REPORT OF THE USAHA / AAVLD COMMITTEE ON ANIMAL HEALTH INFORMATION SYSTEMS

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The Committee met on Sunday, October 22, 2007 from 12:30pm to 5:30pm at John Ascuaga's Nugget Hotel, Reno, Nevada. Attendance included 13 members and approximately 35 guests. Sixteen guests requested Committee membership.

Stan Bruntz, United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), National Surveillance Unit (NSU), presented the National Animal Health Reporting System (NAHRS) 2007 update. The NAHRS Steering Committee convened June 19, 2007 by teleconference and met August 13-14, 2007 in Fort Collins, Colorado. The following issues were discussed and were brought forward to the full Committee: Participation—as of October 2007, 46 States (44 States in 2006) are currently reporting to NAHRS. All 46 participant states reported to NAHRS every month in 2006. NAHRS information continues to be an important source of information used by Veterinary Services to complete U.S. animal disease status reports for the World Organization for Animal Health (OIE). The NAHRS is a credible source of information to support trade negotiations. It also provides summary level information on 'program' diseases and foreign animal diseases (FADs) as well as being a national source of information on the confirmed occurrence of endemic OIE-listed diseases. In 2008 the direction of NAHRS will move from recruitment to national awareness of NAHRS with continued improvement and validation of NAHRS reporting. This will be towards the objective: That the NAHRS reflects the comprehensive summary-level animal disease status of the United States. Individual State NAHRS reporting reflects the summary-level disease status in that State. NAHRS Steering Committee Membership has been enhanced to include representation from the National Assembly of State Animal Health Officials (NASAHO), Regional USDA Area Veterinarian in Charge (AVIC), and National Poultry Improvement Plan (NPIP). Current representatives are NASAHO; Tony Frazier, Alabama; Keith Roehr, Colorado; Steve Halstead, Michigan; AVIC—Paul Sciglibaglio, Texas; and NPIP—Steve Roney. The 2006 NAHRS Annual Summary Report included resource information on OIE listed diseases and the OIE Reportable Disease list. The expansion of NAHRS aquaculture reporting is moving forward as monthly teleconference meetings are being held with the NAHRS Coordinator, NAHRS Aquaculture Chair, NAHRS American Veterinary Medical Association (AVMA) Liaison, VS Aquaculture Program Staff and other involved parties and stake holders. The NAHRS On-line Reporting Tool version 2 is set for release in November 2007. The system will improve the function and format of the on-line reporting tool. As requested by the Subcommittee on Equine Infectious Anemia of the United States Animal Health Association (USAHA) and NAHRS Equine Chairperson and approved, the NAHRS On-line Reporting Tool version 2 will also include an expanded equine infectious anemia (EIA) data request. The EIA module is optional but states that utilize it will not have to submit an annual EIA report to VS Equine Program staff. Also due to the recent increase of Equine Herpesvirus Myeloencephalopathy (EHV1-EHM) a request from Equine Commodity Chair, Tim Cordes was made and approved to collect qualitative presence/absence information on EHV1-EHM in addition to the combined EHV-1 and 4 information currently reported in NAHRS. Other issues currently being discussed include compartment versus commercial reporting in NAHRS and current OIE reporting that requires information on the

identification of the presence of infection/infestation, and the relation to NAHRS disease reporting criteria.

Stan Bruntz also followed up on the Committees' request to the Centers for Epidemiology and Animal Health (CEAH) that: …recommend that CEAH direct its staff, National Surveillance Unit in collaboration with other units, to compile and evaluate all current disease reporting and notification requirements in all States, and suggest a federal list of reportable diseases for consideration at the 2007 USAHA Annual Meeting, Reno, Nevada. The evaluation concluded that all states have some type of reportable disease list, or reporting requirements, but there is a significant lack of standardization between state lists. The basis for most lists includes FADs, OIE and 'program' diseases and several states utilize the NAHRS reportable disease list. These lists appear not to be updated as changes occur in the OIE or NAHRS reportable disease list. Diseases are also listed in multiple formats from state to state for the same disease. The diseases that should be reported to the national level and reporting requirements are listed in multiple areas of the Code of Federal Regulations (CFR) and VS memorandums. The reasons for a comprehensive U.S. National Reportable Disease List include: there are international animal disease reporting requirements with no corresponding U.S. national reporting requirement: diseases currently requiring reporting to the U.S. national level are listed in multiple locations of regulations and memorandums: state reportable lists lack standardization and are not updated as often as they need to be to provide accurate and timely reporting: the lack of a US Reportable Animal Disease List can be a trade issue, as one of the first requests from trade partners is to see the other countries National Reportable Disease List.

Aaron Scott, National Surveillance Unit (NSU), USDA-APHIS-VS, Centers for Epidemiology and Animal Health (CEAH), briefed the Committee on the current state of the development of the National Animal Health Surveillance System (NAHSS) as well as the need for development of a comprehensive, integrated surveillance program. The NAHSS began as a concept in the minds of many people thinking toward the future needs of industry to facilitate trade, consumer confidence, and informed policy decisions. Some of the outcomes of the concept were recommendations of the 2001 Safeguarding Review, a USAHA Resolution for a NAHSS strategic plan, the NAHSS Steering Committee, and the NSU – the first unit in VS wholly dedicated to surveillance. The NAHSS isn't happening by accident or overnight and will continue to develop for years to come. For over a hundred years, APHIS-VS and the agricultural industries have built one of the greatest disease control and eradication infra-structures in the world. Now, after successfully eliminating many of those diseases, it is time to shift surveillance thinking. Can USDA rapidly find animal disease in the United States – wherever it may arise? Can the United States make statements about its national disease status that will convince trading partners that its products are safe and convince consumers to buy them? Can national policy decisions be informed by information based on actual data, support industry and have the information needed to spend tax dollars wisely? Having a comprehensive, integrated NAHSS will provide information to do all of these.

Today, a comprehensive and integrated NAHSS has grown beyond a concept in the minds of forward thinking animal health experts. The NAHRS includes over 120 diseases in 6 species categories and geographically covers 46 states. A comprehensive inventory of surveillance systems in the U.S. is available at **http://nsu.aphis.usda.gov/inventory.** National surveillance plans are based on standards that allow for comparison between diseases and species and the opportunity to gain efficiencies at all levels in the chain of operations.

A good example of a national system is bovine spongiform encephalopathy (BSE). In 2003, the beef industry in the U.S. lost between 2 and 3 billion dollars following the detection of a positive animal. A surveillance system was developed with broad participation by State, Federal, and industry groups. It included the National Animal Health Laboratory Network (NAHLN), Animal Health Surveillance and Monitoring (AHSM) which is a new paradigm for data base development, and data translated into information that proved that the prevalence of BSE in the U.S. is very, very low. The final product of the surveillance system (i.e., information) strongly supported reopening of markets, consumer confidence in American beef, and policy decisions to reduce the costly testing done through enhanced surveillance. The bottom line of this comprehensive national surveillance system amounts to substantial dollars for our industry and savings from science based policy decisions.

Comprehensive surveillance doesn't stop with thorough coverage for a single disease. Standardized plans allow for integration and efficiencies across diseases and even across species. Infrastructure leverage for cost efficiency and common surveillance streams with multiple tests from one farm, animal, or laboratory submission when possible. National databases with similar structure support rapid analysis of trade and health questions. Analytic tools to make surveillance more cost effective and efficient and allow similar metrics to be applied for comparison. Most importantly, it will yield national level information to support decisions, policy, trade, and consumer confidence.

Richard Baca, USDA-APHIS-VS-CEAH, described the evolution of the generic database (CDB) into the universal database and the animal health and surveillance management (AHSM) application. The goal of the AHSM development project is to create a complete tool for animal health management, from initial data collection in the field to easy data retrieval and data interchange at the database level. The AHSM is not just a newer version of the GDB but GDB data will be migrated into it. In addition, AHSM will use a variety of interfaces customized to the needs of different animal health programs yet will be based on strict data standards that will facilitate data sharing between programs. In contrast to the client-server forms-based GDB, the AHSM will use a standard browser interface which greatly simplifies maintenance of the application. At the core of the AHSM will be a re-designed unified database (UDB) which will provide greater flexibility and security. Currently the AHSM comprises several modules to allow data capture of laboratory testing data for the scrapie, classical swine fever, Avian Influenza and Bovine Spongiform Encephalopathy programs. In the coming year additional modules and enhancements will be focused on the scrapie, chronic wasting disease and the classical swine fever programs. In addition to data capture functionality the AHSM will include significant enhancements such as mapping, data query and drill-down, automated generation of alerts, photo uploads and analytic tools. The USDA plans to form a new State/Federal Committee made up of users, analysts and information technology specialists, lead by staff from the Center for Animal Disease Information and Analysis and the NSU to provide oversight and direction for development of the AHSM. An immediate goal will be to create a common Data Management Plan for all data processing within the AHSM.

Sarah Tomlinson, USDA-APHIS-VS-NSU, gave the Committee an update on the development of a National Vesicular Disease Surveillance Plan. The NSU has a two-part approach to the design of vesicular disease surveillance. Part 1 is baseline surveillance for detection of the initial case; Part 2 is surveillance during increased risk or an outbreak. The three phases of each part are design, development, and implementation. The design phase of Part 1 is complete, and Part 2 is in the early design phase. The two objectives for surveillance are the rapid detection of disease introduction and for the analysis and documentation to support disease-free status. There are five general components of the vesicular disease surveillance plan: 1) observational surveillance, which includes both passive observation and reporting as well as active observational surveillance. 2) laboratory based surveillance, which is based on targeting pre-vesicular lesions and is in the final stages of design to incorporate foot-and-mouth disease (FMD) tested based on a trigger by clinical signs and case history and/or a syndromic panel that includes FMD. 3) high risk swine sero-surveillance on high risk populations, as identified by pathways assessments, which will integrate with existing CSF and pseudorabies (PRV) surveillance systems by using the same samples collected in waste feeding, outdoor herd and feral swine populations. 4) market based syndromic surveillance, an extension of active observational surveillance into markets, relying on accreditied veterinarians to play a crucial role in the prevention of disease spread. 5) risk-based intelligence draws in information from a variety of sources to identify a location or population of elevated risk in which targeted surveillance can be conducted accordingly. The next steps will be to finalize the design phase of Part 1 by establishing laboratory protocols, proceed with the development phase, including information technology charters and system requirements, and secure funding sources.

James Case, California Animal Health and Food Safety Laboratory, University of California-Davis, presented a review of non-traditional data sources for animal disease surveillance. The recognized limitations of laboratory based disease surveillance require utilization of additional sources of data that are not commonly included as components of focused surveillance program. Many of these are being investigated by state and federal agencies for

inclusion in their ongoing surveillance activities. Syndromic surveillance in the human health community utilizes a variety of data sources such as emergency medical services, school nurse records, school absentee records, physician outpatient encounters, over-the-counter pharmaceuticals, prescription pharmaceuticals, etc. Many of these data sources take advantage of existing code systems such as the National Drug Code, Current Procedural Terminology, International Classification of Diseases and others that are required for reimbursement or mandated reporting.

It is suggested that similar sources of data useful for surveillance are available for animal syndromic surveillance such as retail drug sales, non-identified herd health disease records, practitioner call records, corporate practice medical records, sale yards, abattoirs, vaccine sales and analytical test kit sales. Additionally, new technologies that allow searching of internet data sources such as animal related web sites, discussion forums, local and national media and blogs, can provide massive volumes of information that may be used to identify animal health events. Issues surrounding consistency, comparability and context of use of these data sources require that they be used carefully when included in animal health surveillance activities. The ability to perform event detection, spatio-temporal analysis and ongoing situational monitoring is highly dependent on the data quality of the sources used. A number of small scale projects have been undertaken to include some of these non-traditional sources and a renewed effort by the Center for Emerging Issues of CEAH to evaluate them in the context of improved surveillance may provide support for the value of these sources to improve our ability to monitor the health of animal populations. It is important to continue these efforts to augment the classical sources of surveillance data, taking into account the impact that they may have on decision and policy making and taking care not to overstate their veracity or understate their value.

Tracey Lynn, USDA-APHIS-VS, Center for Emerging Issues (CEI), described efforts underway to further develop surveillance for emerging animal diseases and issues. The focus of this development includes:

- alignment with the National Surveillance Units' Surveillance Standards
- bringing structure to current processes
- identifying current challenges and strengths
- updating and streamlining processes
- coordinating the plan with CEI and CEAH communication plans
- coordinating the plan with needs of other VS units

The objectives of this surveillance plan are to:

- provide timely warning of a suspected domestic occurrence of a foreign animal disease
- provide timely recognition of emerging diseases
- create a body of knowledge relative to global disease emergence, movement and changes in risk
- facilitate identification, assessment and forecasting of important trends affecting, or with the potential to affect, animal disease emergence, animal health or animal related industries

Data streams utilized include passive reporting and active observational data, both open source and structured data. Information from the Armed Forces Medical Intelligence Center, global newspaper services, animal-related listservs and websites, the Offshore Pest Information System and the newly created Argus biothreat surveillance system, among others, will be used. Potential emerging disease events are evaluated for level of risk using a weighted algorithm based on disease emergence factors. The risk level of the event combined with other intrinsic factors determine what information may be dispersed and to which customers. Expected outcomes from this surveillance effort include improved situational awareness, derivation of actionable information, detection of domestic emerging diseases, analysis of risk factors and identification of trends. A draft of a Communication Plan concerning this effort is under review; many of these surveillance processes are in progress already.

Andres Perez, Center for Animal Disease Modeling and Surveillance, University of California-Davis, addressed the Committee on FMD BioPortal: A System for Global Surveillance of Foot-and-Mouth Disease. Countries and agencies need to have a global situational awareness

for FMD and to be able to estimate, in real time or near real time, elevated risks of FMD so that appropriate measures can be taken to prevent or mitigate disease and its impact. One of the strategies for early detection of and response to FMD is that of global surveillance, which would aim to seek out specific information about new FMD cases, changing risks of FMD, and genomic changes in the FMD virus as necessary in planning and preparing for an FMD incursion. Although there has been considerable discussion about the needs and prospects for a global surveillance system for FMD, little in the way of formal action has taken place to create such a system.

The FMD BioPortal was developed initially as a collaborative effort of the FMD World Reference Laboratory at Pirbright, United Kingdom, the Artificial Intelligence Laboratory at the University of Arizona, and the FMD Laboratory at the University of California, Davis. Version 1.0 was made operational in January, 2007 (http://fmd.ucdavis.edu/bioportal/). An initial goal was to create a web-based system that would make all FMD-related data presently banked at the Pirbright laboratory available to the public. A primary objective was to be able to apply basic search and analytic tools to the data, including graphic and tabular presentation and spatial-temporal clustering analysis, and to be able to download selected records. Since its first release, additional databases have been captured by the FMD BioPortal, including FMD virus genomic data from GenBank and weekly country incident data from OIE (version 2.0). Major systems components of the FMD BioPortal include secure, real-time data transfer, data analysis modules, and interactive visualization tools that allow for integrated analysis and display of epidemiological and genomic sequence data, including linkages with Google Earth. Another version of the FMD BioPortal, which is planned for December 2007, will have additional functionality to access models for real-time development and comparison of phylogenetic trees of virus isolates using FMDV sequence data. One analysis module allows for user adjustment of a threshold genetic distance between any two isolates to assess genetic relatedness among FMD virus strains, using a phylogenetic tree display. Development of the FMD BioPortal represents an important step forward in realizing a goal of global infectious disease surveillance and in recognizing that global surveillance will not be possible without a system for international real time information sharing and analysis.

Tim Carpenter, Center for Animal Disease Modeling and Surveillance, University of California-Davis, addressed the Committee on Modeling as a Tool for Surveillance Planning and Analysis. Simulation modeling can be a useful tool in surveillance. It can be used either for exotic or endemic diseases, alike. For exotic diseases, such as FMD, simulation modeling can be applied in the planning, detection, response and recovery phases of a disease outbreak. Planning and detection- this is often thought of as the pre-war phase of disease, and as such presents an opportunity to simulate a wide range of scenarios. With respect to surveillance, alternatives can be evaluated, such as placement of virus detectors on sensitive premises, such as feed lots, sales yards, dairies and calf raising operations. Scenarios, such as number of these detectors and frequency of testing, can be evaluated in a benefit-cost manner, with the cost being the fixed and variable expenses of putting the system in place and its operating costs. The benefit would be the costs avoided by detecting the disease earlier than it would have been without the detector. Another application would be the application of a ring vs. regional surveillance strategy to detect disease. Response planning would hopefully also be done in a pre-epidemic period. Simulation modeling can be useful to guide surveillance to evaluate testing strategies during an outbreak. This could enable the evaluation of constraints, e.g. manpower, field or laboratory tests, on the system. Non-surveillance examples of useful modeling would include carcass disposal, depopulation and vaccination. Simulation modeling could be used to guide the surveillance program once the disease was contained. This could consist of maximizing the testing efficiency and focusing on either contiguous premises, dangerous contacts, or herds in a high risk zone. This directed surveillance application could be applied to the response phase as well and if so, it could also help guide the timing of testing, e.g. based on the time since animals were received in a herd. Based on "intra-herd" simulations, a more rational testing strategy could be selected.

Michael McGrath, TraceFirst Incorporated, described lessons learned in the development and implementation of information systems to address Emergency Preparedness and Disease Outbreak Management. All such information systems require a foundation of good information, good processes and good syste Good information exhibits the following characteristics:

- electronic availability 24x7, 365 days a year
- systematically refreshed
- housed in a system relevant staff can actually use
- queries can be formed and executed without an advanced degree
- spatially accurate

Failure to design and implement a system with these characteristics can lead to massive amounts of incorrect data and systems that are unable to answer the call and facilitate getting ahead of disease spread such as happened in the FMD outbreak of 2001 in the United Kingdom. Development methods must also be conducive to efficient change control and the design must include easy scalability as well as data segregation. A systematic approach to continual data quality improvement must be included. Spatial display and analysis has also become a "must-have" but should be implemented at a level appropriate for the average end-user while preserving links to full-featured spatial analysis systems for the experts.

The Committee considered, discussed and passed three resolutions that were forwarded to the Committee in Nominations and Resolutions.