



CHAPTER 1



Significant Animal Health Events in 2008

The Veterinary Services (VS) branch of the U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS) protects and improves the health, quality, and marketability of the Nation's animals, animal products, and veterinary biologics. As part of its role in preventing, controlling, and eliminating animal diseases, VS practices veterinary medicine and epidemiology on a broad scale. The VS mission also involves detecting, monitoring, and responding to animal health events of statewide, regional, national, and international significance.

This chapter documents several important animal health events that occurred in the United States in 2008. These events include outbreaks or detections of bovine tuberculosis, malignant catarrhal fever, cattle fever tick, equine piroplasmiasis, equine herpesvirus myeloencephalopathy, contagious equine metritis, bluetongue viruses, epizootic hemorrhagic disease viruses, and methicillin-resistant *Staphylococcus aureus* in swine and swine workers.

Bovine Tuberculosis

In January 2008, animal health officials from USDA and the California Department of Food and Agriculture (CDFA) expanded the epidemiological investigation of a large central California dairy herd that was infected with bovine tuberculosis (TB). The disease confirmation was made in December 2007 following whole-herd tuberculin skin testing. The herd, composed of 5,016 dairy cattle, was depopulated.

The ensuing investigation of this index herd resulted in the identification of 3,209 potentially exposed cattle that had moved to 143 other premises or to slaughter before officials knew that the herd

was infected. Additional investigations to determine the origin of this herd's infection identified 110 cattle from 56 premises as potential sources for the disease.

Epidemiological investigations conducted on the index herd during 2008 identified two other large dairy herds in California as TB-infected. One of these herds, which contained 1,014 dairy cattle, was depopulated. The other herd, composed of more than 12,000 cattle, is undergoing a test-and-removal program to rid the herd of TB. The resulting investigations of these 2 herds identified at least 14,410 potentially exposed cattle that, between 2003 and 2008, had moved to 354 other premises or to slaughter (whereupon they were subject to inspection by USDA's Food Safety and Inspection Service to ensure food safety). These movements required investigatory activities in 16 U.S. States and Canada.

During calendar year (CY) 2008, USDA and CDFA officials conducted 271 herd tests for TB involving more than 377,000 cattle in California alone in response to this outbreak. Nearly \$20 million in Federal funds was used to purchase known exposed cattle, depopulate infected herds, and cover expenses for personnel assigned to conduct herd testing, epidemiological investigations, and identification.

Epidemiological investigations and further herd test activities continue in 2009.

Malignant Catarrhal Fever

Malignant catarrhal fever (MCF) is a clinical disease of cattle and bison caused by a herpesvirus. The MCF virus occurs in two forms, which are named after the associated reservoir host: sheep-associated MCF virus, and wildebeest-associated MCF virus. In affected cattle or bison, MCF can cause high fever, enlarged lymph nodes, profuse nasal and ocular

discharge, sloughing of mucosal surfaces, corneal opacity, and death. Cattle and bison are dead-end hosts for MCF and do not transmit the virus to other livestock. MCF poses no threat to human health. The United States experiences sporadic outbreaks of sheep-associated MCF in cattle or bison; however, wildebeest-associated MCF in cattle is considered a foreign animal disease (FAD).

In April 2008, a cow in Georgia presented at the University of Georgia College of Veterinary Medicine with clinical signs of MCF, a diagnosis later confirmed by laboratory testing as wildebeest-associated MCF. At around the same time, two other cows—one in Alabama and one in Louisiana—also presented with clinical signs; laboratory testing subsequently confirmed wildebeest-associated MCF in the two cows. All three MCF-positive cows had been purchased in March 2008 from a purebred beef cattle ranch in Texas through a private sale. The source ranch in Texas was placed under quarantine on April 16.

An epidemiological investigation revealed that within the approximately 11,000-acre cattle ranch, several species of exotic hoofstock, including 23 adult wildebeest, were contained in a 1,000-acre, high-fenced pasture. The wildebeest, which had been calving from November through December 2007, were in fenceline contact with cattle in four adjacent pastures during that time. Wildebeest-associated MCF virus can be transmitted to cattle via direct contact with infected wildebeest placentas, amniotic fluid, or young wildebeest calves during birth or shortly thereafter.

A total of 589 cattle—including the 3 cows that had already been identified as MCF-positive in Georgia, Alabama, and Louisiana—were determined to have been exposed to MCF virus on the index premises during the wildebeest calving period. There were 459 exposed cattle still located on the index premises in Texas, while 130 exposed cattle had moved to other premises in Texas and 6 additional U.S. States. All exposed cattle were located and quarantined. While under quarantine, one exposed bull and two exposed heifers on the index premises in Texas presented with clinical signs of MCF died and were subsequently confirmed by laboratory testing as positive for wildebeest-associated MCF virus.

Clinical signs of wildebeest-associated MCF usually appear within 30 days of exposure, but incubation periods of up to 7 months have been described in cattle. Additionally, currently available diagnostic tests are not reliable indicators of infection in animals that are not showing clinical signs. It was therefore determined that exposed cattle could be euthanized, slaughtered, or undergo a minimum quarantine period of 7 months from the last date of exposure. This time period was possible to calculate for each animal because the index ranch's management staff kept extensive records of individual animal movement into and out of specific pastures. All quarantined exposed cattle were also required to test negative for MCF just prior to quarantine release.

During the incident, 11 cattle died (6 of laboratory-confirmed MCF, 5 of other or unknown causes), 24 cattle were euthanized, 155 were slaughtered, and 399 underwent the minimum 7-month quarantine. No additional cattle presented with clinical signs of MCF during the quarantine period, and all remaining animals tested negative prior to quarantine release. Exposed cattle on the index farm in Texas were released from quarantine on October 29. (The last possible exposure date for the animals on the infected premises was February; consequently, the release from quarantine on October 29 met the 7-month minimum requirement.) All MCF-exposed cattle associated with this incident were released from quarantine by December 2.

Cattle Fever Tick

The Cattle Fever Tick Eradication Program (CFTEP) was created in 1906 to eliminate bovine babesiosis—a severe and often fatal cattle disease—from the U.S. cattle population. The cattle tick (*Boophilus annulatus*) and the tropical cattle tick (*B. microplus*) are carriers of protozoan parasites (*Babesia bigemina* and *B. bovis*) that cause babesiosis. These ticks are well established in Mexico, and a permanent, 500-mile quarantine zone along the Texas–Mexico border was created in 1938 to maintain the Nation's status as free from babesiosis.

and cattle fever ticks. The disease and the ticks were officially eradicated from the continental United States in 1943, with the exception of a narrow permanent quarantine “buffer” zone (also known as the systematic quarantine zone) that follows the Rio Grande in south Texas. This zone is also known as the systematic quarantine zone because cattle with ticks must be systematically treated every 7 to 14 days for 6 to 9 months.

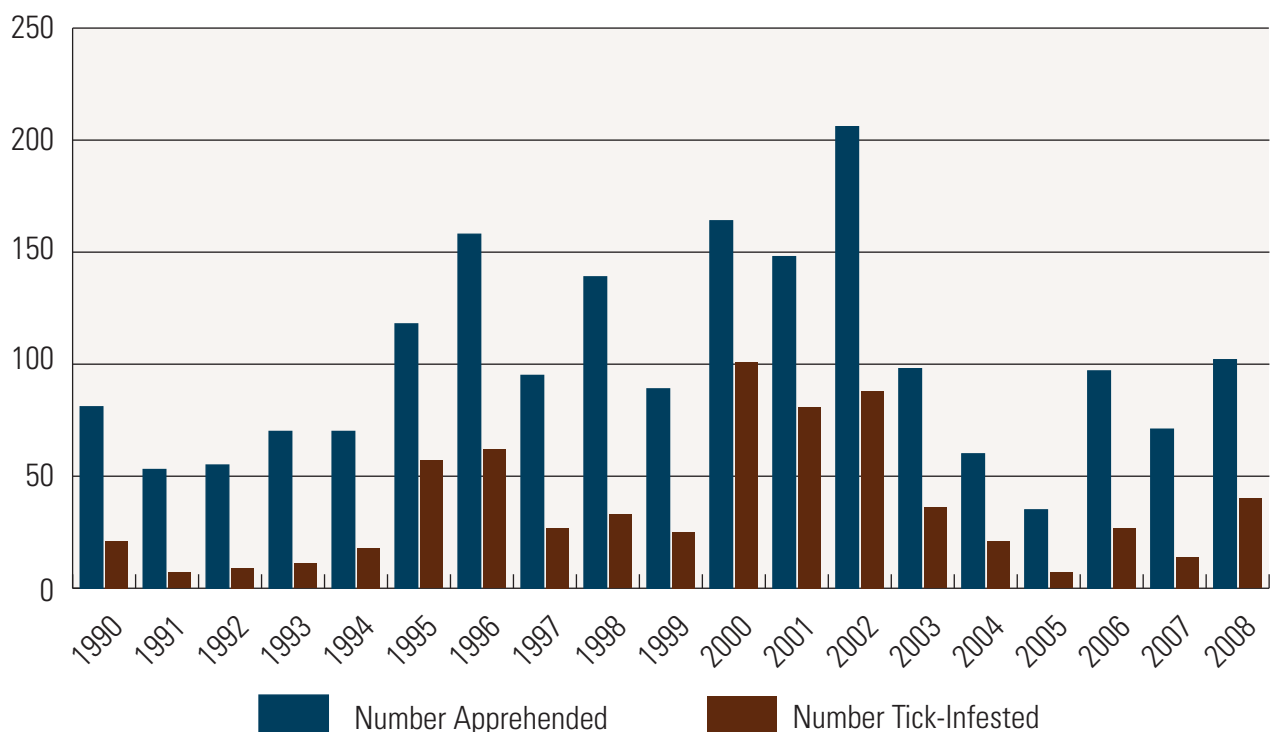
The CFTEP is a cooperative program between APHIS and the Texas Animal Health Commission (TAHC). The TAHC supports the CFTEP by providing personnel, purchasing acaricides, and conducting surveillance in free areas of Texas. APHIS leads the program and maintains the permanent quarantine zone through surveillance and tick control activities. USDA’s mounted patrol inspectors, known as “tick riders,” patrol designated sections along the Rio Grande River for interdiction of tick-carrying wildlife and stray and smuggled Mexican-origin livestock. Intercepted animals must be quarantined, inspected, and treated. From 1990 to 2008, approximately 581 out of 1,092 (53 percent) intercepted cattle have been tick-infested (fig. 1.1). During fiscal year (FY)

2008 (October 1 through September 30), APHIS horseback river patrols along the U.S.–Mexico border apprehended a total of 102 Mexican livestock animals (51 cattle and 51 equids). This compares to 71 animals in FY 2007, a 44-percent increase. Of the 51 cattle apprehended, 30 were infested with fever ticks. Ten of the 51 equids apprehended were infested with fever ticks. Apprehended stray animals are captured, inspected (“scratched”), treated if fever ticks are found, and transported to a local quarantine facility where they are cared for until claimed by the rightful owner, who will then be responsible for paying the boarding fees.

Since FY 2004, the number of tick infestations outside the existing permanent quarantine zone has increased substantially. Factors causing the increase in tick outbreaks include:

- Greater abundance of white-tailed deer and other wildlife along the border;
- Increased commingling of livestock with tick-bearing wildlife;
- Unrestrained movement of white-tailed deer and exotic wildlife;

Figure 1.1: Annual number of apprehended stray and smuggled livestock, including tick-infested animals, 1990–2008.



- A decrease in CFTEP personnel since the early 1980s, which has reduced river surveillance; and
- Increased rainfall and mild winters in recent years, which provide ideal habitat conditions for tick populations.

The high number of outbreaks has precipitated the addition of two temporary quarantine areas totaling approximately 1 million acres outside the permanent quarantine zone in the Texas counties of Starr, Maverick, Dimmit, Webb, and Zapata. Premises and livestock (including deer populations) within these temporarily quarantined areas must be systematically inspected and treated, and the movement of all livestock must be controlled.

APHIS received emergency funding during FY 2008 to hire 14 new temporary tick riders and purchase additional pesticides for treating both cattle and deer on quarantined and adjacent premises.

Equine Piroplasmosis

Equine piroplasmosis (EP) is a disease of equids caused by infection with the blood-borne parasites *Babesia caballi* and/or *Theileria equi* (also referred to as *Babesia equi*, or *B. equi*). The World Organization for Animal Health (OIE) recognizes Australia, Canada, England, Ireland, Japan, and the United States as nonendemic for EP. (Although the United States is considered nonendemic for EP, Puerto Rico and the U.S. Virgin Islands are affected.) The disease agent is commonly transmitted through tick vectors; however, transfer of whole blood or blood products from infected equids to susceptible equids for treatment purposes may transmit the disease agent, as may the reuse of needles on multiple animals.

The Florida State Veterinarian's office provided details on an EP outbreak in the United States during 2008. On August 11, a horse with clinical signs was hospitalized in Ocala, Florida. The attending veterinarian detected suspect hemoprotozoan parasites on a blood smear and sent the blood to the University of Florida for examination on August 12. The laboratory personnel tentatively diagnosed EP after consulting with the attending veterinarian on August 13; the attending veterinarian reported the suspect case to the State Veterinarian's office,

which immediately quarantined the index premises (the premises where the horse resided prior to hospitalization). Between August 13 and December 31, the State Veterinarian's office conducted trace-in and trace-out of equids on the index premises, testing of potentially exposed equids, tick surveillance, and an epidemiological investigation to determine the likely route of introduction and spread of the disease agent.

Investigations identified horses that had potentially been exposed; these horses were tested as part of the initial investigation and then were retested 60 days after the potential exposure. A total of 210 horses were tested, and 20 had positive test results for *B. equi* infection. (Premises with tested horses were located in nine different counties; seven of these premises had one or more infected equids. The number of test-positive horses on premises ranged from one to six.) Twenty-five equine premises in Florida were quarantined in 2008. By December 31, 2008, only two premises remained under quarantine, and no infected horses remained in Florida. The test-positive horses have either been euthanized or shipped to a U.S. research facility. As of February 12, 2009, the last premises had been released from quarantine, and the mainland United States was again considered free of EP.

Tick surveillance included examination of horses on initial quarantine, weekly tick drags to collect ticks on quarantined premises and adjacent premises, carbon dioxide tick traps on quarantined premises, and examination of other domestic and trapped wild animals on quarantined and adjacent premises for the presence of ticks. In the U.S. outbreak, ticks evidently were not important in transmission, as *Dermacentor variabilis* ticks recovered through the surveillance program were tested for *B. equi* by polymerase chain reaction (PCR) and all were found to be negative.

Serosurvey to Determine Prevalence

An APHIS project to determine the prevalence of equids that are seropositive for antibodies to *B. caballi* and/or *B. equi* in the United States was implemented in FY 2008. The project was based on a resolution from the United States Animal Health Association's (USAHA) Infectious Diseases of Horses Committee. Periodically, horses that reside in the United States are seropositive but do not show any clinical signs

(the disease is usually detected when they are tested for export purposes). VS selected a systematic random sample of 15,000 equine serum samples that were previously tested for equine infectious anemia. (The samples were selected from all sera made available by National Animal Health Laboratory Network laboratories in 35 States from October 1, 2007, through June 30, 2008.) As of the end of December 2008, partial testing of samples was completed. Results will be reported when all testing is completed, weighted national seroprevalence estimates have been generated, and the results of the serosurvey have been interpreted.

Equine Herpesvirus Myeloencephalopathy

In August 2007, the steering committee of VS' National Animal Health Reporting System (NAHRS) approved the addition of reporting capabilities for neurological equine herpesvirus myeloencephalopathy (EHM). The USAHA/American Association of Veterinary Laboratory Diagnosticians Committee on Animal Health Information Systems approved the proposal in October 2007 and the additional reporting was implemented in January 2008. Prior to that, States participating in NAHRS had two categories, "yes" or "no," for reporting equine herpesvirus-1 (EHV-1) or EHV-4, with no further differentiation.

A case of EHM is defined as a horse exhibiting signs of central nervous system dysfunction. Additionally, the horse tests positive for EHV-1 by virus isolation and/or PCR assay on nasal swab or blood.

In 2008, eight States reported at least one EHM case into the NAHRS. A total of 11 monthly reports of EHM were submitted to NAHRS by these 8 States; thus, some States reported positives in more than 1 month during 2008. In some months, more than one State reported EHM. EHM cases were reported in January (two State reports), February (two State reports), March (one State report), April (two State reports), November (two State reports), and December (two State reports). Forty-eight States reported data into NAHRS in calendar year 2008.

A July 2008 report from VS' Centers for Epidemiology and Animal Health (CEAH), entitled "Equine Herpesvirus Myeloencephalopathy: Mitigation Experiences, Lessons Learned, and Future Needs," provides information on prevention and mitigation of EHM outbreaks. In addition, the report highlights some of the research needed to provide scientific evidence on designating best management practices for EHV-1 and specifically EHM. This 74-page report can be viewed online at www.aphis.usda.gov/vs/nahss/equine/ehv/equine_herpesvirus_nahms_2008report.pdf.

Contagious Equine Metritis

Contagious equine metritis (CEM) is an FAD in the United States. The CEM organism is transmitted by either carrier stallions or mares during breeding. Clinical signs in mares may include vaginal discharge and temporary infertility. Stallions typically show no clinical signs. Stallions and mares can become chronic carriers of CEM and be sources of infection for future outbreaks. The transmission rate is high; the organism can be spread directly by mating, and also indirectly by contaminated instruments and equipment and semen collected for artificial insemination.

On December 15, 2008, the State of Kentucky confirmed that a quarter horse stallion on a central Kentucky premises was positive for *Taylorella equigenitalis* (*T. equigenitalis*), the bacterium that causes CEM. By December 31, testing confirmed three Indiana stallions as positive for *T. equigenitalis*. The stallions were tested as a result of exposure to a positive stallion while they were kept at a breeding facility in Kentucky.

As of early April 2009, the National Veterinary Services Laboratories (NVSL) had confirmed 17 stallions and 5 mares positive for *T. equigenitalis*. The positive stallions were located in six States: one in Georgia, three in Illinois, three in Indiana, four in Kentucky, one in Texas, and five in Wisconsin. The positive mares were located in three States: two in California, two in Illinois, and one in Wisconsin. One of the positive mares was inseminated by natural breeding; the other four positive mares were

bred by artificial insemination. All of the positive horses are epidemiologically linked cases. None of the positives has been identified as the source of the outbreak.

By early April, locations had been confirmed for an additional 733 horses exposed to *T. equigenitalis*. The 22 positive and 733 exposed horses were located in 47 States. There were 125 exposed or positive stallions in 19 States and 630 exposed or positive mares in 45 States. All positive horses and all exposed horses were placed under quarantine or hold order, and testing and treatment protocols were implemented.

Epidemiological investigations are continuing in 2009.

Bluetongue and Epizootic Hemorrhagic Disease

Bluetongue (BT) is a noncontagious viral disease of domestic and wild ruminants and is caused by the bluetongue virus (BTV), which is transmitted by biting *Culicoides* spp. midges. Epizootic hemorrhagic disease (EHD) is an acute, infectious, often fatal viral disease of some wild ruminants. Like BT, this disease is spread by biting midges.

In most years, few BT and EHD outbreaks are reported in the United States. In 2007, however, significant outbreaks of both BT and EHD occurred. BTV serotype 17 (BTV-17) was identified as the agent that caused disease in sheep, deer, pronghorn, and elk in Montana and Wyoming. In 2008, no large BT outbreaks were reported, but BTV-17 was isolated at NVSL in three samples from Texas. In recent years, EHD virus (EHDV) has been responsible for significant epizootics in deer in the northern United States and southern Canada.

Notable changes in the epizootiology of BTV are occurring, both domestically and abroad. Worldwide, there are 24 serotypes of BT, of which 5 (serotypes 2, 10, 11, 13, and 17) are considered endemic in the United States. The range of serotypes—10, 11, 13, and 17—is associated with *Culicoides sonorensis* distribution and encompasses most of the lower 48 States with the exception of the northeastern United States. BTV serotype 2 is associated with *Culicoides*

insignis (*C. insignis*) and is limited to the southeast, primarily Florida. To date, BT has not been identified in Alaska or Hawaii.

Since 1998, for the first time multiple novel incursions of BTV have been reported in countries surrounding the Mediterranean Basin. In Northern Europe, starting in 2006, unprecedented outbreaks of BTV-1, -6, and -8 have caused high levels of disease in both cattle and sheep in countries previously considered BT-free. BTV-8 in particular has been isolated from cattle with more lesions than historically have been associated with BTV.

In the United States, nonendemic types of BTV have been identified in a collection of historical isolates obtained from animals of U.S. origin. Between 1999 and 2007, BT serotypes 1, 3, 5, 6, 14, 19, 22, and 24 were identified. In 2008, isolates of BTV serotypes 9 and 12 were added to this list of serotypes. The majority of nonendemic isolates were obtained from animals in Florida, with a few originating from animals in Louisiana, Mississippi, Texas, Oklahoma, and Arkansas. Some of the serotypes, such as BTV-3, have been isolated in more than one year, and from more than one location.

In 2008, at the University of Georgia, College of Veterinary Medicine's Southeastern Cooperative Wildlife Diseases Study (SCWDS) laboratory in Georgia, BTV and EHDV isolations included BTV-3 in Arkansas; EHDV-2 in Indiana; EHDV-6 in Kansas; and EHDV-1, -2, -6, and BTV-12 and -17 in Texas. In the past, BTV-3, BTV-12, and EHDV-6 have been considered "exotic" viruses. BTV-3 was first isolated in Mississippi in 2006 and was subsequently detected by APHIS in Florida; the 2008 isolation is the second report of BTV-3 by SCWDS. The 2008 isolation in Texas is the first report of BTV-12 in the United States. This is the third consecutive year in which EHDV-6 has been isolated. Indiana, Illinois, Missouri, Kansas, and Texas are now considered positive for EHDV-6.

The significance of finding "exotic" BT serotypes in the United States is unclear, and the potential impact on U.S. agriculture is largely unknown. Although some of the nonendemic isolates were obtained from ill animals, others were encountered during screening of healthy animals intended for export. No large disease outbreaks due to

nonendemic strains of BTV have occurred in the United States to date.

NVSL, as an OIE reference laboratory for BT, is committed to accurate identification of BT isolates obtained from U.S. animals. NVSL regularly collaborates with veterinary diagnostic laboratories throughout the country, the SCWDS laboratory in Georgia, and the Institute for Animal Health in the United Kingdom.

Methicillin-Resistant *Staphylococcus aureus*

Methicillin-resistant *Staphylococcus aureus* (MRSA) is a type of *staphylococcus* that is resistant to certain antibiotics. These antibiotics include methicillin, oxacillin, penicillin, amoxicillin, and often other non-penicillin antibiotics.

According to the Centers for Disease Control and Prevention, most life-threatening infections caused by *Staphylococcus aureus*, including MRSA, occur among persons who have weakened immune systems and are receiving, or have recently received, care in healthcare facilities, such as hospitals, nursing homes, or outpatient facilities in which surgery, chemotherapy, or hemodialysis services are provided. MRSA infections that are acquired by persons without recent (within the past year) healthcare contact are known as community-associated MRSA infections. *Staphylococcus* or MRSA infections in the community usually appear as skin infections.

Throughout the past decade, a growing number of studies have investigated MRSA in companion and food animals and in their human associates, including pet owners, farmers, and veterinary personnel. MRSA in animals was first detected in milk from cows with mastitis and has since been found in dogs, cats, horses, pigs, sheep, rabbits, chickens, and several exotic species.

In a 2008 pilot study, the University of Iowa took nasal swabs from swine and swine workers from two commercial swine production systems in the Midwestern United States to investigate the presence of MRSA. MRSA was not detected in one of the production systems. In the other production system, MRSA strain sequence type 398 was detected

in swine and swine workers. For the overall study, 299 swine and 20 workers from the two production systems were sampled. Of those sampled, MRSA was cultured from 147 swine and 9 of the swine workers—all from the one affected production system. Samples from pigs less than 15 weeks of age were more likely to be positive than samples from adult pigs. None of the pigs or humans in the study was reported to have clinical illness related to MRSA colonization.

An information sheet on MRSA issued by the APHIS Centers for Epidemiology and Animal Health's Center for Emerging Issues is available online at www.aphis.usda.gov/vs/ceah/cei/taf/emergingdiseasenotice_files/mrsa_122007.pdf.