

Building a comprehensive and integrated NAHSS: an update

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The National Animal Health Surveillance System (NAHSS) is a VS initiative created in response to recommendations made in the 2001 Animal Health Safeguarding Review and Homeland Security Presidential Directive (HSPD) 9. The charge was to (1) integrate existing animal health monitoring programs and surveillance activities into a national, comprehensive, and coordinated system; and (2) develop new surveillance systems, methodology, and approaches. The system is an interdisciplinary network of partners working together to protect animal health and promote free trade through surveillance, control, and prevention of foreign, emerging, and endemic diseases.

A NAHSS steering committee was formed in 2004 with representatives from industry, States, laboratories, universities, and Federal entities. The committee developed a NAHSS strategic plan that identified four goals:

- Early detection and global risk surveillance for foreign animal diseases (FADs);
- Early detection and global risk surveillance for emerging animal diseases;
- Enhanced surveillance for current program diseases; and
- Monitoring and surveillance for diseases with major impact on production and marketing.

Subsequently, other foundations of the NAHSS began to come together. For example, the *National Surveillance Unit* (NSU) was organized as the coordinating entity of surveillance-related activities, including planning, evaluation, integration, and standardization; becoming the first unit within VS with personnel devoted solely to animal health surveillance. Additionally, the *Surveillance and Data Standards for USDA/APHIS/Veterinary Services* were created as a foundation for building information management systems and surveillance systems. These standards assure that VS surveillance supports confident decisionmaking through a standardized and methodical manner to collect the most appropriate information and make it available to address the pertinent issues at the minimum cost. Furthermore, the *National Animal Health Laboratory Network* (NAHLN) was developed to enhance the detection and response capabilities for animal health emergencies, particularly FADs. The implementation of assay validation, equivalency testing, training, and proficiency testing in standardized

diagnostic assays has allowed for meaningful collation and analysis of test results on a national basis and the exchange of information between laboratories and epidemiologists. The development of an *information management system* that will collate and manage animal health data for VS disease management and surveillance programs is also underway. The system is being specifically developed to provide the integrated, coordinated, national, standards-based, quality-controlled, and secure data system that is essential for the NAHSS.

Since 2007, one specific focus of the NAHSS has been advancing the concepts of building comprehensive and integrated surveillance systems that cross species and diseases, rather than focusing on individual diseases.

The terms comprehensive and integrated surveillance are used in many different contexts and with varying meanings. In reference to the NAHSS, the terms are defined and used in the following framework for surveillance:

Comprehensive: An adjective that can describe a surveillance system at many levels within and across diseases, species, and systems. Comprehensive surveillance describes an approach that includes diverse types of health indicators, relies on various data sources, and includes all aspects of the surveillance process. Comprehensive surveillance follows a specific plan, is objective driven, is coordinated at all levels, and is standardized, allowing for multiple-level (including national) conclusions to be made.

Integration: The combination of surveillance system components that have common characteristics to increase efficiency. Integration can occur on many levels; for example, multidisciplinary and harmonized planning, implementation, and analysis of surveillance systems across disease and species; standardized performance metrics to allow comparable information from different surveillance systems; and testing the same sample for multiple diseases (only when epidemiology and surveillance objectives justify that the cost efficiency gained does not detract from the quality and utility of surveillance information received). The information management component of a surveillance system particularly benefits from integration in allowing for an efficient exchange of information among the various stakeholders and across different surveillance systems. The resulting system allows for entry of and ready

access to multi-source information and optimal resource allocations by objective to avoid duplication.

Swine surveillance illustrates the evolution of comprehensive and integrated surveillance development. The first national surveillance plan successfully implemented under the NAHSS was for classical swine fever (CSF). While much of the design and development process was concomitant with building the foundation of the NAHSS, many elements were included— a multidisciplinary team of NAHSS partners, surveillance standards, the NAHLN, and a new information management system. All involved learned many important and valuable lessons from the progression of CSF surveillance resulting in modifications and enhancements in the approach to surveillance design, development, and implementation. Since then, the swine industry has prioritized additional diseases for national surveillance. In addition to CSF, the swine diseases that are current VS and industry priorities are pseudorabies (PRV), swine brucellosis, and vesicular diseases (specifically foot-and-mouth disease). These national plans have been/are being developed on the foundation of the NAHSS; they are each comprehensive, encompassing multiple objectives and data sources. The unique aspect of these plans is that with CSF surveillance already in place, opportunities for integration are actively being identified, evaluated, and captured for both PRV and FMD surveillance. They will be integrated to the extent possible to improve efficiency without compromising scientific integrity. The result will be the first three disease surveillance systems to be components of a comprehensive and integrated swine surveillance system.

The bovine spongiform encephalopathy (BSE) surveillance system is another example of a successful comprehensive and integrated surveillance system. In December 2003, a case of BSE was diagnosed in the United States; subsequently, the U.S. beef industry lost approximately \$2.5-3 billion in trade revenue. The need for joint efforts between many partners became urgent. NAHSS partners across VS developed a plan for enhanced surveillance. An information management system was rapidly developed for storing and analyzing sample data to provide information in support of regaining the lost markets. Participating NAHLN laboratories collaborated on laboratory procedures and processing samples. Field sample collection was coordinated between State veterinary offices, area Federal veterinary offices, USDA Food Safety and Inspection Service (FSIS) veterinarians in slaughter plants, plant managers, the rendering industry,

accredited veterinarians, and livestock producers. The extensive cooperation between NAHSS partners resulted in surveillance data that provided evidence to support reopening markets and maintaining consumer confidence in American beef.

The development and implementation of the swine and BSE surveillance systems has demonstrated the value of each aspect of the surveillance process in building a genuine comprehensive surveillance system--from objective-based planning to sample collection to data analysis and reporting. Furthermore, these two surveillance systems exemplify how integration goes much further than testing one animal for multiple diseases. Personnel costs are decreased when time spent and equipment used for sample collection on one disease can also be used to test for another disease; the infrastructure for field data collection, laboratory electronic messaging, and data storage systems need not be reproduced for each disease.

As VS continues its mission to safeguard animal health, comprehensive and integrated surveillance systems will expand to include the next diseases of priority—set by partners with common goals of maintaining an economically viable agriculture industry; trading partner and consumer confidence; and a safe, disease-free food supply. The NAHSS has been an important catalyst in advancing the comprehensive and integrated surveillance concepts, leading to more effective and efficient U.S. animal disease surveillance. This, in turn, provides the Nation's livestock, poultry, aquaculture, and wildlife populations with greater protection from endemic, emerging, and foreign diseases.