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, 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 (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; and APHIS is developing an ISA proposed rule to reduce the chances of unintentionally reintroducing the virus through trade.

Table 3.1: Infectious salmon anemia testing

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

Viral Hemorrhagic Septicemia

Viral hemorrhagic septicemia (VHS) is 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. A 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/.../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 currently localized to the area regulated by the Federal Order, baseline surveillance outside this region to date 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 the Great Lakes States. Consequently, the 2009 VHSV Surveillance Report encourages all States to support any or all of the following activities: (1) regulatory and public education actions to reduce the potential for anthropogenic introductions; (2) fish health infrastructure development to support passive surveillance and early detection; and (3) structured active surveillance in regions where baseline assessment is incomplete or where introduction risks (e.g., those associated with location) are difficult or impossible to mitigate.

In FY 2009, Congress appropriated $4.6 million for VHS activities. APHIS used $2.4 million of the appropriated funds to offer cooperative agreements with State agencies and Tribal groups to continue surveillance of farmed and wild populations at locations with the greatest risk of acquiring the disease. Additionally, APHIS developed an outreach campaign to educate the public about potential pathogen vectors not easily controlled by regulatory actions, such as activities related to recreational fishing.

National Aquatic Animal Health Plan (NAAHP)

In August 2009, the NAAHP was made available for public comment in the *Federal Register*. The NAAHP is a collaborative effort between APHIS, the U.S. Fish and Wildlife Service, and the National Oceanic and Atmospheric Administration. The Plan is intended to be a road map to guide these three Federal agencies, in partnership with States, Tribes, and other stakeholders, in efforts to improve the health of wild and cultured aquatic animal populations in the United States. Three primary recommendations of the NAAHP are currently being considered and developed: (1) establish a Federal Advisory Committee under the auspices of USDA; (2) establish a national aquatic animal health laboratory network; and (3) develop an application suite to facilitate the safe international and interstate trade of aquatic animals. (This has been more commonly, but inaccurately, referred to and understood as an information technology database.)

Expanded Aquaculture Reporting in National Animal Health Reporting System

In 2009, the National Animal Health Reporting System (NAHRS) Reportable Disease List was expanded to include all OIE-notifiable aquaculture diseases of fish, mollusks, and crustaceans. The list increased from 5 fish diseases to more than 25 diseases of fish, mollusks, and crustaceans. The NAHRS Aquaculture Working Group is defining NAHRS reporting criteria and continuing to develop and improve national summary-level aquaculture disease reporting through the secure NAHRS Web-based reporting tool.

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 2009, APHIS met its goal of testing 40,000 samples for BSE. The primary purposes of 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 Changes—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.
APHIS submitted a dossier to the OIE requesting that the United States be moved from the OIE "controlled-risk" to "negligible-risk" category. A decision is expected in late 2009.

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—FY 2009 marks a new milestone for the bovine brucellosis program—zero prevalence in U.S. domestic cattle herds. With the most recent official classification of a brucellosis-affected cattle herd in June 2008, the United States has officially completed a 12 consecutive-month period without the disclosure of any additional brucellosis-affected cattle herds. As of July 10, 2009, all 50 States, Puerto Rico, and the Virgin Islands were designated Class- Free for bovine brucellosis.

No new brucellosis-affected cattle herds were disclosed in 2009. Montana was officially reclassified to Brucellosis Class Free State status on July 10, 2009, after completing a 12 consecutive-month period without discovery of additional brucellosis-affected cattle herds. Montana also met all requirements for Class-Free State status as detailed in the regulations and confirmed by a pre-Class-Free program review conducted in April 2009. Both Louisiana and Wyoming (having found a single brucellosis-affected cattle herd in FY 2008) continued to conduct vigilant surveillance and maintained compliance with established herd plans, thereby meeting all requirements to maintain their Brucellosis Class-Free State status throughout 2009.

Two primary surveillance activities are conducted for bovine brucellosis: Market Cattle Identification (MCI) testing and Brucellosis Milk Surveillance Testing (BMST). During 2009, APHIS tested approximately 6.881 million head of cattle under the MCI surveillance program; approximately 345 MCI tests yielded preliminary suspicious test results. Epidemiological investigations conducted on the 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 120,000 BMSTs were conducted on 58,370 commercial dairy herds in 2009; approximately 158 of those BMSTs yielded suspicious results on initial testing. Epidemiological investigations conducted on the suspicious BMSTs confirmed all dairy herds were negative for brucellosis. Approximately 552,462 additional head of cattle were tested on-farm; primarily for movement and sale, epidemiological investigation, and herd certification and exhibition purposes. There were approximately 3.746 million calves vaccinated for brucellosis in 2009 and approximately 2,285 brucellosis certified-free cattle herds.

Although a zero brucellosis prevalence was obtained for U.S. domestic cattle herds in 2009, the disease is still present in certain 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. Throughout 2009, significant efforts and activities, including those described below, addressed the unique brucellosis situation in the GYA and the States of Idaho, Montana, and Wyoming.

- Through the Greater Yellowstone Interagency Brucellosis Committee (GYIBC) cooperative agreement, the Idaho State Department of Agriculture (ISDA) received $191,250 for the management of brucellosis activities and planning efforts. These activities included developing and implementing brucellosis action plans for cattle herds and elk herd units, ensuring environmental compliance, and providing education and information to the public. ISDA has 62 beef cattle herds and 15 dairy herds on herd plans in its special focus area. The beef herd plans detail whole-herd testing on a 3-year rotational basis, while the dairy herds undergo ring testing four times per year. In the recent reporting period, adults in five cattle herds were vaccinated as part of their herd plans. With these funds, the ISDA made progress in identifying the prevalence and distribution of brucellosis in Idaho elk herds and in reducing this prevalence. ISDA and the Idaho Fish and Game (IDFG) trapped and tested 106 elk as part of an overall elk surveillance program that gathers serum samples from elk obtained by hunters. Additionally, the agencies eliminated elk feeding (except in emergency situations), reduced the potential for wildlife-to-cattle transmission, enhanced brucellosis preventive and surveillance measures in cattle, and provided the public with information and opportunities for participation.
- The Montana Department of Livestock (MDOL) received $660,000 in cooperative agreement money to restore and maintain Montana's Class-Free brucellosis State status. MDOL tested 2,196 cattle, vaccinated 12 herds, and engaged in 33 herd plans in the aftermath of finding the State's first infected herd. Montana regained its Class-Free status in July 2009. Funded by cooperative agreement money, Montana will continue efforts to maintain Class-Free status through herd plans, vaccination, risk assessments, and mitigation of the risk of transmission from wild ungulates. Funds were also directed toward fulfilling the State's obligations as part of the Interagency Bison Management Plan (IBMP) to prevent the transmission of brucellosis from bison to cattle, while preserving a viable wild bison population and protecting private property. MDOL maintained temporal and spatial separation between bison and cattle by performing 37 hazing operations and sending 3 bison to slaughter, while managing bison in accordance with the herd management population target.
- MDOL received an additional $191,280 in funds through the GYIBC cooperative agreement. This money was directed through Montana Fish, Wildlife and Parks

(MTFWP) toward elk surveillance to determine the distribution of brucellosis to assess brucellosis-related risks to cattle. A total of 1,335 elk serum samples and 183 elk tissue sets were gathered under this surveillance effort. Through MTFWP, a fraction of the money was used to fund a portion of the Bison Quarantine Feasibility Study (BQFS). The BQFS is a partnership with APHIS to investigate the possibility of producing brucellosis-free Yellowstone bison as part of a broader bison conservation initiative. Eighty-eight bison from the first cohort are now available for translocation to an appropriate site. The balance of the funds supported activities by contract veterinarians and other specialists engaged in surveillance, education, and herd plan development. As a precursor to herd plans, contract personnel have evaluated 670 risk surveys.

- Through their GYIBC cooperative agreement, the Wyoming Game and Fish Department (WGFD) and the Wyoming Livestock Sanitary Board (WLSB) received $191,279 to prevent brucellosis in Wyoming cattle, to mitigate the spread of brucellosis in cattle and elk, and to reduce the prevalence of the disease in elk and bison. Funds were also directed to enhance the education of stakeholders about brucellosis and to improve communication and coordination between State and Federal agencies. Toward these goals, the funds maintained a brucellosis field office with its requisite support personnel, programs, travel, and equipment. WLSB personnel participated in more than 100 meetings and conference calls to educate stakeholders about brucellosis. Monies also funded WGFD travel and a critical study to evaluate the effects of Strain 19 vaccination on the elk feeding grounds. This study is ongoing.
- WGFD received $120,000 in cooperative agreement funds directed toward preventing commingling of elk and cattle during potential transmission periods, continuing brucellosis surveillance in feeding ground elk, and reducing the rate of abortion in feeding ground elk due to brucellosis. Toward these goals, 54 elk were fitted with GPS collars and 4 elk units were targeted for hunter surveillance. An additional goal of reducing the incidence of the disease over time through ballistic vaccination with Strain 19 involved vaccinating 3,620 elk. These projects work to prevent the transmission of the disease between species and are consistent with APHIS' goals of eradicating bovine brucellosis by eliminating a source of the disease.
- The Wyoming State Veterinary Laboratory received $65,000 in cooperative agreement funds to provide the laboratory support and record keeping services required for the Brucellosis and Pseudorabies Eradication Programs. The laboratory used these funds to perform 34,987 tests for brucellosis and 1,787 tests for pseudorabies. These tests aided in diagnosing the diseases, tracing the diseases to their source, and removing affected animals.

A portion of FY 2009 funds will support continuation of the following ongoing efforts and activities in FY 2010:

- IDFG received $120,000 to create an effective mechanism for making scientific information accessible in a timely manner to all parties dealing with the brucellosis issue. The department has undertaken efforts to increase awareness and knowledge of brucellosis by organizing training sessions and other events and distributing information about brucellosis to stakeholders. A portion of the agreement money will also be used to obtain the equipment and supplies necessary for surveillance of free-ranging Idaho elk. A portion of the funds will be directed toward managing disease by reducing winter concentrations of elk, minimizing elk-cattle interactions, and obtaining information on elk numbers and movements.
- WGFD received $120,000 to identify locations of high elk calving intensity where *Brucella abortus* is likely being shed in the environment. The project will provide valuable information on the characteristics of brucellosis transmission among elk and will allow animal health authorities to make decisions about the probability of transmission to livestock. Some of the funding and the elk research data will be directed toward reducing the risk of cattle exposure from elk.
- MTFWP received $120,000 in cooperative agreement funds to determine, through surveillance, the presence and extent of different wildlife-livestock diseases in Montana wildlife. Funds will also be used to improve understanding of the temporal and spatial distribution of those wildlife populations that represent the highest risk of disease transmission and effecting management actions to minimize the impacts of disease. Funds will also be applied to mitigation measures that reduce the risk of transmission of disease among wildlife, livestock, and humans.

Program Updates—Final eradication of bovine brucellosis will not be possible unless the United States adopts new strategies to address the current challenges, including wildlife reservoirs of disease. Throughout 2009, APHIS worked with stakeholders to develop a new direction for the program that will allow APHIS and the States to apply limited resources to effectively and efficiently address this unique disease risk. APHIS developed a concept paper to describe this new direction and an action plan designed to achieve the following goals:

- Effectively demonstrate the disease-free status of the United States through a national status-based program supported by a national surveillance strategy
- Enhance efforts to mitigate disease transmission from wildlife
- Enhance disease response and control measures
- Modernize the regulatory framework to allow APHIS to address risks quickly and efficiently
- Implement a risk-based disease management area concept

This action plan will benefit Federal and State animal health officials, the regulated industries, and producers by allowing a more adaptable science-based response that is effective and timely, and addresses the unique challenges facing the brucellosis program.

On October 5, 2009, APHIS published a Notice of Availability for the concept paper in the *Federal Register*. The goal was to solicit further comment on views about the future direction of the bovine brucellosis program. APHIS evaluated comments following a 2-month comment period.

Chronic Wasting Disease

A proposed chronic wasting disease (CWD) herd-certification program for farmed cervid operations has been in process since late 2003. The program goals are to control CWD in farmed cervid herds and to assist State and Tribal wildlife agencies in addressing CWD in wild cervids. The CWD herd certification program for farmed cervids is intended to be a cooperative State-Federal-industry program.

The number of farmed cervids tested for CWD has increased steadily from approximately 12,000 in FY 2003 to more than 23,600 in FY 2009. From 1997 through 2009, CWD was identified in 36 farmed elk herds and 12 farmed white-tailed deer herds in 10 States (table 3.2). Three new farmed cervid herds were found to have animals positive for CWD in 2009.

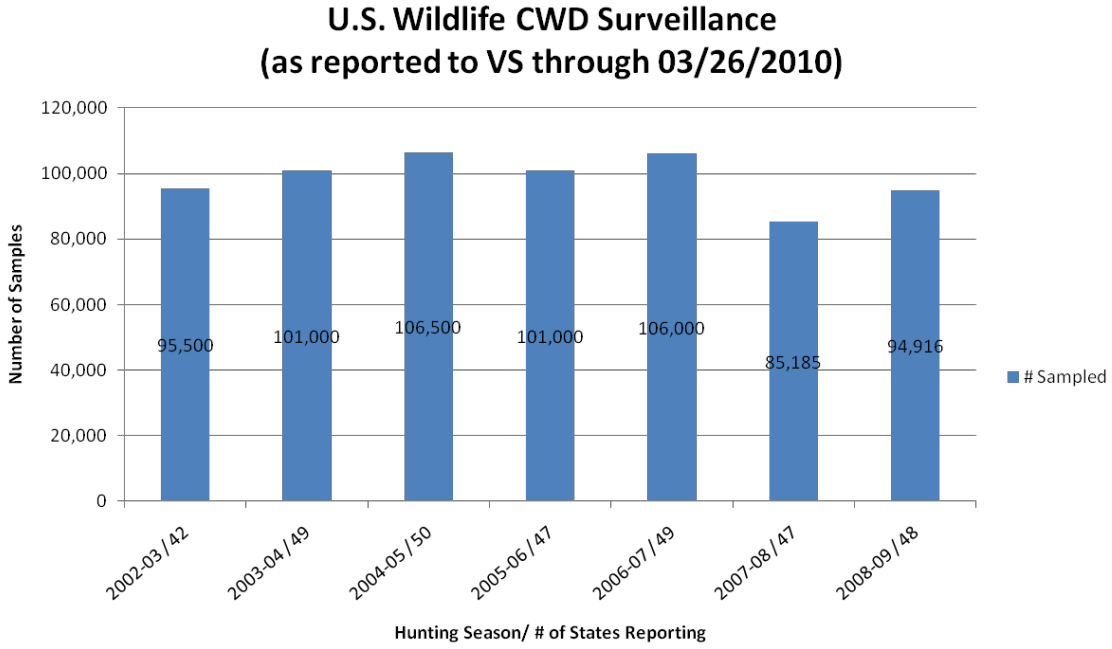
Table 3.2: Number of farmed cervid herds with animals positive for CWD by State, 1997–2009

State	1997–2008	2009	Total (1997–2009)
Colorado	15	2	17
Kansas	1		1
Michigan	1		1
Minnesota	3	1	4
Montana	1		1
Nebraska	5		5
New York	2		2
Oklahoma	1		1
South Dakota	7		7
Wisconsin	9		9
Total	**45**	**3**	**48**

Of the 48 CWD-positive herds identified as of December 31, 2009, 6 elk herds (all in Colorado) remained under State quarantine and 41 were depopulated. One herd that underwent rigorous surveillance for more than 5 years with no further evidence of disease was released from quarantine.

Since 2002, most States have been participating in CWD surveillance in free-ranging deer, elk, and more recently, moose. By December 31, 2009, 11 States had reported detecting CWD in wild cervids: Colorado, Kansas, Illinois, Nebraska, New Mexico, New York, South Dakota, Utah, West Virginia, Wisconsin, and Wyoming. From the 2002–2003 through the 2008–2009 hunting seasons, more than 85,000 hunter-killed and targeted animals were tested each season (figure 3.1). The small decline in the number of wild cervids tested in 2007–2008 and 2008–2009 may reflect the beginning of a shift from active surveillance of hunter-harvested animals to targeted surveillance of animals suspected of having CWD.

Figure 3.1: Surveillance testing of hunter-killed and targeted wildlife for CWD



Johne's Disease in Cattle

The Voluntary Bovine Johne's Disease Control Program is a cooperative effort administered by States and supported by 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—There are 5,675 herds enrolled in the Johne's Disease Control Program, with 891 herds enrolled in the test-negative component of the program (table 3.3). Herds in the test-negative component must use an approved laboratory for testing. Approved laboratories are required to

pass an annual proficiency test. For Johne’s disease testing, 78 laboratories are approved for serology, 51 are approved for MAP fecal culture, and 41 are approved for polymerase chain reaction (PCR) and DNA testing.

Table 3.3: Johne's Disease control program statistics, 2000–2009

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Herds in Johne's control programs	1,952	1,925	3,248	3,268	6,189	6,448	8,738	8,650	6,019	5,675
Johne's test-negative herds	390	514	631	543	972	1,632	1,792	1,672	1,014	891
ELISA tests performed on cattle	359,601	342,045	592,350	480,586	673,299	697,264	784,978	400,445	367,170	196,689
Cultures performed on cattle	44,961	43,218	98,094	96,222	101,786	105,685	125,336	63,392	36,669	15,291

In calendar year (CY) 2009, these laboratories reported conducting 196,689 serum enzyme-linked immunosorbent assays (ELISAs), 91,031 milk ELISAs, and 15,291 fecal cultures, in addition to 5,485 pooled fecal samples (5 bovine per pool) and 50 environmental samples. A decline in Federal funding is the primary reason that fewer serum ELISAs and fecal cultures have been performed in recent years.

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. To accomplish this, APHIS will reduce support to the national Johne's demonstration herd project to data analysis only in 2010. 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 diagnostic 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 2009, 92 TB-affected herds have been detected in the United States. This 92-herd total comprises 53 beef herds, 26 dairy herds, 2 mixed-use cattle herds, and 11 captive cervid herds.

In FY 2009, 12 TB-affected herds were identified: 3 beef herds, 2 dairy herds, and 7 captive cervid herds. While the total number of TB-affected herds identified in FY 2009 is comparable to the 11 herds identified during FY 2008, the identification of 7 TB-affected captive cervid herds is unprecedented. Only four affected captive cervid herds were identified between FY 1998 and FY 2008. TB isolates from two FY 2009 TB cattle cases were determined through genotyping to match strains isolated from captive cervid cases from the 1990s.

Of the TB-affected herds found during FY 2009, two beef herds and five captive cervid herds were depopulated with Federal indemnity. One beef herd in Nebraska and two dairy herds in Texas and California detected in FY 2009 were not depopulated and are under test-and-remove herd plans. Two captive cervid herds in Michigan remain under quarantine.

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

At the end of FY 2009, 46 States and territories and 2 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. Michigan had AF, MAA, and modified-accredited (MA) status. Minnesota was recognized as having MAA and MA status in October 2009. New Mexico again gained split-State status as AF and MAA. Of the AF States and zones, 20 States and the U.S. Virgin Islands have maintained AF status for more than 25 years; 20 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. All States and territories have MA status for TB in cervids.

Specific information for 2009 for TB-affected States

California—One affected dairy herd was identified in 2009 during continuing epidemiological investigations from three affected dairy herds identified during 2008. This herd is under a test-and-remove herd plan.

Molecular epidemiology conducted on the four affected dairy herds recently identified in California revealed three different DNA types, indicating three different outbreaks. The strain of *Mycobacterium bovis* identified during the 2003 outbreak has not been found in any of the recent detections, indicating that the current outbreaks are not related to the 2003 outbreak.

The APHIS TB Task Force, (initiated in FY 2008 to help the California Department of Food and Agriculture respond to the TB outbreak), continued through February 2009 by assisting with the epidemiological case development and on-farm herd testing of 246 herds and approximately 377,000 head of cattle. Twenty-four additional herds containing approximately 20,000 cattle have been tested as part of the epidemiological investigation of the infected dairy discovered in FY 2009.

Indiana—A captive cervid herd was identified through targeted slaughter surveillance and was located in close proximity to a cattle herd implicated in a routine slaughter inspection finding of *M. bovis*. Regulatory personnel, who were present when several animals from this herd were routinely slaughtered, collected lesions consistent with *M. bovis* infection from several carcasses. After *M. bovis* was isolated, the herd was declared affected and an epidemiological investigation initiated.

Two additional TB-affected captive cervid herds were located through tracing of animals sold out of the herd. The index herd and both trace-out herds have been depopulated with Federal indemnity. Other captive cervid herds identified during the epidemiological investigation remain under quarantine until they can be tested during the 2009–2010 winter season.

Michigan—One beef herd and two captive cervid herds were detected in 2009. All three herds are located in northern Lower Michigan in the bovine MA zone. The affected beef herd was detected through annual surveillance testing, and the two captive cervid herds were identified through combined TB and CWD slaughter surveillance. The beef herd was depopulated with Federal indemnity. The two captive cervid herds remain under quarantine. Located in an area where TB is endemic, these herds are used for hunting and represent a low risk for disease spread because no live animals leave the premises.

One dairy in Michigan's MA region remains under a test-and-remove herd plan. This dairy was initially identified as TB-infected in 2000 and was subsequently found TB-affected in 2004. During the most recent herd test for release of quarantine, an *M. bovis*-infected cow was identified. Consequently, 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 achieved.

Minnesota—Minnesota was reclassified to a split-State status of MAA and MA early in 2009. One beef herd was identified as affected in 2009 through routine slaughter surveillance. This herd was participating in the Minnesota State-sponsored buyout program for cattle herds in the core area of the MA region. All affected cattle herds have been found in a small geographic area in northwest Minnesota, and. all identified affected herds in Minnesota have been depopulated with Federal indemnity. Surveillance of free-ranging white-tailed deer continues through hunter-harvested and targeted culling sample collection. Twenty-five infected free-ranging white-tailed deer have been identified.

Nebraska—One beef herd was identified as TB-affected following an epidemiological investigation of a routine slaughter surveillance detection of *M. bovis*. Testing of the herd-of-origin confirmed TB-infection and the herd is under a test-and-remove herd plan. The epidemiological investigation associated with this herd involved testing of 33 Nebraska herds and more than 13,000 cattle through mid-September 2009. The epidemiological investigation found no evidence of spread of the disease.

A captive cervid herd was identified as affected through slaughter inspection. This herd has been depopulated with Federal indemnity. Wildlife surveillance has been conducted in the area surrounding the herd and no signs of infection in free-ranging deer have been found.

New Mexico—New Mexico applied for split-State status, which it received in March 2009 after two program reviews and the implementation of a memorandum of understanding. No affected cattle herds were identified in New Mexico in 2009. One affected dairy herd that had been under

quarantine since 2002 completed a test-and-remove herd plan and was released from quarantine in July 2009.

New York—One captive cervid herd was identified through routine testing for sale purposes. One aged fallow deer was identified as a test responder and taken to necropsy. *M. bovis* infection in this animal was confirmed and the herd was depopulated with Federal indemnity.

Texas—Testing for sale purposes led to the discovery of one affected dairy. This dairy has been placed under a test-and-remove herd plan as epidemiological investigations continue. As of September 17, 2009, at least 15 States have received more than 5,000 exposed heifers believed to have left this dairy over the past several years. In Texas alone, testing has been completed for more than 21,000 cattle in 19 herds as part of this epidemiological investigation. A wildlife survey surrounding the infected dairy found no evidence of TB infection in wildlife species.

Slaughter Surveillance—Slaughter surveillance for bovine TB exceeded the national goal in 2009. Four of the TB-affected herds identified (two cattle and two cervid) were detected as a result of slaughter surveillance and subsequent epidemiological investigations to trace the slaughter cases to their herd-of-origin.

From October 1, 2008 through September 30, 2009, 10,171 granulomas identified during postmortem slaughter inspection were submitted for diagnostic testing. These lesions originated from 176 U.S. establishments that slaughtered 24.2 million cattle, including 6.7 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 2009. Of the 40 highest-volume adult cattle slaughter establishments, 35 (88 percent) met or exceeded the submission standard and 5 (12 percent) establishments did not.

Of the granulomas submitted by slaughter establishments, 25 (0.2 percent) had histology consistent with mycobacteriosis. Of these 25 cases, TB was confirmed in 14 cattle and 2 captive cervids. TB is confirmed by a combination of PCR testing of formalin-fixed tissue and culture of fresh tissue.

Slaughter Cases and Affected Herds: Cervids—Slaughter inspection detected a lesioned elk from a Nebraska herd of elk and fallow deer. The second slaughter case occurred in a red deer from an Indiana cervid herd consisting of elk, red deer, sitka deer, and fallow deer. The subsequent investigation led to the detection of two additional affected captive cervid herds in Indiana. The Nebraska herd, three captive Indiana cervid herds, and a small captive cervid herd in New York were depopulated with Federal indemnity in 2009. An additional two captive cervid herds in Michigan, identified as “shooter” herds, were not depopulated. These animals are

in a TB-endemic area and do not represent a risk of disease spread because no live animals leave the facilities.

Slaughter Cases: Cattle—Of the 14 TB cases detected in cattle at slaughter during 2009, 7 cases occurred in adult cattle over 2 years-of-age and 7 cases occurred in feeder cattle. Of the seven adult cattle cases, six were beef cows and one was a cow of an unidentified type slaughtered in Pennsylvania. Investigations related to these cases identified two TB-affected cattle herds.

Of the seven TB cases in adult cattle, three were in adult beef cows from a single herd located in the MA zone of northwestern Minnesota. The herd was depopulated through the State-funded herd buyout program, resulting in the identification of the lesioned cows during slaughter inspection. Additionally, nine yearling calves originating from the same herd were later confirmed infected with TB.

The fourth TB case in an adult cow was traced back to a beef herd in Nebraska where infection was confirmed in an additional cow from the herd. The herd was then classified as TB-affected. This herd was not depopulated and is under a test-and-remove herd plan. Genotyping of *M. bovis* isolates from the affected Nebraska beef herd and the elk and fallow deer herds indicate that these herds were infected with different TB strains.

TB-affected cattle herds were not found for the remaining three adult cattle slaughter cases found in 2009. One case in an adult cow was traced back to a North Dakota beef herd, which was tested twice without confirmation of TB. Another adult cattle TB case occurred in a cow slaughtered in a Pennsylvania establishment. Individual animal identification was not collected at the time of slaughter and, as a result, an epidemiological investigation was required for each of the six cattle that had been in a pen together at the establishment. One of the six animals was traced to a small beef herd in Indiana. Initial testing of this herd did not find any additional infected animals and additional herd testing is planned. Genotyping results indicated that the isolate from this slaughtered cow was similar to strains isolated from cervids during the 1990s. Because of this finding, Indiana officials conducted surveillance on a nearby captive cervid herd and TB was confirmed in that herd. The most recent case occurred in a beef cow from South Dakota; the epidemiologic investigation for this case is ongoing.

Seven TB cases were detected in feed cattle at slaughter during 2009. These cattle were all beef-type cattle; four cases were from Texas, and Kansas, South Dakota, and Florida each had one case. Two of the Texas cattle and the Kansas animal had official Mexican ear tags collected at slaughter. The tags indicated that the animals had been exported from Chihuahua, Veracruz, and Coahuila (one case each).

Epidemiological investigations are ongoing for the two Texas TB cases that did not have Mexican-origin ear tags. The *M. bovis* isolate obtained from a heifer from South Dakota was similar to strains isolated from captive cervids during the 1990s and led to the detection of an affected herd in South Dakota in early FY 2010. Individual animal identification was not available for this animal and multiple consignors contributed to the feedlot where the animal originated. This epidemiological investigation is ongoing. The Florida case occurred in an aged roping steer that had been moved throughout the southeastern United States. The epidemiological investigation in this case did not identify other infected cattle.

Mexican-Origin Slaughter Cases—Slaughter surveillance in 2009 detected only three Mexican-origin feeder cattle cases. This represents a substantial decrease compared with 2006 through 2008, when there were 26, 17, and 11 Mexican-origin TB cases, respectively. During 1998 to 2008, the rate of TB cases in Mexican-origin cattle ranged from 0.7 to 5.4 infected cattle per 100,000 imported animals. With only 3 TB cases in 2009 and approximately 828,000 cattle imported into the United States from Mexico during the 2008−2009 export cycle (September 1 to August 31), the overall rate of TB in Mexican-origin cattle for 2009 was 0.2 cases per 100,000 imported cattle. Notably, 2008 cattle imports from Mexico substantially decreased from previous years. There were 1.4 million cattle imported from Mexico in 2004 and 1 million in both 2006 and 2007. However, the recent decrease in the number of Mexican-origin cattle imported into the United States 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.

Live Animal Testing—In 2009, 1,164,967 caudal fold tuberculin tests of cattle and bison were reported, with 19,164 responders (1.6 percent, with 46 States and Puerto Rico reporting). The response fraction by State, for States testing more than 300 animals, ranged from 0 to 4.5 percent (median, 1.0 percent). Caudal fold test performance appears to be improving— 24 States had a response fraction of 1 percent or greater in 2009, compared to 13 States in 2008 and 16 States in 2007. The number of States with a response fraction of less than 0.25 percent was 12 in 2007, 13 in 2008, and 12 in 2009.

The gamma interferon test has been available as an official supplemental test in the TB program since 2005. With data available from 4 of the 5 laboratories approved to conduct gamma interferon testing, 4 laboratories conducted a total of 17,972 tests in cattle from 24 States in 2009. Ninety-seven percent of these tests (17,523), were conducted on cattle from California, Georgia, Idaho, Nebraska, New Mexico, Oklahoma, Oregon, and Texas.

During 2009, 21,472 single-cervical tests were conducted in captive cervid species with 381 suspects (1.6 percent) reported to APHIS. There are no standards for granuloma submissions for establishments that slaughter cervids; therefore, tuberculin testing is the primary means of

surveillance for TB in captive cervids. The number of captive cervids tested annually has ranged from 25,000 in 2006 to approximately 10,000 in 2007.

Program Updates—APHIS continues to work on developing and maintaining a TB program that protects the health of U.S. livestock that is responsive, timely, and cost-effective. Based on input received from several bovine TB public meetings, APHIS developed a concept paper titled, "A New Approach for Managing Bovine Tuberculosis: Veterinary Services' Proposed Action Plan." This document presents the current concepts on changes being considered for the TB eradication program. APHIS published this concept paper on October 5, 2009 in the *Federal Registe*r and accepted comments through December 4.

Policy on the Use of Federal Funding for Whole-Herd Depopulation—In summer 2009, APHIS adopted a new policy that no longer recommends the previous primary management option of using Federal funding to depopulate entire TB-affected herds and indemnify herd owners. Rather, whole-herd depopulation will be implemented only when the data indicate that other options will not mitigate disease spread, an imminent public or animal health risk exists, or it is cost beneficial to do so. APHIS will determine the best course of action for each TB-affected herd by evaluating several factors; including the prevalence of disease within the herd, risk of disease transmission, effectiveness of management practices, and cost effectiveness. When appropriate, APHIS proposes to manage specific TB-affected herds under a test-and-remove policy in conjunction with quarantines and restricted movement of animals to limit the spread of TB from these herds.

TB Serum Bank—In 2009, APHIS approved $250,000 to expand its TB serum bank. The serum bank will provide 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. The goal is to obtain blood from 250 TB-infected cattle, 1,600 uninfected cattle, and 1,600 uninfected white-tailed deer. Because of the limited availability of naturally infected white-tailed deer, APHIS expects to obtain samples from only 20 to 30 infected animals.

The majority of serum samples will be collected from uninfected animals in the United States during routine TB skin testing events. Samples from infected cattle are being sought through collaborations with countries that have endemic TB. For example, APHIS is collaborating with Mexico, Canada, and the United Kingdom to collect and receive serum and tissue samples from TB-infected cattle. Sampling in the United Kingdom for the APHIS serum bank began in autumn 2009; participation by Mexico is pending. By the end of 2009, serum samples had been collected

from approximately 150 cervids (including 36 TB-infected animals) and 700 cattle (including 5 that are TB-infected).

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 of the State of Coahuila, the MA zone of Veracruz, and the Mexican National TB Eradication Program were completed in FY 2009. The review teams examined TB program integrity, progress, and the level of prevalence.

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. The VS 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 2009, more than 1.7 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 APHIS' National Veterinary Services Laboratories (NVSL) for confirmatory virus isolation, subtyping, and pathogenicity testing. Low pathogenic notifiable AI (LPNAI) was detected twice in commercial flocks during 2009; both LPNAI detections were H7N9 subtypes. The first detection occurred in a Kentucky commercial broiler-breeder operation consisting of 20,000 birds. Routine NPIP monitoring detected antibodies to the H7N9 subtype, and H7 specific RNA was detected by real-time reverse transcriptase polymerase chain reaction (rRT-PCR); however, no virus was isolated. There were no clinical signs noted other than a modest drop in egg production and the premises was depopulated as a precautionary measure. The second H7N9 LPNAI detection occurred in a Minnesota commercial turkey flock. This H7-specific RNA was detected by rRT-PCR and H7N9 avian influenza virus was isolated. The birds showed no clinical signs or increased mortality and the flock was depopulated through controlled marketing.

[2] Not all States had completed reporting for FY 2009 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 here.

Live-Bird Marketing System Program—As part of the LBMS, 124,898 tests[2] were performed during 2009. All presumptive-positive specimens detected at the State level were submitted to the NVSL for confirmatory virus isolation, subtyping, and pathogenicity testing. The most common subtype isolated was low pathogenic H5N2 AI virus that was isolated from 14 specimens in 4 submissions from New York. Ten other low-pathogenicity AI (LPAI) subtypes were isolated; six H2N2 isolations from New York and one from Pennsylvania; one H2N3 isolation from Pennsylvania; one H6N2 isolation from Florida; and one H10N7 isolation from Oregon. The H5 AI viruses were shown to be LPAI by the chicken pathogenicity test or the deduced amino acid profile at the hemagglutinin cleavage site.

AI Virus (AIV) Surveillance in Wild Birds—In 2009, surveillance for highly pathogenic notifiable 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 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. Between October 2008 and September 2009, 728 presumptive positive specimens were received through this surveillance stream for confirmatory testing. Highly pathogenic notifiable AI H5N1 was not detected; however, LPAI H5N1 virus was detected through virus isolation in specimens submitted from Tennessee and Wyoming. Through cooperative surveillance, 59 H5 viruses (various N subtypes) from 24 States and 54 H7 viruses (various N subtypes) from 21 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 details 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 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 81 and 66 percent respectively between 2003 and 2009.

In 2009, the OIE recognized that Nor98-like (atypical) scrapie is a separate disease from classical scrapie and does not meet the OIE criteria to be a notifiable disease. This determination was made based on differences in epidemiology and laboratory findings (most notably, the lack of evidence to support transmission under natural conditions and its random widespread occurrence). In line with these findings and the 2009 revisions to the OIE Scrapie Chapter, APHIS will no longer depopulate sheep and goats exposed to Nor98-like scrapie. Rather, these animals will be officially identified and their flocks-of-origin monitored for 5 years.

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

As part of the RSSS program in 2009, 42,057 sheep and goat samples, collected from 108 sites in 33 States, were tested for scrapie using immunohistochemistry testing procedures on brain or lymph node specimens. These tests identified 37 scrapie-positive animals (table 3.4).

Table 3.4: Scrapie cases, FY 2003–2009

	Number of Cases by Fiscal Year[1]						
Test or Examination	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Field necropsy[2]	315	374	461	243	253	128	35
Regulatory live animal[3]	32	20	31	37	19	6	6
RSSS[4]	23[5]	85	105	70	59	42	37
Total	**370**	**479**	**597**	**350**	**331**	**176**	**78**

[1]Fiscal years run from October 1 to September 30.
[2]Includes necropsy validations.
[3]Third eyelids and rectal biopsies; includes test validations.
[4]RSSS = Regulatory Scrapie Slaughter Surveillance.
[5]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 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 2009, investigations of RSSS-positive cases, clinical suspect animals, on-farm surveillance, and trace-outs from infected and source flocks resulted in the identification of 38 previously undetected infected or source flocks. The number of newly designated infected and source flocks has declined each year since 2005 (table 3.5). Samples are collected from genetically susceptible animals for scrapie testing during disease investigations and cleanup of infected and source flocks. In 2009, regulatory testing identified 41 scrapie cases; 35 from field necropsy and 6 from live-animal testing (table 3.4). 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 3.5: Newly designated infected and source flocks, FY 2003–2009

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

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_08192008.pdf. The plan provides a comprehensive review of scrapie surveillance in the United States, explains the basis for implementing State-of-origin sampling targets (and ultimately flock-level surveillance), and establishes State-of-origin sampling goals for FY 2010 based on breeding sheep numbers in each State adjusted for local factors that affect sampling. The National Scrapie Surveillance Plan is being revised for FY 2011 and beyond. When final, the new version will be available on the APHIS Web site at http://www.aphis.usda.gov/vs/nahss/sheep/.

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 2009, 24 NAHLN laboratories and the FADDL conducted CSF surveillance testing on 14,494 specimens (table 3.6). 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 3.6: Classical swine fever testing for FY 2009

Surveillance Stream	Number of Tested Specimens
Sick pigs submitted to veterinary diagnostic laboratories	4,375
High-risk slaughter swine	2,086
Food swine collected by APHIS in 50 States	1,884
Swine from high-risk herds (waste-feeders and high-risk populations in Florida, Texas, and Puerto Rico)	6,146
Swine FAD investigations tested for CSF	3
Total	**14,494**

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. This 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. (See Chapter 1 for more on the H1N1 outbreak.) 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 lab component of this surveillance project was quickly established and samples from volunteered case-compatible diagnostic cases were screened for pandemic H1N1. In 2009, this resulted in the finding of pandemic H1N1 in four herds in three 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.

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

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

The first step in implementing PRV surveillance required reducing the number of sow-boar slaughter surveillance samples from the levels collected during the PRV eradication program to the number required for stage V (PRV-free) in the eradication program. Subsequent steps involved identifying NAHLN diagnostic laboratories to conduct PRV surveillance testing and initiating a pilot project in select NAHLN laboratories to begin serologic testing. Targeting serologic samples from swine cases submitted to diagnostic laboratories enhances APHIS' ability to rapidly detect a PRV incursion into swine herds.

With full implementation of the PRV surveillance plan targeted for FY 2012, APHIS is continuing its efforts to implement the plan in stages. APHIS is also preparing to update the existing regulatory structure to allow greater flexibility in meeting requirements. When final, this modification will combine regulations for interstate movement of swine with pseudorabies with those for swine with brucellosis.

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.

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

Status—As of December 31, 2009, all States and U.S. territories, except Texas, remained in stage III (free) status of the Swine Brucellosis Control and Eradication Program. In 2009, 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 is developing 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, *Code of Federal Regulations,* part 149.

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.

[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.

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 use of a USDA-approved tissue or blood-based postmortem test and is regulated by AMS.

Status—All farms in good standing in the pilot program were grandfathered into the official program at its onset. From 2000 to 2009, more than 500 audits were completed on swine production farms. The result 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 2009, 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 regulations regarding 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 2009, 27 States and Puerto Rico allowed feeding food waste to swine and issued or renewed permits to operate garbage-treatment facilities. There were 1,452 licensed food-waste cooking and feeding premises (feeders) as of FY 2009 (table 3.7), and 8,285 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 disease (FAD). Field personnel conducted 27,680 searches for nonlicensed food-waste feeders. Through these efforts, 91 nonlicensed feeders were found; most of these were then licensed and became subject to routine inspections.

Table 3.7: Statistics on licensing of facilities feeding food waste to swine, FY 2006–2009

	Fiscal Year			
Number	**2006**	**2007**	**2008**	**2009**
States allowing food-waste feeding*	29	29	27	27
Licensed premises	2,078	1,951	2,783	1,452
Routine inspections	9,889	9,562	8,183	8,285
Searches for nonlicensed feeders	27,202	39,107	36,729	27,680
Nonlicensed feeders found	95	87	96	91

*Puerto Rico also allowed food-waste feeding.