REPORT OF THE USAHA/AAVLD COMMITTEE ON ANIMAL EMERGENCY MANAGEMENT

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The Committee met on Saturday, October 18, 2014, at the Westin Hotel, Kansas City, MO, from 8:00 a.m. to 1:30 p.m. There were 68 members and 66 guests present. At the beginning of the meeting, the mission statement was reviewed along with the USDA APHIS VS's response to the 2013 USAHA Resolution #2, *National FMD Preparedness Working Group*. Members and guests were referred to the USAHA website to view the responses to all of the 2013 resolutions. Twelve presentations were heard, two of which were time-specific papers.

Time-Specific Paper Title:

Dr. James Roth- Director, Center for Food Security and Public Health, Iowa State University presented a time-specific paper on the FMD Vaccine Surge Capacity for Emergency Use in the United States. The paper, in its entirety, is included at the end of this report.

Dr. Dan Grear – Quantitative Ecologist, USDA-APHIS-CEAH presented a time-specific paper on The Impact of Movements and Animal Densities on Continental Scale Cattle Disease Outbreaks in the U.S. The paper, in its entirety, is included at the end of this report.

Presentations

USDA APHIS VS Emergency Preparedness and Response

Dr. Jon Zack – USDA APHIS Veterinary Services (VS), National Center for Animal Health Emergency Management (NCAHEM)

Dr. Zack gave an overview of the animal emergency response and preparedness planning that occurred over the last year and laid out the goals and objectives for the overall emergency preparedness program.

USDA APHIS Veterinary Services Training and Exercise Planning
Dr. Lee Myers - USDA-APHIS-VS, Emergency Preparedness and Response Training/Exercise Initiative

Dr. Lee Myers in the United States Department of Agriculture Animal and Plant Health Inspection Service (APHIS) Veterinary Services (VS) Surveillance, Preparedness and Response (SPRS) Unit provided an update on the APHIS VS Emergency Preparedness and Response Training/Exercise (T&E) Initiative. Much progress has been made since the initiative was first proposed during the 2012 United States Animal Health Association meeting.

Dr. Myers reviewed the timeline of developments over the last two years and emphasized the approval and implementation of the *USDA APHIS VS Emergency Preparedness and Response Training/Exercise Strategy and Plan Fiscal Year 2015 – 17* (VS TEP). The restructured VS T&E team developed the plan during its annual T&E planning workshop in April 2014. The VS TEP provides a forum and process to build the VS-wide T&E strategy and plan in collaboration with external stakeholders and T&E subject matter experts. The plan also provides the roadmap to enhance emergency response capabilities, and identifies T&E priorities and objectives that support the VS emergency preparedness strategy. The plan outlines a detailed, multi-year schedule of T&E events linked to each priority and objective, adding practical value.

The VS TEP clearly supports the SPRS Mission – to apply competencies of our highly trained workforce to prepare and practice animal health and all-hazard response plans – and the SPRS Goal – to strengthen and integrate preparedness and response services by conducting comprehensive response training and exercises. The APHIS VS Professional Development Staff is an integral component of the initiative and works closely with VS management to ensure that emergency preparedness and response education and training needs are met, in partnership with APHIS.

Dr. Myers reviewed the most frequent emergency preparedness and response training topics from the FY14 survey to VS personnel and external stakeholders. The most valuable and requested training by far was for the Incident Command System, followed by a distant second of biosecurity/personal protective equipment; communications; epidemiology/outbreak investigations; sampling; and specific diseases. The survey results and those from future surveys will be considered by the VS T&E team for planning purposes. The SPRS leadership recognizes significant training challenges that should be addressed, including the proper alignment of T&Es with capability gaps, application and use of learned skills, and ways to help responders take advantage of the many training materials already available.

The VS T&E initiative is a work in progress and is taking a progressive approach to build capabilities. The initial focus is on the VS mission-critical responsibility to prepare for and respond to foreign animal diseases/emerging disease incidents (FAD/EDI). It will take time to establish a track record of success beginning with simple, achievable events.

The VS TEP includes three overarching priorities.

1. Formalize the emergency preparedness and response T&E initiative within the VS reorganization.
2. Train VS and external stakeholder emergency responders.
3. Exercise VS' and external stakeholder emergency responders' capabilities to prepare for and respond to FAD/EDI.

The following 12 VS TEP objectives are aligned with each T&E priority.

1.1. Identify the VS T&E strategy, priorities, objectives, and resources for the next three years.
1.2. Collect T&E feedback and maintain data.
2.1. Collaborate with USDA APHIS PPQ to raise awareness of locally available ICS training.
2.2. Identify training needs, develop training materials, and deliver training for FAD/EDI preparedness and response.
2.3. Promote and support FAD/EDI response training already provided by VS PDS.
2.4. Develop one health core competency capabilities.

2.5. Develop and deliver risk communication training.
3.1. Conduct discussion-based exercises to validate emergency preparedness and response plans and capabilities.
3.2. Conduct a series of exercise drills to test specific operational procedures and functions.
3.3. Participate and engage in T&Es sponsored by or in collaboration with external stakeholder emergency responders that support the VS T&E strategy.
3.4. Adopt a process for VS T&E improvement planning.
3.5. Explore new technologies and processes.

There are multiple events in alignment and support of each VS TEP objective. Events may be specific tasks or actions, training initiatives, or discussion-based or operations-based exercises. Working groups are formed for each event and are open to VS T&E team members, subject matter experts, and other personnel impacted by the event. Groups meet regularly, primarily through virtual means, throughout the year to continue progress. Following is the list of VS TEP events for the Federal fiscal year 2015, which includes 16 training events and 12 exercise events.

All events engage both VS and external emergency response stakeholders.

1.1.1. Establish and institutionalize a VS T&E program, including necessary resources, within the VS reorganization.
1.1.2. VS T&E team conduct a VS T&E workshop each year.
1.1.3. Publish a multi-year VS TEP each year.
1.1.4. Implement the updated VS TEP beginning October 1 of each year.
1.2.1. Prior to the workshop each year, request feedback and input from all VS units and external stakeholder emergency responders on the VS T&E priorities, objectives, and events for consideration in the VS TEP.
1.2.2. Develop and implement a process to catalog VS T&E events and appropriate external T&E events, and have the information accessible to VS personnel and external stakeholder emergency responders.
2.1.1. Distribute the USDA APHIS PPQ list of available ICS courses to emergency responders on a quarterly basis.
2.2.1. Reach out to VS emergency responders and raise awareness about the VS TEP.
2.2.2. Conduct an FAD diagnostician swine euthanasia, personal protective equipment, necropsy and sampling wet laboratory. (FY15 VS micro-grant)
2.2.3. PDS staff promotes available training for working with law enforcement and border patrol.
2.2.4. ICS position-specific training: Kifco poultry foam unit training for emergency responders responsible for poultry depopulation.
2.2.5. PDS staff market training opportunities to emergency responders on a quarterly basis.
2.3.1. Develop new training for Secure Food Supply plans.
2.3.2. Develop new training for VS foot-and-mouth disease vaccination policy and contingency planning.
2.3.3. ICS position-specific training: Captive bolt training for emergency responders responsible for depopulation.
2.3.5. Quarterly FAD/EDI continued education distance training, e.g., disease refreshers, including tick-borne FADs, novel diagnostic technologies, and screwworm response.
2.3.6. Emergency response support roles, e.g. biosecurity and safety.
2.4.1. Develop training materials on one health core competencies and integrate them into future training events.
2.5.1. ICS position-specific training for Incident Commanders and Public Information Officers: Develop and deliver an annual risk communication course focused on an FAD/EDI response.
3.1.1. Livestock market emergency response plan template and workshop. (FY14-15 VS micro-grant)
3.1.2. National Animal Health Laboratory Network FMD laboratory receiving/accessioning drill. (FY14-15 VS micro-grant)
3.1.3. Two-day national workshop for incident management teams to build draft SOPs for transfer of incident command.

3.1.4. Two-day national workshop for federal IMTs, and state and regional animal health partners to review processes, identify gaps, and develop SOPs that will expedite issuance of SFS permits.
3.1.5. One-day workshop at APHIS headquarters to develop SOPs to recall and mobilize personnel assigned to the APHIS Emergency Operation Center for an FAD/EDI.
3.2.1. Drill in each VS SPRS District (6 total) to validate procedures for the investigation of potential FAD/EDIs and Emergency Management Response System 2.
3.3.1. Multi-State Partnership for Security in Agriculture and VS two-day, face-to-face workshop to build plans and procedures for area command and resource management during a multi-state FAD outbreak
3.3.5. VS personnel participate in external stakeholder exercises.
3.4.1. Develop and implement an effective corrective action program to ensure that improvement plans from exercises and emergency incidents are implemented; corrective actions tracked to completion; and tangible preparedness improvements are documented, distributed, and implemented.
3.5.1. Assess new technologies and processes that can support virtual exercise design/development, conduct, evaluation, and improvement planning.

The complete VS TEP can be downloaded from the APHIS VS website link http://www.aphis.usda.gov/animal_health/prof_development/downloads/VS_Training_and_Exercise_Plan_document.pdf

VS recognizes the wisdom in developing a T&E strategy and identifying program-wide T&E priorities to assure the emergency preparedness and response mission will continue to be achieved. This process is particularly important in light of the VS reorganization and recent reduction in agency resources. Implementing the VS emergency preparedness and response strategy will prepare through training and exercises for a high-consequence FAD/EDI and/or pest response requiring emergency responders for multiple rotations.

Emergency Management Response System (EMRS) Update
Dr. Fred Bourgeois – USDA-APHIS-VS-SPRS-NPIC

Dr. Fred Bourgeois, EMRS National Coordinator, provided the update from the USDA, APHIS, Surveillance, Preparedness & Response Services, National Preparedness & Incident Coordination Center EMRS Team. Dr. Bourgeois focused his comments on the Emergency Management Response System (EMRS2) application. Dr. Bourgeois explained that EMRS2 was built on the Microsoft CRM Dynamics platform as a custom XRM in-house development project during the past several years and was put into production in November of 2013. The legacy EMRS1 data was migrated to the new system and EMRS1 was decommissioned. EMRS2 has a number of custom entities for managing premises and the related animals and activities for FAD Investigations; and other disease incidents such as the premises, animals, animal groups, structure entities for managing the basic information as well as the investigation entity for managing activities related to an investigation. During investigations he explained there are a wide variety of activities that can be tracked including examinations of animals or groups of animals and the subsequent sampling and submission of samples to diagnostic labs. Currently the system is being used extensively for the SECD incident in swine including sending electronic lab results from the NAHLN Labs to EMRS2. The tracing and traceability functions are quite extensive and the Cattle Health Program has requested that all tracing activity after October 1, 2014 be entered into EMRS2. Dr. Bourgeois then participated in a Q&A session with other members of the NPIC staff.

Responding to PEDv – Lessons Learned
Dr. Paul Thomas, Associate Veterinarrian, AMVC Management Services, Audobon, IA, USA

Porcine epidemic diarrhea virus (PEDv) was discovered in the United States for the first time in May 2013. Since its arrival, PEDV has spread quickly across the US causing severe losses of piglets on sow farms and performance losses in grow-finish production. The response to PEDv varies from farm to farm, often incorporates both proven methods used to control other diseases and new methods to address PEDv-specific challenges, and is constantly evolving as experience and research provide

veterinarians with new information and tools. This summary serves to address a few of the practical lessons that have been learned while working to prevent and control PEDv on sow farms within the AMVC system.

The current response at AMVC when a farm becomes infected with PEDv is a three-part process involving removal of susceptible piglets from the farm, homogenizing the disease and immune status of all remaining animals, and elimination of the virus from the farm. Mortality among nursing piglets that become infected with PEDv is near 100% in naïve populations. To reduce losses, all piglets 10 days of age or older are weaned immediately following diagnosis of PEDV on the farm. Following this early "wean down," replacement gilts are brought into the farm and the entire farm is exposed to PEDv via oral immunization with intestinal contents from acutely affected piglets. Oral immunization should be performed until every adult animal has displayed clinical signs of PEDv infection (diarrhea, lethargy, anorexia). Once all adults have been properly exposed to PEDv, additional exposure should be halted and elimination processes begin. Elimination of PEDv from the farm is accomplished by cleaning and disinfecting facilities to remove and inactivate PEDv in the environment and by removing sources of new/ongoing virus replication from the farm. All facilities must be thoroughly washed and disinfected not once, but continuously, to remove all PEDv from the farm as sows continue to shed in the weeks post-infection. Until immunity can be conferred to piglets through the dam's milk, all piglets will continue to become infected, shed huge amounts of virus into the environment, and die. For this reason, all piglets should be humanely euthanized at birth for a period of three to four weeks following immunization of the herd. In the weeks and months following the resolution of normal health, cleanliness on the farm is crucial to prevent the movement of PEDv and re-infection of susceptible animals while other animals in the population are likely still shedding.

To minimize immediate and ongoing losses from PEDv, it is critical to have a response plan that is clearly communicated to farm personnel and ready to be implemented immediately. The first step of an outbreak response is to remove susceptible piglets from the farm. By responding rapidly, we maximize the number of animals that can be removed from the farm prior to becoming infected with and dying from PEDv. A rapid response requires having trailers and transporters ready to move pigs in a matter of hours. It also requires having a facility ready to receive these animals and specialized diets to accommodate the young age and nutritional needs of the group. Figure 1 illustrates the differences in PEDV-related losses at two different farms.

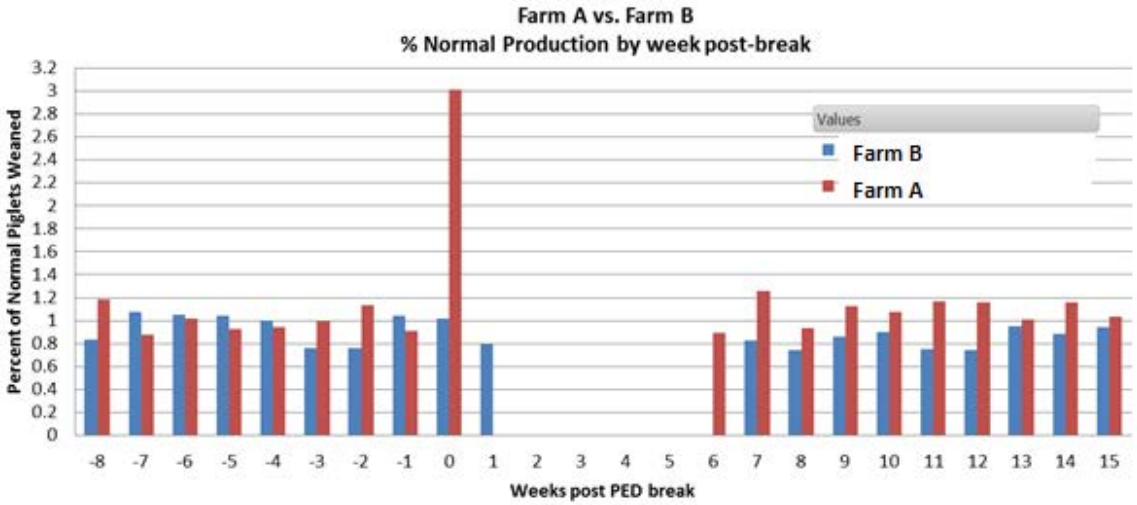

Figure 1: Differences in upfront piglet losses due to differences in response time. Farm A was ready to move piglets offsite immediately, while Farm B did not have a plan in place to react quickly. This allowed Farm A to save more piglets upfront.

During a PEDv outbreak and for several weeks or months following an outbreak, cleanliness on the farm is critical. Apart from proper facility washing and disinfection as described above, other practices

should be implemented to stop virus movement between animals. Most of these steps are targeted at maximizing farrowing room cleanliness because newborn piglets are the most susceptible animals on the farm. Practices include inspection of farrowing creates following power washing, washing sows as they are moved to the farrowing rooms, never stepping in farrowing crates, and eliminating all movement of piglets between litters. Boot wash/disinfection and hand wash stations should be set up in farrowing, gloves should be changed between litters and litters should be processed at 24 hours of age – prior to the shedding of any PEDv. Figure 2 illustrates the impact of cleanliness on ongoing piglet losses at two farms.

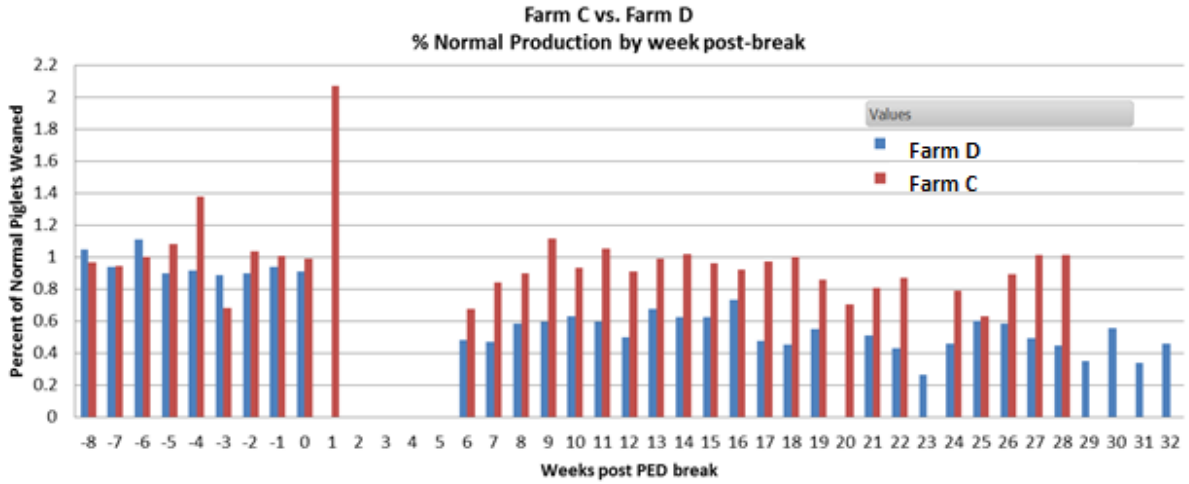

Figure 2: Effect of farm cleanliness on ongoing piglet losses. Farm C implemented strict cleanliness practices, while Farm D struggled with cleanliness procedures, resulting in prolonged increased piglet mortality.

This summary has only touched on a few of the key concepts to keep in mind when working with sow farms to overcome PEDv. By no means is it a complete list, nor could a complete list be created because each farm will have its own challenges to identify and learn from. What's important is to evaluate the processes that are in place on the farm to identify areas of greatest risk and find the points where changes can be made to mitigate these risks. In fact, that is just what the included figures represent – early cases that we learned from and used to prevent future losses at other farms.

Proactive Risk Assessment to Support Managed Movement of Livestock and Poultry During a Disease Outbreak

Dr. Timothy Goldsmith, Assistant Clinical Professor, University of Minnesota, Center for Animal Health and Food Safety

The movement of live animals during a Highly Contagious Animal Disease event such as with a Foreign Animal Disease (FAD) or and Emerging Disease Incident (EDI) carries significant risk for potential disease spread. Conversely, movement restrictions also carry risks including the potential negative effect on continuity of business for un-infected livestock and poultry operations and processing facilities within the control and surveillance zones. Historical outbreaks have demonstrated that the movement of livestock and poultry without adequate mitigations can contribute to disease spread, while not allowing movement of uninfected animals can result in unintended negative consequences to the animals, producers and affiliated industries.

Proactive Risk Assessments are being developed as part of the Secure Food Supply plans to address the need for science and risk based tools to facilitate managed movement of non-infected animals and non-contaminated animal products from uninfected premises in an FAD outbreak. The goal is to facilitate normal agriculture and food industry business operations, while simultaneously mitigating the risk of disease spread from the managed movement.

Proactive Risk Assessments are developed using a public-private partnership approach that involves working groups comprised of industry, state and federal regulatory and academic members. These working groups provide input, data and subject matter expertise into the evaluation process.
The proactive risk assessments include detailed characterization of industry operations and the associated movement; hazard characterization related to specific disease; identification of risk pathways; along with a combination of information sources that include modeling, literature review and expert opinion to evaluate the likelihood of transmission for the risk pathways. Qualitative as well as quantitative risk assessment approaches are employed, with quantitative models developed when appropriate data exists and qualitative approaches used to evaluate pathways with limited quantitative data.

Initial proactive assessments focused on the movement of commodities and utilized an assumption of "infected but undetected" source premises as a conservative approach, as this would be the highest risk situation assuming that movement from known infected premises would not be permitted and truly uninfected premises do not have the causative agent present. As this approach is applied to movement of livestock there are some additional complexities as some of the simplified assumptions used with commodity assessments are not applicable. For the movement of livestock or poultry the likelihood of infection as well as the likelihood of being undetected needs to be assessed. This risk based approach is designed to be a transparent process which incorporates all the applicable production, regulatory and mitigation practices to access the resulting risk to guide risk managers during an outbreak situation.

Outcomes and tools produced through the proactive risk assessment process include the evaluation and/or development of existing mitigation measures that apply to the livestock movement or commodity in question. These include surveillance requirements and options, biosecurity guidelines, cleaning and disinfection procedures, Good Manufacturing Practices and existing regulations. Ultimately the process facilitates development of permitting guidance for use by risk managers in decision making during an outbreak and for preparedness planning prior to an outbreak. Currently, proactive risk assessments for the movement of livestock and poultry are being developed as part of the Secure Broiler Supply, Secure Turkey Supply and Secure Pork Supply plans with anticipated work in the Secure Egg Supply and Secure Milk Supply plans forthcoming.

AgCONNECT ^{TM} and its Role in Enhanced Passive Surveillance (EPS)

Dr, John Korslund, Detailee, Science & Technology Directorate, Department of Homeland Security, Washington DC.

AgCONNECT ^{TM} is a suite of data analysis and integration tools that support multiple functions of animal health emergency preparedness and response. These tools have the capability to integrate data from disparate data sources into a single, easy-to-use, real-time common operating picture for data analysis and visualization. Additionally, they can be customized to meet the individual needs of the user/stakeholder.

The biosurveillance tools of AgCONNECT ^{TM} include mobile applications for field data entry and a web-based Analyst Workstation (AWS) for data analysis and visualization. These tools support an integrated national animal disease surveillance program capable of real-time animal health status reporting from multiple sources to provide early indicators of abnormal animal health events. The mobile applications are available for use on multiple devices and platforms and serve as an interface for veterinarians and inspectors to enter clinical animal health data from livestock and poultry premises, feedlots, and markets. Information from the mobile apps are transferred to the AWS, allowing epidemiologists to aggregate real-time data through the use of visual, geospatial, and temporal analysis tools. The mobile applications also provide valuable information back to practitioners regarding other syndromic reports in their state, providing access to a unique information source to aid in animal diagnosis and treatment. It is anticipated that the program will be rolled-out to at least 15 states and into all major livestock and wildlife industries by the end of the current pilot project.

AgCONNECT ™ also includes a business continuity function for use by the livestock industries, state animal health officials, and emergency responders to maintain commerce during a high-consequence animal disease outbreak. This tool allows for the secure, real-time sharing of needed production and movement data, including the Secure Food Supply Plans. Key pieces of data (such as such as premises locations, livestock census information, disease surveillance results and animal movements) are collected and can be aggregated and visualized for analysis and situational awareness through the AgCONNECT ™ system. Additionally, key partnerships and agreements are being secured prior to an event in order to ensure seamless data sharing and informed decision making.

AgCONNECT ™ : Supporting Pork Industry Operations During and Animal Disease Outbreak
Dr. Patrick Webb, Director of Swine Health Program, National Pork Board, Des Moines, IA

The U.S. pork industry continues to work cooperatively with state and federal animal health agencies/departments to improve the infrastructure for emergency preparedness and business continuity. Central to this effort is the incorporation of a nationally standardized premises identification number (PIN) into current industry business practices. This tool offers the ability to link premises, animal movement and diagnostic data so that it can be securely viewed and analyzed by animal health authorities to help guide appropriate action.

To support business continuity during a foreign animal disease (FAD) outbreak, rapid sharing of data between producers and government is critical. To help demonstrate this capability, the National Pork Board has partnered with the Institute for Infectious Animal Diseases to begin a pilot project using Ag Connect, an internet-based tool to help maintain business continuity and perform risk management during a FAD outbreak.

Pilot project participants included Iowa State University's Veterinary Diagnostic Laboratory, Iowa State University's Center for Food Security and Public Health, an Iowa-based pork production system and the Iowa Department of Agriculture and Land Stewardship. The project successfully demonstrated the ability to securely share data associated with premises identification numbers for analysis and decision-making. In the case of a FAD outbreak, this information could be used to support state and federal animal health officials in making near real-time decisions regarding risk, swine movements and disease status that would help a production system maintain business continuity.

FMD Vaccine Surge Capacity for Emergency Use in the United States
Dr. Jim Roth, Director, Center for Food Security and Public Health, Ames, IA

Foot and mouth disease (FMD) presents the greatest economic threat to U.S. animal agriculture and is viewed as the most important transboundary animal disease in the world. An outbreak of FMD in the U.S. would have a devastating impact on the U.S. economy extending far beyond animal agriculture. The structure of modern animal agriculture in the U.S., including extremely large herds and extensive intra- and inter-state movement of animals and animal products will make it nearly impossible to control an FMD outbreak in livestock dense areas without the rapid use of tens of millions of doses of FMD vaccine.

The amount of antigen in the North American FMD Vaccine Bank is based on the old model of stamping out and limited vaccine use to control FMD. The strategy for FMD control has changed due to changes in animal agriculture and the public acceptance of stamping out. The current plan for FMD control depends much more heavily on vaccination. The amount of vaccine antigen concentrate in the North American Foot and Mouth Disease Vaccine Bank is far below what would be needed to provide vaccine for a single livestock dense state. It would take many months to produce/obtain the volume of vaccine needed. Without sufficient vaccine to aid in the response, FMD could rapidly spread across the U.S., resulting in the destruction and disposal of potentially millions of animals, and become an endemic disease in livestock with spread potentially facilitated by deer, feral swine or other free-living animals. It would then require a much more extensive control program and could take many years to eradicate. Agriculture is critical infrastructure in the U.S. and cash receipts for livestock and poultry often exceed

$150 billion per year. Therefore, it is urgent to develop a plan to ensure that adequate supplies of FMD vaccine with multiple strains of FMD virus are rapidly available in the event of an accidental or intentional introduction of FMD virus into the U.S. The white paper (found at www.cfsph.iastate.edu/pdf/fmd-vaccine-surge-capacity-for-emergency-use-in-the-US) is part of an effort by the private sector stakeholder community to work with the Secretaries of Agriculture and Homeland Security as directed in Homeland Security Presidential Directive 9 to develop a National Veterinary Stockpile (NVS) with sufficient quantities of FMD vaccine to protect U.S. agriculture, food systems, and the economy.

Summary of Potential Solutions to Provide Adequate FMD Vaccine to Control a Type 3 or Larger Outbreak of FMD in the U.S.:

1) A combination of approaches can be used to assure surge capacity for FMD vaccines.

a. Immediate Availability: Finished vaccine held in vendor-managed-inventory and ready for shipment within 24 hours.
   - Enter into vendor-managed-inventory contracts with international manufacturers of FMD vaccines, for rapid delivery of multiple strains of finished vaccines into the U.S. All FMD vaccines that are licensed or permitted by USDA CVB for use in the U.S. and all FMD vaccines produced in the original E.U. member states (Maastricht Treaty; member states prior to 1994) that have either previously obtained EMA CVMP marketing authorization at the national level in one or more original E.U. member states, or single marketing authorization using the multi-strain dossier approach for use across all E.U. Member States could be considered to be safe and effective and pre-approved for emergency use in the U.S. Contracts should be developed to provide enough vaccine to supply the U.S. until vaccine antigen concentrate (VAC) from the NVS is formulated into vaccine and available.

b. Short-Term Availability: Vaccine antigen concentrate (VAC) held in vendor-managed-inventory ready to be formulated into finished vaccine and shipped to the U.S.
   - Stockpile multiple strains of vaccine antigen concentrate (VAC) in the National Veterinary Stockpile (NVS). Enough VAC should be available for the period between depletion of the finished vaccine and availability of large amounts of vaccine available from production initiated at the beginning of the outbreak. The VAC should be held and managed by the manufacturer and the contract should support a rotating inventory (formulating the VAC into finished vaccine for sale and replacing it on a regular basis).

c. Long-Term Availability: Vaccine production initiated at the beginning of the outbreak for the specific outbreak strain(s) of FMD virus.
   - Enter into contracts with international manufacturers of FMD vaccines for surge capacity production of commercially available USDA licensed/permitted or approved E.U. licensed FMD vaccines.
   - Seek USDA licensure of new technology FMD vaccines that could be safely manufactured in the U.S. and which are based on a platform that allows various capsid serotypes/topotypes to be inserted into the vaccine. These would then be candidates for vendor-managed inventory of finished vaccine and of VAC. Ensure that U.S. manufacturers have the surge capacity to rapidly produce finished vaccine at the beginning of an outbreak.

2) Ensure that all FMD vaccines used are capable of detecting infections in vaccinated animals (DIVA compatible), unless animals are intended for slaughter. Ensure that sufficient reagents and/or finished kits for DIVA testing will be available for the recovery phase of the FMD outbreak and sufficient NAHLN labs have been equipped, trained and proficiency tested to conduct this assay.

3) Develop and adopt available technologies and scalable information technologies for identifying and tracking all vaccinated animals and diagnostic testing results.

4) Develop interferon or other antiviral biotherapeutic products for inducing rapid and medium term resistance (1 day to 14 days) to FMD infection (a long-term goal).

5) Form a standing advisory committee with expertise in FMD vaccines, production agriculture, economics, and emergency response to make recommendations on optimal use of vaccine as the outbreak unfolds.

6) Secure funds to enable the surge capacity need for FMD vaccines mandated in HSPD 9 to be met (estimated at $150 million/year for 5 years to help protect a $150 billion dollars a year (cash receipts) animal industry.

7) Convene a stakeholder community working group of experts capable of evaluating existing and new technology FMD vaccines under development to determine the technologies which can best meet the needs for emergency response vaccination in the US. The working group could enter into confidentiality agreements with biologics companies in order to have access to confidential business information which can inform the recommendations for incorporating existing and new vaccines into the surge capacity plan.

8) Conduct research into alternative delivery methods for vaccines which have been shown in cattle and swine to significantly reduce the antigenic mass required in each dose of vaccine, thus enabling existing or future VAC to be formulated into significantly more doses of vaccine.

The stakeholder community should form a working group to develop recommendations to be presented to the U.S. government for meeting the surge capacity needs for FMD vaccine mandated in Homeland Security Presidential Directive 9 (HSPD 9).

As part of this effort, DHS S&T should conduct a classified Biological Threat Risk Assessment (BTRA) in collaboration with the USDA (APHIS and ARS), the Department of Commerce, and the Office of National Intelligence. The BTRA should include the size and economic scope of the livestock industry at risk; the potential sources of virulent FMD virus; the potential routes of incursion into the U.S. (both from natural and intentional introduction); the potential Foreign Terrorist Organizations (FTOs) with capability and interest to utilize FMD virus; an assessment of the ease of obtaining, transporting, and delivering virulent FMD virus; and the impact to the U.S. economy of an FMD outbreak in the U.S. (whether it be natural or intentional).

Washington State Mudslide Response

Dr. Minden Buswell, Reserve Veterinary Corps Coordinator/Epidemiologist II, Washington State Department of Agriculture, Olympia, WA

On March 22, 2014, a massive landslide occurred 4 miles east of Oso, WA that engulfed the neighborhood of Steelhead Haven, resulting in 43 human deaths. County and FEMA Canine Search Teams for Human Remains Detection (CST-HRD) were deployed to recover human remains. On April 4, 2014, the WA State Reserve Veterinary Corps (RVC) was deployed to provide veterinary care for the canines due to the hostile landslide environment.

An analysis of canine medical records was completed and a formal after action report/improvement plan was created to assess the WA State RVC performance. All areas for improvement were derived from the following three evaluations: 1) SR 530 Slide - RVC After Action Meeting held on June 30, 2014, 2) SR 530 Slide – RVC After Action Survey, and 3) Washington RVC – Responder Partners Survey.

A total of 52 employees and volunteers responded to this 19-day mission. Thirty-two canines were seen by the RVC with a total of a 133 exams. The most represented canine breeds were Labrador Retrievers (14) and German Shepherds (8). The most common ages were between 4-6 years. Common injuries/medical events include: paw pad abrasions (23), worn pads (16), pad splits (11), subjective dehydration (10), dietary indiscretion (8), and weight loss (5). Areas for improvement in future deployments include: continued training in Incident Command System (ICS), incident safety, HAZMAT, situational awareness, animal behavior, canine search and rescue, and incident stress management; development of a more robust small animal cache of supplies/equipment; and improve efficiency in the volunteer call-down system.

The WA State RVC was successful in providing appropriate and satisfactory veterinary care for the CST-HRD canines. This mission supported the overall incident objective of recovering the 43 victims lost in the landslide. Areas for improvement were identified in order to more efficiently and effectively respond in the future. Upon demobilization of the RVC, 41/43 victims were identified and as of July 22, 2014 all 43 victims were located and identified.

The Impact of Movements and Animal Density on Continental Scale Cattle Disease Outbreaks in the United States

Dr. Daniel Grear, Ecologist, USDA-APHIS-CEAH, Fort Collins, CO

Large-scale geographic predictions of disease spread are rare. European livestock disease models are data-rich case studies but are limited to relatively small, country-specific scales. Generalizing to larger systems, such as the United States, is difficult with insufficient spatial resolution and alignment among data sets to capture inherently complex contact networks of infectious livestock. Predictive models of large-scale disease outcomes in the United States' cattle industry has been hampered by a large system size, complexity, and the absence of suitable livestock movement data. Here, a unique database of US cattle shipments allows estimation of synthetic movement networks that inform a near-continental scale predictive model of a potential fast-spreading foreign animal disease (FAD) epidemic in US cattle. The largest epidemics may affect over one-third of the US and 120,000 cattle premises, but cattle movement restrictions from infected counties, as opposed to national movement moratoriums, are predicted to effectively contain outbreaks. Slow detection or weak compliance may necessitate more severe state-level bans for similar control. Despite high uncertainty in FAD transmission parameters for the US, the parsimonious model structure allows for extensive sensitivity analysis for disease spread and suggests the geographic and movement control conclusions are robust to disease spread uncertainty. Such results highlight the role of large-scale predictive models in emergency preparedness, particularly for systems lacking comprehensive movement and outbreak data, and the need to rapidly implement multi-scale contingency plans during a potential US outbreak.

Training Tool Framework for Animal Emergency Responders

Dr. Amy Kircher, Associate Director, National Center for Food Protection and Defense, Minneapolis, MN

ANIMAL & AGRICULTURE EMERGENCY RESPONSE - EDUCATION AND TRAINING FRAMEWORK

The United States food and agriculture systems are vulnerable. Disease, pests, or poisonous agents that occur naturally, are unintentionally introduced, or are intentionally delivered by an act of terrorism are all possible attacks to our food supply. Because these systems are extensive, open, interconnected, diverse, and complex in their structure, they are potential targets for terrorist attacks. An attack against these systems could have catastrophic health and economic effects. Within the Department of Homeland Security (DHS) and more broadly across the Federal Interagency, greater emphasis is needed to enhance common understanding and agreement on requirements and capabilities expected in the area of agriculture and food defense.

Animal agriculture stakeholders ranging from federal government officials to primary producers in the food industry all need emergency management competencies that align to serve the national preparedness system. High quality training is needed to prepare for, prevent, mitigate, respond to, and recover from an emergency in the animal agriculture sector, and individuals need an intuitive way to navigate training resources.

In collaboration with Department of Homeland Security Office of Health Affairs (OHA) Food, Agriculture and Veterinary Defense Branch (FAVD Branch), the National Center for Food Protection and Defense (NCFPD) is creating a comprehensive training framework for animal agriculture emergency responders. The purpose of this interactive online framework is to recommend training opportunities for every emergency responder in an Incident Command System so they may be prepared to complete the tasks needed for efficient response during an animal agriculture emergency. The training framework will serve the vision of the national preparedness system by guiding the development of a skilled cadre of

emergency responders, and it will offer a framework for an individual to plot out career development opportunities in emergency response through high quality, standardized training.

Food Agriculture and Veterinary Response Exercise (FAVRE) Workshop
Dr. Marvin Meinders, Office of Health Affairs, Department of Homeland Security, Washington D.C.

The purpose of the FAVRE Workshop was to assess Incident Management and Response to agro-terrorism incidents across all levels of government and private sector as well as to facilitate participants' identification of Federal resources for a FMD response. In addition, the workshop was to address the DHS Secretary's Counterterrorism Advisory Board (CTAB) FMD Table Top Exercise After-Action Report findings.
During the weeks leading up to the workshop, training was provided by webinars on tools available to support disease outbreak responses. The webinar topics included FAD PReP, Emergency Management Response System (EMRS 2), AgConnect Emergency Response Support System (ERSS), and the North Carolina and California Response Playbooks.

The actual workshop was hosted by FEMA Region VII on Dec 11 - 12, 2014 in Kansas City, MO and attended by approximately 160 people from Federal, state and local agencies. Many strengths and areas for improvements were identified during the workshop. For more detail on the workshop findings, please see the US Department of Homeland Security Food, Agriculture and Veterinary Response Exercise FEMA Region VII Workshop After-Action Report/Improvement Plan, February 28, 2014.

Additional benefits of the exercise were its use in the refinement of the Region VII Food and Agricultural annex to their All Hazards Plan. It also brought together all levels of responders from government to producers and helped FEMA develop a regional response approach.

Next Steps - If interested in conducting a FAVRE TTX in your region, request should be made to your FEMA region authority.

Committee Business:
Two resolutions submitted by committee members were adopted through motions made, seconded, and passed by voice vote.

Resolution #1 – *Veterinary License Reciprocity in Emergencies*
Resolution #2 - *Radiological Incident Response and Resources*

The meeting was adjourned at approximately 1:30 p.m.

Addendums:
Time-Specific Papers:

FMD Vaccine Surge Capacity for Emergency Use in the United States

James A. Roth, DVM, PhD, Anna Rovid Spickler, DVM, PhD, Center for Food Security and Public Health, Department of Veterinary Microbiology and Preventive Medicine, College of Veterinary Medicine, Iowa State University Ames, IA 50011, Email: jaroth@iastate.edu

A White Paper Prepared by the Center for Food Security and Public Health
at Iowa State University for National Pork Board, National Cattlemen's Beef Association, and the National Milk Producers Federation,
January 9, 2014

Foot and mouth disease (FMD) presents the greatest economic threat to U.S. animal agriculture and is viewed as the most important transboundary animal disease in the world. An outbreak of FMD in the U.S. would have a devastating impact on the U.S. economy extending far beyond animal agriculture. The

structure of modern animal agriculture in the U.S., including extremely large herds and extensive intra- and inter-state movement of animals and animal products will make it nearly impossible to control an FMD outbreak in livestock dense areas without the rapid use of tens of millions of doses of FMD vaccine.

The amount of antigen in the North American FMD Vaccine Bank is based on the old model of stamping out and limited vaccine use to control FMD. The strategy for FMD control has changed due to changes in animal agriculture and the public acceptance of stamping out. The current plan for FMD control depends much more heavily on vaccination. The amount of vaccine antigen concentrate in the North American Foot and Mouth Disease Vaccine Bank is far below what would be needed to provide vaccine for a single livestock dense state. It would take many months to produce/obtain the volume of vaccine needed. Without sufficient vaccine to aid in the response, FMD could rapidly spread across the U.S., resulting in the destruction and disposal of potentially millions of animals, and become an endemic disease in livestock with spread potentially facilitated by deer, feral swine or other free-living animals. It would then require a much more extensive control program and could take many years to eradicate. Agriculture is critical infrastructure in the U.S. and cash receipts for livestock and poultry often exceed $150 billion per year. Therefore, it is urgent to develop a plan to ensure that adequate supplies of FMD vaccine with multiple strains of FMD virus are rapidly available in the event of an accidental or intentional introduction of FMD virus into the U.S. The white paper (found at www.cfsph.iastate.edu/pdf/fmd-vaccine-surge-capacity-for-emergency-use-in-the-US) is part of an effort by the private sector stakeholder community to work with the Secretaries of Agriculture and Homeland Security as directed in Homeland Security Presidential Directive 9 to develop a National Veterinary Stockpile (NVS) with sufficient quantities of FMD vaccine to protect U.S. agriculture, food systems, and the economy.

Summary of Potential Solutions to Provide Adequate FMD Vaccine to Control a Type 3 or Larger Outbreak of FMD in the U.S.:

1) A combination of approaches can be used to assure surge capacity for FMD vaccines.

b. Immediate Availability: Finished vaccine held in vendor-managed-inventory and ready for shipment within 24 hours.
   - Enter into vendor-managed-inventory contracts with international manufacturers of FMD vaccines, for rapid delivery of multiple strains of finished vaccines into the U.S. All FMD vaccines that are licensed or permitted by USDA CVB for use in the U.S. and all FMD vaccines produced in the original E.U. member states (Maastricht Treaty; member states prior to 1994) that have either previously obtained EMA CVMP marketing authorization at the national level in one or more original E.U. member states, or single marketing authorization using the multi-strain dossier approach for use across all E.U. Member States could be considered to be safe and effective and pre-approved for emergency use in the U.S. Contracts should be developed to provide enough vaccine to supply the U.S. until vaccine antigen concentrate (VAC) from the NVS is formulated into vaccine and available.

b. Short-Term Availability: Vaccine antigen concentrate (VAC) held in vendor-managed-inventory ready to be formulated into finished vaccine and shipped to the U.S.
   - Stockpile multiple strains of vaccine antigen concentrate (VAC) in the National Veterinary Stockpile (NVS). Enough VAC should be available for the period between depletion of the finished vaccine and availability of large amounts of vaccine available from production initiated at the beginning of the outbreak. The VAC should be held and managed by the manufacturer and the contract should support a rotating inventory (formulating the VAC into finished vaccine for sale and replacing it on a regular basis).

c. Long-Term Availability: Vaccine production initiated at the beginning of the outbreak for the specific outbreak strain(s) of FMD virus.
   - Enter into contracts with international manufacturers of FMD vaccines for surge capacity production of commercially available USDA licensed/permitted or approved E.U. licensed FMD vaccines.

- Seek USDA licensure of new technology FMD vaccines that could be safely manufactured in the U.S. and which are based on a platform that allows various capsid serotypes/topotypes to be inserted into the vaccine. These would then be candidates for vendor-managed inventory of finished vaccine and of VAC. Ensure that U.S. manufacturers have the surge capacity to rapidly produce finished vaccine at the beginning of an outbreak.

2) Ensure that all FMD vaccines used are capable of detecting infections in vaccinated animals (DIVA compatible), unless animals are intended for slaughter. Ensure that sufficient reagents and/or finished kits for DIVA testing will be available for the recovery phase of the FMD outbreak and sufficient NAHLN labs have been equipped, trained and proficiency tested to conduct this assay.

3) Develop and adopt available technologies and scalable information technologies for identifying and tracking all vaccinated animals and diagnostic testing results.

4) Develop interferon or other antiviral biotherapeutic products for inducing rapid and medium term resistance (1 day to 14 days) to FMD infection (a long-term goal).

5) Form a standing advisory committee with expertise in FMD vaccines, production agriculture, economics, and emergency response to make recommendations on optimal use of vaccine as the outbreak unfolds.

6) Secure funds to enable the surge capacity need for FMD vaccines mandated in HSPD 9 to be met (estimated at $150 million/year for 5 years to help protect a $150 billion dollars a year (cash receipts) animal industry.

7) Convene a stakeholder community working group of experts capable of evaluating existing and new technology FMD vaccines under development to determine the technologies which can best meet the needs for emergency response vaccination in the US. The working group could enter into confidentiality agreements with biologics companies in order to have access to confidential business information which can inform the recommendations for incorporating existing and new vaccines into the surge capacity plan.

8) Conduct research into alternative delivery methods for vaccines which have been shown in cattle and swine to significantly reduce the antigenic mass required in each dose of vaccine, thus enabling existing or future VAC to be formulated into significantly more doses of vaccine.

The stakeholder community should form a working group to develop recommendations to be presented to the U.S. government for meeting the surge capacity needs for FMD vaccine mandated in Homeland Security Presidential Directive 9 (HSPD 9).

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The Impact of Movements and Animal Densities on Continental Scale Cattle Disease Outbreaks in the U.S.

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Author Summary

Large-scale geographic predictions of disease spread are rare. European livestock disease models are data-rich case studies but are limited to relatively small, country-specific scales. Generalizing to larger systems, such as the United States, is difficult with insufficient spatial resolution and alignment among data sets to capture inherently complex contact networks of infectious livestock. Predictive models of large-scale disease outcomes in the United States' cattle industry has been hampered by a large system size, complexity, and the absence of suitable livestock movement data. Here, a unique database of US cattle shipments allows estimation of synthetic movement networks that inform a near-continental scale predictive model of a potential fast-spreading foreign animal disease (FAD) epidemic in US cattle. The largest epidemics may affect over one-third of the US and 120,000 cattle premises, but cattle movement restrictions from infected counties, as opposed to national movement moratoriums, are predicted to effectively contain outbreaks. Slow detection or weak compliance may necessitate more severe state-level bans for similar control. Despite high uncertainty in FAD transmission parameters for the US, the parsimonious model structure allows for extensive sensitivity analysis for disease spread and suggests the geographic and movement control conclusions are robust to disease spread uncertainty. Such results highlight the role of large-scale predictive models in emergency preparedness, particularly for systems lacking comprehensive movement and outbreak data, and the need to rapidly implement multi-scale contingency plans during a potential US outbreak.

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