A National Approach to Sustainable Syndromic Surveillance

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SUMMARY

The ability to rapidly identify and report infectious diseases of domestic animals is paramount to reducing the size and duration of an outbreak. There is currently a need in the U.S. livestock industry for a centralized animal disease surveillance platform, capable of creating and integrating multiple data streams. Such a system would establish baseline information on animal health and disease prevalence and would alert health officials to triggers potentially indicative of disease outbreaks. The United States Department of Homeland Security Science and Technology directorate is spearheading the development of AgConnect® and the Enhanced Passive Surveillance platform to establish animal health baselines and alert health officials to potential infectious disease outbreaks earlier, allowing for a more rapid response and increased animal health and economic security. This project advances the Department's mission to accelerate and expand the development of countermeasures against the introduction of high-consequence foreign animal, emerging and zoonotic diseases.
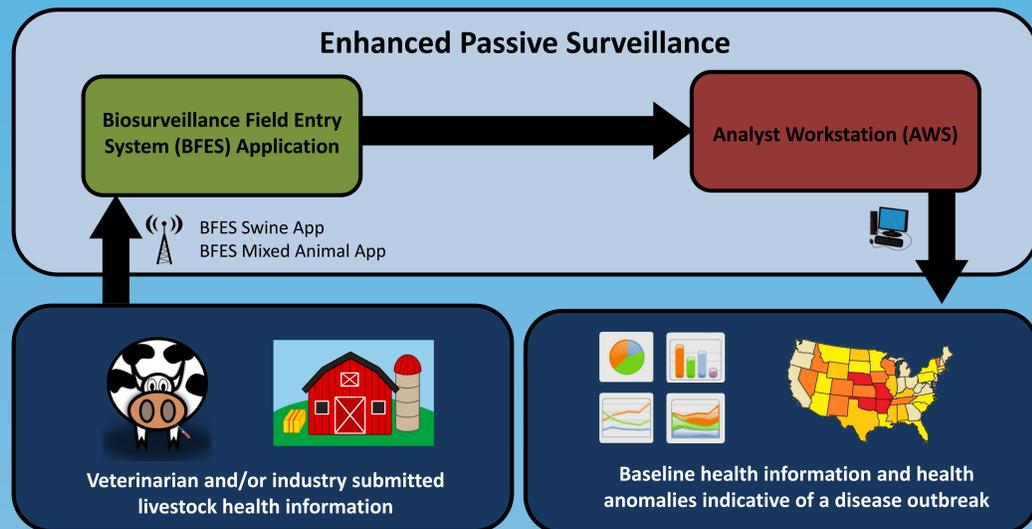
UNIVERSAL KEY ELEMENTS

➤ Incentives for daily use to encourage regular participation
➤ Ensure data security
➤ End-user buy-in and acceptance of concept
➤ Long-term sustainability

UNITED STATES CONSIDERATIONS

✓ Scalability
  • System should be amenable to integration into existing data systems at multiple levels of operation, including private practitioners, industry, and local/state/federal agencies

✓ Willingness to share data
  • Variability between willingness of veterinarians and industry to share animal health data; important to identify and provide incentives to encourage data sharing

✓ Desire for secure independent third party to maintain system and data access to ensure long-term viability of system
  • DHS has taken every measure possible to ensure this system provides value to animal health officials, industry and federal stakeholders; transitioning system to an independent third party will ensure long-term viability

Enhanced Passive Surveillance

Biosurveillance Field Entry System (BFES) Application → Analyst Workstation (AWS)

BFES Swine App
BFES Mixed Animal App

Veterinarian and/or industry submitted livestock health information

Baseline health information and health anomalies indicative of a disease outbreak

AgConnect®

Continuity of business is a high priority to any animal industry before, during and after a disease outbreak. AgConnect® includes several software applications with analytical functions that bring value to business and emergency management functions related to animal health. AgConnect®'s IT architectures allow for interoperability between new and existing applications and data. This approach allows customers to integrate AgConnect® data collection into their daily business practices while allowing authorized officials some visibility into the animal health posture of the nation. One of the applications under development is the "business continuity" function that provides data related to managing the safe movement of non-infected animals, and non-contaminated animal products, from non-infected premises in an animal disease outbreak. The ability to facilitate continued operations of non-infected premises is critical to allow commerce to flow and enable incident command to minimize the economic impact of the outbreak. By employing a system that is used daily prior to an animal disease outbreak, responsible officials at the state and federal level will have the data available immediately in the correct format to understand conditions and make informed decisions.

ENHANCED PASSIVE SURVEILLANCE (EPS)

The EPS system is an application housed within AgConnect® designed to provide early detection of endemic, zoonotic, transboundary, environmental and newly-emerging animal diseases. The EPS system was created to capture veterinarian-submitted healthy and syndromic information on livestock, poultry and wildlife health. The platform is freely-available to users via the Biosurveillance Field Entry System (BFES) application, designed for mobile devices and easily-deployable to the field. Veterinarians and industry animal health officials create an account through the BFES application and participate in a brief training module to learn how to use the application. After registration and training is complete, BFES users are provided access to aggregated animal health information submitted by other users in the state, allowing for better identification and diagnosis of disease as well as increased situational awareness of the status of animal health within their region. All completed syndromic assessment reports are submitted through the BFES application via cellular signal or wireless connectivity via the internet. Extensive security and user-appropriate permissioned data access processes are built into the system to maintain producer confidentiality.

CASE STUDY: THREE-STATE PILOT OF ENHANCED PASSIVE SURVEILLANCE PLATFORM

Minimum essential data elements required for Enhanced Passive Surveillance system.

Data Element	Justification
Visit date	Temporal change in occurrence of a syndrome suggests an emerging, spreading, or declining disease
Premises identifier	Assures that visit was to unique farm and evaluates population coverage within a state/county
Location elements	Demonstrates surveillance system coverage and, along with the premises identifier, defines how many unique observations occur in a geographical area
Primary type of operation	Disease and exposure risk can vary by operation type (e.g., cow-calf, feedlot)
Number of animals at operation by species	Provides denominator for number of animals at risk
Animal species observed	Diseases generally species-specific
Production type	Whereas operation type refers to facility, production refers to animals (e.g., cow-calf, breeding bulls, dairy, etc.)
Age	Disease may appear different during different parts of animal life cycle
Sex (M, F, mixed, neutered)	Disease may appear different depending on animal reproductive status
Number of animals observed	Denominator of observation sample (herd "sample size")
Syndrome count	Monitors syndromic trends and detects animal health anomalies
Dead count (mortality)	Number of animals reported dead in group
Total number sick (morbidity)	Capturing simply the number of animals with each syndrome doesn't reflect total herd morbidity due to potential for more than one disease

OBJECTIVES & METHODS

• Pilot test of the Enhanced Passive Surveillance system from July 2012 to May 2013
• Tablets pre-loaded with Biological Field Entry System (BFES) applications were deployed to veterinarians and animal health officials in Texas, Arizona and New Mexico
• Eight syndromic categories were available for reporting, including *Respiratory, Digestive, Toxicity, Vesicular Syndrome, Central nervous system, Musculoskeletal, Reproductive/Abortion* and *Sudden death*

RESULTS & FEEDBACK

• Of the 8330 reports submitted representing bovids, equids, small ruminants, swine and cervids, most were healthy (50.5%), followed by CNS/musculoskeletal syndromes (21.9%), reproductive problems (13.4%) and other syndromic findings.
• Feedback and ideas for incentives from end-users included:
  • Incorporation of industry-specific tools to customize the mobile application for business purposes
  • Automation of email of submitted report data
  • Tracking of billing information and case notes
  • Incorporation of electronic Certificates of Veterinary Inspection (eCVI) and other health reporting forms
  • Providing manuals and other reference guides
  • Monthly or quarterly reports, with more frequent reports during seasons of high risk for certain seasonal diseases
  • Instant access to submitted reports
  • Access to state data for visibility of other local reports
  • A blog for communication to other participating veterinarians
  • Diagnostic lab credit for test panels
  • Integration of test results with automated notifications
  • Training and continuing education
  • Surveillance and response tool integration into single system

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