (fig. 28).

**FIGURE 28: Sheep and lambs: U.S. inventory on January 1, 1986–2007.**



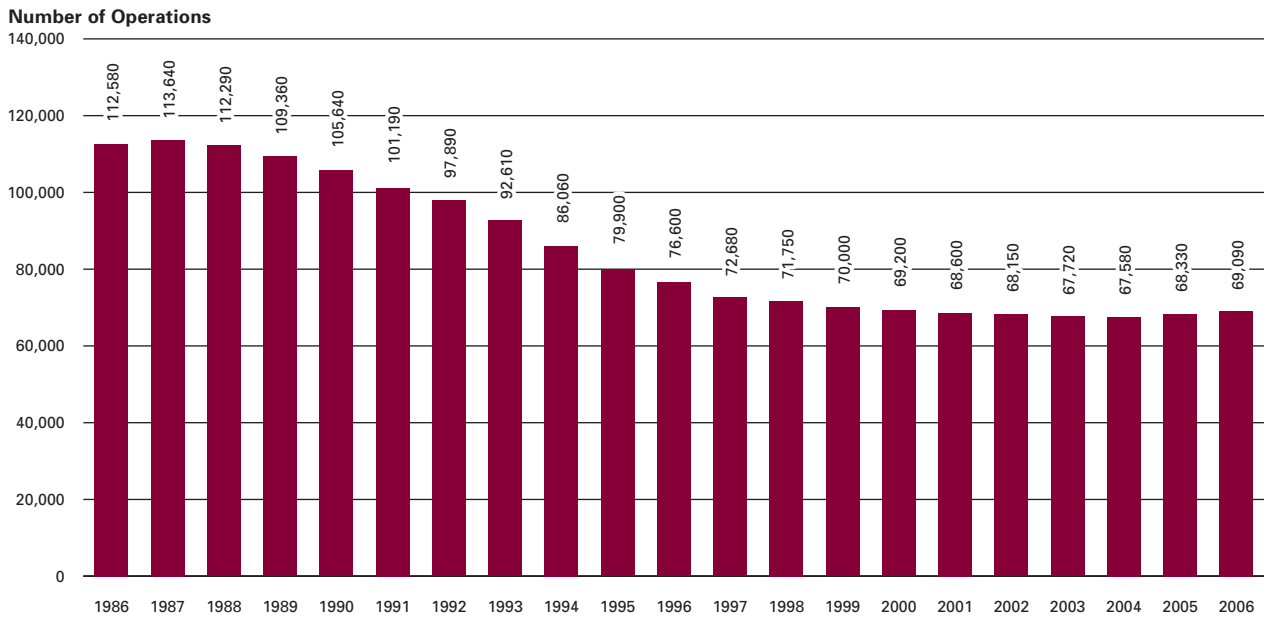
The number of operations with sheep since the late 1980s has declined gradually. However, 1-percent increases have been recorded in each of the last 2 years (fig. 29a).

The January 1, 2007, 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 69,090 total operations had fewer than 100 head of sheep and lambs (table A1.8 in appendix 1). Commercial sheep and lamb slaughter totaled 2.7 million head in 2006. Slaughter typically peaks in March or April (fig. 29b).

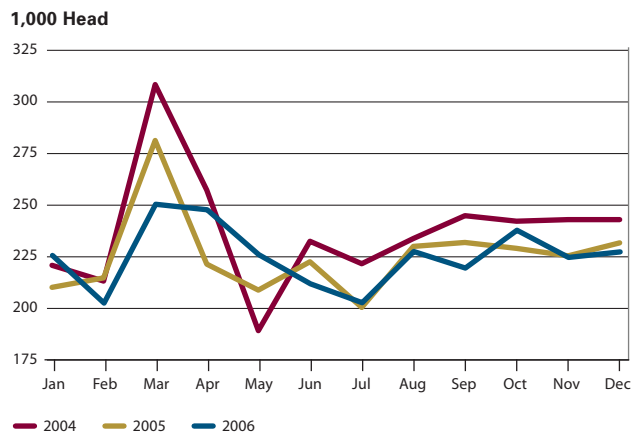
There were 2.93 million goats in the United States on January 1, 2007, which represents a 3-percent increase over the January 1, 2006, population. The number of Angora goats decreased 8 percent, while the number of milk goats increased 2 percent (238,000 and 296,000 head, respectively). Meat and other goats totaled 2.4 million head, which was up 5 percent from 2006.



**FIGURE 29A: Sheep and lambs: Number of U.S. operations, 1986–2006.**



**FIGURE 29B: Sheep: U.S. commercial slaughter, by month, 2004–06.**

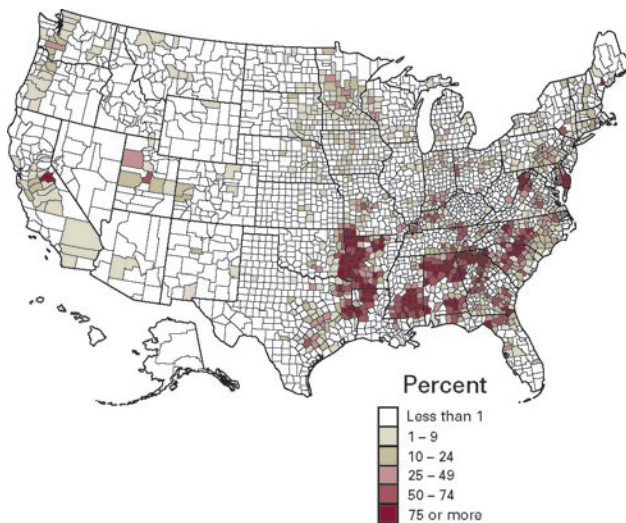


## Poultry Industries

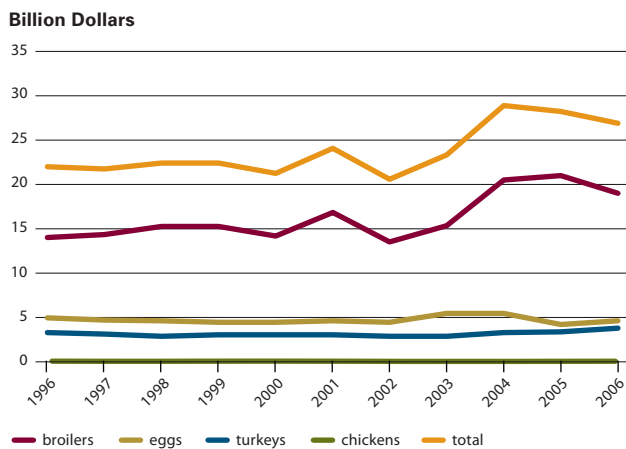
Map 12 shows the economic importance of the poultry industries to the Eastern States—especially the Southeastern States. Note that the value of poultry and eggs is a high percentage of the total value of agricultural products sold in these States. The broiler segment of the poultry industries dominates 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. 30). The quantity of production for each segment has increased rapidly over the past 50 years (figs 31a–c).

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

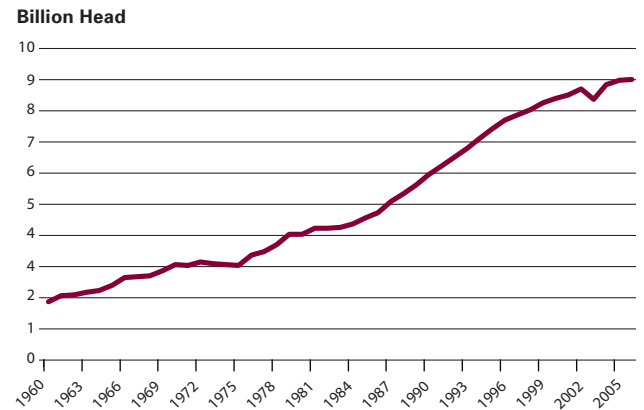
United States: 11.9 Percent



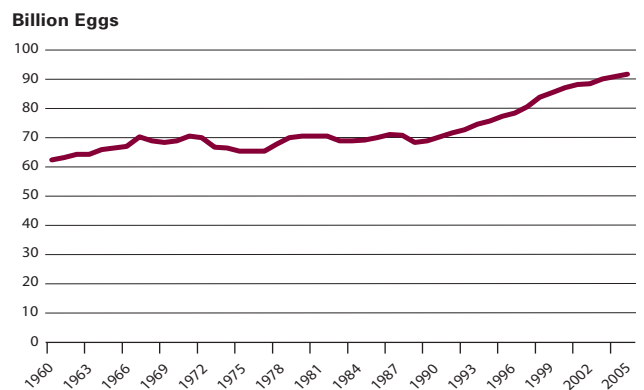
**FIGURE 30: U.S. value of production: Broilers, eggs, turkeys, chickens, and total, 1996–2006.**



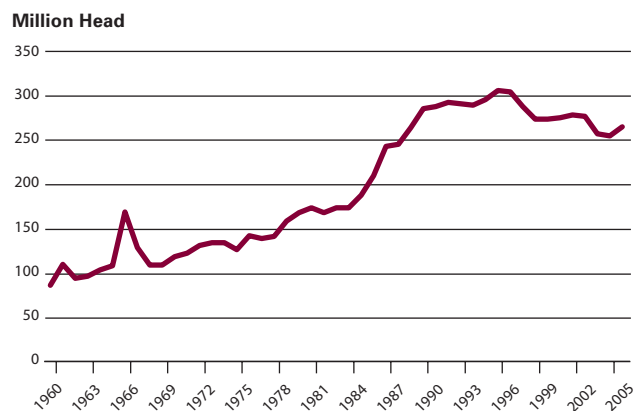
**FIGURE 31A: U.S. broiler production, 1960–2006.**



**FIGURE 31B: U.S. egg production, 1960–2006.**



**FIGURE 31C: U.S. turkey production, 1960–2006.**

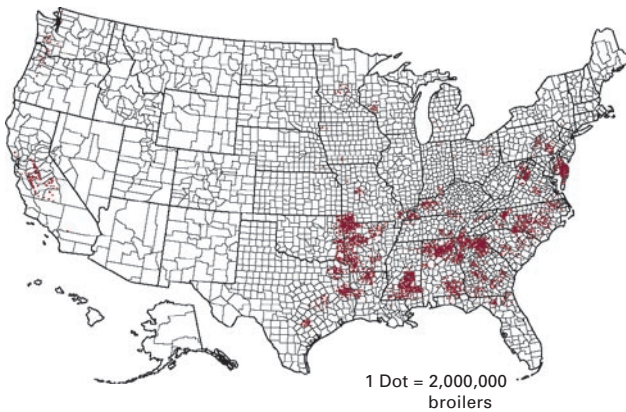


Broiler production is concentrated heavily in the Southeast (map 13), whereas layers are dispersed more widely over the Central and Eastern States (map 14).

Turkey production is concentrated in the eastern half of the United States (map 15). Arkansas, Minnesota, and North Carolina accounted for 42.9 percent of the total number of turkeys raised in 2006.

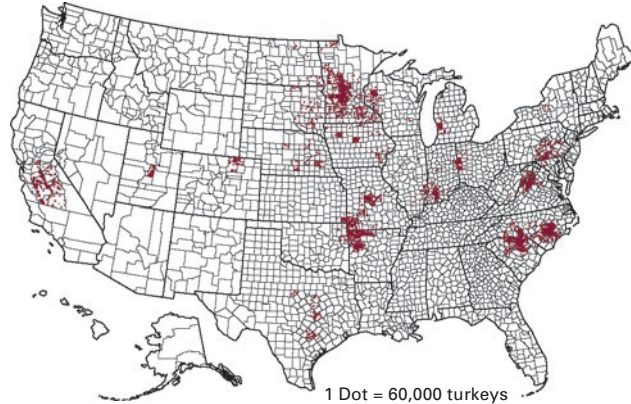
**MAP 13: Number of Broilers and Other Meat-Type Chickens Sold: 2002**

United States Total: 8,500,313,357



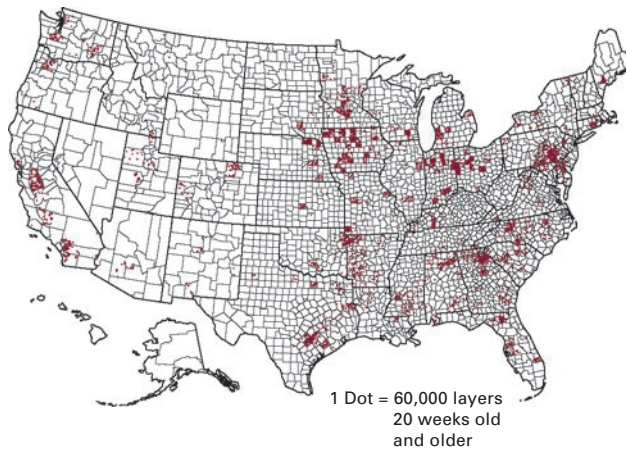
**MAP 15: Number of Turkeys Sold: 2002**

United States Total: 283,247,649



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

United States Total: 334,435,155



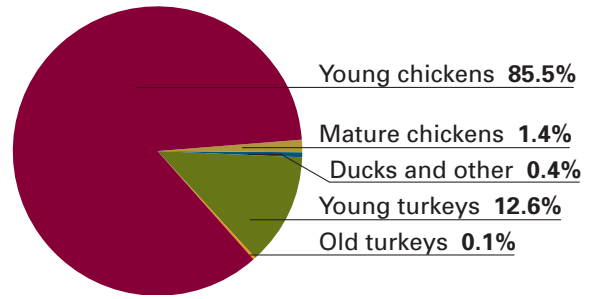
The broiler and layer industries are characterized by a relatively small number of large companies. USDA does not provide annual estimates of the number of companies or production sites. The value of broiler production was 70.2 percent of the \$26.8 billion poultry industries' production in 2006. Egg production accounted for 16.3 percent of the total value of production (table A1.9 in appendix 1).

Hatchery statistics for 2006 include 9.43 billion broiler-type chickens hatched, 426 million egg-type chicks hatched, and 302 million poults hatched in turkey hatcheries. The capacity of chicken hatcheries on January 1, 2007, was 910 million eggs, and the capacity of turkey hatcheries was 38.7 million eggs.

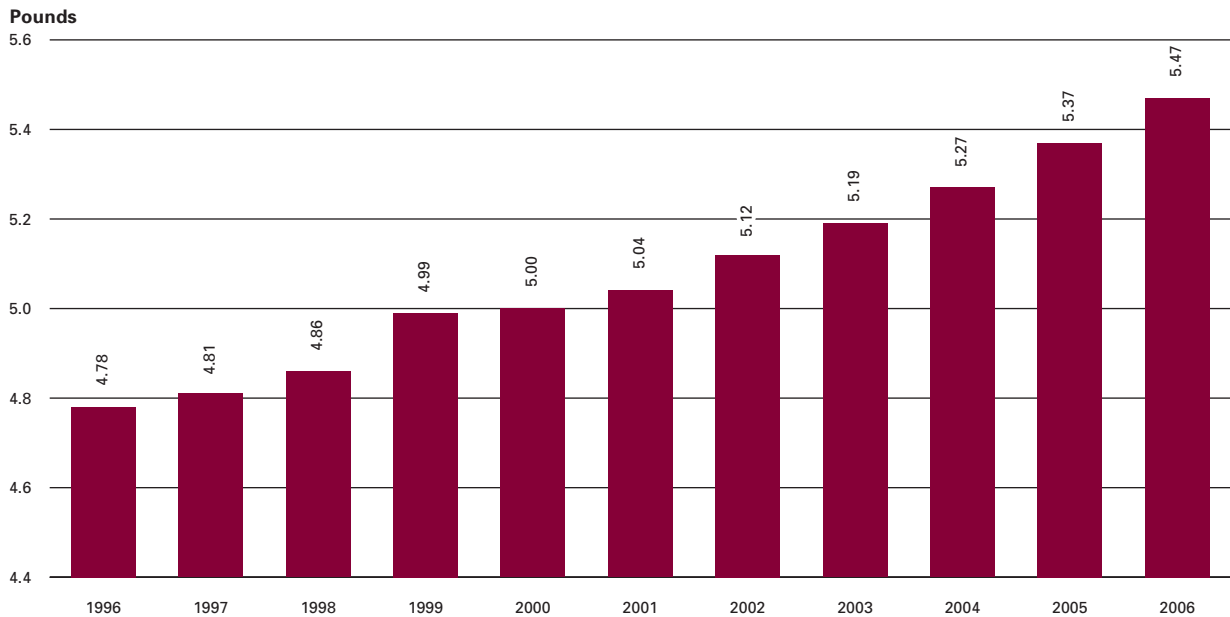
More than 99 percent of total U.S. poultry slaughter for the major species is done in federally inspected slaughter plants. In 2006, approximately 320 plants killed poultry under Federal inspection. Young chickens were killed in 35 States, and young turkeys were slaughtered in 24 States. Slaughter of young chickens<sup>3</sup> accounted for 85.5 percent of the total live weight of poultry slaughtered in 2006 (fig. 32).

The average live weight of young chickens slaughtered has steadily increased over the previous decade (fig. 33).

**FIGURE 32: Poultry: Total live weight slaughtered in 2006, in percentage, by type of poultry.**



**FIGURE 33: Young chickens: Average slaughter live weight, in pounds, 1996–2006.**



<sup>3</sup> Young chickens are commercially grown broilers, fryers, and other young, immature birds (e.g., roasters and capons)



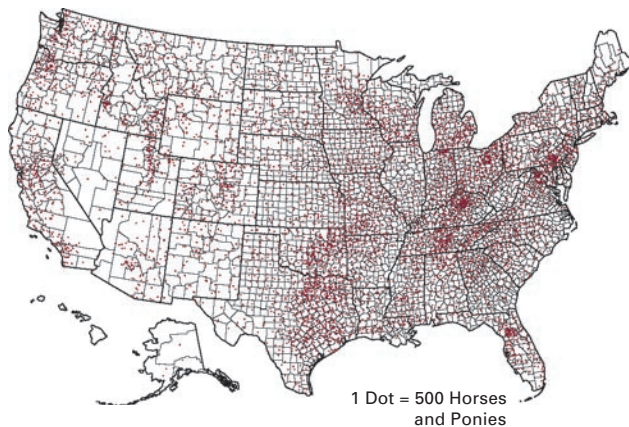
## Equine Industry

Statistics on the demographics of the U.S. equine statistics industry are sparse. USDA does not have an equine statistics program; the only data available are from 1998 and 1999.

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.

### MAP 16: Horses and Ponies—Inventory: 2002

United States Total: 3,644,278



Those figures may be compared with the last statistics published by USDA for equine inventories on all places. As of January 1, 1998, the inventory of equids on both farms and nonfarms totaled 5.25 million head. A year later, that figure was 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 collects no information by size of equid operation for the United States.

## Fish and Other Aquaculture Products

The 2002 Census of Agriculture estimated the value of aquaculture products sold at \$1.1 billion or about 1 percent of the total \$105.5 billion sales for all livestock, poultry, and their products in the United States.

The 2005 Census of Aquaculture expanded data collection from the 2002 Census and now provides the most recent and comprehensive picture of the aquaculture sector. This report, published in October 2006, was the second national census conducted by USDA to collect data about the aquaculture industry specifically.

The first aquaculture census was conducted in 1998. NASS collects information on the catfish and trout industries through monthly catfish processing surveys, semiannual catfish production surveys, and an annual trout survey. Limited aquaculture statistics





In 2005, the United States had 4,309 aquaculture producers with estimated total sales of \$1.1 billion. Food-fish production accounted for 61.5 percent of the sales (table 22, fig. 34).

**TABLE 22: Aquaculture statistics for 2005**

Commodity	Farms	Pct.	Sales (\$1,000)	Pct.
Food fish	1,847	42.9	672,377	61.5
Sport fish	303	7.0	18,126	1.7
Bait fish	257	6.0	38,018	3.5
Ornamental fish	358	8.3	51,297	4.7
Crustaceans	925	21.5	53,381	4.9
Mollusks	980	22.7	203,183	18.6
Miscellaneous	226	5.2	56,003	5.1
<b>Total</b>	<b>14,309</b>	<b>100.0</b>	<b>1,092,386</b>	<b>100.0</b>

from the 5-year Census of Agriculture have been presented since 1974.

The target population for the 2005 Census of Aquaculture was all commercial or noncommercial places from which \$1,000 or more of aquaculture products were produced and either sold or distributed during the census year. Data were collected via mail, telephone, and personal interviews. Report forms were first mailed in mid-December 2005.

Aquaculture is important in the coastal States and is heavily concentrated in the four States of Alabama, Arkansas, Louisiana, and Mississippi (map 17). These four States account for over half (51.7 percent) of the aquaculture sales in the United States.

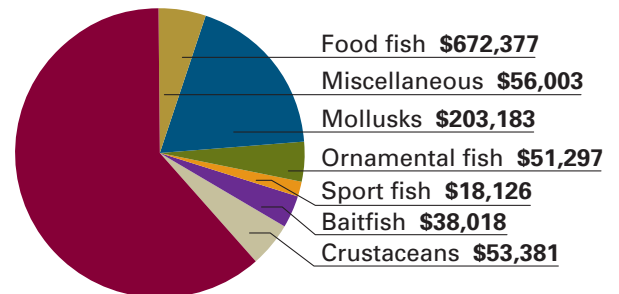
<sup>1</sup> Sum of farms across commodities will be greater than all farms because some farms have multiple commodities.

<sup>2</sup> Sum of percentages will be greater than 100 percent because some farms have multiple commodities.

<sup>3</sup> Sum of commodities may not add to total.

**FIGURE 34: Value of aquaculture products sold, by type, 2005 (x \$1,000).**

U.S. Total = \$1,092,386,000



**MAP 17: Aquaculture Sales: 2005**

United States Total Sales: \$1.09 Billion  
Source: 2005 Census of Aquaculture, USDA-NASS

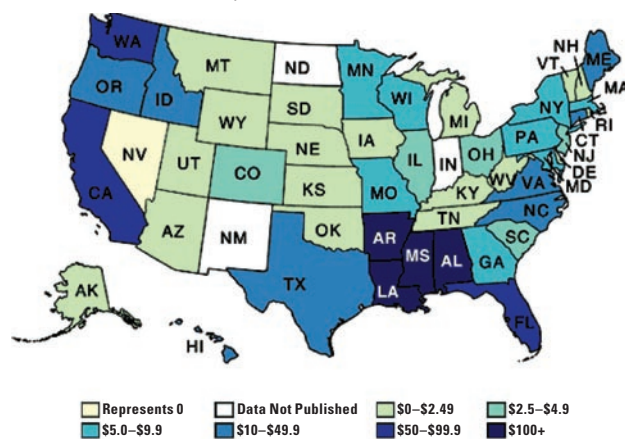


Table 23 shows that the industry is composed of relatively few (5.4 percent) large producers responsible for 61.8 percent of the total sales.

**TABLE 23: Number of aquaculture farms and sales by sales category, 2005**

Sales Category (in dollars)	Farms		Sales	
	No.	Pct.	(\$1,000)	Pct.
<25,000	1,898	44.0	16,217	1.5
25,000 to 49,999	528	12.3	18,540	1.7
50,000 to 99,999	542	12.6	37,733	3.4
100,000 to 499,999	897	20.8	200,082	18.3
500,000 to 999,999	210	4.9	144,868	13.3
1,000,000 or more	234	5.4	674,948	61.8
Total	4,309	100.0	<sup>1</sup> 1,092,386	100.0

<sup>1</sup> Sum of commodities may not add to total.

Catfish producers contribute heavily to the food-fish sector of aquaculture with estimated sales of over two-thirds (68.7 percent) of all food-fish sales (table 24).

**TABLE 24: Food-fish statistics, 2005**

Fish	Farms		Sales	
	No.	Pct.	(\$1,000)	Pct.
Bass, hybrid striped	87	4.7	31,472	4.7
Carp	103	5.6	5,335	0.8
Catfish	1,160	62.8	461,885	68.7
Perch, yellow	99	5.4	692	0.1
Salmon	12	0.6	41,164	6.1
Tilapia	156	8.4	31,334	4.7
Trout	410	22.2	79,282	11.8
Other food fish <sup>1</sup>	83	4.5	21,213	3.1
Total	<sup>2</sup> 1,847	<sup>3</sup> 100.0	672,377	100.0

<sup>1</sup> Includes Arctic char, Pacific threadfin, red drum, sturgeon, and other food fish.

<sup>2</sup> Sum of farms across commodities will be greater than all food-fish farms because some farms have multiple commodities.

<sup>3</sup> Sum of percentages would be greater than 100 percent because some farms have multiple kinds of fish.

Water surface acres used for aquaculture production are slightly more than one-half from freshwater (table 25).

**TABLE 25: Surface water acres used in aquaculture production, 2005**

	Acres	Pct.
Freshwater	365,566	52.7
Saltwater	327,487	47.3
Total	693,053	100.0



## Honey Production

Honey production in 2006 from producers with five or more colonies totaled 155 million pounds, which represents an 11-percent decrease from 2005 (table A1.12 in appendix 1). This decrease, offset by a 14-percent increase in honey prices, resulted in a 2006 value of production of \$161.3 million, up less than 1 percent from the previous year. The distribution



of honey production is rather widespread across the United States, although North Dakota and California accounted for 16.7 and 12.8 percent of the total production, respectively.

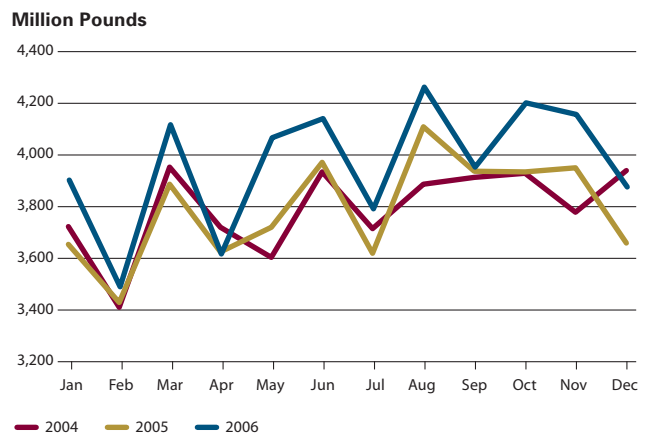
## Miscellaneous

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, 2007, there were 793 federally inspected U.S. slaughter plants. 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 called Talmedge–Aiken plants. Although USDA is responsible for inspection in these plants, Federal inspection is actually carried out by State employees. During 2006, 636 plants slaughtered cattle (table A1.14 in appendix 1), and 14 of these plants slaughtered 56 percent of the total cattle slaughtered. Five of the 238 plants that slaughtered calves accounted for 54 percent of the total, and 4 of the 484 plants that slaughtered sheep or lambs in 2006 produced 68 percent of the total. In 2006, 371 plants slaughtered goats. Hogs were slaughtered at 614 plants, 10 of which accounted for 47 percent of the total. Iowa, Kansas, Nebraska, and Texas accounted for almost 52 percent of U.S. commercial red-meat production in 2006. Commercial red-meat production by month typically reaches a low point in February (fig. 35).

**FIGURE 35: U.S. commercial red meat production, by month, 2004–06.**

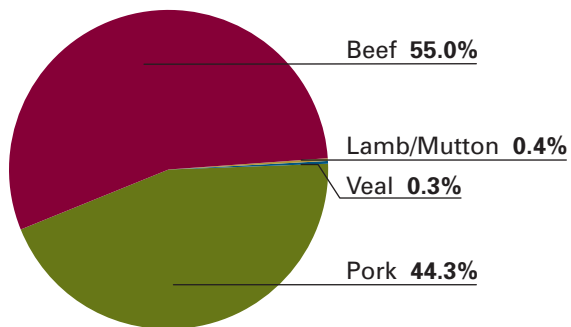




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Beef and pork dominated commercial production in 2006 (55.0 and 44.3 percent, respectively), as shown in fig. 36.

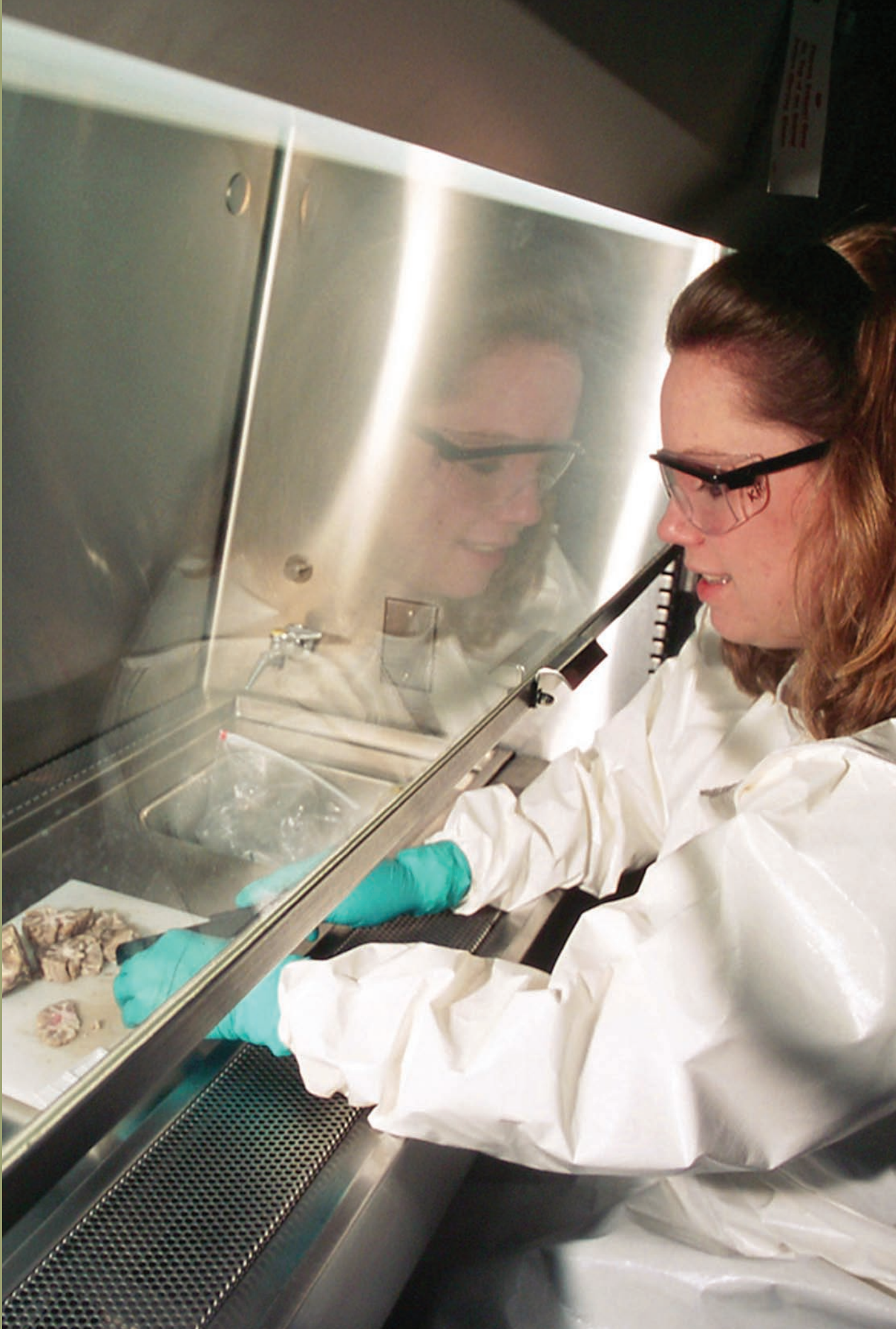
**FIGURE 36: U.S. commercial red meat production, by percentage, 2006.**



There were 2,060 State-inspected or custom-exempt slaughter plants in the United States on January 1, 2007, compared with 2,136 such plants on January 1, 2006. 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.



## CHAPTER 8



# Research Initiatives in Animal Health

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## Introduction

The purpose of this chapter is to provide some insight into current animal-health research conducted by various organizations. Addressing all areas of animal-health research in the United States could be an all-consuming task, so the information presented here is by no means a complete presentation of initiatives. This chapter addresses two major areas of influence over animal-health research: the Federal Government and schools of veterinary medicine located at universities across the United States. Although the information presented here is categorized by these two areas of influence, it is their sense of partnership and collaboration that brings the research to fruition.

## Federal Research Responsibilities

The broad area of research within the U.S. Department of Agriculture (USDA) is the responsibility of the Under Secretary for Research, Education, and Economics (REE) (appendix 3, fig. 37). The REE mission area assumes Federal leadership responsibility for the discovery, application, and dissemination of information and technologies spanning the biological, physical, and social sciences through agricultural research, education, and extension activities and economic and statistical analysis. REE responsibilities are carried out by four agencies:

- The Agricultural Research Service (ARS) is the principal inhouse research agency in USDA in natural and biological sciences. The National Agricultural Library and the National Arboretum

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Two major areas of influence shape the scope of animal-health research initiatives in the United States: the Federal Government and the 28 schools of veterinary medicine.

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are also part of ARS. The agency's 2006 budget was \$1.079 billion.

- The Cooperative State Research, Education, and Extension Service (CSREES) is the Federal partner with land-grant and non-land-grant colleges and universities in carrying out extramural research, higher education, and extension activities. Its 2006 budget was \$1.199 billion.
- The Economic Research Service (ERS) is the principal economic and social-science research agency in USDA. Its 2006 budget was \$81 million.
- The National Agricultural Statistics Service (NASS) conducts the Census of Agriculture and provides the official statistics on agricultural production and indicators of the economic and environmental welfare of the farm sector. Its 2006 budget was \$139 million.

### ARS

ARS, the chief scientific research agency of USDA, has 22 national research programs. National Program 103, Animal Health, includes approximately 46 projects. Within each commodity, and sometimes across commodities, there is a wide breadth of research projects. Cattle disease research includes babesiosis, bovine spongiform encephalopathy (BSE),



bovine tuberculosis, bovine viral diarrhea (BVD), brucellosis, Johne's disease, and mastitis, among other subjects. In addition to cattle diseases, ARS scientists are working on a number of diseases in equids, poultry, sheep, and swine, including West Nile virus, foot-and-mouth disease, avian influenza (AI), Newcastle disease, scrapie, and postweaning multisystemic wasting syndrome. Research is also being conducted into aspects of chronic wasting disease (CWD) in deer and other cervids. ARS also emphasizes work on arthropod-borne diseases, including anaplasmosis and vesicular stomatitis as well as detection, diagnosis, and surveillance for arthropod-borne diseases. The ARS Web site (<<http://www.ars.usda.gov/main/main.htm>>) has more details on these research projects.

The goal of National Program 103, Animal Health, is to protect and ensure the safety of the Nation's agriculture and food supply through improved disease detection, prevention, control, and treatment. ARS scientists use both basic and applied research to solve animal health problems of high national priority. Investigators emphasize methods and procedures to control animal diseases through the discovery and development of

- Diagnostics,
- Vaccines,
- Biotherapeutics,
- Disease resistance mechanisms,
- Disease management,

- Animal disease models,
- Farm biosecurity measures, and
- Agriculture sustainability.

**Aquaculture Program**—The mission of ARS' Aquaculture Program is to conduct high-quality, relevant, basic and applied aquaculture research and technology transfer to create jobs and economic activity that will improve the international competitiveness and sustainability of U.S. aquaculture, and reduce dependence on imported seafood and threatened ocean fisheries.

The research components of this program include

- Genetic improvement;
- Integrated aquatic animal health management;
- Reproduction and early development;
- Growth, development, and nutrition;
- Aquaculture production systems;
- Sustainability and environmental compatibility of aquaculture; and
- Quality, safety, and variety of aquaculture products for consumers.

#### **Commodity Research Projects—ARS**

ARS has about 46 National Program 103 projects, conducted in the agency's principal laboratories across the country. Some of the laboratories and their main areas of research are listed below.

Animal Disease Research, Pullman, WA

(anaplasmosis, babesiosis, CWD, transmissible spongiform encephalopathies (TSEs), scrapie, ovine progressive pneumonia)

Animal Parasitic Diseases Laboratory, Beltsville, MD

(equine protozoal myeloencephalitis, neosporosis, immune mechanisms, porcine reproductive respiratory syndrome)

Arthropod-Borne Animal Diseases Research,

Laramie, WY (West Nile virus, Rift Valley fever virus, vesicular stomatitis)





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Avian Disease and Oncology Research, East Lansing, MI (diseases of poultry, chicken immune response, Marek's disease)

Bovine Functional Genomics Laboratory, Beltsville, MD (mastitis)

Foreign Animal Disease Research, Orient Point, NY (vesicular stomatitis, foot-and-mouth disease, vaccines and diagnostics, classical swine fever)

National Animal Disease Center: Virus and Prion Diseases of Livestock, Ames, IA (BVD, BSE, CWD, TSEs, AI, postweaning multisystemic wasting syndrome, brucellosis, Johne's disease, immune response, emerging diseases)

Southeast Poultry Research Laboratory, Athens, GA (AI, Newcastle disease, Marek's disease)

U.S. Meat Animal Research Center, Clay Center, NE (BSE, infectious diseases of livestock)

## CSREES

The CSREES has been operating for more than 12 years as a single agency of USDA (formerly two separate agencies—the Cooperative State Research Service and the Extension Service). The combined, unique mission is 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. CSREES provides leadership, direction, and oversight for congressional funds distributed through several mechanisms, including formula programs, competitive grants programs, special grants, and cooperative agreements to help fund such work at the State and local level. Researchers, educators, and extension specialists are funded at land-grant institutions, at other institutions of higher learning, in Federal agencies, and in the private sector.

Legislation passed by Congress initiates research opportunities and integrated opportunities (combining research, education, and extension), with the level of funding determined by congressional appropriations passed into law. Once such legislation is passed, CSREES translates

it into a comprehensive research or integrated program. For competitive dollars, the agency releases a request for applications publicly to seek those researchers, educators, and extension specialists who would actually conduct individual projects. The agency creates a peer-review panel of appropriate expertise to review the applications, and the panel recommends whether or not specific applications should be funded. Selected applicants are required to file annual progress and termination reports, document their spending, and attend an annual investigator meeting.

CSREES funding and leadership cover a broad range of topic areas, including:

- Agricultural and food biosecurity;
- Agricultural systems;
- Animals and animal products;
- Biotechnology and genomics;
- Economics and commerce;
- Families, youth, and communities;
- Food, nutrition, and health;
- Natural resources and environment;
- Pest management;
- Plants and plant products; and
- Technology and engineering.

A key subset of the animals and animal products emphasis area is the animal-health program. CSREES' role in the fight against animal disease includes its ability to:

- Support college/university/diagnostic laboratory infrastructure and provide funds to conduct small-scale research to determine how best to respond to animal disease;
- Support basic and applied research, education, and extension projects from all U.S. institution types through a competitive awards program;
- Stimulate interstate cooperation for targeted animal disease issues through multistate committees and multi-million-dollar Coordinated Agricultural Project (CAP) competitive awards;

- Focus funds on targeted diseases and national programs of State and regional importance; and
- Serve as the Federal link to the veterinary extension and education infrastructure to disseminate timely and pertinent animal-health information.

CSREES' animal-health portfolio is extremely broad to reflect the needs of its partners and stakeholders. It includes research, education, and extension activities for animal-related viruses, bacteria, prions, metabolic production diseases, internal and external parasites, and toxins and poisonous plants. During the 5-year period FY 1999–2003, CSREES invested almost \$170 million for animal health and well-being research and education projects.

Approximately 76 percent of that investment was dedicated to infectious and noninfectious diseases. The vast majority of that work is focused on emerging, reemerging, and high-impact endemic infectious diseases. Selected project diseases include tuberculosis, brucellosis, foot-and-mouth disease (FMD), influenza (avian, equine, and swine), Newcastle disease, porcine reproductive and respiratory syndrome (PRRS), mastitis, Johne's disease, salmonellosis, *Escherichia coli*, West Nile virus, and Marek's disease. A much smaller portion of those funds is dedicated to noninfectious diseases (e.g., metabolic ruminant diseases—retained placentas, metritis, fatty liver, ketosis, equine and cattle laminitis, and equine colic).

Project areas of study for infectious diseases include the nature of causative agents involved in animal diseases; mechanisms of disease resistance and immunity; interrelationships among environment, genetics, and infectious agents in the etiology of diseases; methods of diagnosis, prevention, treatment, control, and eradication of diseases, including development of equipment; methods of keeping infectious diseases (e.g., FMD and classical swine fever) out of this country; evaluation of alternative control methods; understanding mechanisms involved in transmission of diseases to animals, including the role of vectors such as insects, ticks, and mites; control of intermediate hosts; and integrated biosecurity control systems.

Beginning in FY 2004, CSREES' National Research Initiative Competitive Grants Program initiated a new integrated activity in its Animal Protection and Biosecurity Program, multi-million-dollar multidisciplinary CAPs. These integrated projects complement existing agency research awards. Three CAPs are currently active: PRRS (<<http://www.prrs.org>>), Johne's disease (<<http://www.jdip.org>>), and avian influenza (<<http://www.aicap.umd.edu>>).

CSREES funds targeted research on CWD in deer and elk, which is related to important livestock diseases such as BSE and scrapie. Research was funded to discover how CWD spreads and how to detect it in deer and elk populations, how CWD threatens domestic cattle, and how to improve and use emerging diagnostic laboratory test kits for CWD. CSREES also supports experiential learning opportunities for veterinary students to help them prepare for careers in food-animal medicine, food safety, and animal-health research in response to a shortage of veterinarians in these critical agricultural areas.

The Extension Disaster Education Network is another prominent network supported by CSREES.

Regional conferences have recently been held focusing on animal agrosecurity and especially the role of the cooperative extension service before, during, and after an animal agrosecurity event.

The National Animal Health Laboratory Network is also an important ongoing, successful partnership joining CSREES and APHIS resources.

## **ERS**

ERS is a primary source of economic information and research in USDA. Five major areas of research define the scope of activity:

- A competitive agricultural system;
- A safe food supply;
- A healthy, well-nourished population;
- Harmony between agriculture and the environment; and
- An enhanced quality of life for rural Americans.

In recent years, changes in the rules of trade, shifts in domestic policy, and new developments in

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technology have altered the competitive landscape of global agriculture and the challenges facing American farmers. Included in this competitive agricultural system research area are special topics relevant to animal health:

- Animal production and marketing issues: animal care and food safety,
- Animal production and marketing: policy and regulatory issues,
- Economics of invasive species management, and
- Traceability in the U.S. food supply.

### **NASS**

The NASS mission is to provide timely, accurate, and useful statistics in service to U.S. agriculture. NASS statisticians furnish the information necessary to keep agricultural markets stable and efficient and to help maintain a “level playing field” for all users of agricultural statistics. NASS conducts hundreds of surveys every year and prepares reports covering virtually every aspect of U.S. agriculture production and supplies of food and fiber, prices paid and received by farmers, farm labor and wages, farm finances, chemical use, and changes in the demographics of U.S. producers. In addition, NASS conducts the cyclical 5-year Census of Agriculture, which provides national-, State-, and county-level details on the agricultural economy. The next Census of Agriculture will be for calendar year 2007.

## **Research Programs Associated With University and College Programs in Veterinary Medicine**

Many universities and colleges in the United States are involved in research related either directly or indirectly to agriculture. The scope of research conducted by these institutions is extremely broad and covers the full range of scientific topics, from genomic sequencing to epidemiologic field studies of herds or flocks. Government, industry, and

academia collaborate in defining the research needs and implementing the research.

The Nation’s 28 veterinary schools (table 26) are also engaged in research related to agriculture and, more specifically, to animal health. The research done at these veterinary schools is also broad, including such topics as viral and bacterial pathogenesis, arthropod-borne diseases, development of vaccines, food safety, and infectious diseases.

**TABLE 26: Veterinary Schools in the U.S.A.**

<b>School</b>	<b>Web Site</b>
Auburn University	<a href="http://www.vetmed.auburn.edu">http://www.vetmed.auburn.edu</a>
University of California, Davis	<a href="http://www.vetmed.ucdavis.edu">http://www.vetmed.ucdavis.edu</a>
Colorado State University	<a href="http://www.cvmbc.colostate.edu">http://www.cvmbc.colostate.edu</a>
Cornell University	<a href="http://www.vet.cornell.edu">http://www.vet.cornell.edu</a>
University of Florida	<a href="http://www.vetmed.ufl.edu">http://www.vetmed.ufl.edu</a>
University of Georgia	<a href="http://www.vet.uga.edu">http://www.vet.uga.edu</a>
University of Illinois–Urbana	<a href="http://www.cvm.uiuc.edu">http://www.cvm.uiuc.edu</a>
Iowa State University	<a href="http://www.vetmed.iastate.edu">http://www.vetmed.iastate.edu</a>
Kansas State University	<a href="http://www.vet.ksu.edu">http://www.vet.ksu.edu</a>
Louisiana State University	<a href="http://www.vetmed.lsu.edu">http://www.vetmed.lsu.edu</a>
Michigan State University	<a href="http://www.cvm.msu.edu">http://www.cvm.msu.edu</a>
University of Minnesota	<a href="http://www.cvm.umn.edu">http://www.cvm.umn.edu</a>
Mississippi State University	<a href="http://www.cvm.msstate.edu">http://www.cvm.msstate.edu</a>
University of Missouri	<a href="http://www.cvm.missouri.edu">http://www.cvm.missouri.edu</a>
North Carolina State University	<a href="http://www.cvm.ncsu.edu">http://www.cvm.ncsu.edu</a>
Ohio State University	<a href="http://www.vet.osu.edu">http://www.vet.osu.edu</a>
Oklahoma State University	<a href="http://www.cvhs.okstate.edu">http://www.cvhs.okstate.edu</a>
Oregon State University	<a href="http://www.vet.orst.edu">http://www.vet.orst.edu</a>
University of Pennsylvania	<a href="http://www.vet.upenn.edu">http://www.vet.upenn.edu</a>
Purdue University	<a href="http://www.vet.purdue.edu">http://www.vet.purdue.edu</a>
University of Tennessee	<a href="http://www.vet.utk.edu">http://www.vet.utk.edu</a>
Texas A & M University	<a href="http://www.cvm.tamu.edu">http://www.cvm.tamu.edu</a>
Tufts University	<a href="http://www.tufts.edu/vet/">http://www.tufts.edu/vet/</a>
Tuskegee University	<a href="http://www.tuskegee.edu/Global/category">http://www.tuskegee.edu/Global/category</a>
Virginia-Maryland Regional College	<a href="http://www.vetmed.vt.edu">http://www.vetmed.vt.edu</a>
Washington State University	<a href="http://www.vetmed.wsu.edu">http://www.vetmed.wsu.edu</a>
Western University	<a href="http://www.westernu.edu">http://www.westernu.edu</a>
University of Wisconsin	<a href="http://www.vetmed.wisc.edu">http://www.vetmed.wisc.edu</a>









CHAPTER 9





# Collaboration and International Capacity-Building Efforts

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Multiple branches within the Animal and Plant Health Inspection Service (APHIS), along with other agencies in the U.S. Department of Agriculture (USDA), collaborate with many countries on training, education, outreach, and capacity-building programs to safeguard and improve animal health. The purpose of this chapter is to highlight some of the collaborative efforts that were conducted in 2006.

APHIS–International Services (IS) assists in providing professional expertise in many countries of the world, serving as a channel of communication for local veterinary services and agricultural officials. IS and several other program units in APHIS provide extensive training in foreign countries. In 2006, this training encompassed a wide variety of topics, including epidemiology, diagnostic testing techniques, foreign animal disease recognition and management, and emergency response.

Many of the centers and program units within Veterinary Services (VS) participated by providing key expertise in international animal-health-related capacity-building projects with countries throughout the world. These units included the National Center for Import/Export (NCIE), Centers for Epidemiology and Animal Health (CEAH), Emergency Management and Diagnostics, National Center for Animal Health Programs, National Veterinary Services Laboratories (NVSL), National Poultry Improvement Plan, and the VS Professional Development Staff. USDA areas of expertise shared with international partners included exotic animal disease preparedness, emergency response, livestock identification, disease investigation, and surveillance systems development. In addition, APHIS cooperated

with USDA’s Agricultural Research Service (ARS) on projects related to scientific research and standards for quarantine and inspection issues.

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The U.S. Department of Agriculture and its international partners share their expertise in several important areas, including preparedness to handle outbreaks of exotic animal diseases, emergency response, livestock identification, disease investigation, and the development of disease-surveillance systems.

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APHIS–Wildlife Services also collaborated with other countries on avian influenza surveillance and sampling, wild waterfowl surveillance, wildlife disease surveillance, risk assessment, and tuberculosis research.

## World Organization for Animal Health (OIE) Collaborations

At the international level, VS collaborates extensively with the OIE. It collects, analyzes, and disseminates information on the distribution and occurrence of animal diseases; provides expertise and encourages international harmonization in the control of animal

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diseases; and promotes safe trade by publishing international standards for the safe movement of animals and animal products. Within APHIS–VS, four major program areas interact directly with OIE: NVSL, the Center for Veterinary Biologics (CVB), CEAH, and NCIE’s Sanitary International Standards Team (SIST).

To support OIE, NVSL

- Provides diagnostic assistance, such as agent isolation and characterization;
- Supplies reference reagents to other laboratories, which can be used to standardize testing or for routine diagnosis;
- Evaluates diagnostic reagents used by other countries and exchanges sera to standardize and harmonize testing;
- Provides training in the diagnostic tests that it performs;
- Consults on a wide range of techniques; and
- Conducts developmental projects to improve diagnostic techniques for diseases of significance in the Americas.

Cooperating with the Southeast Poultry Research Laboratory in Athens, GA, the Institute for International Cooperation in Animal Biologics (IICAB), Ames, IA, and USDA’s Foreign Agricultural Service (FAS) in 2006, NVSL conducted training sessions on diagnosis of avian influenza (AI) and Newcastle disease. A total of 74 diagnosticians from 43 countries attended the courses, which included lectures and hands-on training in classical and molecular diagnostic techniques.

Through the Diagnostic Virology Laboratory, bluetongue proficiency panels using agar-gel immunodiffusion and complementary enzyme-linked immunosorbent assay (ELISA) are prepared and used in annual certification of about 60 laboratories in the United States. The panels are available to OIE Member Countries upon request. NVSL participated in two international quality-assurance reviews of the bovine tuberculosis antibody panels supplied by OIE countries.

NVSL also prepared a *Leptospira* microscopic agglutination test (MAT) proficiency panel and participated in *Leptospira* proficiency-panel testing produced and distributed by the Australian National Quality Assurance Program.

The Diagnostic Bacteriology Laboratory collaborated with numerous countries on evaluation of direct polymerase chain reaction (PCR) testing to detect *M. bovis* from bovine lymph nodes, mycobacterial genotyping, brucella genotyping, and a comparison of the North American and New Zealand *M. bovis* purified protein derivative tuberculins.

The Foreign Animal Disease Diagnostic Laboratory investigated disease outbreaks, including an outbreak of an unknown disease in camels in Ethiopia; provided training on virus isolation of vesicular diseases, vesicular antigen ELISA, and on conventional PCR for foot-and-mouth disease (FMD) in Panama; and evaluated FMD diagnostics capability in Egypt.

The CVB is the sole confirmatory and investigatory testing laboratory involved in regulation of commercial veterinary biologics (vaccines and diagnostic kits) in the United States. In support of OIE, CVB

- Develops, distributes, and uses worldwide standard protocols for biologics evaluation and trains scientists from throughout the world on these protocols;
- Validates and provides standard reagents to biologics manufacturers and regulatory laboratories worldwide;
- Conducts developmental projects to improve biological techniques for diseases of significance in the Americas;
- Reviews, develops, compares, and harmonizes testing protocols in collaboration with industry and other Government laboratories; and
- Hosts scientific meetings in the area of veterinary biologics.

The IICAB, based at Iowa State University, concentrates its efforts on educational endeavors and on facilitating international communication and



harmonization related to the availability, safety, and efficacy of veterinary biologics. The IICAB

- Offers training on scientific principles behind vaccine safety and efficacy;
- Works with other international organizations to harmonize regulations regarding veterinary biologics in the Americas;
- Assists developing countries to obtain veterinary biologics for specific unmet needs and in their efforts to manufacture, import, and regulate veterinary biologics and diagnostics; and
- Organizes scientific meetings and serves as an international resource for information on the use of veterinary biologics.

The 2006 IICAB Veterinary Biologics Training Program (VBTP), held in Ames, IA, was sponsored by the CVB, NVSL, USDA–ARS’ National Animal Disease Center, and the Iowa State University College of Veterinary Medicine. A total of 140 attendees, including 50 international government, education, and industry representatives from 25 countries and 90 U.S. industry and government representatives, participated in the program. The IICAB VBTP represents a major effort in the international harmonization of requirements for veterinary biologics. The training program teaches regulatory authorities from around the world about U.S. methods of assuring quality of veterinary vaccines, diagnostics, and immunotherapeutics.

IICAB also provided training to international scientists in biologics testing; PCR techniques; brucellosis bacteriology, serology, and epidemiology; diagnosis of eastern, western, and Venezuelan equine encephalitis, West Nile virus, and bluetongue; and diagnostics for bovine tuberculosis and AI.

CEAH explores and analyzes animal health and related agricultural issues to facilitate informed decisionmaking in government and industry. CEAH has a multidisciplinary staff that includes agricultural economists, statisticians, spatial analysts, computer specialists, veterinary epidemiologists, and data managers who are committed to providing timely, factual information and knowledge regarding animal health. As an OIE Collaborating Center for Animal



Disease Information Systems and Risk Analysis, CEAH provides Member Countries with technical assistance and expert advice on risk analysis and disease surveillance.

During 2006, CEAH

- Provided training and consultation to international veterinarians on geospatial methods in epidemiology;
- Collaborated with investigators from Uruguay on evaluation of antimicrobial resistance and food-safety issues and on surveillance for cattle diseases;
- Collaborated with the Canadian Food Inspection Agency (CFIA) to develop the North American Animal Disease Spread Model and provided training courses to Mexico and Central American neighbors on the use of the model for disease management;
- Supported the OIE World Animal Health Information System Internet system by providing geospatial data layers for the United States; and
- Partnered with the CFIA to host the Emerging Animal Health Issues Identification and Analysis Training to participants representing Africa, North America, Europe, the Middle East, and Oceania.

As an OIE collaborating center, CEAH

- Participated in various expert OIE ad-hoc group meetings to revise the following: rinderpest status recognition questionnaire, guidelines for regaining FMD-free status, guidelines for CSF surveillance, the FMD Code chapter, and the FMD status recognition questionnaire;

- Participated in the OIE mission to assess the FMD status of Brazil, Paraguay, and Argentina;
- Presented an international course on risk analysis to participants from Central America; and
- Offered the International Veterinary Epidemiology course in Spanish to participants from 20 countries.

Additionally, participants from the Caribbean, Africa, the Middle East, Southeast Asia, and Eastern Europe attended a course on veterinary epidemiology.

VS' NCIE plays an integral role in protecting American agriculture. The Center's SIST facilitates international trade and monitors the health standards on the import and export of animals and animal products drafted by the OIE. Specifically, the SIST staff

- Provides a focal and coordinating point to respond to all OIE inquiries, requests and correspondence;
- Coordinates with other VS units, other State and Federal agencies, academia, and the industry responses to proposed changes on OIE chapters and appendices of the Terrestrial and Aquatic Animal Health Codes;
- Coordinates and clears the submission of all animal health reports to the OIE;
- Through the OIE Regional Commission for the Americas, works with the regional Member Country Chief Veterinary Officers toward animal health positions of mutual benefit; and
- Participates in and prepares the U.S. delegate for the annual General Session of the OIE held in Paris, France.

## International AI Assistance

Due to the transboundary risk of highly pathogenic avian influenza (HPAI), the National Strategy for Pandemic Influenza includes an extensive chapter on international efforts. USDA leads implementation of 20 priority actions and directly supports other Federal agencies on additional actions. USDA safeguards U.S. agriculture from the threat of HPAI introduction primarily by leading the U.S. effort to strengthen the animal health infrastructure in

other countries. In addition, USDA is working to strengthen the governance and technical capacities of international agricultural organizations in combating HPAI worldwide. These groups include the United Nations Food and Agriculture Organization (FAO) and the OIE.

The USDA International Avian Influenza Coordination Center (IAICC) is responsible for the international component of USDA's response on AI issues. The IAICC provides support and coordination in worldwide HPAI incidents requiring emergency response and/or capacity building. This work includes technical assistance, training and education, and the procurement and shipment of reagents and lab equipment.

Under IAICC coordination, as part of APHIS' international activities aimed at mitigating HPAI risk, monetary and personnel contributions were made to the FAO Crisis Management Centre (CMC) in Rome. The CMC was inaugurated in October 2006. It provides rapid deployment of assessment and response teams and technical advice and operational support for outbreak response.

Three APHIS veterinarians have been assigned to the CMC to contribute toward its establishment and initial development. Areas of technical skill include epidemiology, early disease tracking and warning, emergency management, and Incident Command System expertise.





## APPENDIX 1



# Statistics on Major Commodities

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

<b>Commodity</b>	<b>Month conducted</b>	<b>Approximate sample size</b>	<b>No. States</b>
Cattle and calves	January	50,000	50
	July	10,000	50
Sheep and lambs	January	23,000	50
	July	4,600	50
Cattle on feed	Monthly	2,000 (1,000 head or more feedlot capacity)	17
Hogs and pigs	December	12,100	50
	March, June, September	10,000 each	30
Catfish	January	1,300	11
	July	900	4
Trout	January	700	20
Livestock slaughtered	Monthly	793 federally inspected plants, 2,060 State-inspected or custom-exempt plants	50
Poultry slaughtered	Monthly	320 federally inspected plants	50
Turkeys raised	December	1,000	28
Chickens and eggs	December	650 (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 2005 and 2006**

<b>Commodity</b>	<b>2005 (\$1,000)</b>	<b>Percent of total value</b>	<b>2006 (\$1,000)</b>	<b>Percent of total value</b>
Cattle	36,628,658	17.2	35,740,774	16.1
Milk from milk cows	26,873,946	12.6	23,573,744	10.6
Poultry	28,174,715	13.3	26,842,833	12.1
Swine	13,606,780	6.4	12,703,842	5.7
Catfish and trout	551,483	0.3	555,675	0.2
Sheep, including wool	479,397	0.2	392,598	0.2
Honey	160,428	0.1	161,314	0.1
Total of preceding livestock and products <sup>1</sup>	106,475,407	50.1	99,970,780	45.0
Field and miscellaneous crops	78,728,702	37.0	94,325,887	42.4
Fruits and nuts	16,305,755	7.7	16,603,009	7.5
Commercial vegetables	11,083,349	5.2	11,480,641	5.1
Total value of preceding crops	106,117,806	49.9	122,409,537	55.0
<b>All commodities above</b>	<b>212,593,213</b>	<b>100.0</b>	<b>222,380,317</b>	<b>100.0</b>

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

**TABLE A1.3: Cattle and calves production, 2005 and 2006**

	<b>2005</b>		<b>2006</b>	
<b>January 1 following-year inventory (1,000 head)</b>				
All cattle and calves	96,702		97,003	
All cows	42,056		42,023	
Cattle on feed	14,132		14,269	
<b>Operations with cattle and calves</b>	982,510		971,400	
<b>Size of operation</b>	<b>Percentage operations (percentage inventory)</b>			
1–49 head	62.3	(11.0)	62.3	(10.7)
50–99 head	16.7	(11.6)	16.5	(11.2)
100–499 head	18.1	(35.0)	18.1	(34.5)
500 or more head	2.9	(42.4)	3.1	(43.6)
<i>Total</i>	<i>100.0</i>	<i>(100.0)</i>	<i>100.0</i>	<i>(100.0)</i>
<b>Calf crop (1,000 head)</b>	37,575		37,567	
<b>Deaths—cattle (1,000 head)</b>	1,718		1,785	
Deaths—calves (1,000 head)	2,335		2,335	
<b>Commercial calves slaughter (1,000 head)</b>				
Federally inspected	718		699	
Other	17		13	
<i>Total commercial</i>	<i>734</i>		<i>711</i>	
<b>Commercial cattle slaughter (1,000 head)</b>				
Federally inspected				
Steers	16,797		17,478	
Heifers	9,761		9,820	
All cows	4,775		5,336	
Bulls and stags	498		511	
Other	556		553	
<i>Total commercial</i>	<i>32,388</i>		<i>33,698</i>	
<b>Farm cattle and calves slaughter (1,000 head)<sup>2</sup></b>	188		187	
<i>Total cattle and calves slaughter (1,000 head)</i>	<i>33,310</i>		<i>34,597</i>	
<b>Value of production (\$1,000)</b>	36,628,658		35,740,774	

Source: USDA–NASS.

<sup>1</sup> May not total due to rounding.<sup>2</sup> Farm slaughter includes animals slaughtered on farms primarily for home consumption. It excludes custom slaughter for farmers at commercial establishments but includes mobile slaughtering on farms.

**TABLE A1.4: Milk cow production, 2005 and 2006**

	<b>2005</b>		<b>2006</b>	
<b>January 1 following-year inventory (1,000 head)</b>				
Milk cows	9,063		9,129	
Milk replacement heifers	4,275		4,310	
<b>Operations with milk cows</b>	78,300		75,140	
<b>Size of operation</b>	<b>Percentage operations (percentage inventory)</b>			
1–29 head	28.7	(2.0)	28.3	(1.9)
30–49 head	19.0	(6.4)	18.8	(6.0)
50–99 head	29.6	(17.1)	29.6	(16.3)
100–199 head	12.8	(14.6)	13.0	(14.1)
200–499 head	6.0	(15.4)	6.1	(15.0)
500 or more head	3.9	(44.5)	4.2	(46.7)
<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	2,252		2,354	
Other cows	2,523		2,983	
All cows	4,775		5,337	
<b>Milk production</b>				
Average number of milk cows during year (1,000 head)	9,043		9,112	
Milk production per milk cow (lb)	19,565		19,951	
Milk fat per milk cow (lb)	716		736	
Percentage of fat	3.66		3.69	
Total milk production (million lb)	176,929		181,798	
<b>Value of milk produced (\$1,000)</b>	26,873,946		23,573,744	

Source: USDA–NASS.



**TABLE A1.5: Beef cow production, 2005 and 2006**

	<b>2005</b>	<b>2006</b>
<b>January 1 following-year inventory (1,000 head)</b>		
Beef cows	32,994	32,894
Beef replacement heifers	5,904	5,877
<b>Operations with beef cows</b>	<b>770,170</b>	<b>762,880</b>
<b>Size of operation</b>	<b>Percentage operations (percentage inventory)</b>	
1–49 head	77.5 (28.0)	77.4 (27.6)
50–99 head	12.3 (18.9)	12.3 (18.6)
100–499 head	9.5 (38.5)	9.6 (38.7)
500 or more head	0.7 (14.6)	0.7 (15.1)
<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	2,252	2,354
Other cows	2,523	2,983
<i>All cows</i>	<i>4,775</i>	<i>5,336</i>

Source: USDA–NASS.

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

**TABLE A1.6: Cattle-on-feed production, 2005 and 2006**

	<b>2005</b>	<b>2006</b>
<b>January 1 following-year inventory (1,000 head) for all lots</b>	14,132	14,269
<b>January 1 following-year inventory (1,000 head) for lots 1,000+ capacity</b>		
Steers and steer calves	7,570	7,574
Heifers and heifer calves	4,147	4,303
Cows and bulls	87	97
<i>Total</i>	<i>11,804</i>	<i>11,974</i>

<b>Feedlot capacity (head)</b>	<b>Number of feedlots 2006</b>		<b>January 1, 2007, inventory (1,000 head)</b>		<b>Marketed (1,000 head) 2006</b>	
		<b>%</b>		<b>%</b>		<b>%</b>
<1,000	86,000	97.6	2,295	16.1	3,640	13.9
1,000–1,999	818	0.9	488	3.4	797	3.0
2,000–3,999	552	0.6	804	5.6	1,347	5.2
4,000–7,999	344	0.4	1,035	7.2	1,773	6.8
8,000–15,999	190	0.2	1,412	10.0	2,713	10.4
16,000–31,999	135	0.2	2,522	17.7	4,758	18.2
≥ 32,000	126	0.1	5,713	40.0	11,089	42.5
<i>All feedlots</i>	<i>88,165</i>	<i>100.0</i>	<i>14,269</i>	<i>100.0</i>	<i>26,117</i>	<i>100.0</i>

Source: USDA-NASS.

**TABLE A1.7: Hog and pig production, 2005 and 2006**

	2005		2006	
<b>December 1 inventory (1,000 head)</b>				
Breeding	6,011		6,088	
Market	55,438		56,061	
<i>All hogs and pigs</i>	<i>61,449</i>		<i>62,149</i>	
<b>Operations with hogs and pigs</b>				
<b>Size of operation</b>		<b>Percentage operations (percentage inventory)</b>		
1–99 head	60.3	(1.0)	60.2	(1.0)
100–499 head	15.0	(4.0)	14.7	(4.0)
500–999 head	7.1	(6.0)	6.9	(5.0)
1,000–1,999 head	6.3	(10.0)	6.4	(10.0)
2,000–4,999 head	7.8	(26.0)	8.0	(26.0)
≥ 5,000 head	3.5	(53.0)	3.8	(54.0)
<i>Total</i>	<i>100.0 (100.0)</i>		<i>100.0 (100.0)</i>	
<b>Pig crop (1,000 head)</b>				
December–November <sup>1</sup>	103,965		105,259	
<b>Pigs per litter</b>				
December–November <sup>1</sup>	9.01		9.08	
<b>Deaths (1,000 head)</b>				
	7,757		8,414	
<b>Slaughter (1,000 head), federally inspected</b>				
Barrows and gilts	99,123		100,113	
Sows	3,116		3,227	
Stags and boars	280		348	
Other	1,063		1,048	
Total commercial	103,582		<sup>2</sup> 104,737	
Farm slaughter	109		108	
<i>Total slaughter</i>	<i><sup>2</sup>103,690</i>		<i>104,845</i>	
<b>Value of production (\$1,000)</b>				
	13,606,780		12,703,842	

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, 2005 and 2006**

	<b>2005</b>	<b>2006</b>
<b>January 1 following-year inventory (1,000 head)</b>		
Ewes 1 year old and older	3,661	3,706
Rams 1 year old and older	196	195
All sheep and lambs	6,230	6,185
<b>Operations with sheep</b>	68,330	69,090
<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>	4,117	4,085
<b>Deaths—sheep (1,000 head)</b>	216	237
<b>Deaths—lambs (1,000 head)</b>	384	399
<b>Slaughter (1,000 head), federally inspected</b>		
Mature sheep	129	118
Lambs	2,425	2,429
Other	143	151
<i>Total commercial</i>	<sup>2</sup> 2,698	2,698
Farm slaughter	64	68
<i>Total slaughter</i>	2,762	2,766
<b>Wool production</b>		
Sheep shorn (1,000 head)	5,072	4,852
Shorn wool production (1,000 lb)	37,232	36,019
Value of wool production (\$1,000)	26,272	24,414
<b>Value of production (\$1,000)</b>	<b>453,125</b>	<b>368,184</b>

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, 2005 and 2006**

	<b>2005</b>	<b>2006</b>
<b>December 1 total layers (1,000 head)</b>	348,203	348,719
Annual average number of layers (1,000 head)	343,792	346,078
Eggs per layer	262	263
Total egg production (million eggs)	90,027	90,877
<b>Number of broilers produced (1,000 head)</b>	8,872,000	8,882,000
<b>Number of chickens lost (1,000 head)</b>	93,041	100,054
<b>Number of turkeys raised (1,000 head)</b>	252,053	261,960
Young turkeys lost as a percentage of total poults placed	10.4	11.2
<b>Number slaughtered (1,000 head)</b>		
Chickens—young	8,853,809	8,837,755
Chickens—mature	146,664	131,161
<i>Chickens—total</i>	<i>9,000,473</i>	<i>8,968,916</i>
Turkeys—young	245,642	252,734
Turkeys—old	2,452	2,589
<i>Turkeys—total</i>	<i>248,094</i>	<i>255,323</i>
<i>Ducks</i>	<i>27,890</i>	<i>28,081</i>
<b>Value of production (\$1,000)</b>		
Broilers	20,877,916	18,851,054
Eggs	4,049,293	4,387,528
Turkeys	3,182,767	3,551,127
Chickens (value of sales)	64,739	53,124
<i>Total</i>	<i>28,174,715</i>	<i>26,842,833</i>

Source: USDA-NASS.

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

	<b>1997<sup>1</sup></b>	<b>1998<sup>1</sup></b>	<b>2002<sup>2</sup></b>
<b>January 1 following-year inventory (1,000 head)</b>			
All equine	5,250	5,317	
On farms	<sup>2</sup> 3,200	NA	<sup>3</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 revised the 1997 number of all equids to 3,143,328 head.

<sup>3</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, 2005 and 2006**

	<b>2005</b>	<b>2006</b>
<b>Catfish</b>		
Number of fish on January 1, following year (1,000)		
Foodsize	327,680	311,205
Stockers	622,805	572,200
Fingerlings	1,039,415	959,060
Broodfish	1,106	897
Number of operations on January 1, following year	1,035	1,023
<b>Sales (\$1,000)</b>		
Foodsize	450,178	452,084
Stockers	5,995	6,913
Fingerlings	24,122	21,157
Broodfish	2,000	666
<i>Total sales</i>	<i>482,295</i>	<i>480,820</i>
<b>Trout</b>		
Number of fish sold (1,000)		
≥ 12 inches	55,513	49,229
6–12 inches	4,806	5,519
1–6 inches	7,059	7,955
<b>Sales (\$1,000)</b>		
≥ 12 inches	62,660	67,745
6–12 inches	5,208	5,651
1–6 inches	1,320	1,459
<i>Total sales</i>	<i>69,188</i>	<i>74,855</i>
Eggs sold		
Number of eggs (1,000)	307,472	*
Total value of sales (\$1,000)	5,137	*
Total value of fish sold plus value of eggs sold (\$1,000)	174,325	*
Number of operations selling trout	346	345
Number of operations selling or distributing trout, or both	602	604

Source: USDA–NASS.

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

\* Not published to avoid disclosure of individual operations.

**TABLE A1.12: Honey production<sup>1</sup> in the United States, 2005 and 2006**

	<b>2005</b>	<b>2006</b>
<b>Honey-producing colonies (1,000)</b>	2,413	2,392
Yield per colony (lb)	72.4	64.7
Production (1,000 lb)	174,818	154,846
Stocks on December 15 (1,000 lb)	62,478	60,528
<b>Value of production (\$1,000)</b>	160,428	161,314

Source: USDA-NASS.

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

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

<b>Commodity</b>	<b>Number of farms</b>	<b>Inventory</b>	<b>Number sold</b>
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, 2006**

<b>Commodity</b>	<b>Federally inspected plants (no.)</b>	<b>Slaughter in federally inspected plants (1,000 head)<sup>1</sup></b>	<b>Slaughter in State-inspected or custom-exempt plants (1,000 head)</b>
Cattle	636	33,145	553
Calves	238	699	13
Hogs	614	103,689	1,048
Sheep and lambs	484	2,547	151

Source: USDA-NASS Livestock Slaughter 2006 Summary, March 2007.

<sup>1</sup> Includes data for the calendar year.



## APPENDIX 2

## APPENDIX 2

# Tables on FAD Investigations

TABLE A2.1: FAD investigations by State, 2004–06

		2004	2005	2006
AK	Alaska	1	3	0
AL	Alabama	2	2	5
AR	Arkansas	9	10	7
AZ	Arizona	28	57	15
CA	California	62	25	33
CO	Colorado	300	146	24
CT	Connecticut	7	4	4
DE	Delaware	1	0	0
FL	Florida	9	16	6
GA	Georgia	26	25	13
HI	Hawaii	3	2	1
IA	Iowa	11	8	12
ID	Idaho	22	20	14
IL	Illinois	11	12	3
IN	Indiana	9	4	3
KS	Kansas	9	10	9
KY	Kentucky	10	10	4
LA	Louisiana	11	11	6
MA	Massachusetts	7	7	3
MD	Maryland	1	5	0
ME	Maine	0	1	0
MI	Michigan	6	6	23
MN	Minnesota	9	6	1
MO	Missouri	6	3	7
MS	Mississippi	3	9	9
MT	Montana	6	45	16
NC	North Carolina	13	6	10
ND	North Dakota	0	1	0
NE	Nebraska	13	27	6
NH	New Hampshire	4	0	1
NJ	New Jersey	7	11	7
NM	New Mexico	102	44	24
NV	Nevada	10	4	2
NY	New York	4	2	1

**TABLE A2.1: FAD investigations by State, 2004–06***continued*

		<b>2004</b>	<b>2005</b>	<b>2006</b>
OH	Ohio	7	13	4
OK	Oklahoma	10	10	14
OR	Oregon	8	5	3
PA	Pennsylvania	9	9	5
PR	Puerto Rico	5	11	6
RI	Rhode Island	0	0	1
SC	South Carolina	2	4	9
SD	South Dakota	2	7	7
TN	Tennessee	23	11	46
TX	Texas	142	47	47
UT	Utah	4	144	9
VA	Virginia	12	15	15
VI	Virgin Islands	—	0	1
VT	Vermont	7	4	3
WA	Washington	14	31	9
WI	Wisconsin	34	11	12
WV	West Virginia	6	1	2
WY	Wyoming	6	130	29
Total		1,013	995	491

**TABLE A2.2: Complaints, by species disclosed in FAD investigations, 2005 and 2006**

Complaint	Species		Number	
	Major group	Minor group	2005	2006
Central nervous system	Avian	Avian (birds)	5	5
		Chicken, egg-type	2	3
		Chicken, meat-type	0	2
		Poultry (chickens and turkeys)	0	2
		<i>Subtotal avian</i>	7	12
	Bovine (cattle)		12	4
	Canine (dogs)		1	0
	Equine (e.g.,horses, donkeys, mules)		11	31
	Porcine	Feral swine	1	1
		Hogs	2	
		<i>Subtotal porcine</i>	8	3
	Rabbits		2	
	<i>Total CNS</i>		41	52
Diarrhea and discharge	Avian	Avian (birds)	1	4
		Chicken, egg-type	2	3
		Poultry (chickens and turkeys)	1	1
		Waterfowl, exhibition poultry, and gamebirds	1	0
		<i>Subtotal avian</i>	5	8
	Bovine (cattle)		1	2
	Canine (dogs)		0	1
	Ovine (sheep)		1	0
	Porcine (hogs)		1	0
	Rabbits		2	0
	<i>Total diarrhea and discharge</i>		10	11
Epidemic abortion		0	0	
Hemorrhagic vessels	Bovine (cattle)		1	0
	Canine (dogs)		1	0
	Porcine (hogs)		2	0
	Rabbits		3	2
	<i>Total hemorrhagic vessels</i>		7	2
High death rate	Avian	Avian (birds)	15	15
		Chicken, egg-type	7	18
		Chicken, meat-type	2	8
		Gamefowl	1	2
		Poultry (chickens and turkeys)	5	6
		Turkeys	1	2
		Waterfowl, exhibition poultry, and gamebirds	2	7
		<i>Subtotal avian</i>	33	58



**TABLE A2.2: Complaints, by species disclosed in FAD investigations, 2005 and 2006**
*continued*

Complaint	Species		Number	
	Major group	Minor group	2005	2006
High death rate, <i>continued</i>	Bovine (cattle)		4	4
	Caprine (goats)		1	0
	Cervidae		1	0
	Equine (e.g., horses, donkeys, mules)		2	1
	Fish		1	1
	Ovine (sheep)		1	0
	Porcine (hogs)		6	3
	Rabbits		5	3
	<i>Total high death rate</i>		<i>54</i>	<i>70</i>
Illegal import surveillance	Avian	Avian (birds)	0	1
		Chicken, egg-type	0	1
		<i>Subtotal avian</i>	<i>0</i>	<i>2</i>
	<i>Total illegal import</i>		<i>0</i>	<i>2</i>
Maggots or ticks	Avian	Avian (birds)	0	1
	Bovine (cattle)		5	0
	Canine (dogs)		4	2
	Caprine (goats)		0	1
	Feline (cats)		1	2
	Reptiles		1	0
	<i>Total maggots and ticks</i>		<i>11</i>	<i>6</i>
Positive surveillance sample	Avian	Avian (birds)	0	1
		Chicken, meat-type	0	1
		Poultry (chickens and turkeys)	0	1
		<i>Subtotal avian</i>	<i>0</i>	<i>3</i>
	Bovine (cattle)		3	1
	Equine (e.g., horses, donkeys, mules)		3	2
<i>Total positive surveillance</i>		<i>6</i>	<i>6</i>	
Respiratory	Avian	Avian (birds)	5	8
		Chicken, egg-type	5	11
		Chicken, meat-type	0	1
		Poultry (chickens and turkeys)	6	3
		Turkeys	0	1
		<i>Subtotal avian</i>	<i>16</i>	<i>24</i>
	Bovine (cattle)		0	5
	Caprine (goats)		0	1
	Ovine (sheep)		0	1
	Porcine (hogs)		0	3
	Rabbits		2	2
	<i>Total respiratory</i>		<i>18</i>	<i>36</i>

**TABLE A2.2: Complaints, by species disclosed in FAD investigations, 2005 and 2006**

continued

Complaint	Species		Number	
	Major group	Minor group	2005	2006
Septicemia	Bovine (cattle)		1	0
	Equine (e.g., horses, donkeys, mules)		1	0
	Rabbits		0	1
	<i>Total septicemia</i>		2	1
Skin other than muzzle and feet	Avian	Avian (birds)	1	0
		Chicken, egg-type	1	0
		<i>Subtotal avian</i>	2	0
	Bovine (cattle)		6	9
	Caprine (goats)		6	8
	Equine (e.g., horses, donkeys, mules)		14	12
	Ovine (sheep)		1	2
	Porcine (hogs)		0	3
	<i>Total skin</i>		29	34
	Vesicular-skin of muzzle and feet	Bison		1
Bovine (cattle)			146	60
Camelidae		Alpaca	4	0
Caprine (goats)			37	20
Cervidae			0	3
Equine (e.g., horses, donkeys, mules)			603	204
Exotics		Hedgehog	0	1
Ovine (sheep)			14	11
Porcine (hogs)			12	5
<i>Total vesicular</i>			817	305

**TABLE A2.3: Status of the occurrence of OIE<sup>1</sup>-reportable diseases in the United States, 2006**

<b>Disease</b>	<b>Status</b>	<b>Date of last occurrence/Notes</b>
<b>Multiple-species diseases</b>		
Anthrax	Present	Sporadic/limited distribution
Aujeszky's disease	Present	Sporadic (feral, wild animals)/limited distribution, national eradication program
Bluetongue	Present	Sporadic/limited distribution
Crimean Congo haemorrhagic fever	Free	Never occurred
Echinococcosis/ Hydatidosis	?	Sporadic (uncommon in all species)
Foot-and-mouth disease	Free	1929
Heartwater	Free	Never occurred
Japanese encephalitis	Free	Never occurred
Leptospirosis	Present	
New World screwworm	Free	1982
Old World screwworm	Free	Never occurred
Paratuberculosis	Present	National control program
Q fever	Present	Sporadic
Rabies	Present	
Rift Valley fever	Free	Never occurred
Rinderpest	Free	Never occurred
Trichinellosis	Present	Sporadic (feral, wild animals)/limited distribution/national control program
Vesicular stomatitis	Seasonal	2006, sporadic/limited distribution
West Nile fever	Present	
<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	?	No domestic herd detection in 2006/limited distribution/national eradication program
Bovine genital campylobacteriosis	Present	Sporadic/limited distribution
Bovine spongiform encephalopathy	One case	2006 (Alabama)
Bovine tuberculosis	Present	Sporadic/limited distribution/national eradication program
Bovine viral diarrhea	Present	
Contagious bovine pleuropneumonia	Free	1892
Enzootic bovine leucosis	Present	
Hemorrhagic septicemia	?	Sporadic/limited distribution (bison)
Lumpy skin disease	Free	Never occurred
Malignant catarrhal fever (wildebeest only)	Free	Never occurred
Theileriosis	Free	Never occurred
Trichomonosis	Present	
Trypanosomosis (tsetse-transmitted)	Free	Never occurred

**TABLE A2.3: Status of the occurrence of OIE<sup>1</sup>-reportable diseases in the United States, 2006**

continued

<b>Disease</b>	<b>Status</b>	<b>Date of last occurrence/Notes</b>
<b>Sheep and goat diseases</b>		
Caprine arthritis/encephalitis	Present	
Caprine and ovine brucellosis (excluding <i>B. ovis</i> )	Free	1999
Contagious agalactia	Present	Sporadic (non-Mediterranean form)/limited distribution
Contagious caprine pleuropneumonia	Free	Never occurred
Enzootic abortion of ewes (ovine chlamydiosis)	Present	Sporadic/limited distribution
Maedi-visna	Present	Sporadic/limited distribution
Nairobi sheep diseases	Free	Never occurred
Ovine epididymitis ( <i>Brucella ovis</i> )	Present	Sporadic
Peste des petits ruminants	Free	Never occurred
Salmonellosis ( <i>S. abortusovis</i> )	?	Sporadic/limited distribution
Scrapie	Present	National eradication program
Sheep pox and goat pox	Free	Never occurred
<b>Equine diseases</b>		
African horse sickness	Free	Never occurred
Contagious equine metritis	One event	2006, import associated
Dourine	Free	1934
Equine encephalomyelitis (Eastern)	Present	Sporadic/limited distribution
Equine encephalomyelitis (Western)	?	Sporadic/limited distribution
Equine infectious anemia	Present	Sporadic/limited distribution/national control program
Equine influenza	Present	
Equine piroplasmiasis	Present	Limited distribution (limited to Puerto Rico and the U.S. Virgin Islands); last occurrence on the U.S. mainland was in 1978
Equine rhinopneumonitis	Present	Sporadic
Equine viral arteritis	Present	Sporadic/limited distribution
Glanders	Free	1942
Surra ( <i>Trypanosoma evansi</i> )	Free	Never occurred
Venezuelan equine encephalomyelitis	Free	1971
<b>Swine diseases</b>		
African swine fever	Free	Never occurred
Classical swine fever	Free	1976
Nipah virus encephalitis	Free	Never occurred
Porcine brucellosis	Present	Sporadic (feral, wild animals)/limited distribution/national eradication program
Porcine cysticercosis	Free	2004
Porcine reproductive and respiratory syndrome	Present	
Swine vesicular disease	Free	Never occurred
Transmissible gastroenteritis	Present	

**TABLE A2.3: Status of the occurrence of OIE<sup>1</sup>-reportable diseases in the United States, 2006**

continued

<b>Disease</b>	<b>Status</b>	<b>Date of last occurrence/Notes</b>
<b>Avian diseases</b>		
Avian chlamydiosis	Present	Sporadic (wild birds, pet birds, backyard poultry)
Avian infectious bronchitis	Present	
Avian infectious laryngotracheitis	Present	Sporadic (primarily vaccine-related)
Avian mycoplasmosis ( <i>M. gallisepticum</i> )	Present	Sporadic/limited distribution All commercial poultry breeding flocks are under a surveillance program to confirm infection-free status. Commercial table-egg layers may be vaccinated.
Avian mycoplasmosis ( <i>M. synoviae</i> )	Present	Sporadic/limited distribution All commercial poultry breeding flocks are under a surveillance program to confirm infection-free status. Commercial table-egg layers may be vaccinated.
Duck viral hepatitis	Free	1998
Fowl cholera	Present	
Fowl typhoid	Free	1981
High-pathogenicity avian influenza	Free	2004
Infectious bursal disease (gumboro disease)	Present	
Low-pathogenic avian influenza (poultry)	Present	Sporadic (wildlife, backyard-live bird markets; commercial production flocks free)
Marek's disease	Present	
Newcastle disease (neurotropic and viscerotropic strains)	Free	2003
Pullorum disease	?	Sporadic/limited distribution (commercial production flocks are free)
Turkey rhinotracheitis	Present	Sporadic/limited distribution
<b>Lagomorph diseases</b>		
Myxomatosis	?	
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	
Small hive beetle infestation ( <i>Aethina tumida</i> )	Present	Sporadic/limited distribution
Tropilaelaps infestation of honey bees	Free	Never occurred
Varroosis of honey bees	Present	Sporadic/limited distribution
<b>Other listed diseases</b>		
Camelpox	Free	Never occurred
Leishmaniasis	?	Sporadic (canine)/limited distribution



**TABLE A2.3: Status of the occurrence of OIE<sup>1</sup>-reportable diseases in the United States, 2006**

continued

Disease	Status	Date of last occurrence/Notes
<b>Aquatic animal diseases</b>		
<b>Fish</b>		
Bacterial kidney disease ( <i>Renibacterium salmoninarum</i> )	Present	Sporadic/limited distribution
Epizootic hematopoietic necrosis	Free	Never occurred
Epizootic ulcerative syndrome	Free	Never occurred
Gyrodactylosis ( <i>Gyrodactylus salaris</i> )	Free	Never occurred
Infectious hematopoietic necrosis	Present	Sporadic/limited distribution
Infectious pancreatic necrosis	Present	
Infectious salmon anemia	Present	Sporadic/limited distribution
Red Sea bream Iridoviral disease	Free	Never occurred
Spring viremia of carp	Free	2004
Viral hemorrhagic septicemia	Present	Sporadic (wild species)/limited distribution
<b>Molluscs</b>		
Infection with <i>Bonamia ostreae</i>	Present	Sporadic (wild species)/limited distribution
Infection with <i>Bonamia exitiosus</i>	Free	Never occurred
Infection with <i>Marteilia refringens</i>	Free	Never occurred
Infection with <i>Microcytos mackini</i>	Present	May 2006, sporadic/limited distribution
Infection with <i>Microcytos roughleyi</i>	Free	Never occurred
Infection with <i>Perkinsus marinus</i>	Present	Sporadic (wild species)/limited distribution
Infection with <i>Perkinsus olseni</i>	Free	Never occurred
Infection with <i>Xenohalotis californiensis</i>	Present	Sporadic/limited distribution
<b>Crustaceans</b>		
Crayfish plague ( <i>Aphanomyces astaci</i> )	Free	
Infectious hypodermal and haematopoietic necrosis	Free	
Spherical baculovirus ( <i>Penaeus monodon</i> -type baculovirus)	Free	Never occurred
Taura syndrome	Free	2004
Tetrahedral baculovirus ( <i>Baculovirus penaei</i> )	+?	
White spot disease	Free	2004
Yellowhead disease	Free	

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.

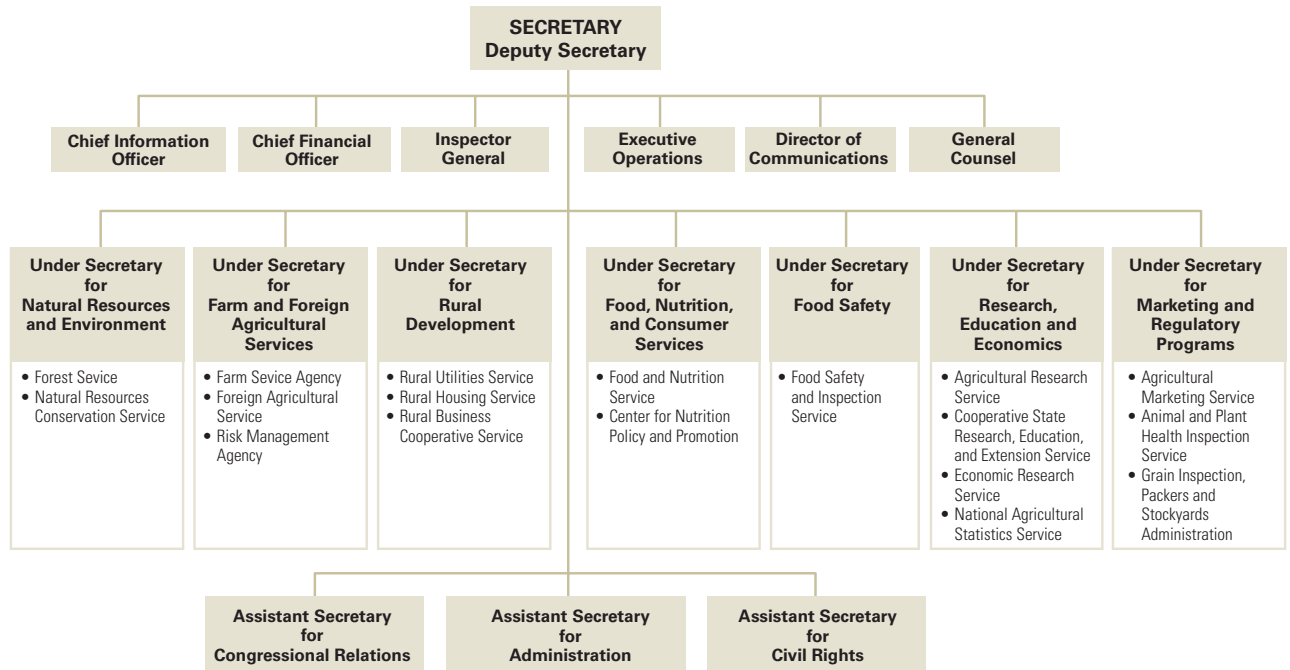
## Federal Animal Health Services

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. 37). 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.

**FIGURE 37: USDA organizational chart. APHIS falls under the Marketing and Regulatory Programs branch of the Department.**

Updated April 2003



Further, VS publishes Uniform Methods and Rules, which are minimum program standards for the implementation of specific animal-health programs covered by regulations.

**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), Wildlife Services (WS), and Veterinary Services (VS).

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 1,800 people with a wide range of scientific, technical, and administrative skills (table A3.1). The VS workforce includes veterinarians,

**TABLE A3.1: Veterinary Services permanent workforce, 2006**

Occupation	Number	Percent of workforce
Veterinarians	537	30.1
Animal health technicians	332	18.6
Administrative and clerical support	401	22.4
Biological sciences	240	13.4
Information technology	91	5.1
Other	186	10.4
<i>Total</i>	<i>1,787</i>	<i>100.0</i>

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.

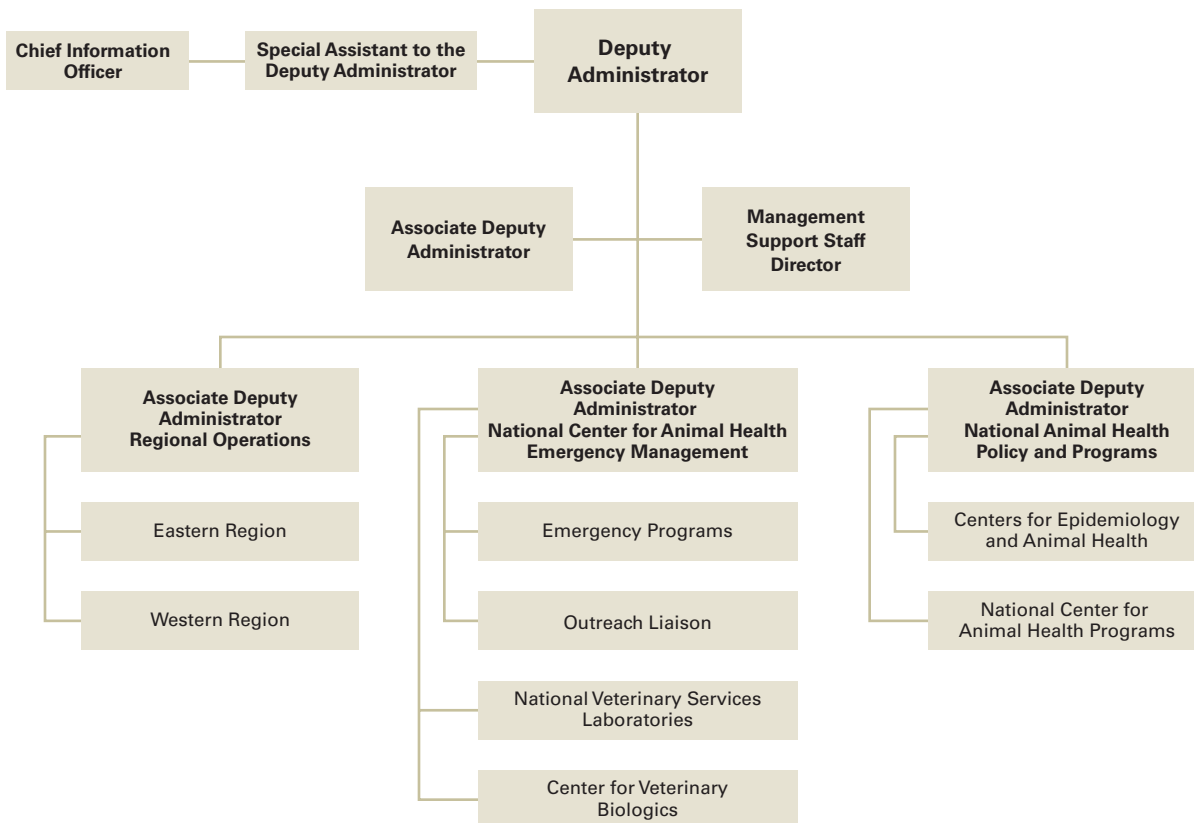
VS maintains headquarters facilities in Riverdale, MD, and Washington, DC, where much of the program, policy, and regulatory development for the organization is established (fig. 38). These offices also provide liaison with other Federal agencies, members of the executive branch, and congressional offices.

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).

**FIGURE 38: Organizational chart for APHIS-VS.**

March 3, 2006





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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 achieved ISO 17025 accreditation in 2006 for several high-volume diagnostic tests.

NVSL's responsibilities include

- Diagnosing domestic and foreign animal diseases;
- Providing diagnostic support for disease control, disease eradication, programs including supplying reagents and proficiency training, and animal-health monitoring programs;
- Testing samples from animals and animal products for import and export;
- Training APHIS and other U.S. and international personnel;
- Certifying laboratories in the United States to conduct the testing for selected diseases;
- Coordinating laboratory testing for the National Animal Health Laboratory Network; and
- Serving as a reference and confirmatory laboratory for the U.S. and as a World Organization for Animal Health (OIE) 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,
- National Poultry Improvement Plan, and the
- 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/animal\\_health](http://www.aphis.usda.gov/animal_health)>. 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 three USDA agencies: the Agricultural Research Service (ARS), the Cooperative State Research, Education, and Extension Service (CSREES), and the Food Safety and Inspection Service (FSIS).

**FDA** oversees the manufacture, importation, and use of human and animal pharmaceuticals, including antimicrobial and anti-inflammatory 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.

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**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 retaining 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/html/lab\\_certification.html](http://www.aphis.usda.gov/vs/nvsl/html/lab_certification.html)>). 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.

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## 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 2006, there were more than 67,000 active veterinarians in the NVAP database. More than 80 percent of all U.S. veterinarians are accredited. 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

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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 American 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

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

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## **National Veterinary Services Laboratories**

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## **Center for Veterinary Biologics**

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### Arkansas

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### California

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

### Colorado

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

### Connecticut

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

### Delaware and District of Columbia

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### Florida

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

### Georgia

Dr. Edgardo Arza  
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Vacant  
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Phone: (614) 469-5602





# APPENDIX 5

## APPENDIX 5

# Key U.S. Animal Health Web Sites

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**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.aaep.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>

**Animal Care**

<http://www.aphis.usda.gov/ac>

**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>

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**International Services**

[http://www.aphis.usda.gov/international\\_safeguarding/](http://www.aphis.usda.gov/international_safeguarding/)

**National Agricultural Statistics Service**

<http://www.usda.gov/nass>

**National Animal Health Emergency Management System**

<http://emrs.aphis.usda.gov/naheems.html>

**National Aquaculture Association**

<http://www.nationalaquaculture.org/>

**National Association of State Departments of Agriculture**

<http://www2.nasda.org/NASDA>

**National Cattlemen's Beef Association**

<http://www.beef.org>

**National Center for Animal Health Surveillance**

<http://www.aphis.usda.gov/vs/ceah/ncahs>

**National Center for Import and Export**

<http://www.aphis.usda.gov/vs/ncie>

**National Marine Fisheries Service**

<http://www.nmfs.noaa.gov>

**National Pork Board**

<http://www.pork.org>

**National Pork Producers Council**

<http://www.nppc.org>

**National Poultry Improvement Plan**

<http://www.aphis.usda.gov/vs/npip>

**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/plant\\_health](http://www.aphis.usda.gov/plant_health)

**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>

**U.S. Department of Homeland Security**

<http://www.dhs.gov/dhspublic>

**U.S. Fish and Wildlife Service**

<http://www.fws.gov>

**U.S. Food and Drug Administration**

<http://www.fda.gov>

**Veterinary Services**

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

**Wildlife Services**

[http://www.aphis.usda.gov/wildlife\\_damage](http://www.aphis.usda.gov/wildlife_damage)

**World Animal Health Organization**

<http://www.oie.int>

**World Trade Organization**

<http://www.wto.org>







## APPENDIX 6

# Acronyms and Abbreviations

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AAVLD	American Association of Veterinary Laboratory Diagnosticians
ADDD	Animal identification device distribution database
AEC	Area Emergency Coordinator
AF	Accredited free
AHE	Animal health emergency
AI	Avian influenza
AIN	Animal identification number
AMS	Agricultural Marketing Service
APHIS	Animal and Plant Health Inspection Service
ARS	Agricultural Research Service
BMST	Brucellosis milk surveillance test
BSE	Bovine spongiform encephalopathy
BTSCC	Bulk tank somatic cell count
BVD	Bovine viral diarrhea
BVDV	Bovine viral diarrhea virus
CBP	Customs and Border Protection
CCD	Colony collapse disorder
CEAH	Centers for Epidemiology and Animal Health
CEI	Center for Emerging Issues
CEM	Contagious equine metritis
CFIA	Canadian Food Inspection Agency
CMC	Crisis Management Center
CNS	Central nervous system
CSF	Classical swine fever
CSREES	Cooperative State Research, Education, and Extension Service
CVB	Center for Veterinary Biologics
CWD	Chronic wasting disease
CVI	Certificate of veterinary inspection
DHS	Department of Homeland Security
DMR	Department of Marine Resources
EIA	Equine infectious anemia
EIV	Equine influenza virus

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ELISA	Enzyme-linked immunosorbent assay
EMD	Emergency Management and Diagnostics
EMS	Emergency Management System
END	Exotic Newcastle disease
ERS	Economic Research Service
EVA	Equine viral arteritis
eVAP	Electronic Veterinary Accreditation Program
FAD	Foreign animal disease
FAO	Food and Aquaculture Organization
FAS	Foreign Agricultural Service
FDA	Food and Drug Administration
FWS	U.S. Fish and Wildlife Service
FMD	Foot-and-mouth disease
FMO	Federal Milk Marketing Order
FSIS	Food Safety and Inspection Service
GI	Gastrointestinal
GYA	Greater Yellowstone area
HPAI	Highly pathogenic avian influenza
IAICC	International Avian Influenza Coordination Center
ICLN	Integrated Consortium of Laboratory Networks
ICS	Interagency Coordination staff
IICAB	International Cooperation in Animal Biologics
IS	International Services
ISA	Infectious salmon anemia
IT	Information technology
LBMS	Live-bird market system
LPAI	Low-pathogenicity avian influenza
MAP	<i>Mycobacterium avium paratuberculosis</i>
MCI	Market Cattle Identification
NAHEMS	National Animal Health Emergency Management System
NAHLN	National Animal Health Laboratory Network
NAHMS	National Animal Health Monitoring System
NAHRS	National Animal Health Reporting System
NAHSS	National Animal Health Surveillance System
NAI	Notifiable avian influenza
NAIS	National Animal Identification System
NASS	National Agricultural Statistics Service
NCAHEM	National Center for Animal Health Emergency Management

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NCAHS	National Center for Animal Health Surveillance
NCIE	National Center for Import and Export
NPIP	National Poultry Improvement Plan
NSU	National Surveillance Unit
NVAP	National Veterinary Accreditation Program
NVS	National Veterinary Stockpile
NVSL	National Veterinary Services Laboratories
OIE	World Organization for Animal Health
OPIS	Offshore Pest Information System
PCR	Polymerase chain reaction
PCV2	Porcine circovirus type 2
PI	Persistently infected
PIC	Preparedness and incident coordination
PPE	Personal protective equipment
PRRS	Porcine reproductive respiratory syndrome
PRV	Pseudorabies virus
REE	Research, Education, and Economics
RESE	Regionalization Evaluation Services–Export
RSSS	Regulatory Scrapie Slaughter Surveillance
RT–PCR	Reverse-transcriptase–polymerase chain reaction
SFCP	Scrapie Flock Certification Program
SIST	Sanitary International Standards Team
TB	Tuberculosis
TBT	Tropical bont tick
TSE	Transmissible spongiform encephalopathy
UM&R	Uniform methods and rules
USAHA	United States Animal Health Association
USDA	U.S. Department of Agriculture
USTCP	U.S. Trichinae Certification Program
USVIDOA	U.S. Virgin Island Department of Agriculture
VBJDCP	Voluntary Bovine Johne’s Disease Control Program
VBTP	Veterinary Biologics Training Program
VHS	Viral hemorrhagic septicemia
VMO	Veterinary Medical Officer
VS	Veterinary Services
VSPS	Veterinary Services process streamlining
WNV	West Nile virus
WTO	World Trade Organization





# Feedback and Contact Details

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## Feedback

Feedback, comments, and suggestions regarding the 2006 United States Animal Health Report are welcomed. Comments may be sent via e-mail to:

NAHMS@aphis.usda.gov

Or you may submit feedback via online survey at:

<http://www.surveymonkey.com/s.asp?u=224493747387>

## Contact Details

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Veterinary Services  
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NRRC Building B, Mailstop 2E7  
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