

2021 NAHLN Projects

National Animal Health Laboratory Network

Number of Projects Awarded: 21
 Amount of Funds Awarded: \$4,406,124

Funding Priorities: The 2021 NAHLN funding priorities targeted projects that will increase capacity for disease testing focusing on currently approved protocols, test development and validation and on rapid sequencing of emerging threats; increase capability to handle surge samples, specifically during sample entry and tracking, as well as through LIMS enhancement, and electronic messaging of results; and enhance laboratory emergency preparedness focusing on developing local and regional cooperation for regulatory testing through targeted outreach and exercise.

Project Title	State	Award Amount	Project Summary
Improving CVMDL emergency preparedness and response: developing next-generation sequencing capabilities	Connecticut	\$69,772	This proposal is aimed to support a NAHLN priority by increasing capacity for disease testing focused on rapid sequencing of emerging threats. Here we propose developing and implementing next generation sequencing (NGS) on clinical samples to detect and obtain whole-genome sequences of emergent or unknown pathogens.
Validation of Real-time Reverse Transcription PCR (RT-qPCR) Assay for the Detection of Spring Viremia of Carp Virus (SVCV)	Florida	\$141,327	Through our project, we aim to develop and validate in-house RT-qPCR assays for the detection of SVCV in fish tissues. This availability of rapid diagnosis via RT-qPCR will aid in the early detection of SVCV in outbreaks and facilitate the safe and swift movement of the aquaculture species around and outside the country. The validated protocols will be shared with NAHLN.
Enhancement of Laboratory Testing Capacity, Biosafety & Biosecurity Practices, and Communications Through Emergency Preparedness Exercises to Prepare for Outbreaks of African Swine Fever and Foot and Mouth Disease	Florida	\$146,876	The purpose of this proposal is to progressively increase the frequency of laboratory joint exercises performed, expand the scope of involvement of major stakeholders and most importantly evaluate the surge capacity for testing for FADs at BADDL. The exercise will focus on the proper biosafety and biosecurity implementation by FDACS staff and stakeholders, laboratory management and sample triage during high volume sample submission, testing surge capacities, preparing educational materials for stakeholders during an outbreak, testing communications between the NAHLN, NVSL laboratories, the public and stakeholders, and acquiring basic to advanced Incident Command System (ICS) training for staff to properly work within an ICS. The target audience that will receive direct benefit will be BADDL, Bureau of Animal Disease Control field inspection force, Florida Fish & Wildlife Conservation Commission (FWC), and local cattle and pig producers and owners in Florida. Overall, this will enhance animal emergency disease preparedness, communications, and response efforts for all participants.

Project Title	State	Award Amount	Project Summary
Enhancing avian diagnostics testing capacity for the detection and differentiation of avian influenza virus (AIV) and Newcastle disease virus (NDV) from other economically significant viral respiratory disease agents by multiplex real-time reverse transcription-polymerase chain reaction (rRT-PCR) assays	Georgia	\$224,126	Primary goal is to develop multiplex rRT-PCR assays that allows simultaneous, rapid and accurate detection and differentiation of both NDV matrix and AIV matrix targets with exogenous extraction control, all in one tube. Also, we propose to develop: a) other multiplex rRT-PCR assays that will maximize the efficiency for respiratory syndromic testing and include screening for infectious bronchitis virus (IBV) and infectious laryngotracheitis virus (ILT); b) multiplex assay for NDV matrix and vNDV F-gene.
Rapid identification and characterization of avian foreign animal diseases in a single-assay using Nanopore Sequencing	Iowa	\$323,951	Oxford Nanopore Technology (ONT) is a third-generation sequencing platform that can be used as a genome-centered, sequence-independent diagnostic tool. The goal of this project is to customize, optimize and validate ONT as a single-assay for the rapid identification and genetic characterization of Avian Influenza and Newcastle disease, in one step directly from clinical samples. We aim to utilize ONT, along with different enrichment methods to optimize the sensitivity and accuracy of the assay. Validation of this approach will be performed by comparing the sensitivity of identification with qPCR and sequencing accuracy for characterization with Sanger and Illumina sequencing.
SmartChip Real-Time PCR System significantly enhances the diagnostic laboratory preparedness for rapid detection of high-consequence foreign animal diseases (FADs)	Iowa	\$369,000	Veterinary diagnostic laboratories strive to develop and implement new platforms to reach the expected high level of readiness and volume of testing required during outbreaks. Yet, this often requires operating its own brand-new state-of-the-art instrumental and testing facilities, requiring infrastructure upgrades and costly improvements. Traditional real-time PCR (qPCR) is a powerful diagnostic molecular tool, which can process ~2000 - ~9000 reactions/96-384 well in 24 h. However, during the COVID-19 pandemic, traditional qPCR testing still lacked the high-throughput capacity necessary to satisfy the unprecedented testing demand experienced by many hygienic labs. The SmartChip Real-time PCR system has emerged as a powerful tool for identifying pathogens 1, (~40,000 qPCR reactions in 24 h) pushing the limits of rapid, high-throughput testing. The specific aim of this proposal is: Purchase a SmartChip Real-time PCR system, KingFisher Apex Benchtop Sample Prep and Bravo Liquid Handler instruments for rapid, high-throughput detection of FADs and other high consequence swine diseases adapting existing protocols.

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ASF PCR Negative Cohort Study – Partnering to expand testing capacities, support further evaluation and validation of two commercially available ASF PCR assays, and enhance preparedness across the NAHLN	Iowa	\$140,126	This study aims to build upon a number of USDA sponsored efforts looking to expand the number of ASF PCR assays and sample types approved for use to support ASF diagnostic efforts. Specifically, the proposed study serves to more fully validate the specificity of three ASF PCR assays across two aggregate sample types (oral fluids and processing fluids) in US swine. Fully validating the specificity of diagnostic assays across a range of otherwise complex sample types in clinical specimens obtained from farm sites across the country is especially important in FAD diagnostic use cases. In addition to the custom-built ASF PCR currently approved for use in NAHLN labs, this study will include ASF PCR assays produced by Tetracore and Thermo Fisher. These industry partners are leaders in molecular diagnostics for veterinary applications that have highly scalable diagnostic reagent manufacturing capacity in the US. This study aims to make a substantive contribution towards a much larger collective effort focused on creating a step-change in the ASF PCR diagnostic testing capacity and state of readiness across the NAHLN.
Increase Capacity For Testing for Chronic Wasting Disease (CWD)	Louisiana	\$381,451	The enhancement of the capacity for testing CWD in Louisiana is needed, and it can be accomplished by purchasing an additional automated Leica BOND-MAX™ instrument for IHC staining, a grossing station for tissue trimming, and improving sample entry and tracking using the Leica CEREBRO Sample Tracking and Workflow Management system. These upgrades to the current system will more than triple our CWD surveillance testing capacity and efficiency in the state of Louisiana.
Web-based Sample Submission for Foreign Animal Disease Investigations	Michigan	\$203,481	The goal of this proposal is to increase laboratory capacity and capability to respond to a foreign animal disease by creating a web-based submission process by capturing appropriate data, a higher quality of data, and a timely and accurate messaging of the diagnostic results to state and federal agencies. 1. Identify essential data to collect for a foreign animal disease submission. 2. Develop a web-based interface for data entry that communicates with LIMS. 3. Create LIMS interface for data management and reporting diagnostic results 4. Ensure LIMS and web-based submission form interface with each other.

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Increasing ASF preparedness by improving diagnostic submissions to the NAHLN laboratory in Minnesota	Minnesota	\$177,478	<p>The objective of this project is to improve the preparedness of swine producers and veterinarians against ASF by providing the resources they need to produce excellent laboratory submissions. This will be achieved by: 1) Developing training materials on ASF, regulatory testing, sample collection and sample submission; 2) Reaching out to veterinary clinics and swine production companies by in person visits. We estimate that we will need 40 in-person training sessions to assist veterinarians and producers that oversee >95% of the swine raised in Minnesota. During these visits, the training materials will be used to raise awareness of ASF diagnostics and to develop specific plans to improve the quality of laboratory submissions. Follow up support will be provided by email, phone and videoconference to help the submitters implement the changes identified in the improvement plan; 3) Evaluating the efficiency of the training through evaluation of real laboratory submissions and through simulation exercises. This project will enhance the preparedness of the Minnesota swine industry against ASF by increasing awareness of ASF diagnostics among veterinarians and producers and by improving the quality of laboratory submissions.</p>
Enhancing surge capacity with a streamlined online sample submission web application	Minnesota	\$99,647	<p>A key component of managing diagnostic testing in the face of a disease outbreak is a highly functional information system to streamline case accessioning and reduce the potential for errors. Online platforms for remote submission of case demographics that include required fields are especially useful when large volumes of samples are arriving from multiple locations for urgent testing. Our current online submission platform is outdated and needs to be updated to include multiple user platforms and enhancements such as bar coding of samples to speed accessioning and reduce errors. This funding will be used to create an updated version for routine and emergency use.</p>
Enhancement of chronic wasting disease (CWD) testing capacity	Mississippi	\$101,548	<p>Currently, only the BioRad platform is approved for CWD ELISA testing. MVRDL purchased one set of BioRad equipment in 2018 to meet the immediate needs of the state. In the event of equipment failure, which has already occurred a couple of times, MVRDL does not have in-house backup equipment to complete partially processed samples or to handle incoming submissions. A second set of equipment will allow us to increase capacity to meet the increasing testing goals of our state CWD regulatory agencies. The goals of this project are a) to mitigate the risk of not being able to perform CWD testing due to equipment failure and b) to increase the diagnostic laboratory testing capacity for CWD in Mississippi and surrounding states.</p>
Validation of Automated High Throughput Testing for Diseases of High Consequence	Nebraska	\$97,071	<p>Validation of Liquid handler. Automation of laboratory testing reduces error in test performance and reduces the need for additional personnel while increasing testing capacity. Automation of different stages of test procedures allows laboratory personnel time to be repurposed to perform tasks that require manual attention. Automated liquid handlers have the capacity to perform several critical test steps that reduce the need for manual liquid handling and can reduce the potential for human error.</p>

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Increasing capacity to handle surge samples through online submissions and elimination of the manual sample data entry step in the laboratory	Oklahoma	\$360,078	The goal of this proposal is to extend the online submission module of the VetView Portal to provide a cutting- edge platform that facilitates multiple-animal submissions for NAHLN reportable diseases and, subsequently, all test submissions to NAHLN laboratories.
Enhancing OVDL emergency preparedness for regulatory testing through exercise and inter-agency coordination	Oregon	\$332,349	This project will address critical gaps in the OVDL’s by enhancing laboratory emergency preparedness for regulatory testing through targeted exercise and inter-agency coordination. The project is designed as an iterative process of exercises and plan development and refinement, following well-developed models for strategic emergency preparation. Four cycles will include exercises, each with a unique scope and participant roster, followed by work on a preparedness plan, from development through refinement to implementation and integration into the OVDL’s quality management program, and training of OVDL staff. At the completion of the work, the OVDL will have developed, tested and trained on an emergency preparedness plan that will prepare the laboratory to respond to sample surges, testing for FAD and emerging and non-traditional diseases, while maintaining routine regulatory testing activities. Furthermore, the OVDL will have tested and refined cooperative emergency response preparedness for regulatory testing in the context of a statewide emergency response.
Increasing Regional Testing Capacity and Rapid Pathogen Characterization Capabilities at the Oregon Veterinary Diagnostic Laboratory	Oregon	\$183,966	Throughout the last 18 months, the OVDL has played a critical role in providing surge capacity to test human clinical specimens for the presence of SARS-CoV-2 while maintaining essential diagnostic services for veterinary hospitals and clinics and readiness to respond to emerging agricultural pathogens such as RHDV and SARS-CoV-2 in farmed mink. The experience and testing capabilities of the Molecular Diagnostics section at the OVDL for the surge testing needed throughout the state allowed us to provide a critical public health service. As the demand for SARS-CoV-2 testing winds down, we have the opportunity to incorporate equipment acquired during this extended emergency into our routine and emergency response testing workflows to support and expand our NALHN related surveillance and foreign animal disease investigation testing. Objective 1: Incorporation of new testing equipment into the OVDL veterinary diagnostic testing operations. Objective 2: Harmonization of laboratory protocols. Objective 3: Implementation of rapid sequencing of pathogens at the OVDL.

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Enhancing Expedited Bulk Sample Submission and Message Processing at the Oregon Veterinary Diagnostic Laboratory	Oregon	\$158,840	Oregon Veterinary Diagnostic Laboratory (OVDL) plans to integrate bidirectional data transfer between the Laboratory Information Management System (LIMS) and the laboratory instruments. This project is critical for streamlining the workflow and reducing data entry error during surge testing events. In addition, this project will support bulk messaging with minimal manual entry. Working with our LIMS vendor, Trace First, enhancements to the existing client portal will be made to facilitate the rapid submission of large specimen quantities. An improved submission template will be available to both submitters and for use within the labs which will expedite the collection of data and automate accessioning upon receipt at the laboratory. Further enhancements to the NAHLN messaging feature will provide the ability to quickly generate and send multiple messages per disease detection.
Data Exchange Between NAHLN Laboratories and Offices of State Animal Health Officials	Texas	\$117,777	Most recently, our LIMS vendor, Trace First, committed to develop a proposal for provision of test result data from Texas Veterinary Medical Diagnostic Laboratory (TVMDL) to TAHC. Recognizing the wider benefit that this offers, we have extended the scope of this to allow any CoreOne for Labs system to make result data available to any CoreOne system (including USDA's SCS systems); this would facilitate a national roll-out of the functionality envisioned in this proposal as the SCS system is available in all 50 States. This proposal will support and be implemented in adherence to the NLRAD reporting standards outlined in Appendix B of NLRAD System Standards – March 2020.
Notification of Priority and Emergency Disease Test Results	Washington	\$128,260	At its core, the system envisioned in this proposal will be based on the principle of defining “triggers” based on a number of factors. When a trigger event occurs, the notification system (NOTIFIER) will follow a workflow which will allow reliable and immediate notification of relevant parties. Notifications by email, text and automated phone call will be developed. Recognizing the sensitivity of the data and functionality in this proposal, the highest standards of system security will be adhered to. In collaboration with our LIMS vendor, Trace First, a dedicated and highly secure module (NOTIFIER) will be created. This module will be responsible for executing the workflows and sending out notifications whenever trigger events occur within a CoreOne for Labs system. The messaging standard created for CoreOne for Labs to transmit “Start Workflow” messages to the NOTIFIER will be an open standard so that other laboratories not using the CoreOne for Labs LIMS can also use the NOTIFIER for notification of animal health events.

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Enhancing Rapid Detection of Emerging Aquatic Diseases for Deployability	Washington	\$350,000	<p>In 2019, WADDL was awarded a NAHLN enhancement grant (AP20VSD&B000C015) “Laboratory Detection Preparedness of Emerging Diseases in Aquatic Species” where we proposed a methodology for pathogen discovery. Our investigatory approach was successful, as we achieved competency to characterize known and unknown aquatic viruses, principally guided by next generation sequencing. While we achieved our objectives, areas of improvement exist before this technology is legitimately deployable in a real-world outbreak situation, principally detection speed. We propose to build and refine our previous work by addressing this time-to-detection deficiency in two objectives: 1) test and integrate multiple novel molecular technologies for rapid detection using known high-consequence pathogens, and 2) apply these refined methods on an archive of multiple known and unknown isolates to assess method readiness.</p>
Increased capacity for disease testing with digital microscopy and whole slide imaging for NAHLN	Wisconsin	\$299,000	<p>The purpose of this project is to increase the diagnostic capacity of NAHLN scope diseases with purchase and validation of digital microscopy (DM) for routine and surge diagnostic samples. Digital microscopy (DM) will play an expanded role in highly complex veterinary diagnostic laboratories in to support of the NAHLN mission for collaborative and standardized diagnostic testing.</p>