National Animal Health Laboratories Network (NAHLN)
November 3, 2008

The United States Department of Agriculture's (USDA) Homeland Security Office established the NAHLN as part of a national strategy to coordinate and network the diagnostic testing capacities of the Federal veterinary diagnostic laboratories with the extensive infrastructure (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 bioterrorist events, newly emerging diseases, and foreign animal disease (FAD) agents that threaten the Nation's food supply and public health.

Laboratory Membership

In 2002, the Animal and Plant Health Inspection Service (APHIS) and Cooperative State Research Education and Extension Service initiated the network by entering into cooperative agreements with 12 State and university veterinary diagnostic laboratories. These were funded by Homeland Security appropriations. APHIS has since contracted with additional State and university diagnostic laboratories to assist with testing and surveillance. These contracts are with 54 State/university laboratories; the Department of the Interior (DOI) laboratory in Madison, Wisconsin; the Food Safety and Inspection Services laboratory in Athens, Georgia; and the National Veterinary Services Laboratories (NVSL), Ames, IA and Plum Island, NY campuses, for a total of 58 laboratories in 45 States.

The NVSL trains and proficiency tests the NAHLN member laboratories either annually or semi-annually. Tests include standardized screening methods for the currently targeted diseases in the NAHLN [avian influenza (AI), exotic Newcastle disease (END), foot and mouth disease (FMD), classical swine fever (CSF), bovine spongiform encephalopathy (BSE), chronic wasting disease (CWD), scrapie, and vesicular stomatitis virus (VSV)]. NAHLN laboratories perform screening assays and forward any suspect or positive samples to the appropriate section of the NVSL (the national reference laboratory) for confirmatory testing.

Current Activities

- **Revisions to VS Memorandum 580.4:** VS Memorandum 580.4 provides the procedures for investigating a suspected foreign animal or emerging disease incident. It outlines the foreign animal diseases (FAD) investigative responsibilities of AVICs, the Foreign Animal Disease Diagnosticians, and the NVSL. The original memorandum was written prior to having personnel in the NAHLN laboratories trained and proficiency tested to conduct screening assays for FADs. A laboratory issues working group was formed and developed the supplemental materials and policies that were needed to support the revision of the memorandum. The materials developed include revisions to the NAHLN Checklist and Policy document, as well as guidance for sample collection, scenarios, laboratory and state response plans, and discordant results.

- **Scenarios Testing:** The week of February 11, 2008, the NAHLN AI tabletop exercise was beta tested in IA and OH. The table top game exercise moves the participants through challenges encountered during an outbreak of highly pathogenic avian influenza. Participants gain enhanced awareness of laboratory issues they will encounter during an outbreak and have the opportunity to assess the completeness of their response plans. The tabletop was provided to NAHLN laboratory personnel and other animal health professionals in facilitated sessions throughout the United States during 2008. Thirty-eight (38) exercises were conducted involving 55 NAHLN laboratories. After Action Reports are being provided to participants for each exercise. A summary report will be produced and used to identify gaps and prioritize necessary actions.

- **NAHLN Review**: The NAHLN program was reviewed by stakeholders in 2007. The review report indicated that the mission, vision and founding principles are still valid, and appropriate recommendations for further program development were made. The NAHLN Steering Committee

developed a series of questions to gather the data needed to address the recommendations. Surveys were sent in March 2008, to various stakeholder groups (Laboratory Directors, State Veterinarians, industry groups and VS personnel). Data collected was analyzed by the NAHLN Steering Committee. A summary report has been prepared and will be provided to stakeholders.

- **NAHLN Laboratory Review Process:** The NAHLN review indicated a general concern of the quality of NAHLN laboratories. NVSL, NAHLN personnel collaborated with AAVLD to establish a process to review NAHLN laboratories. The 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:** One of the NAHLN efforts for the past several years has been to determine the amount of laboratory space needed to address the testing volume during and after an animal disease outbreak. Modeling is being used to help determine if adequate biosafety level-2 (BSL-2) and BSL-3 space is available to deal with the number of samples that would be generated in an outbreak and during recovery, as well as to aid in determining the reagents and supplies needed in the National Veterinary Stockpile.

- **High-Throughput Equipment Training:** Kansas State University hosted training workshops in collaboration with the NVSL, Diagnostic Virology Laboratory and Foreign Animal Disease Diagnostic Laboratory for the use of high-throughput testing systems. Sessions were held the weeks of May 19, June 23, and July 22, 2008. Representatives from 31 NAHLN laboratories participated in a two-day training course that included an overview of high-throughput systems, instruction on equipment programming, and breakout sessions that provided hands-on use of each piece of equipment. The systems have been validated for use with real time PCR diagnostic assays for AI, CSF, and FMD.

Ongoing Initiatives

- **"Train the Trainer" Program:** APHIS developed and implemented a "Train the Trainer" program for FMD, CSF, AI, and END rapid assays. This increased the number of State/university laboratories approved to conduct the CSF and FMD assays from 14 to 36. The program was implemented for AI and increased the number of State/university and DOI laboratories approved to conduct AI testing from 44 to 53 laboratories. The program was utilized upon the completion of the high-throughput system training when participants who successfully completed proficiency testing were then able to train other personnel from their laboratories as well as other laboratories. Not only has the program increased the number of laboratory personnel prepared to respond to a national animal health emergency, but it provides a cadre of trainers available to teach others. Successful implementation of this program is a significant step for the network and its mission of ensuring sufficient diagnostic capability and capacity to address an animal health emergency.

- **Surveillance Activities:**
  - **CSF Surveillance -** In January 2006, USDA implemented phase one of a surveillance plan developed by the National Surveillance Unit for CSF in states (and Puerto Rico) with a high risk for introduction of CSF. There are currently 36 NAHLN laboratories participating in CSF surveillance testing. The NVSL's Foreign Animal Disease Diagnostic Laboratory at Plum Island, NY, performs confirmatory testing.

  - **TSE Surveillance Testing -** Since June 2004, seven (7) NAHLN laboratories have participated in enhanced BSE surveillance testing. As of October 1, 2008, they completed in excess of 850,000 tests. The NVSL's Pathobiology Laboratory in Ames, IA, performs confirmatory testing. Surveillance for CWD and scrapie also occurs in 24 NAHLN laboratories.

- **Wildbird Surveillance -** Forty-five (45) approved State/university laboratories and one (1) DOI NAHLN laboratory conduct enhanced AI surveillance efforts for APHIS' Veterinary Services (VS) and Wildlife Services (WS). These laboratories determine if evidence of the AI virus is present and whether it is an H5 or H7 subtype. Because of the potential for H5 or H7 subtypes to mutate into highly pathogenic strains, the NAHLN laboratories forward presumptive positive samples to the NVSL for confirmatory testing. The NVSL then conducts additional screening tests and confirmatory tests with research assistance from USDA's Southeast Poultry Research Laboratory as needed to confirm genetic identification of isolated strains of the virus. The NVSL Diagnostic Virology Laboratory in Ames is the only internationally recognized AI reference laboratory in the United States.

- **VSV Disease Surveillance -** Personnel from six (6) NAHLN laboratories have been trained and proficiency tested. The complement fixation test for vesicular stomatitis can be conducted on equidae in approved laboratories after the index case has been confirmed by the NVSL.

- **Diagnostic Capacity:** NAHLN and AI supplemental funds were used to increase the overall diagnostic testing capability of member laboratories by supporting the development and distribution of high-throughput equipment. This technology allows semi-automated processing of diagnostic samples and test methods to enhance the daily testing output of each laboratory. In order to determine the most appropriate placement of the high-throughput testing systems in NAHLN laboratories, VS, NVSL, NAHLN requested the assistance of analytical epidemiologists within the USDA, APHIS, VS, Centers for Epidemiology and Animal Health (CEAH), Center for Animal Disease Information and Analysis, Risk Analysis Team. The team prepared a risk assessment model to evaluate the risk level of high pathogenicity avian influenza introduction and spread, and they created a prioritized ranking of states based on risk level. VS, NVSL, NAHLN purchased high-throughput equipment that was distributed in 2007 to 31 NAHLN laboratories located in the highest risk states. Training on the high-throughput testing systems occurred during May, June and July of 2008 which has helped ensure that there is adequate capacity to respond to diagnostic testing needs during an outbreak. Currently, APHIS is validating NAHLN methods for AI, CSF, and FMD using high-throughput testing systems.

- **USDA/DHS Diagnostic Roadmap:** The USDA and Department of Homeland Security (DHS) are continuing to update and implement a Diagnostic Roadmap to evaluate and prioritize gaps in available diagnostic technology for U.S. Agriculture and propose mechanisms to address and ultimately close the gaps. A high-level strategic roadmap, applicable across a range of FAD threats, was developed in addition to roadmaps specific for several high-consequence FADs.

- **International Collaboration:**
  - APHIS collaborates with the Canadian Food Inspection Agency laboratory at the Winnipeg National Centre for Foreign Animal Disease to produce, distribute, and use proficiency panels and reference materials to harmonize the diagnosis of major animal diseases between U.S. and Canada.

  - APHIS is working with animal health laboratory network personnel from Canada and Mexico to develop the terms of cooperation and a road map towards the harmonization of tests used in North America for the diagnosis of animal diseases. This initiative addresses a key objective of the Security and Prosperity Partnership of North America towards creating a safer and more reliable food supply, while facilitating agricultural trade, by pursuing common approaches to enhanced food safety, enhanced laboratory coordination, and information sharing.

- APHIS has developed and provided international training programs for AI epidemiology and diagnostics to laboratory personnel from 60 countries. APHIS has developed and implemented similar training programs in seven countries for FMD and brucellosis.

- **NAHLN Information Technology (IT) System:** A critical aspect of the NAHLN is the effort to standardize data, improve data quality, and maximize the efficiency of data transfer via the IT infrastructure and data repository. Defined electronic messages have been developed and implemented for CSF [real-time, reverse transcription polymerase chain reaction (rRT-PCR)], BSE [enzyme linked immunosorbent assay (ELISA)], and AI (rRT-PCR). The NAHLN IT system is being integrated with numerous existing animal health and veterinary diagnostic data networks to allow seamless electronic transfer of information from the time diagnostic samples are collected in the field, to the addition of appropriate diagnostic test information from the NAHLN laboratories, and finally to the daily reporting of relevant information from each submission to the NAHLN repository database.

  The NALHN IT system enhances surveillance programs, recognizes emerging issues, and provides automated alerts on defined animal health events to authorized personnel who support disease prevention and response. It is designed to simplify the reporting process and eliminate the need for duplicate data entry into the web-based applications supported by the Animal Health and Surveillance Management (AHSM) and Veterinary Services Laboratory Submissions (VSLS). Once messaged, the results are immediately applied to the appropriate samples awaiting test results both within the NAHLN as well as within AHSM and VSLS. Training on messaging has been provided to NAHLN laboratories and documentation on the process for messaging is available in the User Documentation Guide.

- **NAHLN Working Groups:**

  - **Exercises and Drills -** The group was established in September 2007 and is made up of representation from Core Member, Member, and Contract laboratories. This group assisted in developing laboratory based questions used in the AI Tabletop exercise and will also assist in developing and implementing drills for the NAHLN laboratories.

  - **Methods Technical -** The group, established in July 2006, consists of personnel from NAHLN laboratories and the NVSL as well as the Department of Interior, USDA's Food Safety Inspection Service, and the National Center for Foreign Animal Disease in Winnipeg, Manitoba. The working group provides input on various aspects of methods validation and approval of methods including: review of available methods and associated gaps; identification of potential new technologies; validation criteria; dossier review; assay approval process; equivalency of modified methods or for adaptation to new platforms; continual performance assessment of assays; development of performance characteristic summary documents for NAHLN assays; and issues associated with transfer of existing and new technologies to laboratories.

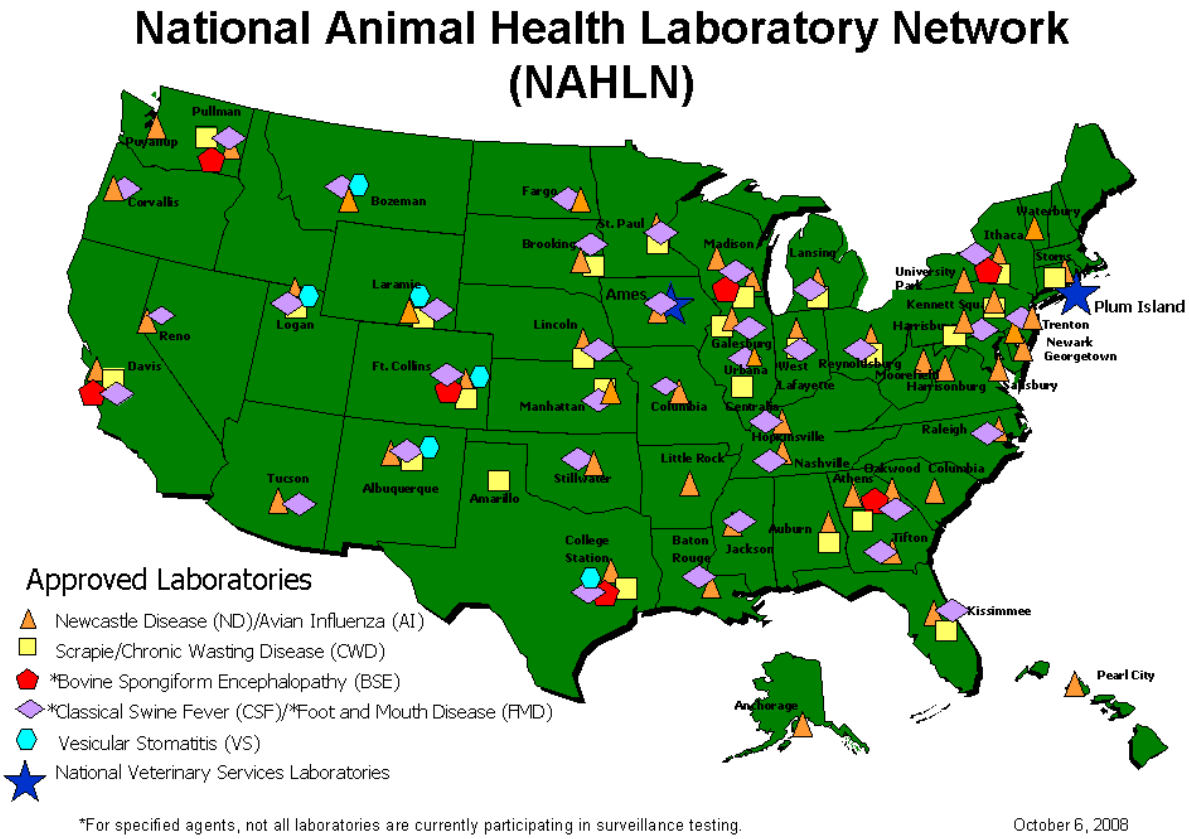
  - **Toxicology -** The NAHLN Toxicology Working Group was formed in April 2007 during the melamine/pet food issue. The working group wrote a white paper to request Federal funding to fully equip a series of AAVLD-accredited veterinary analytical toxicology laboratories with the following: state-of-the-art analytical instrumentation; the highly trained personnel required to run and maintain those instruments, and to provide recurring funds for those personnel; procurement of analytical reagents and standards; proficiency testing; methods/instrument development and validation; training; IT; emergency response; exchange of information; and for training the next generation of toxicologists. The group met in 2008 to discuss implementation strategies and the potential to partner with the Food Emergency Response Network.

- **Integrated Consortium of Laboratory Networks (ICLN)**: NAHLN is a participating member of the ICLN, which is a multi-department and multi-agency effort led by the DHS. The ICLN includes public, animal, and plant health response networks (Laboratory Response Network, Environmental Laboratory Response Network, Food Emergency Response Network, National Plant Diagnostic Network, and NAHLN). This group identifies gaps in surveillance and diagnostic efforts of national importance and develops mechanisms for collaboration and sharing of information and resources.

- **NAHLN Symposia:**
  - **2008 AAVLD/USAHA -** Emergency Response - NAHLN organized an Emergency Response symposium that will be held in conjunction with the 2008 AAVLD and USAHA meeting. Topics to be discussed include: developing and implementing disease response plans, VS and State roles and responsibilities during an outbreak; modeling to determine laboratory capacity; using bar-coding and IT to increase efficiency; NAHLN AI and other exercises; National Veterinary Stockpile, FMD vaccine bank; use of mobile laboratories; and integrated response.

  - **2009 WAVLD (World Association of Veterinary Laboratory Diagnosticians) -** Establishment of Veterinary Diagnostic Networks – VS, NVSL, NAHLN is organizing a pre-meeting symposium for the June 2009 WAVLD meeting, in Madrid, Spain, on the establishment and implementation of veterinary diagnostic laboratory networks.

- **NAHLN Website:** The website provides information on the organization, mission, and vision of the NAHLN along with current lists and maps of approved NAHLN laboratories. Information on the NAHLN IT system, surveillance efforts, and other NAHLN-related publications can also be found at http://www.aphis.usda.gov/animal_health/nahln/.


National Animal Health Laboratory Network
(NAHLN)
Pullman
Puyallup
Corvallis
Bozeman
Fargo
St. Paul
Brookings
Madison
Lansing
Waterbury
Ithaca
Storrs
University Park
Kennett Square
Plum Island
Trenton
Newark
Georgetown
Harrisburg
Salisbury
Reno
Logan
Laramie
Ames
Lincoln
Galesburg
Urbana
West Lafayette
Reynoldsburg
Moorefield
Harrisonburg
Davis
Ft. Collins
Manhattan
Columbia
Centralia
Hopkinsville
Raleigh
Little Rock
Nashville
Oakwood
Columbia
Athens
Tucson
Albuquerque
Amarillo
Stillwater
Auburn
Tifton
College Station
Baton Rouge
Jackson
Kissimmee
Pearl City
Anchorage
Approved Laboratories
Newcastle Disease (ND)/Avian Influenza (AI)
Scrapie/Chronic Wasting Disease (CWD)
*Bovine Spongiform Encephalopathy (BSE)
*Classical Swine Fever (CSF)/*Foot and Mouth Disease (FMD)
Vesicular Stomatitis (VS)
National Veterinary Services Laboratories
*For specified agents, not all laboratories are currently participating in surveillance testing.
October 6, 2008

NAHLN Approved Laboratories by Disease and State						
State	**AI Approved**	**END Approved**	**CWD / Scrapie Approved**	**CSF / FMD Approved**	**BSE Approved**	**VSV Approved**
AK	1	1				
AL	1	1	1			
AR	1	1				
AZ	1	1		1		
CA	1	1	1	1	1	
CO	1	1	1	1	1	1
CT	1	1				
DE	2	2				
FL	1	1	1	1		
GA	3	3	1	2	1	
HI	1					
IA	1	1		1		
IL	2	2	2	2		
IN	1	1	1	1		
KS	1	1	1	1		
KY	1	1		1		
LA	1	1		1		
MD	1	1				
MI	1	1	1	1		
MN	1	1	1	1		
MO	1	1				
MS	1	1		1		
MT	1	1		1		1
NC	1	1		1		
ND	1	1		1		
NE	1	1	1	1		
NJ	1	1		1		
NM	1	1	1	1		1
NV	1	1				
NY	1	1	1	1	1	
OH	1	1	1	1		
OK	1	1		1		
OR	1	1		1		
PA	3	3	2	1		
SC	1	1				
SD	1	1	1	1		
TN	1	1		1		
TX	1	1	2	1	1	1
UT	1	1	1	1		1
VA	1	1				
VT	1					
WA	2	2	1	1	1	
WI	2	2	1	1	1	
WV	1	1				
WY	1	1	1	1		1
NVSL - Ames, IA	1	1	1	1	1	1
NVSL - Plum Island, NY				1		
# of Labs TOTAL	**54**	**52**	**24**	**38**	**8**	**7**
# of States TOTAL	**45**	**44**	**21**	**34**	**8**	**6**