CHAPTER 3

CHAPTER 3

Detection and Early Response

Monitoring and surveillance for foreign and emerging animal diseases are critical components of VS' mission. VS programs and activities are aimed at ensuring rapid detection of, and early response to, animal disease threats, as well as development and application of new technologies for early and rapid disease detection. This chapter includes updates on the National Animal Health Surveillance System (NAHSS), the National Animal Health Laboratory Network (NAHLN), and the National Animal Health Reporting System (NAHRS). In addition, the chapter describes the plans for a new animal disease biocontainment facility to house the National Animal Disease Center (NADC) now located on Plum Island, New York.

The National Animal Health Surveillance System

The NAHSS is an APHIS initiative to integrate existing animal health monitoring programs and surveillance activities into a national, comprehensive, and coordinated system. The NAHSS is an interdisciplinary network of Federal, State, and industry partners working together to develop a national strategy that incorporates the Nation's Federal, State, and local resources and builds a surveillance system to protect animal health and promote free trade through surveillance, control, and prevention of foreign, emerging, and endemic diseases.

The NAHSS is envisioned to be a national-level surveillance system for animal diseases that affect the economic well-being of the U.S. livestock industry and trade markets, as well as animal diseases that are of significant risk to public health or wildlife species.

The NAHSS, composed of monitoring programs and surveillance systems, will function to integrate the collection, collation, and analysis of animal health data and promptly disseminate animal health information, especially to those partners responsible for maintaining animal health. The key factors for realizing this vision are:

- Surveillance that is flexible in that it provides information enabling quick response to emerging and foreign animal diseases, and allows for the continual monitoring of the status of domestic diseases as needed for information to control, eradicate, or manage disease;
- Monitoring systems that provide a current and thorough understanding of industry and management practices that influence surveillance planning and disease control;
- Standardized surveillance plans with pre-established information collection streams that are rapidly adaptable to new diseases;
- Surveillance that delivers timely information through a network of disease experts in the field who provide front-line observation and specimen collection;
- Surveillance strategies that provide near real-time detection of disease arising from natural or man-made introductions;
- Laboratories with state-of-the-art technology to process surveillance specimens;
- Information technology that is standardized and coordinated between laboratories and national databases, and provides rapidly accessible integrated disease data;

- Metrics, methods, and tools to prioritize, measure, and monitor surveillance activities to maximize information quality and cost efficiency; and
- Communication and collaboration between State, Federal, and industry partners in animal health, public health, wildlife, and agriculture intelligence gathering.

2008 NAHSS Highlights

In 2008, NAHSS planning activities focused around three main themes: evaluation of existing surveillance, standardization of surveillance processes, and continued development of comprehensive surveillance systems for high impact diseases.

The development and application of methodology to evaluate the priority and efficiency of surveillance are critical in order to address the growing need for cost-efficient, enhanced animal health surveillance. One such method of efficiency evaluation is assessment of surveillance sensitivity—the probability that a surveillance system or component of a system will detect a given disease in a specified timeframe. Sensitivity combined with the probability of disease introduction, the value or consequences of a disease outbreak, the cost of surveillance, and the ability to take action that will mitigate the event provide the framework central to ongoing evaluations of current VS surveillance activities.

Using the same evaluation principles, VS developed a prototype Tool for the Assessment of Intervention Options (TAIO) in 2008. The TAIO is a decision support tool designed to help assess and compare the value of different response options for a specific disease event or incursion. Standardization of surveillance processes continued to be a priority for the NAHSS partners in 2008. Substantial progress was achieved in developing a library of case definitions for World Organization for Animal Health (OIE)-listed diseases, creating a proposed national list of reportable animal diseases, and creating standardized surveillance strategies to be applied in an outbreak. In 2008, the importance of a standardized planning process was reflected in the development of business plans for many VS programs, including bovine spongiform encephalopathy (BSE) surveillance and comprehensive swine surveillance, as well as the business plan for the National Animal Health Monitoring System. The NAHLN also undertook several standardization activities in 2008, including the institution of a standardized laboratory review process and revised laboratory qualification checklist to ensure uniform performance across laboratories. (Read more about the NAHLN later in this chapter.)

As the NAHSS moves toward VS' 2015 vision, comprehensive monitoring and surveillance remains an important goal. Central to the NAHSS concept are collaboration, coordination between NAHSS partners, and flexibility to adapt to changes in the disease environment. In 2008, one example was the development of a swine influenza virus (SIV) surveillance pilot—a collaborative effort between APHIS, industry, and the Centers for Disease Control and Prevention (CDC). Additional collaborations with other government organizations in 2008 included APHIS' participation in the Homeland Security Presidential Directive 21 effort to develop a national biosurveillance program, and APHIS' partnership with the Armed Forces Medical Intelligence Center. Furthermore, several projects involving swine disease, avian influenza (AI), bovine brucellosis, and tuberculosis surveillance strengthened the focus on the wildlife-livestock interface and the importance of joint efforts with wildlife agencies in the control of these diseases.

Timely transmission of surveillance data is another key factor in achieving VS' 2015 vision. In support of the vision, the NAHLN information technology system continued its expansion in 2008 with efforts focusing on transmitting laboratory test results through standardized electronic messages. Finally, partnerships within the global surveillance community continued to strengthen in 2008. These international relationships have become critical for sharing new surveillance methodology, veterinary infrastructure capacity building, and emphasizing transparency of surveillance data.

In early 2009, the American Zoological Association initiated an effort in conjunction with APHIS to evaluate and develop standardized surveillance plans for zoos.

Foreign Animal Disease Surveillance and Investigations

A foreign animal disease (FAD) is defined as a transmissible livestock or poultry disease that is believed to be absent from the United States and its territories and that has a potential for significant U.S. animal health and economic impacts. APHIS works with State animal health officials and accredited private veterinary professionals to identify, control, and eradicate such animal diseases and diminish their impact.

Efforts to detect FAD events in the United States include surveillance conducted as a component of disease-specific programs; reporting by producers and private veterinarians; and field investigations conducted by Federal, State, and private accredited veterinarians. Additional detection efforts include State diagnostic laboratory surveillance conducted by diagnosticians when routine cases yield test results considered suspicious for FADs. Such results are reported to Federal and State animal health authorities for further investigation.

The NAHLN was developed to screen samples for FADs. From calendar year (CY) 1997 through CY 2008, the number of FAD investigations per year ranged from a low of 254 in 1997 to a high of 1,013 in 2004. The high number of investigations in both 2004 and 2005 (995 investigations) reflects the occurrence of a widespread vesicular stomatitis outbreak.

Of the 290 investigations conducted in 2008, 9 resulted in confirmed FAD findings. One FAD investigation (of a performance horse in Florida) was positive for equine piroplasmosis (*Theileria equi*), four were positive for wildebeest-associated malignant catarrhal fever (MCF) [alcelaphine herpesvirus type 1], and four were equine cases positive for contagious equine metritis (CEM), a transmissible, exotic, venereal disease of horses caused by the bacterium *Taylorella equienitalis*. The MCF investigations involved cattle pastured near a wildebeest pasture in Texas, with one investigation on the originating premises and three on premises in Alabama, Georgia, and Louisiana. The index case for the 2008 CEM investigations was on an equine breeding stable in Kentucky, with another positive premises identified in Kentucky and two positive premises in Indiana in 2008. This investigation is continuing in 2009. In all cases, early identification and quick response minimized further spread of disease. See Chapter 1 for more information on these two FAD events.

In 2008, vesicular conditions (blisterlike lesions) of the muzzle and feet were the most common complaint investigated. There were 167 vesicular complaints: 90 in equids (horses, donkeys, and mules), 35 in cattle, 25 in goats, 8 in sheep, 5 in pigs, 3 in deer, and 1 in an alpaca. Concern about vesicular lesions in ruminants, camelids, captive cervids, and swine would include not only vesicular stomatitis but also foot-and-mouth disease (FMD), a highly contagious viral infection that primarily affects cloven-hoofed domestic and wild animals. If FMD were to enter the United States and spread throughout the country, it would have a severe economic impact. In equids, the only FAD concern resulting from vesicular conditions is vesicular stomatitis. None of the 167 vesicular complaints identified in 2008 was positive for either vesicular stomatitis or FMD.

APHIS Surveillance Activities in 2008

Avian Influenza Surveillance

APHIS' AI Surveillance Program addresses the following poultry populations: the large-volume commercial poultry industry; the small-volume, high-value commercial poultry industry; the live bird marketing system (LBMS); and backyard poultry flocks. The program also includes nonpoultry avian populations, including migratory waterfowl and zoo or exhibition birds. The VS National AI Surveillance Plan can be found online at *www.aphis.usda.gov/vs/nahss/poultry/ai/avian_influenza_surveillance_plan_062907.pdf*.

APHIS works closely with States and the commercial poultry industry in its AI surveillance effort. One industry partner is the National Chicken Council (NCC), which represents 98 percent of the U.S. broiler industry and conducts rigorous testing

for AI. Under the NCC's AI Monitoring Plan, which uses private laboratory testing, every participating company tests all broiler flocks before slaughter. APHIS collaborates with the NCC to maintain secure data-reporting systems that allow its testing data to be used in national AI surveillance. The NAHSS Web site, *www.aphis.usda.gov/vs/nahss/poultry/index.htm*, presents the NCC summary surveillance data. Consumers and international partners can easily access these data and learn about the surveillance measures the United States is taking to ensure the safety of poultry exports to other countries.

Commercial Industry Program and Backyard Birds—Breeder flocks, as well as commercial meat and egg production flocks, are monitored for AI through the National Poultry Improvement Plan (NPIP) administered by VS. In fiscal year (FY) 2008, more than 1.8 million tests were performed as part of the NPIP surveillance program. Low pathogenic notifiable AI (LPNAI) strains were detected in commercial flocks twice during FY 2008. The first detection occurred in an Arkansas commercial broiler multiplier flock of 16,000 birds. Routine NPIP preslaughter serum testing detected antibodies to the low pathogenic avian influenza (LPAI) H7N3 subtype. Virus isolation confirmed LPAI H7N3. In accordance with State NPIP LPNAI response plans, the premises was depopulated. The second reportable LPNAI detection occurred in an Idaho gamebird facility (which included pheasants, ducks, quail, chukars, and pigeons) during routine testing of three dead pheasants. Additional testing of the flock detected LPAI H5N8 virus and antibodies in the pheasants and ducks. The flock was depopulated.

During FY 2008, LPNAI was detected in five backyard flocks in four States (South Dakota, Massachusetts, North Carolina, and New Hampshire).

- In South Dakota, a mixed-species operation had H5N2 antibodies detected in turkeys, but no virus was isolated. The flock was depopulated with on-site slaughter and controlled marketing of virus-negative birds.
- In Massachusetts, there were two LPNAI incidences in backyard flocks. The first involved a mixed-species operation on which antibodies to H5N2 were detected in pheasants. Real-time reverse transcriptase polymerase chain reaction (rRT-PCR) testing was H5 positive, but no virus was isolated. The flock was released from quarantine following two negative virologic tests. In the second Massachusetts LPNAI incident, antibodies to H5N2 were detected on a mixed-species operation. Virus isolation and rRT-PCR were negative. The positive birds were euthanized, and the remaining flock was released from quarantine after repeated negative testing.
- In North Carolina, H7N7 virus and antibodies were detected and determined to be LPAI by sequencing and pathogenicity testing. The flock was depopulated.
- H7N7 antibodies were detected in a New Hampshire mixed-species flock. Virus isolation and rRT-PCR were negative. The flock was released from quarantine following two negative virologic tests.

Live Bird Marketing System Program—The domestic LPAI program provides surveillance to detect H5 and H7 LPAI in the LBMS. Surveillance for notifiable AI in the LBMS remained a high priority in 2008. APHIS has initiated cooperative agreements with 40 States and 2 territories to conduct LBMS surveillance.

From July 1, 2007, to June 30, 2008, a total of 103,797 tests were performed as part of the LBMS. All specimens that tested positive were submitted to the National Veterinary Services Laboratories (NVSL) for confirmation. Low pathogenic H5N2 AI virus was isolated from 51 specimens in 19 submissions during FY 2008. The H5N2 subtype AI virus was isolated from 19 specimens from New York, 30 specimens from New Jersey, and 2 specimens from Pennsylvania. In addition, an H7 was isolated from nine specimens as follows: one H7N3 specimen from New Jersey, seven H7N7 specimens from New Jersey, and one H7N7 specimen from Pennsylvania. The H5 viruses were shown to be low pathogenic by the chicken pathogenicity test and the deduced amino acid profile at the hemagglutinin cleavage site.

Avian Influenza Surveillance in Wild Waterfowl—In FY 2008, funding continued for the early detection of highly pathogenic avian influenza (HPAI) in wild migratory birds. Surveillance activities were

initiated in 2006 in all 50 States and continue to date. Figure 3.1 illustrates samples collected as part of the collaborative interagency HPAI surveillance effort of wild migratory birds. Surveillance consists of the capture and sampling of apparently healthy wild birds—primarily waterfowl and shorebirds—and investigations of morbidity and mortality events in all species of wild birds. This collaborative interagency effort involves APHIS' Wildlife Services (WS) and VS programs, the U.S. Department of the Interior, State wildlife and natural resource agencies, and nongovernmental wildlife organizations.

Figure 3.1: FY 2008 collection sites for wild bird samples and environmental fecal samples in the United States

Specimens collected from apparently healthy wild birds were screened at veterinary diagnostic laboratories in the NAHLN; the laboratory personnel used rRT-PCR to detect type A influenza virus-specific RNA. The samples from sick or dead birds were submitted to the NAHLN, to the U.S. Geological Survey's National Wildlife Health Center, or to NVSL. Fecal samples collected from the environment were submitted to WS for screening with rRT-PCR assays. All presumptive H5 and H7 positive wild bird and fecal samples were submitted to NVSL for confirmation and virus isolation.

Between October 2007 and September 2008, more than 69,000 wild birds were tested, yielding 499 presumptive H5 and H7 positive specimens. More than 25,000 environmental fecal samples from wild birds were also analyzed, resulting in 8 presumptive H5 and H7 positive specimens. More than 6,000 wild bird and environmental fecal samples tested positive for type A influenza virus-specific RNA, and virus was isolated from 155 wild bird samples collected in the United States. The predominant subtype isolated was H5N2, with 25 isolations from 15 States. No HPAI was detected; however, LPAI H5N1 was isolated from two specimens submitted from Michigan and Iowa. All H5 and H7 AI viruses were characterized as LPAI viruses of North American lineage.

Bovine Spongiform Encephalopathy Surveillance

BSE is an extremely rare central nervous system (CNS) disease in cattle that has raised public health concerns. In cattle that display CNS signs, such as changes in temperament, abnormal posture, and ataxia, BSE is one of the possible diagnoses. APHIS has conducted surveillance for BSE since 1990. In August 2006, USDA implemented an ongoing surveillance plan commensurate with the extremely low level of risk in the United States; this plan continues to exceed surveillance guidelines set by the OIE for controlled BSE risk status. The controlled risk status classification provides acknowledgment from the OIE that the science-based mitigation measures in place in the United States effectively protect animal health and food safety. A 2006 analysis of surveillance data concluded that BSE might occur in this country, but levels would be extremely low—less than one case per million in the U.S. adult cattle population.

In FY 2008, more than 40,000 cattle were sampled as part of the ongoing surveillance program, with no disease detected. Surveillance efforts focus on those cattle in which the disease is most likely to be found. The targeted populations are cattle exhibiting signs of CNS disorders or any other signs that may be associated with BSE, including emaciation or injury. The surveillance program also targets cattle that die of unknown causes, as well as nonambulatory cattle. Healthy slaughter cattle are not included in the sampling because the likelihood of detecting BSE in this population has been shown to be extremely low.

This level of sampling on an ongoing basis assures that the United States is capable of detecting as few as one infected animal per million U.S. adult cattle. Ongoing surveillance allows the United States to assess any change in the BSE status of U.S. cattle and identify any significant rise in BSE prevalence in this country.

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 surveillance program focuses on testing targeted swine populations, or surveillance streams, in high-risk States. These populations are:

- Sick pigs submitted to veterinary diagnostic laboratories;
- Pigs condemned at slaughter by USDA's Food Safety and Inspection Service;
- Feral swine;
- High-risk swine populations including waste-feeding operations and high-risk herds in Florida, Texas, and Puerto Rico; and
- Swine FAD investigations submitted to the VS Foreign Animal Disease Diagnostic Laboratory (FADDL) as suspicious for CSF.

Areas or States at high risk for CSF include 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 more swine imports. Additionally, farming operations using immigrant labor, particularly from countries where CSF is endemic, may pose a risk because of laborers who may illegally bring contaminated swine products to their workplace in the United States.

In FY 2008, 25 NAHLN laboratories and FADDL conducted CSF surveillance testing on a total of 18,341 specimens (table 3.1). 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 3.1: Classical swine fever testing for FY 2008

Surveillance Stream	Number of Tested Specimens
Sick pigs submitted to veterinary diagnostic laboratories	3,187
Swine condemned at slaughter	1,602
Feral swine collected by APHIS in 30 States	2,302
Swine from high-risk herds (waste feeders and high-risk populations in Florida, Texas, and Puerto Rico) and other specimens tested for CSF	11,244
Swine foreign animal disease (FAD) investigations tested for CSF	6
Total	**18,341**

Equine Arboviral Web Reporting

APHIS provides weekly updates on the number of cases of diseases associated with West Nile virus and eastern and western equine encephalitis during the transmission season (approximately June through November) at *www.aphis.usda.gov/vs/nahss/equine*. In 2008, there were 179 equine cases of West Nile virus reported in 30 States and Puerto Rico, and 185 equine cases of eastern equine encephalitis reported in 15 States.

Equine arbovirus reporting is accomplished through collaboration with the CDC and State veterinary and public health officials. CDC provides arbovirus case information to APHIS from its ArboNET reporting system, an electronic-based surveillance and reporting system used to track and report arboviral activity. APHIS then disseminates the equine case information to State veterinary officials weekly for their confirmation, and posts the confirmed data on the NAHSS Web site. The Web site was developed at the request of the United States Animal Health Association's (USAHA)

Infectious Diseases of Horses Committee and the American Horse Council. The site is intended to provide timely and accurate equine arbovirus case information to individuals associated with the horse industry, including horse owners, animal health professionals, and regulatory officials, as well as public health officials and those in related academic and research fields.

Swine Influenza Virus Surveillance

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. Like other influenza A viruses, SIV has the potential to rapidly mutate and exchange genetic material with other influenza viruses, including influenza viruses of birds and humans. As a result, new SIV genotypes are constantly being generated. Some of these new "reassortant" genotypes contain genetic material from humans and/or birds, as well as pigs, and may increase severity of disease and the virus' ability to move between animals and humans.

Circulating SIV subtypes create challenges for vaccine manufacturers, diagnostic laboratories, and swine producers. The number of SIV 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.

Although not common, SIV can be directly transmitted from humans to pigs and vice versa, but pork and pork products are not 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 CDC each year, and most include reports of exposure to swine. Three such cases were reported in 2008. Early in the year, one case was reported in Minnesota in a young adult exposed to pigs at a live animal market. In October, a teenager in Texas who reported several swine exposures tested positive for swine influenza. In late 2008, a young adult from South Dakota with reported links to swine through college activities experienced influenza-like symptoms and was found to be positive for swine influenza. When human cases of SIV are detected, animal and public health officials at the local, State, and Federal levels work together to investigate. The virus did not attain the ability to spread easily among people in any of these cases.

To better understand the epidemiology and ecology of SIV in swine and the epidemiology of human SIV infections, an interagency project was initiated in 2008. The project—which 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—establishes a pilot program for SIV surveillance in swine and investigation of human SIV cases. This project will look at the incidence and distribution of different SIV strains in swine populations, identify and research novel swine isolates, and investigate cases of human SIV infection. In addition, Federal agencies will share isolates for developing diagnostic reagents and vaccines for animals and humans. The project has been jointly developed with industry and agency stakeholders.

Surveillance samples will be selected from laboratory samples that private veterinary practitioners submit for routine diagnosis of respiratory disease in pigs. Cases of interest include positive SIV cases in swine in which the disease is unusually severe, cases in which influenza viruses are novel to pigs (non-H1 or -H3 viruses), or cases in which human infection with SIV in association with influenza-related illness in swine has been reported.

National Animal Health Laboratory Network Update

The USDA Homeland Security Office established the NAHLN as part of a national strategy to

coordinate and link the testing capacities of the Federal veterinary diagnostic laboratories with the facilities, professional expertise, and support of State and university veterinary diagnostic laboratories. This network enhances the Nation's early detection of, response to, and recovery from animal health emergencies, including emerging diseases and FADs that threaten the Nation's food supply and public health.

Revisions to VS Memorandum 580.4

VS Memorandum 580.4 provides the procedures for investigating a suspected foreign animal or emerging disease and outlines the responsibilities of the VS Area Veterinarians-in-Charge (AVICs), the FAD diagnosticians, and the NVSL. In 2008, the memorandum was revised to include the potential use of NAHLN laboratories for initial testing of FAD investigation samples. A laboratory issues working group developed the supplemental materials and policies necessary to support the memorandum's revision. Revisions to the NAHLN checklist and policy document, as well as guidance for sample collection, scenarios, laboratory and State response plans, and discordant results, were developed and distributed to animal health professionals through the National Assembly of State Animal Health Officials and APHIS.

2008 National Animal Health Laboratory Network Highlights

Distribution of the Revised NAHLN Laboratory Qualification Checklist—The NAHLN Laboratory Qualification Checklist was revised to address laboratory responsibilities during FAD investigations, surveillance, and outbreaks. The checklist was distributed in 2008 to NAHLN laboratory directors, State animal health officials, and AVICs for their signatures.

Scenarios Testing—In February 2008, the NAHLN AI tabletop exercise was beta-tested in Iowa and Ohio. Participants gained enhanced awareness of laboratory issues they would encounter during an outbreak and had the opportunity to assess their response plans. After the February testing, NAHLN laboratory personnel and other animal health professionals participated in facilitated tabletop sessions throughout the United States during 2008. Thirty-eight exercises were conducted, involving 55 NAHLN laboratories and more than 700 participants. Internal and external stakeholders drafted and reviewed a summary report to identify gaps and prioritize necessary actions.

National Animal Health Laboratory Network Laboratory Review Process—NAHLN program personnel collaborated with the American Association of Veterinary Laboratory Diagnosticians (AAVLD) to establish a process to review NAHLN laboratories to ensure the development and implementation of a quality system consistent with AAVLD, OIE, and International Organization for Standardization standards. The review process was implemented in 2008 and will be expanded in 2009. In addition, a corrective action process was established and implemented to ensure that the root cause of deficiencies is identified and addressed.

Modeling to Determine Diagnostic Capacity Requirements—Simulation modeling is being used to help determine if adequate biosafety level-2 (BSL-2) and BSL-3 space is available in NAHLN laboratories to handle the number of samples generated in an outbreak—particularly of FMD—and during recovery, as well as to aid in determining the reagents and supplies needed in the National Veterinary Stockpile (NVS). Modeling will also help decisionmakers: (1) develop a contingency plan if adequate laboratory space and equipment are not available to test the number of samples generated during an extensive FMD outbreak, and (2) prioritize additional appropriate laboratory space and equipment needs. FMD modeling is important because of all the species impacted by the disease. VS personnel are working on models for other diseases and have one completed for AI as well.

Collaboration with the National Veterinary Stockpile—Representatives from the NVS, NVSL, and NAHLN have identified resource needs to support diagnostic testing during emergency response. The initial project focuses on AI, FMD, CSF, exotic Newcastle disease, and Rift Valley fever, and on day-to-day operations and surge requirements. The aggregate

requirements and resources have been identified and are now being compared with multiple scenarios to determine appropriate capabilities, including the necessary diagnostic tests, reagents, and supplies.

High-Throughput Equipment Training—Automated, high-throughput equipment has been purchased and distributed to NAHLN laboratories according to a risk-based model for the introduction and spread of HPAI.

The NVSL Diagnostic Virology Laboratory and Foreign Animal Disease Diagnostic Laboratory collaborated with NAHLN to host training sessions for the use of high-throughput testing systems. Representatives from 31 NAHLN laboratories participated in training that included an overview of high-throughput systems, instruction on equipment programming, and hands-on equipment use. The systems have been validated for use with rRT-PCR diagnostic assays for AI, CSF, and FMD.

National Animal Health Laboratory Network Emergency Response Symposium—NAHLN organized an emergency response symposium held in conjunction with the 2008 AAVLD and USAHA annual meeting. Topics included:

- Disease response plans;
- APHIS and State roles and responsibilities during an outbreak;
- Laboratory capacity;
- Use of bar-coding and information technology (IT) to increase efficiency;
- NAHLN AI and other exercises;
- The NVS FMD vaccine bank;
- Use of mobile laboratories; and
- Integrated response.

Surveillance Activities—In 2008, NAHLN laboratories participated in surveillance programs for CSF (36 laboratories), BSE (7 laboratories), and chronic wasting disease and scrapie (24 laboratories). Forty-five laboratories participated in wild bird AI surveillance with APHIS' WS.

NAHLN Information Technology System—The NAHLN IT system was developed with data messaging and standards to ensure that accurate and consistent diagnostic information is quickly and securely transmitted. Routine test results have been securely submitted via a Web-based system for more than 3 years. Efforts in 2008 focused on transmitting test results through standardized electronic messaging. Laboratories are now able to send CSF test result messages to the production system of the NAHLN IT system.

National Animal Health Laboratory Network Web Site—Information on the NAHLN IT system, surveillance efforts, and other NAHLN-related publications can also be found at *www.aphis.usda.gov/animal_health/nahln/*.

National Animal Health Reporting System

The NAHRS gathers data from State animal health officials on the presence of confirmed OIE-reportable diseases in specific livestock, poultry, and aquaculture species in the United States. NAHRS is a joint effort of the USAHA, AAVLD, and APHIS. Coordinated by the National Surveillance Unit, the system was designed to function as one part of a comprehensive and integrated animal health surveillance system.

The United States meets its OIE reporting obligations using a variety of sources, including the NAHRS, FAD reports, and national program disease surveillance reports. Table 2.1 in appendix 2 lists the U.S. status of the occurrence of OIE-reportable diseases.

NAHRS is a voluntary, cooperative system for reporting animal diseases. In 2008, 48 States reported disease information to NAHRS. States that do not participate in NAHRS are still required to report to the FAD surveillance and VS national program disease surveillance data systems.

The NAHRS online reporting tool enables State animal health officials to complete their monthly NAHRS reports via the Internet, with assurance of secure data transfer and information confidentiality. State animal health officials may also use the NAHRS online tool to view summary reports as well as past monthly reports.

2008 National Animal Health Reporting System Highlights

Enhanced Aquaculture Reporting—Efforts to enhance aquaculture disease reporting continued in 2008 with expansion of the NAHRS online reporting application to include all OIE-reportable aquaculture diseases. This reporting application will be launched in 2009.

Equine Infectious Anemia Reporting—In 2008, the NAHRS equine infectious anemia (EIA) online reporting module was launched, providing States the option of reporting EIA data through NAHRS rather than to VS Equine Program staff.

National List of Reportable Animal Diseases—APHIS, in cooperation with USAHA, AAVLD, State animal health officials, and industry representatives, is exploring the development of a National List of Reportable Animal Diseases and appropriate reporting criteria. The national disease list would enhance current animal disease reporting requirements through individual State-reportable disease lists and Federal regulatory reporting requirements. The NAHRS steering committee, representing States, industry, laboratories, and academic institutions, will work with APHIS on this project in 2009. More information is available at the NAHRS Web site, *www.aphis.usda.gov/vs/ceah/ncahs/nahrs/*.

National Bio- and Agro-Defense Facility

APHIS is developing a world-class animal disease biocontainment facility in conjunction with the U.S. Department of Homeland Security (DHS) Science and Technology Directorate. It will be called the National Bio- and Agro-Defense Facility (NBAF). In 2008, Manhattan, Kansas, was selected by DHS as the site for the NBAF. The facility will be constructed on the campus of Kansas State University. The work currently done by the Foreign Animal Disease Diagnostic Laboratory (FADDL) is scheduled to be transferred from Plum Island, New York, to the new facility. Scientists at FADDL are devoted to diagnosing foreign diseases of animals. They partner with scientists of DHS and USDA's Agricultural Research Service, also located on Plum Island, in foreign animal disease research.

This facility will enable basic and advanced research, diagnostic testing and validation, countermeasure development (i.e., vaccines and antiviral therapies) and diagnostic training for high-consequence livestock diseases with potentially devastating impacts on U.S. agriculture and public health.