

Near Real-Time GIS Mapping for Animal Disease Monitoring Utilizing Veterinary Diagnostic Laboratory Data Streams

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Overview--

The value of diagnostic testing can be viewed in two ways. The first is by focusing strictly on clinical cases. Diagnostic tests are ordered in hopes of arriving at a diagnosis of morbidity or mortality in a single animal or a group of animals. Historically, diagnostic specimens and results are generally have not been utilized beyond this purpose. Once a specimen has been used to generate the desired clinical results and diagnoses, a case report is generated for the client's perusal and files (e.g. practicing veterinarian or animal owner) and the specimens are discarded. A second means of generating value from diagnostic specimens is through conducting further testing on them. One example might be to look for multi-drug antibiotic resistance genes in bacterial isolates from many species. Possibly the greatest value can be generated through carefully designed diagnostic epidemiological studies that analyze data already available in laboratory archives to look for trends in serological titers or other results locally, regionally or even nationally to assess the geographic distribution of disease. Other creative ways of utilizing diagnostic data are listed here:

Direct Value (clinical case focused)--

- Improve treatment, management and prevention intervention for a single animal or herd
- Minimize/prevent economic losses
- Preserve the human-animal bond
- Identify a potential public health problem

Extended Value (research/epidemiology focused)--

- Potential for monitoring & increased situational awareness of animal health issues for practicing veterinarians, producers, animal owners, state veterinarian, AVIC through near-real time thematic maps, graphs
- Follow animal health trends through near-real-time retrospective studies (e.g. AMR, serovar drift, increased mortality, emerging diseases)
- Earlier recognition and response minimizes losses and can lead the development of new animal health products (e.g. improved management, new vaccine development)

Lack of situational awareness—

- Diagnostic case results that only benefits one animal or premise—re *incomplete outbreak communication*
- Lack of clinical awareness and curiosity leads to increased morbidity & mortality
- Lost income
- Fractured human-animal bond

Near Real-Time Monitoring—

- Real-time mapping of near-real-time diagnostic case results provides *better outbreak communication for practicing veterinarians and producers*
- Better situational awareness spurs faster medical response—can benefit a region, state or a nation
- Improved income
- Improved animal health outcomes
- Preservation of the human-animal bond

Obstacles, many laboratories—

- Cannot capture and archive confirmed/etiological diagnoses
- Do not maintain diagnoses in a structured or standardized format.
- Do not have dedicated IT staff to help implement/maintain new server or web-based applications.

Some good news—

- Due to the AAVLD Accreditation program with QA/QC programs that adhere to the ISO 17025 standard, VDLs produce some of the highest quality animal health data in the world!
- Near real-time thematic maps, seasonal maps and other products can now be produced and sustained with minimal investment in technology and staff.
- Near real-time monitoring of VDL data streams are proven to increase the situational awareness of animal health for veterinarians, producers and animal owners.
- System design will assure that client confidentiality will be fully maintained.
- Providing better animal health situational awareness is in agreement with the OIE philosophy of transparency.
- Better situational awareness of animal health issues will result in better outcomes.

Mission of the AAVLD Epidemiology Committee—

To communicate epidemiology concepts, techniques and methodologies *to enhance the efficacy and efficiency of veterinary diagnostics and utilization of veterinary diagnostic laboratory information for the maintenance of animal and public health.*

Mission of the Joint AAVLD/USAHA Animal Health Surveillance and Information Systems Committee—

Animal Health Surveillance and Information Systems are designed and implemented to solicit, obtain, *compile and manage data on animal health and disease and on factors that influence the health status of animals and animal population. Animal Health Surveillance and Information Systems are to provide information to stakeholders with a need, right and obligation to know in order to take action for the maintenance of animal and public health, control and eradication of disease, well-being of animals, profitability of animal industries and animal owners, and for the National and global good.* The Committee on Animal Health Surveillance and Information Systems encourages, stimulates and aids the design, development and implementation of such systems; the committee provides a forum for discussion of new developments and facilitates review and oversight of existing systems.

Resolution proposed to these two committees was approved in 2017—

Develop and implement a national and regional GIS mapping of high quality data streams captured by veterinary diagnostic laboratories to improve animal health situational awareness of reportable and non-reportable animal diseases (see Figure 1).

Figure 1. Resolution to the USAHA/AAVLD Joint Committee on Animal Health Surveillance and Information Systems and the AAVLD Committee on Epidemiology

**UNITED STATES ANIMAL HEALTH ASSOCIATION
October 12-18, 2017; San Diego, California**

RESOLUTION NUMBER: ___TBD_____ (numbered by Comm. on Resolutions)

**SOURCE: USAHA/AAVLD COMMITTEE ON ANIMAL HEALTH
SURVEILLANCE AND INFORMATION SYSTEMS
AAVLD COMMITTEE ON EPIDEMIOLOGY**

**SUBJECT MATTER: NEAR REAL-TIME MAPPING OF HIGH QUALITY
VETERINARY DIAGNOSTIC LABORATORY DATA
FOR IMPROVED ANIMAL HEALTH SITUATIONAL
AWARENESS**

BACKGROUND INFORMATION:

The mission of the AAVLD Epidemiology Committee is to communicate epidemiology concepts, techniques and methodologies ***to enhance the efficacy and efficiency of veterinary diagnostics and utilization of veterinary diagnostic laboratory information for the maintenance of animal and public health.***

The mission of the Animal Health Surveillance and Information Systems Committee is to design and implement to solicit, obtain and ***compile and manage data on animal health and disease and on factors that influence the health status of animals and animal population. Animal Health Surveillance and Information Systems are to provide information to stakeholders with a need, right and obligation to know in order to take action for the maintenance of animal and public health, control and eradication of disease, well-being of animals, profitability of animal industries and animal owners, and for the National and global good.*** The Committee on Animal Health Surveillance and Information Systems encourages, stimulates and aids the design, development and implementation of such systems; the committee provides a forum for discussion of new developments and facilitates review and oversight of existing systems.

When animal morbidity and mortality is suspected, the first step is to establish the existence of an outbreak and secondly verify the diagnosis. Veterinary diagnostic laboratories (VDLs) do an outstanding job of accomplishing these two steps in partnership with their clients---practicing veterinarians, producers and animal owners. One of the final steps of outbreak investigation is to communicate the findings. Laboratory testing results are communicated back to a lab client via a diagnostic case report that is mailed, faxed, emailed or made available via an electronic portal. Once the case is finalized and distributed, that concludes the communication. In other words, most veterinary diagnostic laboratories in the United States routinely utilize testing results to benefit the health only one animal or a group of animals on one premise. On the other hand, near real-time mapping of various VDL data streams (diagnostic test result such as diagnoses, etiologies, sensitivity testing) provide situational awareness for animal health (better communication of lab findings while still maintaining full confidentiality). Early recognition of animal health problems leads to quicker medical responses and better health outcomes. The real beauty of VDL data streams is that they originate in laboratories that are for the most part, fully accredited by the AAVLD to the ISO 17025 standard and some of the best quality control and assurance available with respect to method development, test validation, proficiency testing and beyond.

RESOLUTION:

The AAVLD and the United States Animal Health Association supports the development and implementation of a national and regional GIS mapping of high quality data streams captured by veterinary diagnostic laboratories to improve animal health situational awareness of reportable and non-reportable animal diseases. The University of Kentucky is willing to provide hosting and technical assistance for this pilot project.