Chapter 3 – Animal Disease Surveillance and Management

This chapter describes some of the APHIS programs designed to prevent, detect, or manage diseases that threaten the biological and commercial health of U.S. aquaculture, livestock and poultry industries. *Please note: This chapter is not all-inclusive, either in terms of the animals included or the diseases listed.*

Aquaculture

Infectious Salmon Anemia Virus

Infectious salmon anemia virus (ISAV), an orthomyxovirus specific to salmonids and a World Organization for Animal Health (OIE)-listed disease of fish, has caused severe morbidity and mortality in farmed Atlantic salmon in Canada, Chile, Norway, the United Kingdom, and the United States. ISAV was first detected in the United States in 2001, in farmed salmon at grow-out sites in Cobscook Bay, Maine, adjacent to the Canadian border.

In December 2001, the U.S. Secretary of Agriculture declared an ISA disease emergency. This action permitted allocation of funds to APHIS to establish an emergency control program to provide indemnity, disease response, and epidemiological assistance to Maine's Atlantic salmon farming industry. From January 2002 to the present, the ISA Program has operated in partnership with the Maine Department of Marine Resources and in cooperation with the salmon farming industry. The program emphasizes early detection and early removal of newly infected cages, establishment of management areas along hydrologically-defined boundaries, coordination of stocking, fallowing, and parasite control within management areas, and harmonization of ISA standards bilaterally with New Brunswick, Canada, to unify disease-control practices across industry and shared waters.

As a result of these combined efforts, Maine waters have been ISA disease-free since February 2006 (table 3.1) and epidemiological information is available to guide ongoing prevention and control activities. However, outbreaks of ISAV still occur with serious economic consequence in various locations throughout the world. In Maine, occurrences of a nonpathogenic genotype are periodically detected in healthy salmon by reverse-transcriptase polymerase chain reaction (rt-PCR). Though none of these spurious detections have been confirmed in culture, questions remain about the potential evolvement of new forms of ISAV and about the possible existence of marine reservoirs of the virus. Consequently, the ISA Program continues to assist the U.S. industry and the State of Maine with ISAV surveillance, disease prevention, and data management activities.

Table 3.1: Infectious salmon anemia testing

	2002	2003	2004	2005	2006	2007	2008	2009	2010
Fish sampled	1,963	3,187	3,933	1,453	807	900	1,104	965	949
Site inspections	189	369	387	178	95	95	119	110	106
Site audits	22	21	13	11	12	16	9	13	9
Cages confirmed positive	0	5	17	19	1	0	0	0	0
Confirmed cages removed	0	5	17	19	1	0	0	0	0
Newly confirmed sites	1	2	6	0	1	0	0	0	0
Previously confirmed sites	0	0	1	5	0	0	0	0	0
Sites in water	20	23	21	12	13	12	15	15	12

Viral Hemorrhagic Septicemia

Viral hemorrhagic septicemia (VHS) is also a World Organization for Animal Health (OIE)-listed disease of fish. In 2005, an emergent genotype of VHS virus IV (referred to as VHSV IVb) was detected in freshwater fish associated with fish kills in the Great Lakes, an extensive watershed shared by the United States and Canada. Currently, 28 freshwater species are considered susceptible to natural infection or disease caused by VHSV IVb, including species harvested, cultured, or stocked for bait, sport, or food. A Federal Order regulates the anthropogenic movement of these susceptible species from the Great Lakes States and Canadian Provinces boarding the Great Lakes. An APHIS proposed rule, intended to replace the Federal Order, is being developed. In the meantime, the Federal Order remains in effect.

Since 2007, APHIS has offered cooperative agreements to States and Tribal nations for VHSV IVb surveillance in freshwater fish populations of the United States. Results through August 2009 are available in the VHSV 2009 Surveillance Report at www.aphis.usda.gov/animal_health/animal_dis_spec/aquaculture/downloads/vhs_surv_rpt.pdf .

VHSV IVb surveillance results suggest that the pathogen is centered in the Great Lakes region. Fish positive for VHSV IVb have been found in the Great Lakes and in several inland waters in Michigan, New York, and Wisconsin; also, a single detection occurred from an inland lake in

Ohio that drains into a neighboring watershed. To date, there have been no detections in cultured populations or in any populations outside States bordering the Great Lakes.

Although VHSV IVb appears to be currently localized to the area regulated by the Federal Order, baseline surveillance outside of this region is incomplete. Further, certain States are predicted to be at risk of introduction through natural movements of fish or water from known VHSV IVb-affected regions. Varying State capacities to mitigate risks of anthropogenic transmission could also contribute to spread of VHSV outside of the Great Lakes States. The 2010 surveillance data is under review and will be compiled, analyzed and reported in FY 2012.

In FY 2010, the APHIS Aquaculture Program awarded approximately $2 million in cooperative agreements to States and Tribes for VHS surveillance and outreach activities. APHIS developed an outreach campaign called Focus of Fish Health (http://www.focusonfishhealth.org) to educate the public about potential pathogen vectors not easily controlled by regulatory actions, such as activities related to recreational fishing. Also, APHIS worked with Iowa State University to develop three aquatic animal health modules under the National Veterinary Accreditation Program.

National Aquatic Animal Health Plan (NAAHP)

Development of the NAAHP has been completed by APHIS in collaboration with the U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration. The agencies have partnered with industry stakeholders to generate methods to use available funding to effectively implement the NAAHP priorities. The NAAHP is a roadmap to guide industry, other stakeholders and State, Tribal, and Federal agencies on how to work together to develop programs, policies, and if necessary, regulations to improve the health of U.S. farmed and wild aquatic animals.

NAAHP implementation will be guided by a Federal Advisory Subcommittee under the Secretary‘s Advisory Committee on Animal Health. The composition of the Subcommittee on Aquatic Animal Health (SAAH) is based on the 2008 proposed amendments to the Farm Bill. Committee membership will include seven representatives from the aquaculture industry, five from State governments, one Tribal representative, four from the Federal government, and one or more representatives from the research community. Selection of the subcommittee members has been approved by the APHIS Administrator and the first meeting of the SAAH is scheduled for the first quarter of FY 2012.

An important goal of the NAAHP is to establish an aquatic animal laboratory network. To move forward on implementing this goal, a pilot initiative called the National Aquatic Animal Pathogen Testing Network (NAAPTN) was established through United States Animal Health Association in 2010. Under this network, a VHS technical working group was established to optimize the cell culture protocol for VHS- IVb as well as a PCR confirmatory test. The Blue

Book and OIE protocols were used as a starting point. A subset of the group is also looking at the existing VHS real time PCR protocols to see which assay might best be validated for future use as a screening tool. The SAAH will eventually provide further direction and guidance to the NAAPTN.

Expanded Aquaculture Reporting in National Animal Health Reporting System

In 2010, the National Animal Health Reporting System (NAHRS) Reportable Disease List continued to include all OIE-notifiable aquaculture diseases of fish, mollusks, and crustaceans. The NAHRS 2011 Reportable Disease List, NAHRS State Report, and the NAHRS Online Reporting Tool will be updated to include the aquaculture crustacean disease necrotizing hepatopancreatitis to correlate with the proposed 2011 OIE List.

Additional information is available on the NAHRS home page at http://www.aphis.usda.gov/animal_health/nahrs/info_for_participants.shtml, under Participant Resources.

APHIS is working to establish an aquaculture liaison in each Veterinary Services (VS) Area Office because of the expanding aquaculture industry and increasing international trade opportunities in many States. APHIS VS aquaculture liaisons will assist the industry at the Area Office level by serving as an important link to State governments, other stakeholders, and as a resource for States on aquaculture disease reporting. Additional information on VS and State aquaculture contacts is available on the APHIS Web site at http://www.aphis.usda.gov/animal_health/animal_dis_spec/aquaculture/.

Cattle and Cervids

Bovine Spongiform Encephalopathy

APHIS has taken aggressive measures to prevent the introduction and potential spread of bovine spongiform encephalopathy (BSE) and has conducted surveillance since 1990 to monitor whether the disease is present in the United States. The current ongoing surveillance program is designed to detect one case of BSE per 1 million adult cattle, which exceeds the OIE “Type A” surveillance guidelines that require adequate surveillance samples to detect one case of BSE per 100,000 adult cattle.

Status – In FY 2010, APHIS met its goal of testing 40,000 samples for BSE. BSE has not been detected in the United States since 2006 and no cases were detected in 2010. The primary reasons for the ongoing surveillance program are to continue to monitor and assess changes to the BSE status of U.S. cattle and to provide mechanisms for early detection of BSE. The program enables APHIS to detect BSE at a rate of one infected animal per 1 million adult cattle in the population with a high degree of confidence, maintains surveillance at levels that exceed

international standards, emphasizes sample collection from cattle subpopulations where BSE is most likely to be detected, and retains sample collections from all important surveillance sources.

Program Updates – The OIE is the internationally recognized standard-setting body that develops science-based recommendations for the safe trade of animals and animal products. The OIE member countries, including the United States, have agreed by consensus to amend the OIE guidelines as necessary based on increased scientific evidence regarding BSE. The OIE guidelines reflect the current understanding that, depending on multiple factors, there can be gradations in the risk of the BSE agent being moved from one country to another, and gradations in the risk of BSE transmission and amplification within any particular country. Currently, the OIE categorizes countries as negligible-risk, controlled-risk, or undetermined-risk for BSE. For live cattle and for many products derived from cattle, the trade conditions recommended by the OIE guidelines are based on the BSE risk classification of the exporting country. The United States continues to be classified as a controlled-risk country by the OIE.

Based on its review of the latest scientific literature, APHIS is drafting a proposed rule, known as the comprehensive rule, which would make the BSE regulations largely consistent with the OIE recommendations regarding the disease. The proposed rule would establish regulatory criteria for U.S. classification of negligible-, controlled-, and undetermined-risk regions for BSE and (with some exceptions) would establish conditions for importing live bovines and bovine products that are consistent with OIE guidelines regarding trade in cattle and cattle products with regard to BSE.

Brucellosis

The Brucellosis Eradication Program is a longstanding initiative that was established to safeguard the health of domestic livestock, maintain the economic viability of the U.S. cattle industry in national and international trade, protect public health, and ensure food safety. The goal of the program is to eradicate brucellosis from the United States.

Status – All 50 States, Puerto Rico, and the Virgin Islands remained designated Class- Free for bovine brucellosis throughout calendar year 2010. This designation represents a significant milestone for the brucellosis program because, in the past 5 years, each of the three Greater Yellowstone Area (GYA) States lost and subsequently regained its Class Free status. The presence of brucellosis in wildlife populations in the GYA is a continuing challenge for the brucellosis program.

In 2010, three cases of bovine brucellosis were detected among domestic cattle and bison herds in the GYA, with epidemiologic and genetic evidence indicating infected elk as the most likely source. In November 2010, two brucellosis-affected domestic bison herds and one brucellosis-affected domestic cattle herd were disclosed in the GYA. One domestic bison herd is located in Montana. The second domestic bison herd and the domestic cattle herds are located in Wyoming.

All three herds are under quarantine with affected herd plans, including periodic testing and use of vaccination strategies. Thorough epidemiologic investigations have been completed. No additional brucellosis-affected herds were found and no epidemiologic links among any of these herds were identified.

Two primary surveillance activities are conducted for bovine brucellosis: market cattle identification (MCI), which includes slaughter surveillance and first-point testing at livestock markets, and brucellosis milk surveillance testing (BMST). During FY 2010, APHIS tested approximately 6.170 million head of cattle under the MCI surveillance program; approximately 400 MCI tests yielded preliminary suspicious test results. The brucellosis-affected domestic cattle herd was detected in 2010 through first point testing at a livestock market. Epidemiological investigations conducted on all other suspicious MCI tests confirmed all cattle herds were negative for brucellosis.

BMST surveillance is conducted in all commercial dairies a minimum of two times per year in Class-Free States. Approximately 114,620 BMSTs were conducted on 53,540 commercial dairy herds in FY 2010. Of those, approximately 77 yielded suspicious results on initial testing. Epidemiological investigations conducted on the suspicious BMSTs confirmed all dairy herds were negative for brucellosis. Approximately 486,000 additional head of cattle were tested on-farm in FY 2010; primarily for movement and private sale (approximately 33 percent), herd certification (approximately 27 percent), epidemiological investigation (approximately 20 percent), and exhibition purposes (approximately 10 percent). The 2010 brucellosis-affected bison herd in Montana was detected through enhanced area surveillance testing. The 2010 brucellosis-affected bison herd in Wyoming was detected through on-farm testing for private sale. Nearly 3.10 million calves and 2,200 brucellosis certified-free cattle herds were vaccinated for brucellosis in FY 2010.

Program Updates – APHIS published a concept paper in the *Federal Register* in October 2009 that described an action plan for a new direction for the brucellosis program. To address the action plan, APHIS published an interim rule that went into effect on December 27, 2010. The goal of the interim rule is to transition the national brucellosis program from one based on geopolitical boundaries to one based on boundaries determined by science, epidemiology, and risk assessment.

Under previous regulations, producers in the States faced increased movement testing requirements and costs even when they were not affected by the threat of brucellosis from wildlife. The interim rule removed this requirement to ensure equity for producers. The interim rule also facilitates implementation of a national bovine brucellosis slaughter surveillance strategy to maintain confidence that brucellosis is present in less than one animal per million in the national beef and dairy cattle herd. This new strategy improves the efficiency and cost

effectiveness of slaughter surveillance by eliminating State-by-State census sampling while demonstrating the national herd's disease-free status.

Most significant, the interim rule removes the automatic loss of Class Free status in any Class Free State if a brucellosis-affected herd is not depopulated within 60 days or if 2 or more herds are found to have brucellosis within 24 months. States will retain Class Free status if affected herds are maintained under quarantine, an individual herd plan (including a test-and remove schedule) is developed and implemented for each affected herd to prevent the spread of brucellosis, and appropriate surveillance is conducted to detect brucellosis in other herds or species. The interim rule also stipulates that any Class Free State with brucellosis in wildlife or continued detections of brucellosis-affected herds must develop and implement a brucellosis management plan (BMP) approved by the APHIS Administrator.

The need for a BMP is based on an APHIS risk assessment. The BMP will define and explain the basis for the geographic area identified in the plan, describe epidemiologic assessment and surveillance activities to determine if wildlife populations are affected, and describe surveillance activities and mitigation activities for domestic cattle, bison, and wildlife. Additionally, the interim rule changes the requirements for herd blood tests and for certifying herds as brucellosis-free.

APHIS is moving toward a new direction and supporting regulations for the bovine brucellosis and bovine tuberculosis (TB) programs by considering a combined rule for both programs. A TB/Brucellosis Working Group was formed to develop a comprehensive regulatory framework for both programs. The working group's State, Federal, and Tribal representatives serve as a conduit for additional input from stakeholders. The group held its kickoff meeting on September 21 and 22, 2010, and continued to hold weekly conference calls throughout the year to address the regulatory framework. An additional workshop was held on December 14 to16 to provide face-to-face discussions.

In addition to the working group activities, APHIS will continue to discuss TB/brucellosis strategies, standards, and plans with a wide range of stakeholders and other interested entities. We plan to host a series of public meetings across the United States in early 2011 to obtain stakeholder feedback on the regulatory framework. Based on the comments received during the public meetings and through other outreach efforts, the working group will make recommendations on the content of a TB/brucellosis proposed rule.

The most significant challenge facing the brucellosis program is the presence of brucellosis in wildlife populations, in particular the wild elk and bison populations in the Greater Yellowstone Area (GYA). The presence of disease in these wildlife populations presents a significant risk to domestic livestock herds and a unique challenge for disease eradication efforts. This challenge is exemplified by the finding of brucellosis-affected cattle herds in all three of the GYA States (Montana and Wyoming in 2010 and Idaho in 2009).

The following significant activities were carried out in 2010 in efforts to continue to address the unique brucellosis situation in the GYA States:

- The Bison Quarantine Feasibility study made the first successful transfer of bison from the project to a new conservation herd in February 2010. A cohort of 87 brucellosis-free Yellowstone bison completed the quarantine process and were released to Turner Enterprises Inc. in Bozeman, Montana. The bison will be monitored for 5 years then moved to a final destination for conservation as determined by the Montana Fish, Wildlife and Parks. A second cohort of 35 bison is scheduled to complete phases 2 and 3 of the study. If all bison remain brucellosis-free, this cohort will be available for conservation purposes in 2011 or 2012.

- In April, a bull bison semen evaluation study was initiated to evaluate the potential of venereal transmission of brucellosis by infected bison bulls in the GYA. A total of 39 free-roaming bulls, ranging from 2 to more than 15 years of age, were captured in Montana and semen and blood collected for culture and serology. Of these, 64 percent were found to be seropositive for brucellosis and 2 were semen culture positive. An additional 11 bulls will be captured and tested in spring 2011 to complete the necessary sample size of the study, and final results will be evaluated and reported.

- **Cooperative agreement funds**
  Each of the three GYA States received Federal funds through cooperative agreements in FY 2010. Continued activities supported by these funds include:

  - **Idaho:** State animal health officials worked on habitat improvement to encourage elk to stay on traditional ranges and off of cattle inhabited ranges. One ranch that was experiencing problems with elk commingling was supplied fencing which was inspected to determine adequacy. In addition, 40 elk were trapped and tested and 1,500 hunter blood test kits were supplied. Herd plans for ranches in the designated surveillance area (DSA) were reviewed and updated as needed. Testing of 17 cattle herds comprised of 3,100 animals was conducted as part of an affected herd investigation with 1,350 animals in 8 herds, including the infected herd, being retested.

  - **Montana:** A total of 397 elk blood samples were tested during the Montana hunting season (October 2009 to March 2010). Eleven (2.8 percent) samples were seropositive for exposure to brucellosis on standard serologic tests and Western blot assays. In addition, 384 elk tissue samples (primarily retropharyngeal lymph nodes) were submitted for culture. Eleven of these samples were culture positive for *Brucella abortus* biovar 1. Herd plans for 105 cattle producers in Montana's DSA were signed or are pending signature.

- **Wyoming:** Herd plans have been developed for 84 herds in Wyoming's DSA; a total of 191 herd plans are in place Statewide. More than 1,600 head of cattle in 5 herds were tested in accordance with herd plans. Wyoming animal health officials coordinated efforts to focus on testing, prevention and education, including an educational video on brucellosis for State veterinarians, Area Veterinarians in Charge, and other regulatory personnel. Brucellosis Feedground Habitat (BFH) personnel activities during the winter of 2009–2010 centered on elk captures, vaccination, elk-cattle separation efforts, and brucellosis research projects. This work included trapping 662 elk at 11 feedgrounds and tagging 401 elk. Vaccination of 2,333 calf elk occurred on 18 State feedgrounds and the National Elk Refuge during winter 2010; 83 percent of calf elk are classified as vaccinated for brucellosis.

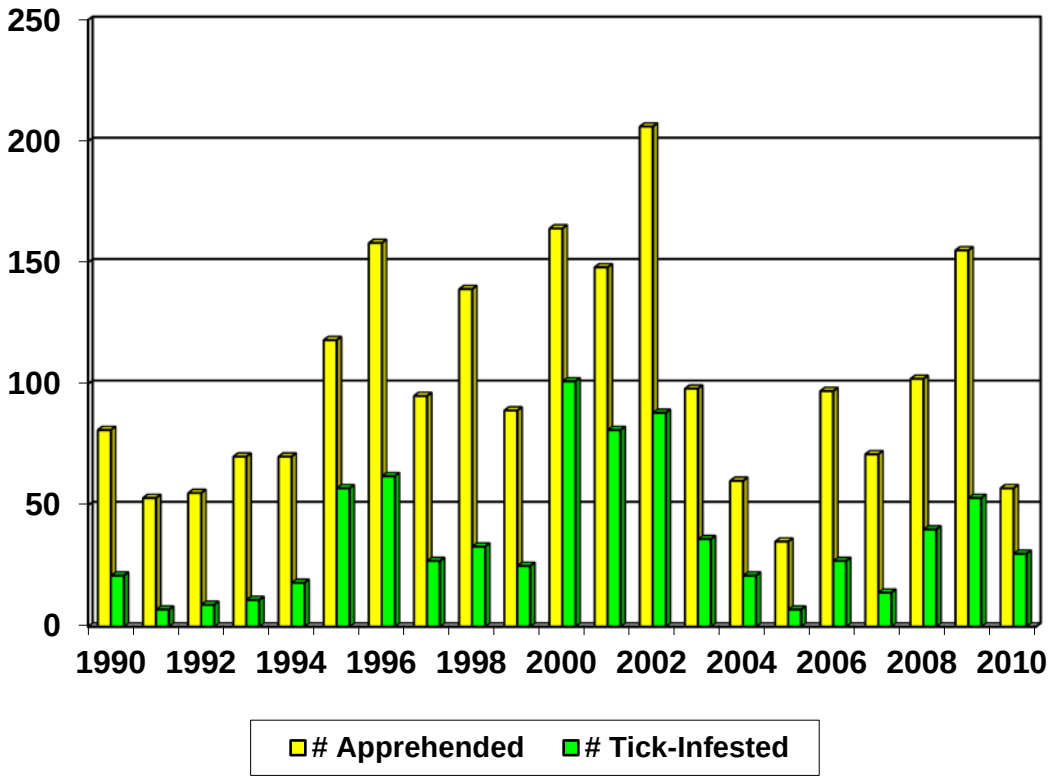
Cattle Fever Tick Eradication Program

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 fever tick, *Rhipicephalus* (*Boophilus) annulatus*, and the southern cattle fever tick, *R.* (*B.) microplus*, are carriers of protozoan parasites (*Babesia bigemina* and *B. bovis*) that cause babesiosis. The ticks are well established in Mexico. A permanent 500-mile quarantine zone along the Texas-Mexico border was established in 1938 to effectively 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 (i.e., systematic zone) in south Texas that follows the Rio Grande.

The CFTEP is a cooperative program between APHIS and the Texas Animal Health Commission (TAHC). APHIS 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 to intercept tick-carrying wildlife and stray and smuggled Mexican-origin livestock. Intercepted animals must be quarantined, inspected, and treated.

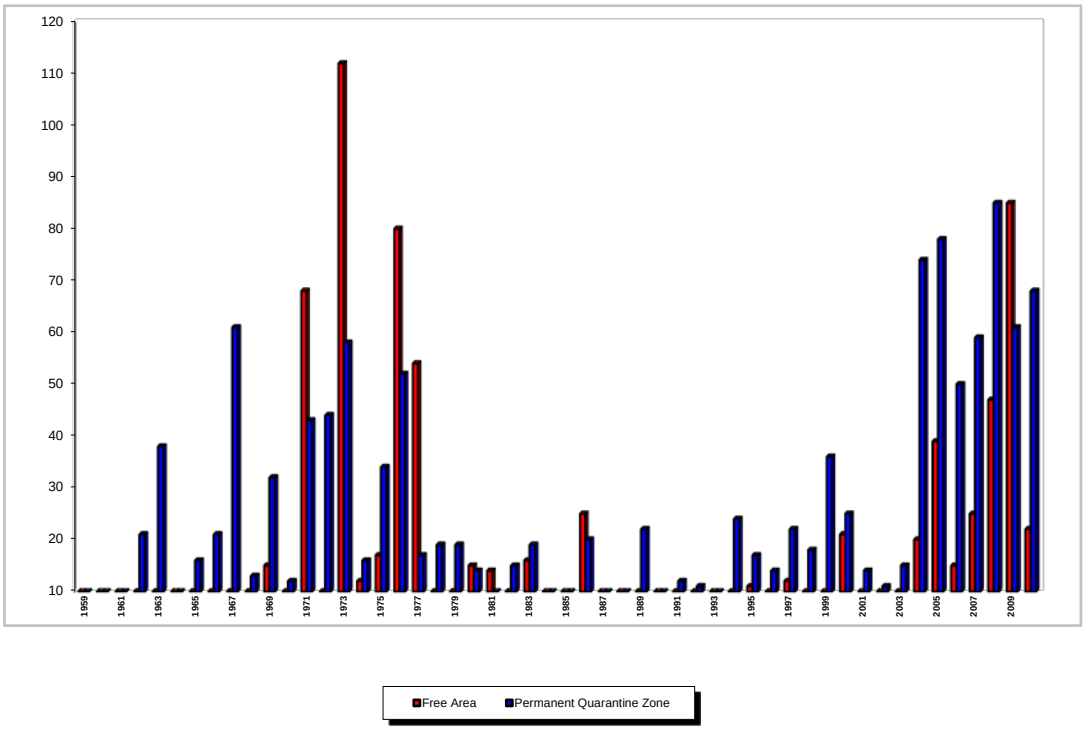
From 1990 to 2010, more than 52 percent of intercepted cattle were tick infested. During FY 2010, APHIS horseback river patrols along the U.S.-Mexico border apprehended 57 Mexican livestock compared to 155 in FY 2009, a 63 percent decrease (figure 3.1). Of the 44 cattle apprehended, 28 were infested with fever ticks. Two of the 13 apprehended equids were infested.

Figure 3.1: Annual number of apprehended stray and smuggled livestock, including tick-infested animals, 1990–2010



Following the second highest recorded number of tick outbreaks during FY 2009 (146), the number of outbreaks during FY 2010 was reduced to 90 —a 38 percent decrease in total number of infested premises (figure 3.2). More importantly, the number of infested premises in the free areas of south Texas was reduced to 22 from 85 in FY 2009 (a 74 percent decrease) because of the coordinated surveillance and systematic treatment procedures implemented by APHIS and the TAHC.

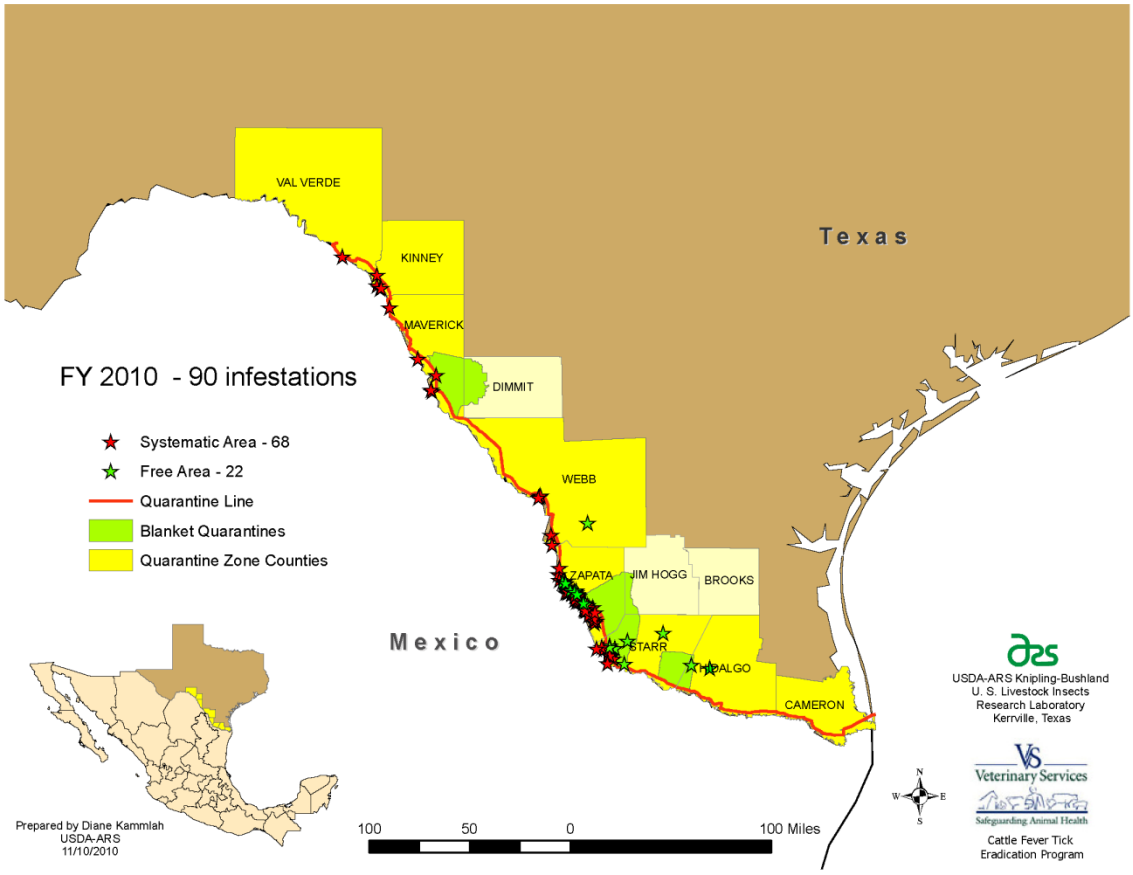
Figure 3.2: Annual number of cattle fever tick infested premises in Texas, 1959-2010



In addition, 638 tick samples were collected and submitted for identification as a result of livestock inspections during FY 2010. During FY 2009, a total of 856 tick samples were submitted.

Since 2007, the high number of tick outbreaks outside the permanent quarantine zone has precipitated the addition of approximately 1 million total acres included in three temporary "blanket" quarantine areas outside of the permanent quarantined area in Maverick, Dimmit, Webb, Zapata, Jim Hogg, Starr, and Hidalgo Counties (Figure 3.3). Premises and livestock within these temporary quarantined areas must be systematically inspected and treated (including captive and free-ranging deer populations), and the movement of all livestock must be controlled.

Figure 3.3: Cattle fever tick infestations in FY 2010



During FY 2010, the CFTEP received an increase in appropriated funding to purchase new equipment and repair or replace aging equipment (e.g., spray-dip machines and portable dipping vats) to help address the more recent tick outbreak situations in Zapata, Starr, and Hidalgo Counties. In addition, emergency funding was provided to the CFTEP during FY 2009 that allowed APHIS to address the continuing emergency situation in Texas through an enhanced eradication plan, that includes some of the mitigation measures outlined in the National Strategic Plan.

These proactive measures include conducting surveillance and treatments at south Texas livestock sale barns, conducting voluntary livestock inspections, evaluating anti-tick vaccine technology, facilitating the registration of new tick control products, developing better technologies for communicating or recording spatially referenced data, and purchasing additional pesticides for treating both cattle and deer on quarantined and adjacent premises inside the permanent quarantine zone and within the three temporary blanket quarantine areas.

The most important factor causing the increase in tick outbreaks in both the permanent quarantine zone and the free areas of south Texas continues to be the unrestrained movement of white-tailed deer, including exotic deer species.

Chronic Wasting Disease

The Federal Chronic Wasting Disease (CWD) herd-certification program for farmed cervids operations has been in development since late 2003. A CWD final rule was published in the *Federal Register* in 2006 but was not implemented in response to several petitions. The CWD rule was amended in 2010 following the publication of proposed changes. The amended rule will set minimum standards for interstate movement and establish the Federal CWD Herd Certification Program (HCP).

The Federal CWD HCP for farmed cervids is intended to be a cooperative State-Federal-industry program. The CWD program goals are to control CWD in farmed cervid herds and to encourage State and Tribal wildlife agencies to conduct CWD surveillance in wild cervids.

The number of farmed cervids tested for CWD has increased steadily since FY 2003 from approximately 12,000 animals tested to nearly 20,000 in FY 2010. From FY 1997 through FY 2010, CWD was identified in 37 farmed elk herds and 13 farmed white-tailed deer herds in 11 States (Table 3.2). Three new farmed cervid herds were found to have animals diagnosed as positive for CWD in 2010.

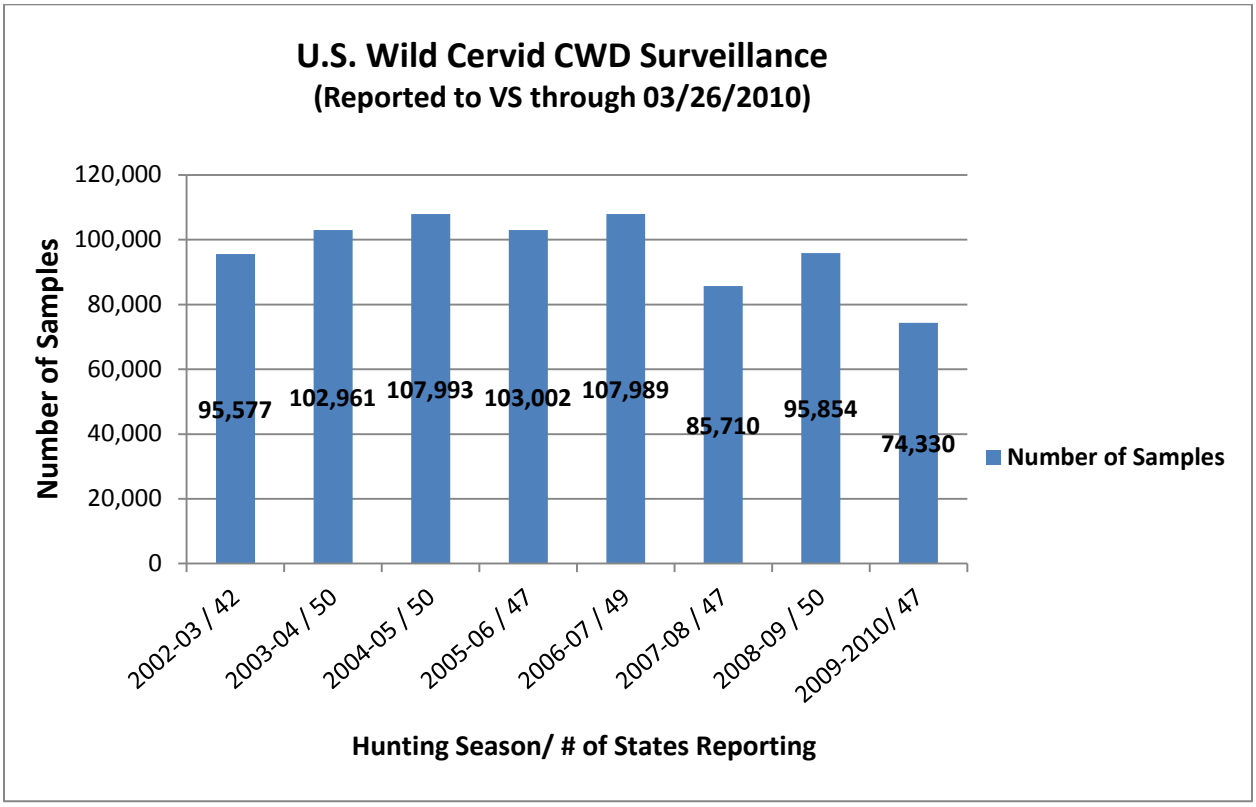
Table 3.2: Number of farmed cervid herds with animals positive for CWD by State, FY 1997–FY 2010

State	FY 1997–2010	FY 2010	Total (FY 1997–2010)
Colorado	18		18
Kansas	1		1
Michigan	1		1
Minnesota	4		4
Missouri		1	1
Montana	1		1
Nebraska	5		5
New York	2		2
Oklahoma	1		1
South Dakota	7		7
Wisconsin	9		9
Total	**49**	**1**	**50**

Of the 50 CWD-positive herds identified as of September 30, 2010, 6 elk herds (all in Colorado) remained under State quarantine. One White-tailed deer herd in Missouri was identified as CWD positive in February 2010 and remained under State quarantine through 2010 pending depopulation.

Since 2002, most States have been participating in CWD surveillance in free-ranging deer, elk, and more recently, moose. By September 30, 2010, 13 States had reported detecting CWD in wild cervids (Colorado, Illinois, Kansas, Nebraska, North Dakota, New Mexico, New York, South Dakota, Utah, Virginia, West Virginia, Wisconsin, and Wyoming). From the 2002 through the 2010 hunting seasons, an approximate total of 773,400 hunter-harvested and targeted wild cervids were tested with an average of 95,600 samples each season (Figure 3.4). Wildlife surveillance strategies have also evolved over the years from broad active surveillance of hunter-harvested animals to targeted and weighted surveillance of wild cervids considered to be at greater risk of CWD (based on our knowledge and understanding of CWD transmission in those populations).

Figure 3.4: Surveillance testing of hunter-killed and targeted wildlife for CWD



Johne's Disease in Cattle

The Voluntary Bovine Johne's Disease Control Program (VBJDCP) is a cooperative effort administered by States with support from the Federal Government and industry. The program provides national standards for controlling Johne's disease, with the goals of reducing the spread of the causative bacterium, *Mycobacterium avium* subspecies *paratuberculosis* (MAP), to noninfected herds, and decreasing disease prevalence in infected herds. The program has three basic elements: education, management, and testing.

Status – In 2010, there were 4,611 herds enrolled in the Johne's Disease Control Program, with 412 herds enrolled in the test-negative component of the program. Program enrollment has continued to decline as Federal funding has decreased. Herds in the test-negative component must use an approved laboratory for testing. Approved laboratories are required to pass an annual proficiency test. Laboratories approved for Johne's disease testing, in addition to the National Veterinary Services Laboratories (NVSL), include 78 domestic laboratories for serology, 38 for MAP fecal culture, and 35 for polymerase chain reaction (PCR) and DNA testing. In FY 2010, these laboratories reported conducting 207,456 serum enzyme-linked immunosorbent assays (ELISAs), 135,284 milk ELISAs, and 27,035 individual fecal sample

tests (culture and PCR), in addition to 9,446 pooled fecal samples (5 bovine per pool) and 114 environmental samples.

Program Changes – In 2008, the national Johne's Disease Strategic Plan was revised. The revised plan calls for decreased emphasis on herd enrollment by APHIS and for increased emphasis on developing tools and information to assist producers in implementing on-farm control measures. Accordingly, APHIS reduced support to the national Johne's demonstration herd project to data analysis only in 2010. The Uniform Program Standards for the VBJDCP were also updated in 2010 to conform to the revised Strategic Plan. Educational efforts will be limited to developing material for distribution at the national level. The remaining Johne's Disease Control Program resources will be focused on activities needed to continue support of the certification portion of the program, such as laboratory proficiency testing and licensing of diagnostics and vaccines.

Tuberculosis in Cattle and Cervids

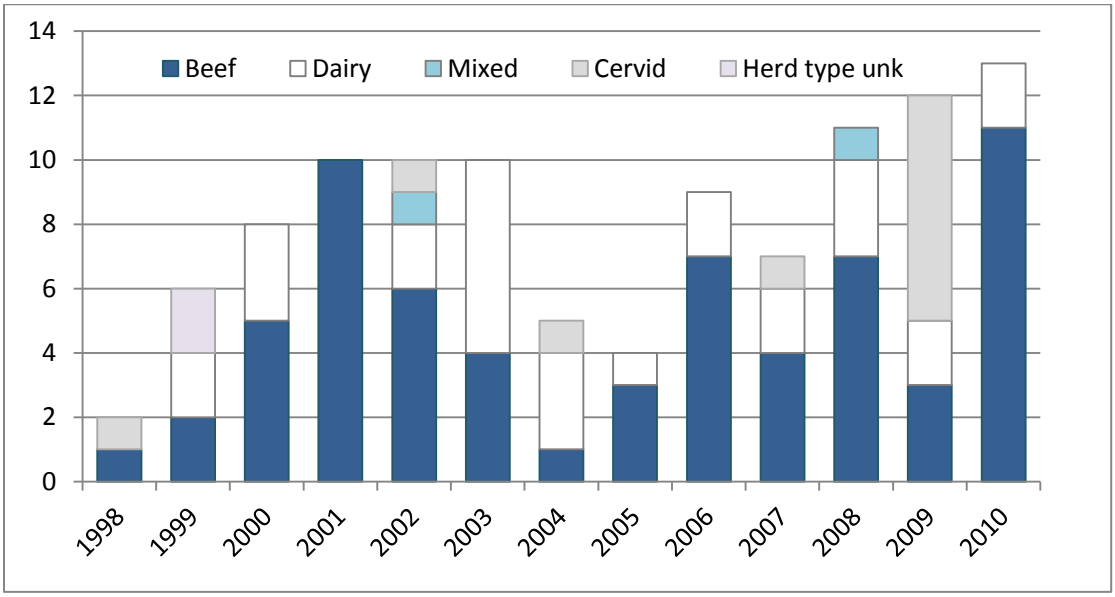
Surveillance for bovine tuberculosis (TB) in the United States consists of slaughter surveillance in cattle and live-animal testing in cattle and captive cervids. The publication "Bovine Tuberculosis Eradication: Uniform Methods and Rules" (UM&R) gives the minimum standards adopted and approved by the VS Deputy Administrator in January 2005.[1] For more detailed information about the requirements of the bovine TB program, please see the UM&R.

Status – From FY 1998 to FY 2010, 105 TB-affected herds have been detected in the United States. This total comprises 64 beef herds, 28 dairy herds, 2 mixed-use cattle herds, and 11 captive cervid herds (Figure 3.5).

In FY 2010, 13 TB-affected herds were identified (11 beef and 2 dairy herds). The total number of TB-affected herds identified in FY 2010 is comparable to the 12 herds identified during FY 2009. While no affected captive cervid herds were detected in FY 2010, TB isolates from four FY 2010 TB beef cases matched strains isolated from captive cervid cases from the 1990s. Cases identified in FY 2009 and 2010 represent the emergence of this strain since TB was initially detected in captive cervid herds during the 1990's.

[1] http://www.aphis.usda.gov/animal_health/animal_diseases/tuberculosis/downloads/tb-umr.pdf

Figure 3.5: Bovine tuberculosis affected herds, FY 1998–2010



Of the TB-affected herds found during FY 2010, one dairy and nine beef herds were depopulated with Federal indemnity. Two beef herds in Michigan detected in FY 2010 were not depopulated and are under test-and-remove herd plans. An affected Ohio dairy herd undergoing dispersal was identified as affected with TB in FY 2010. At the time of detection the herd had been mostly dispersed; however, following detection the remaining cattle were sent to slaughter. One dairy and two captive cervid herds in Michigan remain under quarantine.

At the end of FY 2010, 46 States, 2 Territories, and 3 zones were TB accredited-free (AF), including Puerto Rico and the U.S. Virgin Islands. California was Modified Accredited Advanced (MAA) and three States had split-State status. New Mexico has AF and MAA status. Michigan has AF, MAA, and modified accredited (MA) status. In December 2009, APHIS published an interim rule in the *Federal Register* that advanced six counties in the western portion of Michigan's current MA zone to MAA status. Minnesota was upgraded from MAA and MA to AF and MAA status on October 1, 2010. Of the AF States and zones, 20 States and the U.S. Virgin Islands have maintained AF status for more than 25 years. Twenty States have been AF for 15 or more years, 5 States have been AF for 10 or more years, 1 State and Puerto Rico have been AF for 5 or more years; and 1 State and 1 zone have had AF status for less than 5 years.

Specific information for 2010 for TB-affected States

Colorado – One beef and one dairy herd were detected in FY 2010. The dairy herd was detected through routine slaughter surveillance. The beef herd owner purchased cattle from a dairy herd and TB was detected in one animal. Both herds were depopulated with Federal indemnity.

Kentucky – One beef herd was detected through routine slaughter surveillance and depopulated with Federal indemnity. The isolate from this herd matched strains isolated from captive cervid cases from the 1990s.

Michigan – Five TB-affected beef herds were detected in FY 2010. Three herds were located in northern Lower Michigan in the bovine MA zone and two herds were located in a county advanced to MAA status in December 2009. One of the herds located in the MA zone had previously been depopulated in FY 2001 due to TB infection. Four of the five affected herds were identified through surveillance testing and the fifth herd was identified through epidemiological tracing. Three herds have been depopulated with Federal indemnity and two herds are under a test-and-remove herd plan.

One dairy herd in Michigan's MA region remains under a test-and-remove herd plan. The herd was identified as TB-affected a second time in 2004—the first infection was found in 2000. An *M. bovis*-infected cow was identified during the most recent herd test for release of quarantine. As a result of this finding, the quarantine was not released and the dairy herd is still considered affected. Under the terms of the herd plan, testing will revert to the disease removal phase of the test-and-remove protocol and will continue until the freedom-from-disease phase is successfully concluded and all requirements for quarantine release have been met.

Minnesota – Following a TB program review in November 2009, Minnesota was upgraded from a split-State status of MAA and MA to AF and MAA on October 1, 2010. No affected herds were detected during FY 2010. To date, all affected cattle herds have been found in a small geographic area in northwest Minnesota. All identified affected herds in Minnesota have been depopulated. Surveillance of free-ranging white-tailed deer continues through hunter-harvested and targeted culling sample collection. Twenty-six infected free-ranging white-tailed deer have been identified; an increase of one case since FY 2009.

Mississippi – One affected beef herd was identified through routine slaughter surveillance where lesions were detected in an aged roping steer. The herd was depopulated with Federal indemnity.

South Dakota – Two beef herds were identified as TB-affected following an epidemiological investigation of a routine slaughter surveillance detection of *M. bovis* in a domestic feeder heifer in FY 2009. The investigation determined that the heifer was from a group of approximately 200 beef heifers that were pastured in close proximity to the Nebraska captive cervid herd identified and depopulated in FY 2009. A total of five infected heifers were detected in this cohort group.

The TB strain isolated from the five heifers matches the Nebraska captive cervid strain by genotyping. The first affected herd was identified through epidemiological testing and the second herd was identified through epidemiological investigations as having purchased heifers from the index herd, one of which was found to be infected. Both herds have been depopulated with Federal indemnity.

Nebraska – One beef herd was identified as affected as a result of the South Dakota epidemiological investigation. This herd received heifers from the index South Dakota herd and TB was detected in one animal. The herd was depopulated with Federal indemnity.

Ohio – A dairy herd was identified as TB-affected as a result of movement testing during a dispersal sale. By the time TB was identified, the majority of the herd had been dispersed. Trace investigations of dispersed animals and possible source premises for this herd encompassed more than 16 States. No further infection was identified through epidemiological investigations.

Surveillance for TB in 2010

Slaughter Surveillance – Bovine TB slaughter surveillance tissue submissions exceeded the national goal in 2010. Seven TB-affected herds were detected as a result of slaughter surveillance and subsequent epidemiological investigations.

From October 1, 2009 through September 30, 2010, 10,914 granulomas were identified during postmortem slaughter inspection and submitted for diagnostic testing. These lesions originated from 157 U.S. establishments that slaughtered 31.4 million cattle, including 6.9 million adult cattle. The minimum standard for slaughter surveillance is 5 granulomas submitted per 10,000 adult cattle slaughtered annually. This standard is applied to each slaughter establishment. Many establishments substantially exceeded the minimum submission rate in FY 2010. Of the 40 highest volume adult cattle slaughter establishments, 35 (87.5 percent) met or exceeded the submission standard and 5 (12.5 percent) establishments did not. These establishments slaughtered 6.7 million cattle, which is 95.5 percent of all adult cattle slaughtered in the United States.

Of the 10,914 granulomas submitted by slaughter establishments in FY 2010, 17 (0.2 percent) had histology consistent with mycobacteriosis. Of these 17 cases, TB was confirmed in 8 cattle. TB is confirmed by a combination of polymerase chain reaction (PCR) testing of formalin-fixed tissue and culture of fresh tissue.

Slaughter Cases and Affected Herds

Cattle Slaughter Cases – Of the eight TB cases detected in cattle at slaughter during FY 2010, two cases occurred in adult cattle over 2 years of age and six cases occurred in feeder cattle. The

two adult cattle cases include an adult beef cow that led to detection of an affected Kentucky beef herd and an adult Holstein cow that led to detection of an affected Colorado dairy.

Six TB cases were detected in fed cattle at slaughter during FY 2010. These cattle were all beef-type cattle from Texas (three cases), Indiana/Ohio (two cases), and Mississippi (one case). Of the three Texas cases, one animal had official Mexican ear tags collected at slaughter indicating that the animal originated from the State of Coahuila. The two other Texas cases originated from Mexico but the definitive Mexican State-of-origin could not be determined. The Mississippi case occurred in an aged roping steer and the epidemiologic investigation identified TB in an adult beef cow in the herd. The investigation is ongoing for two domestic steer cases that trace back to Indiana.

Mexican-Origin Slaughter Cases – Slaughter surveillance in 2010 detected only one Mexican-origin fed cattle case with official Mexican identification—the lowest number ever recorded. This represents a continued decrease in Mexican-origin TB cases compared to FY 2006 (26), FY 2007 (17), FY 2008 (11), and FY 2009 (3). During the 2008–2009 import cycles, there were 827,739 and 810,985 animals imported, respectively. This represents approximately a 30 percent decrease from the 1.1 to 1.4 million imports per year during 2004–2007. However, the decrease in imported cattle is substantially less and does not fully explain the decrease in the observed rate of TB cases in Mexican-origin cattle. Other factors may be contributing to the decrease in TB cases.

Live Animal Testing – Tuberculin skin testing in live animals is the second component of national TB surveillance. In FY 2010, 1,275,815 caudal fold tuberculin tests of cattle and bison were reported, with 18,217 responders (1.4 percent, 48 States, Puerto Rico, and the U.S. Virgin Islands reporting). The response fraction by State, for 46 States testing more than 300 animals, ranged from 0.1 to 6.8 percent (1.0 percent median). Caudal fold test performance appears to be improving. During FY 2008 through FY 2010, 13, 24, and 23 States, respectively, had a response fraction of 1 percent or greater. The number of States with a response fraction of less than 0.25 percent was 13, 12, and 5 from FY 2008 through FY 2010, respectively.

Tuberculin testing is the primary means of surveillance for TB in captive cervids as there are no standards for granuloma submissions for establishments that slaughter cervids. During FY 2010, 11,029 single-cervical tests were conducted in captive cervid species with 182 suspects (1.7 percent) reported to APHIS. The number of captive cervids tested annually has ranged from 25,000 in FY 2006 to just over 10,000 in FY 2007.

The gamma interferon test has been available as an official supplemental test in the TB program since 2005. Laboratories in four States (California, Michigan, Nevada, and Texas) and the NVSL are approved to conduct gamma interferon testing. A total of 13,314 tests were conducted in cattle in FY 2010.

Program Updates

In October 2009, APHIS published a concept paper in the *Federal Register* entitled "A New Approach for Managing Bovine Tuberculosis" that outlined proposed changes to the TB program. The potential changes represent a new approach to managing bovine TB in the United States that will:

- Mitigate the introduction of TB into the U.S. national herd
- Enhance TB surveillance
- Increase options for managing TB-affected animals and herds
- Modernize the regulatory framework, and
- Transition the TB program from a State classification system to a science-based zoning approach.

APHIS will amend its TB regulations to align them with the new approach. However, because the rulemaking process can be lengthy, APHIS has implemented several interim measures in FY 2010 to mitigate disease spread while addressing the most urgently needed changes.

New Policy for Management of TB-Affected Herds – During FY 2010, APHIS continued to alter its approach to the management of TB-affected herds. Historically, Federal funding was used to depopulate entire TB-affected herds and indemnify herd owners as the primary management option. Rather than recommending whole-herd depopulation, we will base our approach on the circumstances surrounding each herd. Whole-herd depopulation will be implemented when the data indicates that other options will not mitigate disease spread, an imminent public or animal health risk exists, or it is financially beneficial to do so. Otherwise, APHIS proposes to manage specific TB-affected herds under a test-and-remove policy in which animals on an affected farm are placed under quarantine and repeatedly tested for TB. The herd will be released from quarantine when there is a high level of confidence that the herd is free of the disease.

To assist in making these decisions and managing TB-affected herds, APHIS developed an epidemiological model. The model estimates the probability of a TB-affected herd being free of infection after implementing a defined herd testing protocol. The model also incorporates specific factors associated with the herd and information about the accuracy of currently approved tests for TB. APHIS is developing updated guidance for classifying and managing livestock herds affected with TB in light of this new policy.

TB Federal Order

On April 15, 2010, APHIS issued a Federal Order to initiate other urgent changes. Through the Federal Order, APHIS suspended its enforcement of title 9 of the *Code of Federal Regulations* (9 CFR) 77.7(c) in AF zones and States, and 9 CFR 77.10 for MAA zones and States. All other existing requirements continue to be enforced. The Federal Order resulted in the following changes to the TB program:

- APHIS will not downgrade an AF State or zone, or any part of that State or zone, where TB-affected herds are confirmed, as long as the State or zone meets certain criteria for controlling the disease
- Cattle and bison that are not known to be infected with or exposed to TB may be moved interstate from MAA States or zones without restriction for TB
- The APHIS Administrator may require increased surveillance within all or part of a State or zone or restrict the interstate movement of cattle and bison from all or part of a State or zone, when necessary.

Joint TB and Brucellosis Regulatory Working Group – The development of the proposed TB regulation is expected to take approximately 2 years. It will require ongoing engagement with a wide group of internal and external stakeholders to obtain input on the proposed strategies, program standards, surveillance plans, and other policy concepts before proposed regulations can be published. Because the bovine brucellosis program is undergoing similar changes, APHIS has formed a joint working group to discuss overarching regulatory concepts for the TB and brucellosis programs. The working group is composed of State, Federal, and Tribal subject matter experts.

TB Serum Bank – APHIS' goal of obtaining 250 well-characterized samples from TB-infected cattle was exceeded in FY 2010. As a result of successful collaborations with Mexico and the United Kingdom, the TB serum bank received 307 samples from TB-infected cattle in these countries with an additional 111 samples collected from U.S. animals. The serum bank provides well-characterized serum samples with skin test results for samples from uninfected animals and skin test, histopathology, and TB culture results for samples from infected animals. The serum bank samples will be available to researchers and diagnostic companies as they develop and evaluate serologic tests for bovine TB using the criteria recommended by the United States Animal Health Association. In addition, large volume samples were collected from 1,044 uninfected cattle and 486 uninfected white-tailed deer in FY 2009 through FY 2010.

The serum bank will continue to accept blood and tissue samples from potentially infected cattle and white-tailed deer and blood samples from presumably uninfected cattle and white-tailed deer from AF States.

Collaborations with Mexico – APHIS continues to work with Mexico animal health authorities to help advance the country's TB eradication program and to significantly reduce the risk of importing TB-infected and -exposed animals into the United States. To achieve equivalency between the two countries' requirements, reviews were conducted in Aguascalientes, Chihuahua, Chiapas, Campeche, and Zacatecas during FY 2010. The review teams examined TB program integrity, progress, and the level of prevalence in the State or zone under review. Also in FY 2010, the MA zone of Coahuila was downgraded from MA to accredited preparatory status effective August 1, 2010. This action was taken as TB continued to be found in imported cattle from Coahuila and exceeded the allowable standard.

Poultry

Avian Influenza Surveillance

The APHIS Avian Influenza (AI) Surveillance Program addresses the large-volume commercial poultry industry; small-volume, high-value commercial poultry industry; live-bird marketing system (LBMS); and backyard poultry flocks. The program also includes nonpoultry avian populations, including wild, migratory birds and zoo or exhibition birds. Information about the National AI Surveillance Plan is available on the APHIS Web site at www.aphis.usda.gov/vs/nahss/poultry/ai/avian_influenza_surveillance_plan_062907.pdf.

Commercial Industry Program – In FY 2010, more than 2.08 million[2,3] tests were performed as part of the National Poultry Improvement Plan (NPIP) surveillance program. All detected presumptive-positive specimens were submitted to NVSL for confirmatory virus isolation, subtyping, and pathogenicity testing. During FY 2010, no detections of notifiable low pathogenicity avian influenza (LPNAI) in commercial poultry were reported to the World Organization for Animal Health (OIE). Pandemic H1N1 (pH1N1) was detected in commercial turkeys in Virginia and California. In Virginia, 6 flocks infected with pH1N1 experienced a significant drops in egg production (10 to 68 percent) following insemination, but no other clinical symptoms or morbidity were present. Sequence analysis for the hemagglutinin (HA), neuraminidase (NA), and matrix (M) genes was conducted. The Virginia detection is the first confirmed case of pH1N1 influenza virus infection in a commercial turkey breeder flock in the United States following presumptive human-to-turkey transmission. The detection in California represented multiple flocks. Sequence analysis was conducted on the HA, NA and M genes.

Live-Bird Marketing System Program – As part of the LBMS, 169,963 tests[2] were performed during FY 2010. All presumptive-positive specimens detected at the State level were submitted to the NVSL for confirmatory virus isolation, subtyping, and pathogenicity testing. As part of the

[2] Not all States had completed reporting for FY 2010 testing at the time of writing.
[3] Represents tests performed in State-affiliated labs from States that receive NPIP cooperative funding for AI. Additional NPIP testing that occurs at private or industry laboratories is not reported in this document.

ongoing LBMS surveillance for presence of avian influenza virus (AIV), NVSL tested 4,283 specimens in 624 submissions from 10 States (California, Connecticut, Florida, Massachusetts, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, and Texas,) by virus isolation in embryonating chicken eggs. One detection of LPNAI H5N2 was isolated from a Muscovy duck in Pennsylvania. Nineteen other LPAI subtypes were isolated; seven H6N8 isolations (six from Florida and one from Pennsylvania); four H3N1 isolations from Pennsylvania; one H6N4 isolation from New Jersey; two H4N6 isolations from Pennsylvania; two H6N2 isolations from Ohio and Texas; and three H10N2 isolations from Florida. Also, an AIV subtype H7N3 was isolated from specimens received from a hunter preserve breeding farm in New Jersey. This flock was raised for on-premises hunting (no meat consumption) and was not linked or related to any commercial poultry operations or the LBMS. This farm raises 160,000 birds annually. The H5 and H7 AI viruses were shown to be LPAIV by the chicken pathogenicity test or the deduced amino acid profile at the hemagglutinin cleavage site.

AIV Surveillance in Wild Birds – In FY 2010, surveillance for highly pathogenic notifiable avian influenza (HPNAI) H5N1 continued through investigation of morbidity and mortality events in wild birds as well as testing of apparently healthy wild migratory birds in all 50 States. The surveillance is a cooperative effort between APHIS Wildlife Services National Wildlife Disease Program in Fort Collins, Colorado, State wildlife agencies, Tribal cooperators, the Department of Interior, and others involved in monitoring the AIV reservoir in wild birds.

NVSL performs the confirmatory testing for all wild bird samples, while the National Animal Health Laboratory Network (NAHLN) and the Department of Interior's U.S. Geological Survey screen samples by real-time reverse transcriptase - polymerase chain reaction (rRT-PCR) for AIV-specific RNA, including the matrix gene and H5/H7 subtypes. All presumptive H5- and H7-positive specimens were submitted to NVSL for confirmation and virus isolation. For the 2010 wild bird surveillance biological year, 897 presumptive positive specimens were received for confirmation testing. No HPNAI H5N1 was detected; however, LPAI H5N1 virus was detected in specimens submitted from Maryland, Ohio, and Wisconsin. A total of 61 H5 viruses (various N subtypes) from 18 States and 44 H7 viruses (various N subtypes) from 15 States were isolated. All H5 and H7 AIVs were characterized as LPAI viruses of North American lineage. Other AIV subtypes isolated included H1, H2, H3, H4, H6, H10, and H11.

Additional information on wild bird surveillance is available on the APHIS Web site at http://www.aphis.usda.gov/wildlife_damage/nwdp/AI.shtml.

Sheep and Goats

Scrapie in Sheep and Goats

APHIS accelerated its efforts to eradicate classical scrapie in FY 2002 by adopting regulations requiring the official identification of sheep and goats and by implementing slaughter surveillance in 2003. As a result, the percentage of black-face sheep and the percentage of white- or mottled-face sheep found scrapie-positive at slaughter decreased by 90 and 87 percent respectively between 2003 and 2010. In FY 2010, the percentage of black-face sheep found positive at slaughter was 0.09 percent and the percentage of white or mottled-face sheep found positive was 0.01 percent.

Surveillance – The Regulatory Scrapie Slaughter Surveillance (RSSS) program, initiated on April 1, 2003, 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 targeted populations include:

- All mature black-face sheep
- White- or mottled-face sheep 2 to 5 years of age
- Any mature sheep or goat that:
    - Dies prior to slaughter
    - Is condemned on antemortem inspection
    - Has a combination of clinical signs consistent with scrapie, such as central nervous system signs, poor body condition in an animal with good dentition, or wool loss and thickened, hyperpigmented or abraded skin consistent with chronic rubbing

Mature is defined as having at least one permanent incisor completely erupted, corresponding to an age of at least 12 months.

As part of the RSSS program in 2010, 45,590 sheep and goat samples, collected from 155 sites in 36 States, were tested for scrapie using immunohistochemistry testing procedures on brain or lymph node specimens. These tests identified 24 scrapie-positive animals (table 3.3), 4 of which were Nor98-like cases

Table 3.3: Scrapie cases[1], FY 2003–2010

	Number of Cases by Fiscal Year[2]							
Test or Examination	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Field necropsy[3]	315	374	461	243	251 (2)	128	35	51 (1)
Regulatory live animal[4]	32	20	31	37	19	6	6	1
RSSS[5]								
	23[6]	85	105	70	57 (2)	41 (1)	37	20 (4)
Total	**370**	**479**	**597**	**350**	**327(4)**	**175 (1)**	**78**	**72 (5)**

[1]Classical cases and Nor98-like cases – Nor98-like case are shown in ( )
[2]Fiscal years run from October 1 to September 30.
[3]Includes necropsy validations.
[4]Third eyelids and rectal biopsies; includes test validations.
[5]RSSS = Regulatory Scrapie Slaughter Surveillance.
[6]Includes only part of FY 2003 (April 1 to September 30, 2003).

Identification and Management of Infected and Source Flocks — Under the scrapie eradication program, any animal that NVSL confirms as positive is traced back to its flock-of-origin and, if different, the flock in which it was born, and any other flock in which it might have lambed. The flocks in which the animal lambed and the flock-of-birth are designated as infected and source flocks, respectively. Infected and source flocks are placed under movement restrictions until a flock cleanup plan has been completed.

In 2010, investigations of RSSS-positive cases, clinical suspect animals, on-farm surveillance, and trace-outs from infected and source flocks resulted in the identification of 24 previously undetected infected or source flocks. The number of newly designated infected and source flocks has declined each year since 2005 (Table 3.4). Samples are collected from genetically

susceptible animals for scrapie testing during disease investigations and cleanup of infected and source flocks. In 2010, regulatory testing identified 53 scrapie cases; 52 from field necropsy (1 Nor98-like case) and 1 from live-animal testing (Table 3.3). A scrapie case is defined as an animal for which NVSL has made a diagnosis of scrapie using a USDA-approved test (typically immunohistochemistry testing of the obex, lymph node, or other lymphoid tissue).

Table 3.4: Newly designated infected and source flocks, FY 2003–2010

	Fiscal Year							
	2003	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Infected	61	83	108	52	30	25	12	12
Source	19	35	71	68	46	36	26	12
Total flocks	**80**	**118**	**179**	**120**	**76**	**61**	**38**	**24**

National Scrapie Surveillance Plan — Detailed information on the National Scrapie Surveillance Plan is available on the APHIS Web site at http://www.aphis.usda.gov/vs/nahss/sheep/national_scrapie_surveillance_plan_0907_2010.pdf. The plan provides a comprehensive review of scrapie surveillance in the United States, explains the basis for implementing State-of-origin sampling minimums, and establishes State-of-origin sampling minimums for FY 2011 based on breeding sheep numbers in each State adjusted for local factors that affect sampling. The plan also establishes the method for determining State-of-origin sampling minimums for goats, which are currently planned for implementation in FY 2013. Additional information is also available at http://www.aphis.usda.gov/animal_health/animal_diseases/scrapie/.

Swine

Classical Swine Fever Surveillance

The United States has been free of classical swine fever (CSF) since 1978. CSF is still endemic in many other countries in the Western Hemisphere, including Mexico, Cuba, Haiti, and the Dominican Republic. APHIS implemented a comprehensive CSF surveillance program in 2006 with the goals of rapidly detecting CSF virus in U.S. swine and mitigating the impacts of a large-scale outbreak. Surveillance is conducted through the cooperative efforts of State and Federal government agencies, Tribal authorities, producers, and private practitioners.

The CSF surveillance program focuses on testing targeted swine populations, or surveillance streams, in high-risk States. High-risk States are defined as those with garbage-feeding operations, backyard swine operations, feral swine hunting clubs, military bases, international airports or seaports, and corporations engaging in international movement of swine. CSF risk is higher in areas with greater numbers of swine and increased swine imports. Additionally, farming operations using immigrant labor, particularly from countries where CSF is endemic, may pose a risk because of laborers who might illegally bring contaminated swine products to their workplaces in the United States.

Surveillance populations include:

- Sick pigs submitted to veterinary diagnostic laboratories
- High-risk slaughter swine (condemnations and "poor doers" in slaughter channels)
- Feral swine
- High-risk swine populations, including waste-feeding operations and high-risk herds in Florida, Texas, and Puerto Rico
- Swine undergoing foreign animal disease (FAD) investigations submitted to the VS Foreign Animal Disease Diagnostic Laboratory (FADDL) as suspicious for CSF.

In 2010, 24 NAHLN laboratories and the FADDL conducted CSF surveillance testing on 14,666 specimens (table 3.5). All specimens were confirmed negative. Additional information about the CSF surveillance program is available on the NAHSS Web site at www.aphis.usda.gov/vs/nahss/swine/csf/index.htm.

Table 3.5: Classical swine fever testing for FY 2010

Surveillance Stream	Number of Tested Specimens
Sick pigs submitted to veterinary diagnostic laboratories	3,431
High-risk slaughter swine	2,753
Feral swine collected by APHIS in 32 States	2,560
Swine from high-risk herds (waste-feeders and high-risk populations in Florida, Texas, and Puerto Rico)	5,922
Total	**14,666**
Swine FAD investigations tested for CSF	14

Swine Influenza Virus Surveillance

Swine influenza virus (SIV) is commonly found in U.S. swine herds, often presenting as respiratory infection. Swine influenza is controlled primarily through biosecurity measures and vaccination programs. Similar to other influenza A viruses, SIV has the potential to mutate rapidly or exchange genetic material (reassort) with other influenza viruses, including influenza viruses of birds and humans. As a result, new SIV genotypes are generated. Some of these new "reassortant" genotypes may contain genetic material from human, bird, and pig viruses. Reassortants may increase the severity of disease in pigs or enhance the virus' ability to move between animals and humans, or both.

Determining which SIV subtypes are currently circulating in pig populations is a challenge for vaccine manufacturers, diagnostic laboratories, and swine producers. The number of subtypes and genotypes now circulating among U.S. swine herds has reduced the effectiveness of SIV vaccination programs and the ability of diagnostic laboratories to rapidly identify the problem. This has increased economic losses for producers and increased the need for rapidly updated, effective vaccines and diagnostic reagents produced from current circulating genotypes of the virus.

SIV can be directly transmitted from humans to pigs and vice versa (although this is not common) however, pork and pork products have not been shown to be a source of infection. While swine infections with SIV are not notifiable diseases to the OIE, human infection with novel influenza A viruses is designated as a nationally notifiable condition in the United States. Typically, a few human SIV cases are reported to the Centers for Disease Control and Prevention (CDC) each year.

To better understand the epidemiology and ecology of influenza in swine and the epidemiology of human SIV infections, a project establishing a pilot program for SIV surveillance in swine and investigation of human SIV cases was initiated in 2008. The interagency project involves APHIS, the USDA Agricultural Research Service's National Center for Animal Disease, and the CDC's National Center for Immunization and Respiratory Diseases Influenza Division. The project was designed to investigate the incidence and distribution of different SIV strains in swine populations, identify and research novel swine isolates, and investigate cases of human SIV infection.

Additionally, the project developed a system for Federal agencies to share isolates for developing diagnostic reagents and vaccines for animals and humans. In 2009, as this system was getting started, pandemic H1N1 influenza was discovered in humans in the United States. With this discovery, the project quickly converted to the development of a broader swine influenza surveillance project that initially focused on determining if the pandemic H1N1 was present in

U.S. swine populations. The diagnostic laboratory component of this surveillance project was quickly established and samples from volunteered case-compatible diagnostic cases were screened for pandemic H1N1. In 2010, through the swine influenza surveillance project, pandemic H1N1 was found in 20 herds in 6 States.

Pseudorabies Surveillance

The National Pseudorabies Virus (PRV) Surveillance Plan[4] is designed to rapidly detect the introduction of PRV into commercial swine. APHIS revised the surveillance plan in 2007 and began implementation of the revised plan in 2009. Although the PRV eradication program successfully eradicated pseudorabies from commercial production swine, the disease remains in feral swine and domestic swine herds that are exposed to feral swine. Populations and distribution of feral swine continue to expand in the United States; therefore, if PRV were to be reintroduced into commercial swine, the most likely sources would be feral swine, hunting clubs specializing in wild swine or boars, or other infected swine.

The revised National Pseudorabies Surveillance Plan has three objectives:

- Rapid detection
- Demonstration of freedom from PRV
- Monitoring of international or domestic sources of PRV

To meet these objectives, samples are collected from specifically targeted swine populations or "sampling streams." For the rapid detection objective, sample collection focuses on suspicious PRV cases, sick pigs submitted to diagnostic laboratories, serology samples submitted to diagnostic laboratories for herd profiling, feral swine, and domestic herds classified as high risk due to feral swine exposure.

To demonstrate freedom from PRV, testing targets culled sows and boars at slaughter and meat juice from market hogs at slaughter. The monitoring of international and domestic sources of PRV focus on disease in the feral swine reservoir and overall population expansion, the number and distribution of swine hunting preserves, and the international PRV status.

With full implementation of the PRV surveillance plan targeted for FY 2012, APHIS is continuing its efforts to implement the plan in stages. In FY 10 APHIS tested more than 14,500 samples for PRV in NAHLN laboratories. APHIS plans to continue to expand this surveillance activity to assist with rapid detection. APHIS is also preparing to update the existing regulatory structure to allow greater flexibility. When the regulations are final, the modifications will combine pseudorabies and swine brucellosis regulations into one section dedicated to the requirements for interstate movement of swine

[4] www.aphis.usda.gov/vs/nahss/swine/prv/prv_surveillance_plan_final_draft_04_16_08.pdf

Brucellosis

The swine brucellosis eradication program is administered, supervised, and funded through cooperative efforts between State and Federal animal health regulatory agencies. The program guidelines are described in the Swine Brucellosis Control/Eradication State-Federal-Industry Uniform Methods and Rules[5] (SB UM&R). The SB UM&R was developed by using expert advice from State, Federal, and industry advisory committees.

Similar to the pseudorabies program, the swine brucellosis eradication program recognizes feral swine as an infected reservoir that could infect the commercial swine herd. Swine brucellosis, caused by *Brucella suis*, is commonly found in feral swine and may be found in domestic herds that are allowed direct or indirect exposure to feral swine.

Surveillance for swine brucellosis eradication continues through sampling of cull sows and boars and monitoring of feral swine populations. The *Code of Federal Regulations* requires States that have reached stage III of the eradication process (States thought to be free of swine brucellosis) to sample at least 5 percent of their breeding population through market surveillance yearly.

Status – In FY 2010, no commercial production swine herds were found to be infected with swine brucellosis. However, brucellosis was identified in three high-risk herds and these herds were depopulated. Epidemiological investigations of the brucellosis-positive herds indicated that infection had not spread to commercial herds. Feral swine remain a reservoir of brucellosis; therefore, biosecurity measures remain vital in preventing or minimizing contact with feral swine.

APHIS' National Surveillance Unit plans to develop a new swine brucellosis surveillance plan. This plan will likely contain many of the same principles and sampling streams as the pseudorabies surveillance plan because feral swine are recognized as the disease reservoir for both swine brucellosis and pseudorabies. The new swine brucellosis surveillance will be incorporated into a comprehensive swine surveillance system.

Trichinae

With modern pork-production systems essentially eliminating trichinae as a food safety risk, pilot programs were established by USDA to explore alternatives to individual carcass testing to demonstrate that pork is free of *Trichinella* spp. Initiated as a pilot program in 1997, the voluntary U.S. Trichinae Certification Program (USTCP) became an official USDA program in October 2008, with publication of the regulations in title 9 of the *Code of Federal Regulations*, part 149.

[5] www.aphis.usda.gov/animal_health/animal_dis_spec/swine/downloads/sbruumr.pdf

The USTCP is based on scientific knowledge of *Trichinella* spp. epidemiology and the results from numerous studies demonstrating that specific "good production practices" can prevent swine 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.[6]

Three USDA agencies—APHIS, the Food Safety and Inspection Service (FSIS), and the Agricultural Marketing Service (AMS)—collaborate to certify pork production sites as free from trichinae, and to verify that certified sites manage and produce pigs according to the requirements of the program's "good production practices." USDA also verifies the identity of pork from certified production units through slaughter and processing. Production sites participating in the USTCP may be certified as "trichinae safe" if they follow sanctioned production practices.

During the pilot study, objective measures for good production practices were developed through review of production records and inspection of production sites. An objective audit procedure, based on risk factors related to swine exposure to *Trichinella,* was developed for on-farm production practices. The audit procedure includes reviewing practices associated with farm management, biosecurity, feed and feed storage, rodent control programs, and general hygiene.

Production site audits are performed by veterinarians trained in auditing procedures, *Trichinella* risk-factor identification, and *Trichinella* good production practices. Program sites are audited on a regular status-determined schedule as established by regulations and official standards of the USTCP.

USDA manages the auditing process by qualifying, training, and overseeing program auditors and by conducting random spot audits. Spot audits performed by USDA personnel verify that the program's good production practices are maintained between scheduled audits and ensure that the audit process is conducted with integrity and consistency across the program.

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

[6] Gamble H, Bessonov A, Cuperlovic K, Gajadhar A, Van Knapen F, Noeckler K, Schenone H, Zhu X. 2000. International Commission on Trichinellosis: Recommendations on Methods for the Control of *Trichinella* in Domestic and Wild Animals Intended for Human Consumption. *Vet Parasitol* 93, 393–408.

Status — All farms in good standing in the pilot program were grandfathered into the official program at its onset. From 2000 to 2010, more than 500 audits were completed on swine production farms. The results from a great majority of these audits found compliance with good production practices as defined in the program. Compliant sites were granted status as "enrolled" or "certified" in the program. At the end of 2010, there were 42 Stage III certified sites in the program.

Efforts now focus on promoting and implementing the program throughout the U.S. pork industry and establishing the program as a way to ensure the *Trichinella*-safe status of fresh pork. The on-farm 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 developing other on-farm quality and safety initiatives.

Swine Health Protection Inspection Program

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. Facilities that treat waste must possess a valid permit issued by APHIS or by the chief agricultural or animal health official of the State. Licensed facilities must follow the regulations on the handling and treatment of food waste, facility standards (rodent control, equipment disinfection), cooking standards, and recordkeeping. Licensed operations also are required to allow Federal and State inspections.

Status – In 2010, 27 States and Puerto Rico allowed feeding food waste to swine and issued or renewed permits to operate garbage-treatment facilities. There were 1,405 licensed food-waste cooking and feeding premises (feeders) as of FY 2010 (table 3.6), and 7,462 routine inspections were conducted at these licensed premises during the year. Ensuring that all food-waste feeders are properly licensed is crucial because of the potential for incursions of foreign animal diseases (FAD). Field personnel conducted 25,032 searches for nonlicensed food-waste feeders. Through these efforts, 142 nonlicensed feeders were found; most of which subsequently became licensed and subject to routine inspections.

Table 3.6: Statistics on licensing of facilities feeding food waste to swine, FY 2007–2010

	Fiscal Year			
Number	**2007**	**2008**	**2009**	**2010**
States allowing food-waste feeding*	29	27	27	27
Licensed premises	1,951	2,783	1,452	1,405
Routine inspections	9,562	8,183	8,285	7,462
Searches for nonlicensed feeders	39,107	36,729	27,680	25,032
Nonlicensed feeders found	87	96	91	142

*Puerto Rico also allowed food-waste feeding.