



CHAPTER 4



Animal Disease Eradication, Control, and Certification

This chapter describes APHIS programs that are designed to eradicate, control, or prevent diseases that threaten the biological and commercial health of U.S. livestock and poultry industries. Disease surveillance is a critical component of these efforts, and this chapter also discusses the enhanced surveillance plans being developed for some program diseases.

Eradication Programs

Diseases targeted in APHIS eradication programs include scrapie in sheep and goats, tuberculosis (TB) in cattle and cervids, pseudorabies and brucellosis in swine, and brucellosis in cattle and bison.

Scrapie in Sheep and Goats

Since 1952, APHIS has worked to control scrapie in the United States. In 2000, as a result of increasing industry and public concern about transmissible spongiform encephalopathies (TSEs) and the discovery of new TSE diagnostic and control methods, APHIS initiated an accelerated scrapie eradication program.

Status of Program Components—The primary components of the scrapie eradication program are animal identification, surveillance, disease

investigations, and certification of flocks through the Scrapie Flock Certification Program (SFCP).

Animal Identification—As of September 30, 2008, 144,818 premises with sheep and/or goats were recorded in the scrapie national database (a premises that contains both sheep and goats might be listed twice, once for each species). Of these premises, 113,609 had requested official ear tags. Both of these numbers have risen steadily since 2004.

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 mature black- or mottle-faced sheep and any mature sheep or goats showing clinical signs that could be associated with scrapie, such as poor body condition, wool loss, or gait abnormalities.

During fiscal year (FY) 2008, as part of the RSSS program, 43,914 sheep and goat samples, collected from 98 slaughter plants in 27 States, were tested for scrapie using immunohistochemistry testing procedures on brain and/or lymph node specimens. These tests identified 42 scrapie-positive animals (table 4.1); follow-up information is provided below in “Disease Investigations.”

TABLE 4.1: Scrapie cases, FY 2003–08

Test or examination	Number of cases by year					
	2003	2004	2005	2006	2007	2008
Field necropsy ¹	315	374	461	243	253	128
Regulatory live animal ²	32	20	31	37	19	6
RSSS ³	⁴ 23	⁵ 85	⁵ 105	70	59	42
Total	370	479	597	350	331	176

¹ Includes necropsy validations.

² Third eyelids and rectal biopsies; includes test validations.

³ RSSS = Regulatory Scrapie Slaughter Surveillance.

⁴ Includes only part of FY 2003 (April 1 to September 30, 2003).

⁵ Number revised from 2007 U.S. Animal Health Report.

The Caprine Scrapie Prevalence Study, a short-term surveillance project, was conducted from May 2007 through March 2008 to estimate the national prevalence of scrapie in adult goats at slaughter. A total of 3,032 goats were sampled for scrapie testing as part of this study (1,515 in FY 2007 and 1,517 in FY 2008). None of these goats tested positive for scrapie, indicating that the scrapie prevalence in U.S. adult slaughter goats is less than 0.1 percent with 95-percent confidence. The prevalence of scrapie in U.S. goats is greater than zero, however, because five positive goats were identified in FY 2008 through investigation and testing of a goat with clinical signs. The index scrapie-positive goat was diagnosed from tissues collected at necropsy after unsuccessful treatment for pruritis, skin thickening, bilateral hair loss, and hypersensitivity. The other four positive goats were nonclinical scrapie cases identified by testing in the clinical goat's herd of origin.

Disease Investigations—Under the scrapie eradication program, any animal confirmed positive by the National Veterinary Services Laboratories (NVSL) 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 flock 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 FY 2008, investigations of RSSS-positive cases, clinical suspect animals, on-farm surveillance, and trace-outs from infected and source flocks resulted in the identification of 61 previously undetected infected and/or source flocks. The number of newly identified infected and source flocks has declined each year since FY 2005 (table 4.2). During disease investigations, samples for scrapie

testing are collected from exposed and potentially exposed genetically susceptible animals and clinical suspects, as well as depopulated animals from infected and source flocks. In FY 2008, this testing identified 134 scrapie cases: 128 from field necropsy and 6 from live-animal testing (table 4.1). A scrapie case is defined as an animal for which a diagnosis of scrapie has been made by NVSL using a U.S. Department of Agriculture (USDA)-approved test (typically immunohistochemistry testing of the obex and/or lymphoid tissue, but other tests, including the Western blot and enzyme-linked immunosorbent assay, may also be used).

Certification of Flocks—The SFCP¹ is a cooperative effort among producers, State and Federal animal health agencies, and industry representatives to enable enrolled flocks to participate in one of three levels of monitoring and two levels of certification:

- **Complete Monitored**—Requires annual inspection and inventory reconciliation, application of official identification, recordkeeping, and testing of animals displaying clinical signs. If female animals from flocks of lower status are added, the status of the flock is lowered. If scrapie is found in or traced to the flock, the flock is removed from the program.
- **Complete Monitored Certified**—Achieved after gaining 7 years of status in the complete monitored category.
- **Selective Monitored**—Designed for producers of slaughter lambs to allow for scrapie surveillance in large production flocks.
- **Export Monitored**—Designed to meet World Organization for Animal Health (OIE) guidelines, must meet all the requirements of the complete monitored category for 7 years and test for scrapie

TABLE 4.2: Infected and source flocks detected, FY 2003–08

	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008
Infected	61	83	108	52	30	25
Source	19	35	71	68	46	36
Total Flocks	80	118	179	120	76	61

¹ www.aphis.usda.gov/animal_health/animal_diseases/scrapie/downloads/sfcp.pdf

TABLE 4.3: Scrapie Flock Certification Program participation, FY 2002–08

Fiscal year, as of 9/30	Total Participating Flocks	Status			
		Enrolled	Certified	Selective Monitored	Export
2002	¹ 1,542	¹ 1,455	78	9	0
2003	1,776	1,663	105	8	0
2004	1,868	1,726	135	7	0
2005	1,961	1,770	188	3	0
2006	¹ 2,047	¹ 1,747	297	3	0
2007	2,047	1,611	427	4	5
2008	1,988	1,422	534	4	28

¹ Number revised from 2007 U.S. Animal Health Report.

all sheep and goats more than 14 months old that die on farm (other than through normal slaughter).

- Export Monitored Certified—Achieved after gaining 7 years of status in the export monitored category.

By the end of FY 2008, 1,988 flocks were participating in the SFCP (table 4.3).

National Scrapie Surveillance Plan—The National Scrapie Surveillance Plan has been finalized and posted at 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 minimum targets for FY 2009 and 2010.

For the Future—Work continues to expand surveillance for scrapie and to increase the traceability of sheep and goats presented for sampling.

Tuberculosis in Cattle and 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 2005.² For more detailed information about the requirements of the bovine TB program, see the UM&R.

² www.aphis.usda.gov/animal_health/animal_diseases/tuberculosis/downloads/tb-umr.pdf

Status—From FY 2000 to 2008, 74 TB-affected herds have been detected in the United States. This 74-herd total comprises 48 beef herds, 22 dairy herds, 2 mixed-use cattle herds, and 2 captive cervid herds (1 of elk and 1 of white-tailed deer). The annual number of affected herds per year during this period ranged from 4 to 11.

In FY 2008, 11 affected herds were found, an increase from 7 affected herds in FY 2007. Three of these 11 herds were located in Michigan and were detected through annual testing. Four herds were located in Minnesota and were detected as a result of annual testing and area testing. Of three herds detected in California, the first was detected through slaughter surveillance and the additional two herds through the resulting epidemiological investigation. One affected herd was detected in New Mexico as a result of market testing.

At the end of 2008, 46 U.S. States, Michigan’s Upper Peninsula, Puerto Rico, and the U.S. Virgin Islands were considered Accredited TB Free (table 4.4). New Mexico, California, part of Michigan’s Lower Peninsula, and most of Minnesota were classified as Modified Accredited Advanced. A total of 11 counties plus portions of 2 other counties in northern lower Michigan were Modified Accredited, as were portions of 4 counties in northwestern Minnesota. Specific information for affected States in 2008 follows:

Michigan—Three new affected herds were detected in FY 2008; all were beef herds and were depopulated. Annual herd testing is ongoing in the Modified Accredited Zone (MAZ). Within the highest endemic area of the MAZ, the apparent prevalence

TABLE 4.4: Bovine tuberculosis accreditation categories and State status—end of calendar year 2008

Category	Prevalence of TB	States (numbers as of 12/31/08)
Accredited Free	Zero for cattle and bison	46 U.S. States, Michigan's Upper Peninsula, all of Puerto Rico, and the U.S. Virgin Islands
Modified Accredited Advanced	Less than 0.01 percent of total cattle and bison herds	California, New Mexico, most of Minnesota, part of Michigan's Lower Peninsula
Modified Accredited (Regionalized)	Less than 0.1 percent of cattle and bison herds	11 counties in the northern part of Michigan's Lower Peninsula and parts of 2 other counties; part of 4 counties in northwestern Minnesota
Accredited Preparatory	Less than 0.5 percent of the total number of cattle and bison herds	—
Nonaccredited	Either unknown or 0.5 percent or more of the total number of cattle and bison herds	—

of TB in wild deer has been 2.3, 1.4, and 1.8 percent for 2006, 2007, and 2008, respectively. Outside of this endemic area within the MAZ, the apparent prevalence of TB in wild deer has been 0.2 to 0.3 percent for 2006 through 2008. One dairy herd, classed as a “carryover herd” from FY 2004, remains under a test-and-removal herd plan. A second dairy herd that had been under a test-and-removal herd plan was released in early 2008, after 4 years under quarantine. Both of these herds were detected through annual area testing.

Minnesota—Minnesota had four positive beef herds detected and depopulated in FY 2008. These herds were detected through area testing and retesting of designated high-risk herds. Modified Accredited Advanced States or zones with fewer than 30,000 herds may have no more than 3 affected herds during 12 consecutive months; consequently, Minnesota's status was reduced to Modified Accredited from Modified Accredited Advanced in April 2008. Minnesota applied for and received split-State status in October 2008; the majority of the State returned to Modified Accredited Advanced status and an MAZ was established in the northwestern corner of the State.

Surveillance and population reduction of free-ranging white-tailed deer in the MAZ continued in 2008. Surveillance detected 6 positive (0.7 percent) of 883 tested deer, the same prevalence of infection detected in 2007, when 11 positive (0.7 percent) deer were found out of 1,654 tested.

New Mexico—In the Accredited Free portion of New Mexico, an affected mixed-use herd, consisting of dairy and beef cows and bulls and feeder steers, was detected through market testing in 2008. The

herd was detected when a dairy cow from the affected herd was tuberculin-tested at a market for interstate-movement purposes.

New Mexico also had one affected dairy herd in the Accredited Free portion of the State in FY 2007. Because Accredited Free States and zones may have no more than one affected herd in a 48-month period, the detection of the positive mixed-use herd in 2008 caused the Accredited Free portion of the State to be downgraded to Modified Accredited Advanced in September 2008. With the entire State now in Modified Accredited Advanced status, New Mexico has applied for split-State status.

California—The epidemiological investigation resulting from the December 2007 detection of bovine TB at a slaughter plant in California continues. The index herd was depopulated; of two additional infected large dairy herds found through the investigation, one was depopulated and the other is under a test-and-removal plan. During 2008, officials from USDA and the California Department of Food and Agriculture conducted 271 herd tests involving more than 377,000 cattle in California alone. For a summary of this investigation and resulting activities, see Chapter 1.

Slaughter Surveillance—In FY 2008, 34 cases of bovine TB (*Mycobacterium bovis*, or *M. bovis*) were found at slaughter, an increase from 24 cases the year before (table 4.5). One case occurred in an adult dairy cow and the remaining 33 cases occurred in feedlot cattle. The national granuloma³ submission

³ Granulomas are types of inflammatory lesions that can be found in cattle with TB.

TABLE 4.5: Slaughter surveillance

FY	<i>M. bovis</i> cases	Granuloma submissions	
		Total submissions*	Number per 10,000 adult cattle slaughtered
2004	35	6,367	9.3
2005	40	9,439	16.2
2006	28	9,565	16.4
2007	24	10,286	16.6
2008	34	10,666	15.9

*Primarily from adult cattle.

rate for adult cattle for FY 2008 was 15.9 submissions per 10,000 adult cattle killed, exceeding the target rate of 5 submissions per 10,000 adult cattle killed.

The adult dairy cow mentioned above was the index case that led to the detection of three affected dairy herds in California (described above).

Of the 33 *M. bovis* cases identified in feedlot steers by slaughter surveillance, 9 (27 percent) involved Mexican-origin animals. An outbreak involving 19 of the 33 feedlot steers (58 percent) occurred within a large Texas feedlot. The infected cattle were former rodeo steers assembled from sales in Oklahoma and Kansas. The animals originated from several different States; no additional infected animals were detected during subsequent epidemiological investigations. One of these 19 animals had official Mexican eartags, and several others had an “M” brand, indicating that they were Mexican-origin animals. Genotyping of all outbreak isolates revealed that these 19 animals were infected with the same strain of *M. bovis*, supporting the hypothesis that disease transmission occurred while the animals were in market channels or after they arrived in the feedlot. Two feedlot cases occurred in cattle imported from Canada, and one case traced back to a known infected herd from the Modified Accredited Zone of Minnesota. The outcome of the remaining three cases in fed cattle is pending epidemiological investigation.

Cervids—No TB-infected captive cervid herds were found in 2008.

For the Future—In response to ongoing challenges to the TB program, a process to review and revise the TB program was implemented in 2008. Ongoing challenges include wildlife as a reservoir; changes in

the dairy and beef cattle industries; regulations and approaches to disease control that warrant updating; and, perhaps most important, fiscal limitations. TB listening sessions open to the public were held in December 2008, and public input from those sessions is being used as a starting point for drafting new policy for the TB program, beginning in early 2009.

APHIS is developing a sera bank at NVSL in collaboration with international partners. The bank will provide industry stakeholders with well-characterized serum samples, from both TB-infected and uninfected program species, for use in validating developmental tests for TB.

APHIS continues to work with Mexico to help advance its TB eradication program and to significantly reduce the risk of importing TB-infected and -exposed animals into the United States. During 2008, the countries continued discussions regarding the 5-year plan, *Strategic Plan for Reducing the Risk of Importing Tuberculosis Infected Cattle from Mexico 2008-2012*, which the United States developed and presented to Mexico. This plan requires that the Mexican TB Eradication Program achieve equivalency with the U.S. program by the end of 2012.

APHIS’ VS and International Services work together to conduct program reviews in Mexican states in order for USDA to recognize their status for purposes of importation. During FY 2008, USDA conducted reviews in six Mexican states or zones.

Pseudorabies in Swine

The Pseudorabies Eradication State-Federal-Industry Program Standards⁴ describe pseudorabies program activities, which include surveillance, herd certification, and herd cleanup. These standards were developed by State, Federal, and industry representatives and are endorsed by swine health practitioners and State animal health officials in cooperation with the United States Animal Health Association (USAHA).

Status—In FY 2008, all 50 States, Puerto Rico, and the U.S. Virgin Islands filed annual reports with VS’ National Center for Animal Health Programs’ swine staff for review. These filings were analyzed to ensure

⁴ www.aphis.usda.gov/animal_health/animal_diseases/pseudorabies/downloads/program_stds.pdf

that surveillance of the breeding herd population was adequate and that the Feral-Transitional Swine Management Plan (if required) was complete.

As of December 31, 2008, there were no commercial production swine herds infected with pseudorabies virus (PRV) in the United States. Nine transitional herds, however, were identified through surveillance as infected in FY 2008; transitional swine are defined as captive feral swine or domestic swine that have reasonable opportunity to be exposed to feral swine. These infected transitional herds were depopulated. Epidemiological investigations disclosed no evidence that infection had spread from the infected transitional herds to commercial herds.

Pseudorabies Surveillance—A comprehensive surveillance plan designed to rapidly detect introduction of PRV into commercial swine was finalized in 2008. Although pseudorabies has been eradicated from commercial production swine, it still exists in feral swine and transitional herds allowed exposure to feral swine. The distribution of feral swine continues to expand; if PRV were to be reintroduced into commercial swine, the source most likely would be free-roaming feral hogs, wild boars at hunting clubs, or infected transitional swine.

The revised National Pseudorabies Surveillance Plan⁵ has three objectives: rapid detection; demonstration of freedom from PRV; and monitoring of international or domestic sources of PRV. Each objective contains sampling streams. To meet the objective of rapid detection, sampling will be focused on suspicious PRV cases, sick pigs submitted to diagnostic labs, herds classified as high risk, and herds exposed to feral swine. To demonstrate freedom from PRV, sampling will focus on the testing of culled sows and boars at slaughter and meat juice from market hogs at slaughter. Sampling for the third objective, monitoring international and domestic sources of PRV, will focus on monitoring the feral swine reservoir, the number and distribution of swine hunting preserves, and international PRV status.

For the Future—APHIS will continue efforts to implement the pseudorabies surveillance plan. The plan will be implemented in stages, with an estimated full implementation date of 2012. Additionally, APHIS plans to modify the existing regulatory structure. If this regulatory concept is accepted, a comprehensive program for swine diseases will be created.

Brucellosis in Swine

The swine brucellosis eradication program is administered, supervised, and funded via 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 Rules⁶ (SB UM&R). The SB UM&R was developed with expert advice from State, Federal, and industry advisory committees.

Like 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 domestic herds allowed exposure to feral swine.

Surveillance for swine brucellosis continues through sampling cull sows and boars. The *Code of Federal Regulations* requires all stage III States (States thought to be free of swine brucellosis) to sample at least 5 percent of their breeding population through market surveillance yearly.

Status—As of December 31, 2008, all States and U.S. territories, except Texas, remained in stage III (free) status of the Swine Brucellosis Control and Eradication Program. No commercial production swine herds were identified as infected with swine brucellosis. Four transitional herds, however, were identified through surveillance as infected with swine brucellosis in FY 2008; these herds were depopulated. Additionally, epidemiological investigations disclosed no evidence that infection spread from the infected transitional herds to commercial herds. Exclusion plans remain vital in preventing or minimizing contact with feral swine.

⁵ www.aphis.usda.gov/vs/nahss/swine/prv/prv_surveillance_plan_final_draft_04_16_08.pdf

⁶ www.aphis.usda.gov/animal_health/animal_dis_spec/swine/downloads/sbruumr.pdf

TABLE 4.6: Brucellosis certification categories and State status—2008

Designation	Infection rate	No. of States with designation
Class Free	No domestic cattle or bison herds found to be infected for 12 consecutive months while under an active surveillance program	49 States, Puerto Rico, U.S. Virgin Islands
Class A	Herd infection rate less than 0.10 percent	1 (Montana)*
Class B	Herd infection rate between 0.10 percent and 1.0 percent	0

*Texas attained Class Free status on February 1, 2008. Montana was reclassified from Class Free status to Class A status on September 3, 2008 (subsequently regaining Class Free status in July 2009).

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

For the Future—VS’ National Surveillance Unit (NSU) is designing a new swine brucellosis surveillance plan. Because feral swine are recognized as the disease reservoir for both swine brucellosis and pseudorabies, the brucellosis surveillance plan will likely contain many of the same principles and sampling streams as the pseudorabies surveillance plan. When developed, the swine brucellosis plan will be part of the overall comprehensive swine surveillance system.

Brucellosis in Cattle and Bison

The brucellosis eradication program is based on active surveillance of domestic cattle and bison herds by each State. The program’s UM&R document sets forth minimum standards for States to achieve eradication and conduct continued surveillance, primarily through Market Cattle Identification (MCI) testing and the Brucellosis Milk Surveillance Test (BMST).⁷

Status—During 2008, for the first time in the 74-year history of the brucellosis program, all 50 States, Puerto Rico, and the U.S. Virgin Islands were simultaneously designated brucellosis Class Free. This milestone occurred when the State of Texas was declared brucellosis-free on February 1, 2008. In May 2008, however, the State of Montana disclosed a second brucellosis-affected cattle herd within a 24-month period, resulting in reclassification to brucellosis Class A State status on September 3, 2008.

As of December 31, 2008, 49 States, Puerto Rico, and the U.S. Virgin Islands were officially declared

free of brucellosis (table 4.6). Specific information regarding Montana’s reclassification follows.

Montana—In June 2008, a cow originating from a cattle herd in southern Montana was disclosed as being infected with *Brucella abortus*. This herd was tested as part of Montana’s efforts to test and develop brucellosis-risk-mitigation herd plans for herds near the Greater Yellowstone Area. The brucellosis-affected herd was depopulated with indemnity, and a thorough epidemiological investigation was conducted. No additional brucellosis-affected cattle herds were disclosed. Infected free-ranging elk are thought to be the most likely source of infection. A year earlier, in May 2007, a single brucellosis-affected cattle herd was disclosed in southern Montana. With the finding of two brucellosis-affected cattle herds within 24 months, Montana no longer met the conditions for Class Free status and was subsequently reclassified to Class A State status on September 3, 2008. Previously, Montana had been classified as brucellosis Class Free since June 1985.

Other Program Components—As previously noted, the two primary surveillance activities conducted for bovine brucellosis are MCI testing and BMSTs. During FY 2008, approximately 7.349 million head of cattle were tested under the MCI surveillance program. State- and federally inspected establishments slaughtering test-eligible cattle participate in the MCI surveillance program. Test-eligible cattle include cows and bulls 2 years of age and older. In FY 2008, 94.3 percent of all test-eligible slaughter cattle were tested. Brucellosis program standards require a minimum of 90 percent successful traceback of all MCI reactor cattle and a minimum of 95 percent successful case closure.

⁷ For details see www.aphis.usda.gov/animal_health/animal_diseases/brucellosis/downloads/umr_bovine_bruc.pdf

In FY 2008, 97.24 percent of all MCI reactors were successfully traced and investigated, resulting in successful case closures. Approximately 629,100 additional head of cattle were tested on farms or ranches during FY 2008, bringing the total cattle tested for brucellosis in FY 2008 to 7.98 million head (table 4.7).

TABLE 4.7: Number of cattle tested for brucellosis (million head), 2004–08

FY	Total	Market Cattle Identification (MCI) Program		
		Farm/ ranch	Slaughter plants	Markets
2004	9.1	0.8	5.5	2.8
2005	8.7	0.6	5.2	2.9
2006	8.8	0.9	4.7	3.2
2007	8.8	0.8	4.7	3.3
2008	8.0*	0.6	4.6	2.7

*Sum of categories may not add to total due to rounding.

BMST surveillance is conducted in all commercial dairies a minimum of two times per year in Class Free States and a minimum of four times per year in Class A States. Suspicious BMST results are followed up with an epidemiological investigation. According to herd inventory data reported on individual State annual reports, there were 61,250 dairy operations in the United States in FY 2008. Approximately 138,000 BMSTs were conducted in FY 2008, and 110 of those tests yielded suspicious results after repeat screening (repetitive brucellosis ring test and/or heat inactivation ring test). All suspicious BMST results in FY 2008 were confirmed negative by subsequent epidemiological investigations and additional herd testing (table 4.8).

TABLE 4.8: Brucellosis Milk Surveillance Test results, 2004–08

FY	No. of tests	No. suspicious on screening	No. positive
2004	184,000*	200	0
2005	171,000	200	0
2006	164,000	186	0
2007	142,700	126	0
2008	138,000	110	0

*Estimated

Approximately 3.799 million calves were vaccinated for brucellosis in FY 2008. The national calfhoo vaccination policy recommends proper calfhoo vaccination in high-risk herds and areas, and whole-herd adult vaccination when appropriate in high-risk herds and areas. The policy also recommends elimination of mandatory vaccination in all States.

Bovine Brucellosis Surveillance Planning—An evaluation of the current brucellosis surveillance program identified redundancies in surveillance activities. A Brucellosis Surveillance Planning Working Group proposed a plan to improve the efficiency and effectiveness of the national brucellosis surveillance program by eliminating redundancies in brucellosis surveillance testing and addressing imbalances in surveillance in lower risk States. Proposed changes to brucellosis surveillance include reducing slaughter surveillance, eliminating the brucellosis ring test, eliminating Federal funding for first-point testing in lower risk States where it is not required, and standardizing slaughter surveillance testing using the rapid automated presumptive test and the fluorescence polarization assay for initial slaughter surveillance sample testing.

VS' NSU worked with the Brucellosis Laboratory Consolidation and Testing Standardization Working Group to assess laboratory capabilities for bovine brucellosis slaughter surveillance sample testing. This assessment is evaluating the laboratories' potential to consolidate brucellosis slaughter surveillance testing, based on size and costs. The objectives of the brucellosis laboratory consolidation plan are to increase cost efficiency of slaughter surveillance testing, increase effectiveness by standardizing slaughter surveillance testing, and maintain testing accuracy and timely reporting of results. This assessment will ensure that APHIS creates an efficient and effective brucellosis slaughter surveillance system to support the U.S. brucellosis surveillance program as recognized in national and international trade.

Brucellosis Activities Related to the Greater Yellowstone Area—The Greater Yellowstone Area (GYA) is one of the last known reservoirs of brucellosis in the country. Brucellosis-infected wildlife, primarily elk, have been implicated in the transmission of brucellosis to multiple cattle herds in

the GYA during the past 4 years. All three GYA States lost their Brucellosis Class Free State status at some point during the past 4 years: Wyoming and Idaho have successfully regained Class Free State status, and Montana will be eligible to regain Class Free State status in May 2009.⁸

APHIS, in collaboration with the GYA States, is developing a concept for use when a State is affected by brucellosis. This concept creates an area with increased surveillance to mitigate risks, reduce the statewide impact of the brucellosis finding, and allow the rest of the United States to be considered free of brucellosis. The establishment of such an area would facilitate the elimination of brucellosis from livestock and provide clear, consistent control and surveillance guidance to livestock producers.

In FY 2008, APHIS continued its involvement in several developmental projects, including the Bison Quarantine Feasibility Study, brucellosis transmission studies in bison and elk, and immunocontraceptive studies. Working closely with the U.S. Department of the Interior's National Park Service, APHIS has been able to maintain a viable bison population and prevent transmission of brucellosis to domestic livestock. APHIS personnel assisted with Interagency Bison Management Plan (IBMP) management operations. The IBMP partner agencies are committed to the adaptive management framework of the IBMP. In FY 2008, the partners met to deliberate on recent recommendations by the U.S. Government Accountability Office; assess the effectiveness and outcomes of IBMP management activities (highlighting winter 2007–08); and, considering prevailing conditions, develop and incorporate short- and long-term adaptive management adjustments to the IBMP for winter 2008–09 and beyond.

The Bison Quarantine Feasibility Study is now ready to translocate its first cohort of brucellosis-free Yellowstone bison to a suitable location outside the GYA. Five Native American organizations have applied to receive the first group of 22 cows, 16 calves, and 4 bulls as a first step in conserving valuable Yellowstone bison genetics on landscapes removed from the GYA.

⁸ In July 2009, USDA amended its brucellosis regulations to remove Montana from the list of Class A States and add it to the list of Class Free States.

For the Future—The United States is very near eradication of brucellosis from the national domestic cattle and bison herd. APHIS is considering a new approach toward national recognition of brucellosis freedom in domestic cattle and bison. Appropriate and adequate national brucellosis surveillance activities and levels will be defined to verify that the United States is free of brucellosis and to ensure timely detection of new occurrences, thus providing integrity to a national brucellosis disease-status designation. Development of plans to implement the consolidation of brucellosis surveillance testing and use of a standardized testing protocol will continue.

Control, Certification, and Other Programs

Other animal disease programs include chronic wasting disease (CWD) in cervids, Johne's disease in cattle, trichinae in swine, the Swine Health Protection Inspection Program, infectious salmon anemia (ISA) virus, viral hemorrhagic septicemia (VHS), and equine infectious anemia (EIA).

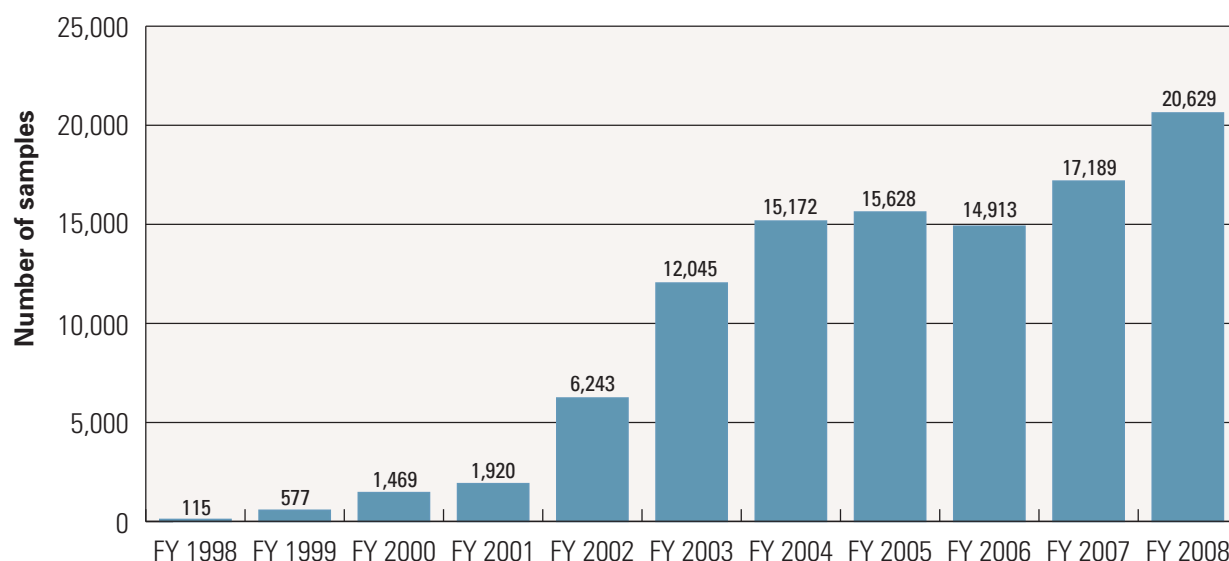
Chronic Wasting Disease in Cervids

APHIS and State CWD surveillance in farmed animals began in late 1997. APHIS began supporting CWD surveillance in wildlife in 1997. Since beginning to receive line-item funding for CWD in FY 2003, APHIS has provided assistance, through cooperative agreements, to State wildlife agencies and tribes to address the disease in free-ranging deer, elk, and moose.

A proposed CWD herd-certification program for farmed cervid operations has been in process since late 2003. Program goals are to control and eventually eradicate CWD from farmed cervid herds. The program is intended to be a cooperative State-Federal-industry program.

Status—Since FY 2004, more than 14,900 farmed cervids have been tested for CWD each year (fig. 4.1). In 2008, four new farmed cervid herds, including the first positive herd in the State of Michigan, were found to have animals positive for CWD. Cumulatively, from 1997 through 2008, CWD was

Figure 4.1: Number of farmed cervids tested for chronic wasting disease, FY 1998–2008



identified in 33 farmed elk herds and 12 farmed white-tailed deer herds in 10 States (table 4.9).

TABLE 4.9: Number of farmed cervid herds with animals positive for chronic wasting disease, by State, CY 1997–2008

State	1997–2005	2006	2007	2008	Total 1997–2008
Colorado	14	—	—	1	15
Kansas	1	—	—	—	1
Michigan	—	—	—	1	1
Minnesota	2	1	—	—	3
Montana	1	—	—	—	1
Nebraska	5	—	—	—	5
New York	2	—	—	—	2
Oklahoma	1	—	—	—	1
South Dakota	7	—	—	—	7
Wisconsin	7	—	—	2	9
Total	40	1	0	4	45

Of these 45 positive herds identified as of December 31, 2008, 38 were depopulated, 6 (5 in Colorado and 1 in Wisconsin) remained under State quarantine, and 1 herd was released from quarantine several years ago after undergoing rigorous surveillance for more than 5 years with no further evidence of disease.

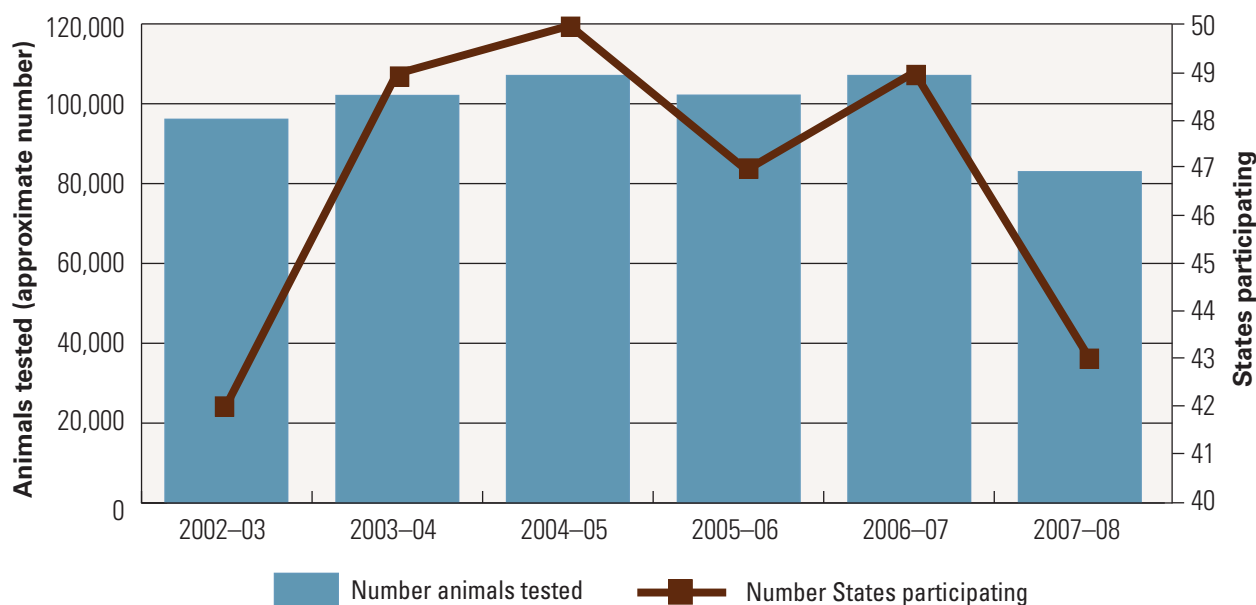
Since 2002, most States have been participating in CWD surveillance in free-ranging deer, elk, and more recently, moose. From the hunting seasons of 2002-03 through 2006-07, more than 90,000 animals were tested each year; these animals were hunter-killed or targeted because they showed signs consistent with CWD (fig. 4.2). The decline in the number of animals tested for the 2007-08 hunting season reflects the beginning of a shift from active surveillance of regular hunter harvest to targeted surveillance of animals suspected of having CWD.

For the Future—Several concerns were raised during the final comment period for the rule establishing the Federal CWD herd certification program and interstate movement restrictions. As a result, APHIS delayed implementation of the rule. A new supplemental proposed rule addressing those concerns was published for public comment in March 2009.

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,

Figure 4.2: Surveillance testing of hunter-killed and targeted animals for chronic wasting disease



and decreasing disease prevalence in infected herds.⁹ The program has three basic elements: education, management, and testing.

Status—There are 6,019 herds enrolled in the Johne’s disease control program, with 1,014 herds enrolled in the test-negative component of the program (table 4.10).

Herds in the test-negative component of the program must use an approved laboratory for testing. Approved laboratories are required to pass an annual proficiency test. For Johne’s disease testing, 86 laboratories are approved for serology, 39 are approved for MAP fecal culture, and 37 are approved for polymerase chain reaction/DNA testing. In calendar year (CY) 2008, these laboratories

reported conducting 367,170 serum enzyme-linked immunosorbent assays (ELISAs), 97,372 milk ELISAs, and 36,669 fecal cultures, in addition to 87 pooled fecal samples (5 bovine per pool) and 47 environmental samples. A decline in Federal funding is the main reason that fewer serum ELISAs and fecal cultures have been performed in recent years.

Trichinae in Swine

With modern pork-production systems essentially eliminating trichinae as a food-safety risk, pilot programs were established to explore alternatives to individual carcass testing to demonstrate that pork is free of *Trichinella* spp. Initiated as a pilot program

TABLE 4.10: Johne’s disease control program statistics, CY 2000–08

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

⁹ For more details, see www.aphis.usda.gov/animal_health/animal_diseases/johnes/downloads/johnes-umr.pdf

in 1997, the voluntary U.S. Trichinae Certification Program (USTCP) became an official USDA program in October 2008, with publication of regulations in the *Code of Federal Regulations* (see Title 9 Part 149).

Uniform program standards detailing the requirements of this certification program have been developed, along with additional Federal regulations in support of the program.

The USTCP is based on scientific knowledge of *Trichinella* spp. epidemiology and numerous studies demonstrating that specific “good production practices” can prevent pigs’ exposure to this zoonotic parasite. The program is consistent with recommended methods for control of *Trichinella* in domestic pigs, as described by the International Commission on Trichinellosis.

Three USDA agencies—APHIS, the Food Safety and Inspection Service (FSIS), and the Agricultural Marketing Service (AMS)—collaborate to verify that certified pork-production sites manage and produce pigs according to the requirements of the program’s “good production practices.” USDA also verifies the identity of pork from the certified production unit through slaughter and processing. Production sites participating in the USTCP may be certified as “trichinae safe” if sanctioned production practices are followed.

During the pilot study, objective measures of these good production practices were obtained through review of production records and inspection of production sites. An objective audit based on risk factors related to swine exposure to *Trichinella* was developed for on-farm production practices. The audit includes aspects of 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 oversees the auditing process by qualifying program auditors and by conducting random spot audits. Spot audits verify that the program’s good production practices are maintained between scheduled audits and ensure

that the audit process is conducted with integrity and consistency across the program.

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

Status—From CY 2000 to 2008, more than 500 audits were completed on farms, and a great majority of these indicated compliance with the good production practices as defined in the program. These compliant sites were granted status as “enrolled” or “certified” in the program.

For the Future—Efforts will 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 the development of 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 FY 2008, 27 States and Puerto Rico allowed feeding food waste to swine and issued or renewed permits to operate garbage-treatment facilities. There were 2,783 licensed food-waste cooking and feeding premises (feeders) at the end of the fiscal year (table 4.11), and 8,183 routine inspections were made of these licensed premises during the year.

TABLE 4.11: Statistics on licensing of facilities feeding food waste to swine, FY 2005–2008

Number	FY 2005	FY 2006	FY 2007	FY 2008
States allowing food-waste feeding ¹	26	29	29	27
Licensed premises	2,557	2,078	1,951	2,783
Routine inspections	9,631	9,889	9,562	8,183
Searches for nonlicensed feeders	28,845	27,202	39,107	36,729
Nonlicensed feeders found	101	95	87	96

¹ Puerto Rico also allowed food-waste feeding.

Because of the potential for foreign animal disease (FAD) incursions, ensuring that all food-waste feeders are properly licensed is crucial. Field personnel conducted 36,729 searches for nonlicensed food-waste feeders. Through these efforts, 96 nonlicensed feeders were found; most of these were then licensed and became subject to routine inspections.

Infectious Salmon Anemia Virus

In 2001, ISA virus infection was detected at salmon-rearing sites in Cobscook Bay, Maine. In December 2001, the Secretary of Agriculture declared an ISA disease emergency, which permitted allocation of funds to APHIS to provide indemnity and epidemiological and surveillance assistance to Maine's Atlantic salmon farming industry.

The ISA program was initiated in early January 2002 in partnership with the Maine Department of Marine Resources. Under the ISA program, surveillance is mandatory at all marine aquaculture sites in Maine where Atlantic salmon are raised. The company veterinarians at these sites perform

the surveillance inspections at a frequency dictated by the ISA status of the site, but at least monthly. These inspections include a visual overview of the site, a review of mortality records, the collection and submission of 10 moribund salmon or fresh mortalities, and a completed submission form that is sent with the salmon tissues to an APHIS-approved laboratory. Biosecurity audits are performed semiannually on high-risk sites and yearly on low-risk sites. Audit reports identify observed strengths and weaknesses, recommend improvements, and prioritize response times according to apparent relative risk.

In 2008, over 2 million smolts were stocked in Machias Bay, Eastern Bay, and Blue Hill Bay, and on five sites southwest of Cobscook Bay. In the Cobscook Bay area, harvest of over 2.5 million disease-free, market-size fish was initiated in October 2007 and nearly complete by the end of 2008. During 2008, 1,104 surveillance samples were collected during 119 veterinary inspections at 15 cage sites in Maine, and 9 biosecurity audits were conducted. Since the program began in 2002, a total of 13,347 fish have been collected during 1,432 veterinary inspections, and 104 biosecurity audits have been conducted.

Maine waters have been ISA disease-free since the last case was confirmed in February 2006. A new bay management strategy continued in 2008 with stocking in areas southwest of Cobscook Bay. The management strategy was implemented in conjunction with provincial authorities in New Brunswick, Canada, based on geographic boundaries determined by hydrographic exchange during a single complete tidal cycle. Cobscook Bay will again be stocked in the spring of 2009 after all sites in the bay are fallowed for at least 2 months.

Viral Hemorrhagic Septicemia

VHS is a highly contagious disease of certain fresh and saltwater fish, caused by a rhabdovirus. It is listed as a notifiable disease by the OIE. The pathogen produces variable clinical signs in fish including lethargy, skin darkening, exophthalmia, pale gills, a distended abdomen, and external and internal hemorrhaging. The disease can result in substantial mortality in infected fish. However, infected fish in which the disease is not as well developed may not

show any clinical signs or die, and may be lifelong carriers and shed the virus.

Four genotypes of VHS virus have been identified. Genotypes I, II, and III are mainly found in Europe or Asia and are highly pathogenic to rainbow trout. The fourth genotype, referred to as North American type IV, has been found in wild fish from the East and West coasts of North America periodically since 1988. The North American VHSV genotype was initially associated with the marine environment and, in commercially important salmonids, appeared to cause less morbidity and mortality than the European/Asian VHSV genotypes.

In 2005 and 2006, however, VHS outbreaks were reported in wild freshwater fish from the Great Lakes in both Canada and the United States. The mortality associated with individual outbreaks ranged from just a few fish to many thousands per outbreak. These outbreaks were the first freshwater isolations of VHS virus in the United States and were found by researchers to be a distinct sublineage of VHSV IV, termed VHSV IV(b). APHIS, along with the Canadian Food Inspection Agency and the U.S. Fish and Wildlife Service, developed a VHSV IV(b) surveillance plan for bilateral use in freshwater systems in Canada and the United States. Surveillance methods combine standard diagnostic test data with historical data and expert opinion on risk to predict the distribution of VHS occurrences in freshwater fish populations of the United States and Canada. An international panel of 30 fish health experts identified 9 factors that estimate the likelihood of VHSV IV(b) occurring in any particular freshwater watershed. The identified risk factors include hydrologic connectivity, geographic proximity, and/or a history of untested-fish transfers from the affected Great Lakes and associated watersheds.

A 2006 Federal Order prohibited movement of 37 species of live fish into the United States from Ontario and Quebec, Canada, the 2 Provinces that reported VHS outbreaks. This order also prohibited the interstate movement of the same fish species from eight States (New York, Pennsylvania, Ohio, Michigan, Indiana, Illinois, Minnesota, and Wisconsin) that have reported an occurrence of VHS or are at immediate risk of acquiring the disease. Following stakeholder feedback, the Federal Order

was amended to allow for restricted movements, under certain conditions, out of the affected States. No cases of VHSV IV(b) have been diagnosed or reported outside of the States bordering the Great Lakes or in any cultured populations of known susceptible species. In September 2008, APHIS published an interim rule that was intended to replace the Federal Order. Implementation of that interim rule has been delayed indefinitely as the agency addresses comments submitted regarding the rule. In the meantime, the Federal Order remains in effect.

In FY 2008, Congress appropriated \$5.6 million for VHS activities. APHIS used \$1.8 million of the appropriated funds to offer cooperative agreements with State agencies and tribal groups to conduct surveillance of farmed and wild populations at greatest locational risk of acquiring the disease. In addition, APHIS developed an outreach campaign to educate people about potential pathogen vectors not easily controlled by regulatory actions, such as activities related to recreational fishing. VHSV IV(b) surveillance suggests that the pathogen is centered in the Great Lakes region. To date, there have been no detections in cultured populations, or in any populations outside States bordering the Great Lakes. Surveillance efforts inform regulatory and management decisions relating to the distribution and control of VHSV IV(b).

Equine Infectious Anemia

Identified in France in 1843 and first tentatively diagnosed in the United States in 1888, EIA has received substantial attention over the years. EIA can be difficult to differentiate from other fever-producing diseases, including anthrax, influenza, and equine encephalitis. Because there is no vaccine or treatment for the disease, many countries use control programs based on serologic testing.

Currently in the United States, the States carry out the major regulatory actions to control EIA. States' rules encompass a broad scope of EIA concerns but vary considerably. To facilitate the development of a uniform control program for EIA and the interstate movement of horses, USDA created the EIA UM&R, which can be accessed at www.aphis.usda.gov/vs/nahss/equine/eia/eia_umr_jan_10_2007.pdf.

Issued in 1998 and most recently revised in January 2007 to incorporate current science on testing, the UM&R contains minimum standards for detecting, controlling, and preventing EIA. The provisions in the UM&R are approved by APHIS and are recommended by USAHA, the American Horse Council, and the American Association of Equine Practitioners (AAEP).

Status—To evaluate the prospects of an EIA national certification program, APHIS has prepared a possible budget, completed a cost-benefit analysis for the industry, and developed an EIA prevalence model for the purposes of regionalization. The cost-benefit analysis concluded that implementing regionalization for EIA (in a five-region scenario) would save the horse industry \$11.1 million from an overall reduction in testing. APHIS is drafting a proposed rule to incorporate select elements of the UM&R into the *Code of Federal Regulations*.

During FY 2008, 1,876,078 horses were tested for EIA in the 50 States and Puerto Rico, and 113 were positive (table 4.12). The number of premises with new reactors was 84.

For the Future—Attendees at the 2007 EIA National Direction Meeting, the 2008 USAHA Infectious Diseases of Horses Committee, and the 2008 AAEP Infectious Disease Committee are promoting incorporation of the following recommendations, with direct VS assistance, into a proposed National EIA Certification Program:

- **Universal acceptance of negative ELISA test results for EIA.** Because the official EIA ELISA test has lower levels of false-negative results than the agar gel immunodiffusion (AGID), it should be the first test of choice.
- **EIA testing requirement nationally for change of ownership.** This will provide EIA surveillance of untested reservoirs in the United States. States that require testing for change of ownership have found it effective for finding new cases of EIA in previously untested horses.
- **Regionalization using the VS EIA prevalence model.** In areas of the country where EIA is expected to occur at a rate of less than 0.01 percent in the untested population, the chance of encountering an infected horse today is essentially zero. Therefore, the minimum testing for States with lower prevalence could be set at 2 years, with the minimum testing for States with higher prevalence set at 1 year. Similarly, horses could be moved among lower prevalence States or from a lower prevalence State to a higher prevalence State with a test conducted within 2 years, while movement of horses among higher prevalence States or from a higher prevalence area to a lower prevalence State would require a test conducted within 1 year.

TABLE 4.12: Summary of equine infectious anemia testing for FY 2008

State	Positive	Horses tested	Tested negative	No. of tests	No. of premises with new reactors
Alabama	1	19,191	19,190	19,191	1
Alaska	0	535	535	578	0
Arizona	1	14,775	14,774	14,775	1
Arkansas	14	40,540	40,526	40,540	10
California	1	35,026	35,025	35,202	1
Colorado	3	28,441	28,438	28,441	1
Connecticut	0	2,376	2,376	2,376	0
Delaware	0	3,683	3,683	3,683	0
Florida	3	145,876	145,873	145,876	1
Georgia	0	51,841	51,841	51,841	0
Hawaii	0	754	754	754	0
Idaho	0	15,260	15,260	15,260	0
Illinois	0	57,512	57,512	57,512	0

continued

State	Positive	Horses tested	Tested negative	No. of tests	No. of premises with new reactors
Indiana	3	30,452	30,449	30,452	2
Iowa	0	27,797	27,797	27,797	0
Kansas	2	12,687	12,685	12,687	0
Kentucky	1	117,417	117,416	117,417	1
Louisiana	7	54,618	54,611	54,850	6
Maine	0	5,505	5,505	5,505	0
Maryland	0	35,292	35,292	35,292	0
Massachusetts	6	4,716	4,710	4,716	1
Michigan	0	36,761	36,761	36,796	0
Minnesota	0	45,803	45,803	45,803	0
Mississippi	6	38,945	38,939	38,945	6
Missouri	3	71,495	71,492	71,495	3
Montana	0	18,414	18,414	18,414	0
Nebraska	0	16,030	16,030	16,030	0
Nevada	0	7,017	7,017	7,017	0
New Hampshire	0	17,169	17,169	17,169	0
New Jersey	0	16,906	16,906	16,906	0
New Mexico	4	20,962	20,958	20,962	2
New York	1	57,434	57,433	57,434	1
North Carolina	1	52,224	52,223	52,224	1
North Dakota	0	12,847	12,847	12,847	0
Ohio	1	40,034	40,033	40,034	1
Oklahoma	15	97,575	97,560	97,808	6
Oregon	0	7,402	7,402	7,402	0
Pennsylvania	0	58,342	58,342	58,342	0
Rhode Island	0	2,286	2,286	2,286	0
South Carolina	0	40,769	40,769	40,769	0
South Dakota	0	13,854	13,854	13,854	0
Tennessee	3	72,687	72,684	72,687	3
Texas	36	254,248	254,212	255,133	35
Utah	0	13,581	13,581	13,581	0
Vermont	0	9,136	9,136	9,136	0
Virginia	0	67,096	67,096	67,096	0
Washington	0	3,895	3,895	3,895	0
West Virginia	1	18,055	18,054	18,055	1
Wisconsin	0	46,541	46,541	46,541	0
Wyoming	0	14,276	14,276	14,276	0
Total	113	1,876,078	1,875,965	1,877,682	84
Puerto Rico	0	22	22	42	0

