REPORT OF THE COMMITTEE ON FOREIGN AND EMERGING DISEASES

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The Committee met on Tuesday, October 22, 2013 at the Town and Country Hotel, San Diego, California, from 8:00 a.m. to 5:15 p.m. Dr. Paul Gibbs welcomed the committee and guests and Dr. Tammy Beckham provided an update on 2012 Committee resolutions.

Time Specific Paper:

Foot-and-mouth disease (FMD) in South America and Briefing on Activities of the Pan American Health Organization

Alfonso Clavijo

Surveillance and Control of Zoonotic and Emerging Diseases at the Pan American Health Association (PAHO)

The Pan American Health Organization (PAHO), founded in 1902, is the world's oldest international public health agency and serves as the Regional Office of the World Health Organization for the

Americas. The Pan American Foot-and-Mouth Disease Center (PANAFTOSA) is a Specialized Center of PAHO and provides technical cooperation to the countries of the region in Veterinary Public Health. This cooperation is primarily intended to strengthen the structure of the veterinary services and public health issues related to the prevention, early detection, early warning and implementation of contingency plans on priority diseases affecting animals, food safety, zoonoses and foodborne diseases. It also integrates Veterinary Public health within emergency response programs and disaster. During the 2013-2017 period, PANAFTOSA is giving priority to three major subject areas:

1. Eradication of Foot-and-Mouth Disease (FMD) in the Americas and the strengthening of national capacities in animal health surveillance.
2. Prevention, control and elimination of zoonoses and prevention of emerging infectious diseases.
3. Food safety and the prevention of foodborne diseases.

Foot-and-mouth disease is still a major focus of PANAFTOSA. Although vaccines are available and have been instrumental in eliminating the disease from most of the South American countries, viral circulation still persists in some countries. The current Plan of Action 2011–2020 for the elimination of FMD is based on the experience acquired by the countries and PANAFTOSA during the past 60 years. This plan is now being implemented; several challenges are still continue to ensure the elimination of FMD from the Americas by 2020, however, the goal is achievable.

Presentations and Reports

Update: Department of Homeland Security, Science & Technology Directorate
Michelle Colby, DHS S&T Directorate (*via webinar*)

An overview of the Agricultural Defense program of the Department of Homeland Security, Science and Technology Directorate (DHS S&T) was presented. Agricultural defense programs primarily fall under DHS S&T Chemical/Biological Defense Division (CBDD), Office of National Laboratories, and the Office of University Programs. The CBDD is within the Homeland Security Advanced Research Projects Agency and its goals are to detect, protect against, respond to, and recover from potential biological or chemical events. The mission for Agriculture Defense is to enhance current capabilities and develop state-of-the-art countermeasures for high priority foreign animal diseases (FADs). This includes near- and long-term research and development for vaccines and diagnostics, in coordination with internal and external stakeholders. The Program's projects expand the entire outbreak spectrum. The Enhanced Passive Surveillance (EPS) project includes diagnostic tests, mobile surveillance tools, and data integration procedures to identify infected animals prior to overt clinical signs and improve our ability to detect diseases that threaten the U.S. agricultural critical infrastructure. The FAD modeling program provides tools to support outbreak planning and response, drive requirements for countermeasures development, and inform post-outbreak response activities by creating scalable simulation and modeling tools to analyze potential responses and control options to minimize FAD spread. The FAD vaccines and diagnostic projects develop more effective vaccines and diagnostic countermeasures for high priority FADs, in partnership with the USDA and industry. These include FMD vaccines and research and development (R&D) funding for swine (African swine fever (ASF), classical swine fever (CSF) and zoonotic (Rift Valley fever (RVF) FADs. Next-generation high-throughput and molecular-based technologies are also being developed to provide surge in the National Animal Health Laboratory Network (NAHLN). Agriculture Screening Tools (AST) projects support the development of portable tools and standardize protocols to provide rapid detection and field identification of high priority pathogens and toxins of concern in the U.S. livestock and agriculture sector. ASTs also facilitate decisions on animal movement to preserve continuity of business. The decontamination, depopulation, and disposal (3D) program is a multi-agency effort to develop new and enhanced methodologies and equipment for high-capacity mass livestock mortality depopulation and disposal, decision support tools for FAD mass livestock mortality disposal, and strategies for depopulation best management practices and for cleaning and disinfection of animal facilities. In addition to contractual relationships, the Ag Defense Branch works closely with the Plum Island Animal Disease Center (PIADC) and the two Zoonotic and Animal Disease DHS Centers of Excellence (COEs). Each partner plays a key role in the development process. PIADC develops industry partnerships and conducts critical applied research related to vaccines and diagnostics. The COEs (National Center for Foreign Animal and Zoonotic Disease (FAZD) and Center of Excellence for Emerging and Zoonotic Animal Diseases (CEEZAD) maintain important international, state, local and academic partnerships, and conduct basic research vital to a continuous pipeline of candidates for

advanced development and transition. Furthermore, the Agricultural Defense Branch coordinates with other R&D organizations such as the National Science and Technology Council's FAD Threats working group, USDA Agricultural Research Service (ARS), Departments of Defense, Health and Human Services, Interior, State, the Environmental Protection Agency, the Smithsonian Institution, and the National Science Foundation. Sub-working groups ensure that DHS and other agency resources are utilized as efficiently and effectively as possible.

Update: National Veterinary Services Laboratory (NVSL)
Elizabeth Lautner, USDA-NVSL (*on behalf of Paul Hauer*)

NVSL modified its structure slightly during the reorganization of Veterinary Services (VS) to consolidate from three Sections to two at the Foreign Animal Disease Diagnostic Laboratory, and to create a new Proficiency Test Section which combined with cytology portions of the Reagents Biosecurity and Reference Materials Section of the Center for Veterinary Biologics (CVB). This new Section will report through the Diagnostic Virology Laboratory (DVL) and provide services to all of NVSL and CVB. Lautner moved into the Assistant Deputy Administrator over the new Science, Technology, Analysis Services business unit in VS which includes all of NVSL in addition to CVB and portions of the Centers for Epidemiology and Animal Health (CEAH). Key staff positions filled during the year include the selection of Dr. Mia (Kim) Torchetti as Head of the Avian Viruses Section in the DVL and Dr. Sarah Tomlinson as the NAHLN Coordinator. During the time period between October 1, 2012 and September 1, 2013, NVSL received over 43,000 accessions, processed 239,000 samples, and reported 364,000 tests. The first case of Porcine Epidemic Diarrhea (PED) reported in the United States was confirmed at NVSL in May from samples submitted to the Iowa State Veterinary Diagnostic Laboratory from an Iowa farm. NVSL also participated in Influenza A (H7N9) preparedness activities this spring including the cooperative development of an updated "pan-H7" avian influenza assay to detect more circulating H7 strains including the low pathogenic avian influenza A (H7N9) that has caused significant morbidity and mortality in humans in China. Key developmental activities included a) the transition from using *Mycobacterium bovis* genotyping methods of spoligotyping and Variable Number Tandem Repeats (VNTR) to single nucleotide polymorphism analysis of whole genome sequencing; and b) the development of high pressure liquid chromatography (HPLC) with fluorescence spectrophotometry tests to determine the blood levels of Ivermectin. These tests will be used to correlate blood levels of Ivermectin in animals with the degree to which the animals are tick-free, thus assessing the efficacy of orally administered Ivermectin on tick load. Quality remains a focus at NVSL. NVSL successfully completed an ISO 17025 renewal and scope expansion audit in May. Accredited methods now number 379 with 11 proficiency panels accredited under ISO 17043 and 24 reference materials accredited under ISO Guide 34.

Update: Foreign Animal Disease Diagnostic Laboratory
Fernando Torres-Velez, Plum Island Animal Disease Center (*via webinar*)

The Foreign Animal Disease Diagnostic Laboratory (FADDL) is divided into three main sections: Diagnostic Services, Reagents and Vaccine, and North American Foot and Mouth Disease Vaccine Bank (NAFMDVB). In 2013 Foreign Animal Disease (FAD) investigations and surveillance activities within FADDL included a total of 178 accessions with the majority being priority level two and three diagnostics. Out of the 178 accessions, 104 had FADs ruled-out but with an undetermined diagnosis. Final diagnosis of other samples included Seneca Valley Virus (ten total), Epizootic Hemorrhagic Disease (46 total) and Parapox (BPS/Orf; 18 total). These totals do not include testing of imports and reference submissions. As part of the U.S. classical swine fever (CSF) surveillance program, 2,236 accessions were tested representing 7,661 samples. Reagent Production and Proficiency Panels have been provided for foot and mouth disease (FMD)/CSF, lumpy skin disease, and contagious bovine pleuropneumonia. FADDL has also provided training to veterinarians for Foreign Animal Disease Diagnosticians (60), Veterinary Laboratory Diagnostics Course (28), and International Transboundary Animal Disease Course (52). FADDL has many completed and ongoing research projects to develop and establish diagnostic assays. Research has been completed on qRT-PCR/PCT test for endemic and foreign animal diseases from swine oral fluids, CSF ELISA to detect antibody in sera, an FMD 3ABC NSP ELISA, and development and implementation of a microarray. Research ongoing includes development of a FMD 3D NSP ELISA for bovine and swine, development of an immunohistochemistry assays for FMD, CSF, ASF, and peste des petits ruminants (PPR), and a subtracted hybridization to enhance detection of foreign or emerging pathogens. Projects are also ongoing for reagent production, assay validation, and NAHLN support.

These include a FAD assay validation program for FADs in wildlife and development of monoclonal antibodies specific to ASF virus proteins. Production of polyclonal antisera against vesicular disease viruses was completed. Staff support was increased for the North American FMD Vaccine Bank and efficiency tests of 4 VACs were conducted, with three added to the emergency stockpile. FADDL also has many international activities and capacity building efforts in Panama, Guatemala, Kazakhstan, Brazil, Italy, Kingdom of Saudi Arabia, Bangladesh, Mexico, Lebanon, Kenya, and Russia (pending).

Update: National Animal Health Laboratory Network

Sarah Tomlinson, National Animal Health Laboratory Network, USDA-APHIS-VS (*via webinar*)

The National Animal Health Laboratory Network (NAHLN) is a partnership between the United States Department of Agriculture, State, university and federal diagnostic laboratories across the U.S. Currently, there are 60 NAHLN laboratories that work together to ensure there is adequate diagnostic capacity and capability for early detection of, rapid response to, and recovery from animal health emergencies. In 2012-2013 the NAHLN continued to focus on activities related to its founding principles and improving the network. A concept paper that reflects a revised NAHLN structure was published for public comment in the Federal Register in April 2013; forty-two comments were received that will be incorporated into efforts to codify the NAHLN, develop program standards and update the NAHLN strategic plan. Additionally, trainings on quality management systems were conducted in an interactive classroom and via an on-line application for NAHLN laboratories, other laboratory network members and international partners. Also, improvements were made for the network's secure communication mechanisms in the form of standardized electronic messaging of test results and a secure NAHLN portal for management of laboratory information, documents, SOPs and proficiency testing results. Further, NAHLN continues to focus on preparedness through the activities of the Exercises and Drills Working Group such as the development and enhancement of the Laboratory Capacity Estimation Model to improve the ability to accurately estimate and monitor testing capacity. Finally, as a fundamental function of the network, NAHLN and collaborators completed a number of assay validation studies this year, including: real time RT-PCR for Foot and Mouth Disease (FMD) virus in bulk tank milk; a FMD pen-side antigen assay; and real time RT-PCRs for Lumpy Skin Disease and Contagious Bovine Plueropneumonia. Other studies to be completed in 2013 include an FMD serological negative cohort and a multiple influenza H7 PCR inter-laboratory comparison.

Post-eradication of Rinderpest: Required Activities to Maintain Global Freedom from Rinderpest - Food and Agriculture Organization (FAO)

Dr. Mo Salman, Colorado State University (*on behalf of Dr. Samia Metwally, FAO Rome*)

For centuries, outbreaks of rinderpest have caused wide-spread destruction of cattle, which resulted in famine and starvation. The FAO Global Rinderpest Eradication Programme (GREP) was concluded mid-2011, with FAO and OIE announcing global freedom from Rinderpest June 28, 2011. Following the declaration, FAO and OIE have taken strict measures in light of adopting the FAO Resolution 4/2011 and OIE Resolution 18 and signed an agreement to maintain world freedom from rinderpest in June 2012. Resolutions called for the creation of a FAO/OIE Rinderpest Joint Advisory Committee (JAC) with the objective to support both organizations in ensuring continued world freedom from rinderpest. A joint FAO/OIE secretariat was appointed in March 2012 and the members of the JAC were selected in April 2012. JAC members met for the first time in June 2012 to assume their responsibilities and are taking lessons learned from the World Health Organization's (WHO) experience in smallpox eradication. A FAO-OIE agreement was signed in June 2012: "FAO-OIE Agreement on joint actions to maintain the world free of rinderpest", it includes Terms of Reference of the FAO/OIE Rinderpest Joint Advisory Committee.

There is a critical need to establish a clear planning process for global response in the case of a rinderpest recurrence and for the response of countries directly affected or at risk.

African Swine Fever – Focus on the Situation in Eastern Europe and the Caucasus

Sherrilyn Wainwright, FAO of the United Nations, Rome (*via webinar*)

The evolution of the African swine fever (ASF) incursion and spread outside of the African continent began in June 2007 with an introduction to the country of Georgia. From there it spread to Armenia in August 2007 and was found in wild boar in the Russian Federation in December 2007. The disease was seen in Azerbaijan in January 2008 (a single introduction in domestic pigs), in Iran in December 2008 and January 2009 (detected in three wild boar), in the Ukraine in July 2012 (as a single introduction in

domestic pigs), and in Belarus, with three ASF outbreaks reported in June and July 2013. Currently, the Russian Federation, Georgia and Armenia remain infected with ASF. Dynamics of the density and distribution of backyard domestic pig (with low biosecurity) and wild boar populations were presented, as well as the risks for movement of the virus beyond the current locations. The risk to other ASF-free countries in Europe may be from ASF moving from the Ukraine and Belarus, countries with ASF outbreaks reported in 2012 and 2013, to ASF-free countries in Europe. Challenges identified in these two countries include porous borders, movement of people, including immigrant workers to the Russian Federation and the countries of the European Union, and tourists. More than fifty percent of the domestic pigs in these countries are backyard pigs, usually with low biosecurity standards. A number of FAO activities have been developed to address the ASF outbreaks and to reduce the risk for spread to ASF-free countries.

Update: Plum Island Animal Disease Center

Dr. Luis Rodriguez, Plum Island Animal Disease Center, ARS-USDA

The current Foreign Animal Disease Research Unit (FADRU) staff includes a total of 54 people, which includes scientists, federal post-docs, research fellows, university collaborators, and volunteer scientists. CRIS Projects for 2012-2017 include Intervention Strategies to Support the Global Control and Eradication of FMD, Countermeasures to Control FADs of Swine (CSF/ASF), and the Ecology and Pathogenesis of Re-Emerging VSV in North America. A double marker cDNA-derived killed FMDv vaccine platform has been developed that has two independent DIVA markers and is a safe and easy production platform. It is non-transmissible from cattle and swine and all early development work has been performed. There is an rRT-PCR detection test available and the development of two DIVA detection ELISA tests are underway. Research is also underway on a) the molecular epidemiology and biosurveillance of FMD in endemic regions of Central Asia, Southeast Asia, and Africa; b) on the transmission and evolution of FMDv in livestock in the Lake Chad Basin, Cameroon; and c) on persistent FMD infections in buffalo in Vietnam. PIADC also has an active African swine fever (ASF) research program. As there are currently no vaccines for ASF, PIADC research is focused on vaccines and development of animal models to evaluate ASF pathogenesis. A challenge model has been developed and standardized that resembles natural infection in swine and DHS has provided funding for the next three years to support research toward developing the first effective vaccine against ASF. A research alliance has been established of 22 countries and a meeting held at PIADC in April 2013 that resulted in the creation of the Global African Swine Fever Research Alliance. A CSF DIVA vaccine has been developed that is effective in three days. There has been a re-emergence of vesicular stomatitis virus (VSV) with recent outbreaks in southern U.S. The virus has been traced back to a 2005 strain in southern Mexico. Analyses of genetic lineages have been performed to better understand the spatial spread of the virus. Other activities ongoing at PIADC include projects on disinfection of FAD viruses on surfaces relevant to the pork packing industry. PIADC has many strategic partnerships with government, stakeholders, academia, and industry to help guide and support R&D activities.

Update: Center of Excellence for Emerging and Zoonotic Animal Diseases

Jessica Green, CEEZAD

Center of Excellence for Emerging and Zoonotic Animal Diseases (CEEZAD) enters its fourth year with a streamlined research portfolio that addresses four major themes surrounding response to high priority foreign animal and zoonotic diseases: Vaccines, Detection, Epidemiology and Education/Outreach. Vaccine and detection research continues to focus on high-threat pathogens, but now reflects shifts in proposal selection, implementation and review processes that emphasize consideration of stakeholders and include short-term projects with clear pathways to deliverables. CEEZAD's core vaccine project is focused on development of recombinant subunit vaccine for Rift Valley fever virus. We have completed immunogenicity studies with potential vaccine candidates and are currently working on efficacy trials. In continuing development of NDV-based vaccine platforms, we successfully completed a proof of concept efficacy study on an NDV-based vaccine for avian influenza. Our detection projects focus on applications of MassTag PCR and unbiased pathogen detection techniques in agricultural settings and on the deployment of pen side PCR detection systems for emergency response. We recently participated via webinar with the NAHLN Methods Technical Working Group Meeting on Emerging Disease Detection to an overview of CEEZAD detection projects and their potential practical implementation. The scope of the epidemiology theme now focuses on one major

project on model ontology; CEEZAD has proposed the addition of a small advisory board to this project to guide application of this research. The education and outreach overlay is an integral part of CEEZADs mission. Education/Outreach programs emphasize web-based continuing education on zoonotic and emerging diseases of agricultural animals using the Emerging and Exotic Diseases of Animals course developed by the CFSPH. The program will expand to include training of young researchers for careers that focus on emerging and exotic diseases of animals.

Update: National Center for Foreign Animal and Zoonotic Disease Defense
Tammy Beckham, FAZD Center

The National Center for Foreign Animal and Zoonotic Disease Defense (FAZD Center) performs research and develops products to defend the nation from high-consequence foreign animal and zoonotic diseases. Founded in April 2004 as a Department of Homeland Security (DHS) Science and Technology (S&T) Center of Excellence (COE), the FAZD Center leverages the resources of multiple major universities, Minority Serving Institutions, national laboratories, and partners in state and federal government. The FAZD Center is a multi-institutional organization with partners in 42 U.S. states and the District of Columbia and with 14 foreign countries, plus laboratories in the National Animal Health Laboratory Network (NAHLN). The center's portfolio is also closely aligned with the DHS Science and Technology Directorate, U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS), the USDA Agricultural Research Service (ARS), agricultural and allied industries, the private sector, bio-pharmaceutical companies, additional federal agencies, national laboratories, and other DHS Centers of Excellence. The FAZD Center's team of scientists conducts cutting-edge, inter-institutional and interdisciplinary research across three areas of emphasis:

- Biological Research – Vaccines, screening tools, diagnostic assays and universal sample preparation/preservation platforms to help meet the goals of early detection, diagnosis, prevention, response and recovery.
- AgConnect – A suite of customizable data integration and analysis products designed to enhance situational awareness. The FAZD Center is currently piloting the AgConnect suite of tools in four states to solicit feedback on requirements for use, visual displays, data integration, and other capabilities needed to support daily use by state animal health officials.
- Training and Education – Graduate programs, early responder training, K-12 education and stakeholder workshops to provide the next generation workforce for agriculture, public health and homeland security.

In addition, the FAZD Center is currently expanding its portfolio internationally to adapt and apply technology and products developed at the Center to support global animal health.

Veterinary Science Certificate Program
Dr. Heather Simmons, FAZD Center

This presentation provided an overview of a national program that addresses the veterinary paraprofessional workforce by providing education and training toward eventual professional certification. The Veterinary Science Certificate Program (VSCP) integrates human, animal, and environmental health sciences and emphasizes the public health, diagnostic, and regulatory aspects of zoonotic and transboundary diseases. Specifically, the VSCP curriculum includes 150 lessons of core sciences, clinical medicine, public health, and laboratory science. The program has been designed to be used at three levels. These include youth organizations, (such as 4-H and FFA), high schools, and community colleges. With over 11,000 students enrolled annually in the program, it provides students with the knowledge, motivation, and skills necessary to pursue educational and career goals. The program is provided in 490 high schools across the United States with program resources being utilized in 31 states.

USDA-APHIS FAD Training Efforts
Ms. Elizabeth Clark, Plum Island Animal Disease Center (*via webinar*)
Dr. Lee Myers, National Veterinary Stockpile, USDA-APHIS-VS

The Professional Development Staff (PDS) provides professional and technical training for both Federal and State Veterinarians. In addition to the Foreign Animal Disease Diagnostician (FADD) course, PDS delivers training to provide refresher courses for field veterinarians who have been previously trained at Plum Island. The FADDs must obtain training each year in order to maintain their FADD status. The development of additional courses assists field veterinarians in maintaining their skill sets and

enhances their knowledge base in the event of a foreign animal disease outbreak. This presentation outlined the new training initiatives for FY 2014 as well as providing an update on the FAD Investigation Manual.

CFSPH Education and Outreach Efforts
Dr. Jim Roth, Iowa State University

The Center for Food Security and Public Health (CFSPH) at Iowa State University College of Veterinary Medicine works to increase national and international preparedness for accidental or intentional introduction of disease agents which threaten food security or public health. The CFSPH has a staff of veterinarians, graphic designers, instructional development and information technology specialists that develop and deliver educational resources. Almost all the resources are freely available at www.cfsph.iastate.edu. The website received almost 24 million hits in 2012. The CFSPH is funded entirely through grants and cooperative agreements.
Education and Outreach materials include:

- Fact sheets and annotated images for 140 trans boundary animal diseases
- USDA National Animal Health Emergency Management System (NAHEMS) Guidelines for 11 topics
- The training website for the National Animal Health Emergency Response Corps
- Details on Secure Food Supply Plans for eggs, turkeys, milk and pork. These plans are designed to provide business continuity in the face of a foreign animal disease outbreak. Goals include avoiding interruptions in animal/animal product movement to commercial processing from farms with no evidence of infection during a foreign animal disease outbreak; providing a continuous supply of safe and wholesome food to consumers; and maintaining business continuity for producers, transporters, and food processors through response planning.
- Just-In-Time Training Resources for Responders to Animal Health Emergencies
- Emerging and Exotic Diseases of Animals Web Course and Initial Accreditation Training (in English and Spanish)
- USDA National Veterinary Accreditation Program Supplemental Training Educational Modules
- Basic Veterinary Immunology and Principles of Vaccination web-based courses

Porcine Epidemic Diarrhea (PED) in the USA
Dr. Harry Snelson, American Association of Swine Veterinarians

On May 17, 2013, the USDA confirmed the introduction of porcine epidemic diarrhea virus (PEDv) in a U.S. swine herd. This is the first time this virus has been diagnosed in North America. The virus was diagnosed in a handful of geographically and operationally disparate herds in multiple states within a few days. The virus clinically resembles transmissible gastroenteritis (TGE) which is endemic in the U.S. swine herd. While all ages of swine are susceptible, the disease is most severe (typically resulting in 100% mortality) in suckling pigs. Infected animals generally exhibit diarrhea, vomiting and anorexia. Older animals typically recover post-exposure and exhibit some level of immunity. This presentation will describe the introduction and continued spread of PEDv within the U.S. swine herd and the response undertaken by producers, veterinarians, diagnosticians and state and federal animal health officials.

Low Pathogenic H7N9 Avian Influenza Virus – China, 2013
Dr. Susan Trock, Centers for Disease Control and Prevention

On March 31, 2013, the China Health and Family Planning Commission notified the World Health Organization (OIE) of three cases of human infection with influenza A(H7N9). The cases were laboratory confirmed on March 29 by China CDC. All three cases presented with severe respiratory distress and subsequently died. As of August 8, 2013, there have been 134 cases reported from 12 provinces; 43 died. The earliest illness onset date was February 18 and the last case onset date was July 10, 2013. The virus was characterized as a low pathogenic avian H7N9 influenza virus. The H7N9 appears to be a reassortant virus deriving the HA from domestic ducks, while the NA is similar to that identified in wild birds and the remaining six genes most closely relate to H9N2 virus recovered from domestic poultry.

The Ministry of Agriculture (MOA) in China identified the virus in several live bird markets, including some associated with the human cases. The MOA reported >700,000 samples were collected from farms, retail live markets, agricultural distribution market areas and wild birds. As of August 8, 52 isolations of

H7N9 have been reported to OIE. All but two of these viruses were from birds and environments associated with the live market system. Several provinces and municipalities responded by ordering their live bird markets temporarily closed. Subsequent trace out investigations from the markets did not identify infected farm supply sources.

H7N9 Poultry Experimental Results in Response to the 2013 China Outbreak
Dr. David Suarez, University of Georgia

The recent outbreaks of H7N9 influenza in China has resulted in many human cases with a high fatality rate. Poultry have been suspected as the source of infection based on sequence analysis and virus isolations from live bird markets, but it's not clear which species of birds are most likely to be infected and shedding sufficient levels of virus to infect humans. Intranasal inoculation of chickens, turkeys, Japanese quail, pigeons, Pekin ducks, Mallard ducks, Muscovy ducks, and Embden geese with 10^6 EID_{50} of the A/Anhui/1/2013 virus resulted in infection but no clinical signs. Virus shedding in quail, chickens, and Muscovy ducks was much higher and prolonged than in the rest of the species. Quail effectively transmitted the virus to direct contacts but pigeons and Pekin ducks did not. In all species, virus was detected at much higher titers from oropharyngeal swabs than cloacal swabs. The HA gene from samples collected from infected chickens and quail were sequenced to examine for changes in the virus after passage in these species. Three amino acid differences were observed when compared to A/Anhui/1/2013: N123D, N149D, and L217Q. Different combinations were present indicating most likely that the inoculum had virus subpopulations that were selected after passage in birds. In conclusion, these experimental studies corroborate that poultry species are an important reservoir of the H7N9 virus. The high levels of viral replication in the upper respiratory tract is characteristic of poultry-adapted influenza viruses, and consequentially testing of bird species should preferentially be conducted with OP swabs for best sensitivity.

Schmallenberg Virus
Dr. Francisco Javier Rivierego Gorejo, European Commission

The Schmallenberg virus (SBV) is not a zoonosis and infects ruminants. It can give congenital malformations similar to Akabane. The European Union (EU) established a management and coordination plan to address this virus, performing a risk assessment in 2011. In 2012 the EU co-financed studies and preliminary results of these studies have been received in 2013 with the EFSA releasing an epidemiological reporting May 2013. Completion of these studies is planned for March 2014. SBV has short viremia. The virus is transmitted horizontally through midges (Culicoides) and vertically through the placenta. There is no conclusive data on semen and there is also no direct transmission. The proportion of affected sheep flocks is less than 0.1% in affected regions with maximum 4-6% in the most severely affected regions. In cattle the maximum affected ranges from 2-4%. Syndromic surveillance for SBV was coordinated among EU member states, the European Commission, and European Food Safety Authority (EFSA). A harmonized case definition was developed that addresses both adult and new born animals as well as herds and requires confirmation of suspicious cases. There is regular analysis of data by EFSA and publications within scientific reports. Syndromic surveillance within the EU also involves non-EU countries. Transparency and timely communication has been implemented from the start. Several seroprevalence studies have been performed in Austria, Belgium, Germany, and The Netherlands with seropositive levels ranging from 63% (dairy heifers in The Netherlands) to 99.76% in Belgium cattle herds. Recent findings suggest there is no evidence to refute the assumption that SBV infection results in long term immunity. SBV is 30 times more efficient in disease spread and transmission than bluetongue. While vaccines for SBV are becoming available, research is still needed to determine protection. In May 2012 the 80th OIE General Session concluded that the conditions to consider SBV infection as an emerging disease are no longer met and that the disease does not meet the criteria for listing by the OIE. The emergence of SBV is a test for the international community and research activities should continue to be performed in a transparent manner. Careful considerations should be given to the implications of the expected new findings that will come from future research of this virus.

The Screwworm Barrier between Two Continents: Biologic, Political and Economic Considerations
Dr. John Shaw, Commission for the Prevention and Eradication of Screwworm – COPEG, Panama (*via webinar*)

The goal over some sixty years of screwworm (SW) eradication in North America was always to maintain a permanent barrier of sterile insects – the same tool used in eradication. The site of this barrier has over the Program's history, moved southward with eradication efforts. In 1998, the Program began the eradication of Panama, and the goal of a barrier which was cost effective was clearly in sight. The original barrier in Eastern Panama, the Darien Province, also included release into Colombia up to 20 nautical miles of the border. With SW eradication and the transnational barrier in place, cases within the Program's Panama surveillance area (all within the political delineations of the country of Panama) all but disappeared. However, for a period of two years the sterile fly dispersal over Colombia was suspended. During the second of these years, the amount of cases within Panama's barrier zone tripled, plus one case outside the dispersal zone. Each situation incurred high costs. Subsequently, the Colombia portion of the barrier was re-established. The number of cases the following year decreased greatly (two detections to date in 2013 in the dispersal area). This presentation seeks to explore the nature of biological and economic/political barriers for animal disease programs, current SW dispersal and costs, SW dispersal grid options with costs and risks, SW detections in Panama and their costs, and SW Program benefits.

NAADSM Update

Dr. Kelly Patyk, APHIS-VS-CEAH (*via webinar*)

Disease modeling is one tool that can be used to evaluate disease spread scenarios and evaluate control and response strategies against animal disease outbreaks. The North American Animal Disease Simulation Model (NAADSM) has been in use and development for 15 years at USDA-APHIS–VS Centers for Epidemiology and Animal Health (CEAH). In 2003 a modeling team was established to continue developing and using the model and in 2006 the NAADSM model was released. NAADSM is a herd-based, state transition model and is spatially explicit. It is a stochastic Monte Carlo simulation model that can account for natural variability and chance events. NAADMS been used to evaluate control strategies, outbreak consequences, inform response and policy, and for training and exercises. A recent study using NAADSM was performed to evaluate potential control strategies for highly pathogenic avian influenza (HPAI), using de-identified commercial and backyard poultry premises in South Carolina. Conclusions from this study showed that the choice of control strategy, the type of poultry premises an outbreak originated from, and detection delay affected outbreak outcome. A stop movement disease control strategy consistently provided most favorable outcomes. NAADSM has also recently been used to evaluate the epidemiological impact of delayed detection for FMD. The study was focused in Texas and six surrounding states (New Mexico, Colorado, Oklahoma, Kansas, Arkansas, and Louisiana). Outbreak outcomes were affected by herd density and type of livestock operation where the outbreak originates. In addition, varying time to detection in one day intervals affected outbreak outcomes. The study showed a linear increase between mean infections and increases in delay of detection, in which each one-day delay led to more serve outcomes. The study also showed a lot of indirect spread, suggesting a focus on education to the industry on biosecurity practices would be of benefit. A next step for this study is to perform an economic analysis on outbreak outcomes. There are also many other ongoing projects underway and USDA-APHIS-VS-CEAH has a number of cooperative agreements in place with national and international institutions and agencies to support modeling activities.

De-identification of Spatially-Explicit Premises Data for Epidemiologic Disease Spread Modeling

Dr. Michael Martin, Clemson University

One important tool in preparing for control of an introduced foreign animal disease is stochastic disease spread modeling. Because disease spread models such as North American Animal Disease Simulation Model (NAADSM) are spatially explicit they depend upon realistic animal location information. Farm locations can be simulated using sources of aggregate population information such as the National Agricultural Statistics Service's *Census of Agriculture*. However the quantitative results obtained from such synthetic data sets have been shown to vary significantly from reality. Accurate farm location data exist in a number of data sets around the country. These data sets were almost always collected with a promise of confidentiality. We developed a technique for removing the identifying information from a spatially explicit data set in such a way that the epidemiologically significant clustering is preserved while providing a significant degree of anonymity for the individual farms in the dataset. This technique was shown to produce both qualitative and quantitative modeling results that are statistically indistinguishable from those obtained with fully identified data. This approach has been implemented in the form of an

open-source Java program that can create the de-identified data set from a fully identified set with field-mappings, degree of anonymity, and a few other parameters set in a configuration file.

Controlled Movement of Swine in an FMD Outbreak

Dr. Jim Roth, Iowa State University (*on behalf of Jon Zack, USDA-APHIS*)

The controlled movement aspect of the secure pork supply plan was presented. There is a need to change how we will move swine as the North American agricultural industry is unique, with very large herd sizes and extensive mobility of animals, products and feed. There is a lot of movement of U.S. swine both within and between states. When considering Foreign Animal Disease (FAD) outbreak response plans, all types of swine operations in the U.S. have to be considered, including small and large operations. In the US, 62% of pigs live in premises with 5,000 or more pigs. Wildlife must also be considered in FAD response plans as the U.S. feral swine and deer populations continue to increase and become more widespread. Wildlife can potentially affect an FAD outbreak and could play a role in moving disease between herds, depending on the virus. We have had nine outbreaks of foot and mouth disease (FMD) in the U.S. between 1870 and 1929, all of which were successfully controlled with stop movement and stamping out. However, given the change in the U.S. agriculture industry, our response strategies need to change and various control options considered. If an FMD outbreak is small in size and restricted to a local area, stamping out is a likely strategy, but this may not be the case for larger outbreaks. FAD response strategies shift based on outbreak size, in which vaccination and other control strategies should be considered with larger outbreaks. As such, a secure pork supply planning committee was established to develop the secure pork supply plan. The committee included industry representatives from all phase of swine production, government, state, industry groups, and academia. The FADs focus is on FMD, African swine fever (ASF), classical swine fever (CSF), and swine vesicular disease (SVD). Plans are always subject to change based on new science and risk assessments and so will be considered evolving documents, but these plans will be publically available in the near future. The plans are guidelines only, with final decisions made by responsible officials during an outbreak. There needs to be a lot of outreach and training pre and post outbreak. Within the plans, biosecurity performance standards have been developed for producers, haulers, and packers/processors. Biosecurity performance standards are being revised based on experience with Porcine Epidemic Diarrhea virus (PEDv). Traceability is important so premises identification is needed to track movements and to allow trace forward/back in the event of an outbreak to be performed. The plan recommends implementing active observational surveillance (AOS), in which someone on each premises is a herd health monitor who can identify potential clinical signs of FADs. AOS enhances early detection. On day one of an outbreak, there will be no new pigs put on trucks and moved. Pigs currently on a truck and all pork from processing facilities that have received swine from a FAD control area will be considered to potentially be infected with FMDv. However, as FMD is not a human health risk pork should be allowed to still enter commerce even if infected. Feeding garbage to swine must be strictly enforced due to risk of disease spread. Animals in transit to slaughter facilities will not be able to be unloaded if the processing of swine at the plant is not continued. It is recommended to process all healthy animals in slaughter and in transit. Restarting movement will be dependent on type of outbreak. The main requirements of the plan for restarting movement require implementing biosecurity, surveillance/traceability with validated premises ID, and movement permits. A new working group is being formed that will include Food Safety and Inspection Service (FSIS), APHIS, packers, and the food industry to further evaluate the secure pork supply plan.

Conventional FMD Vaccines – Current Capabilities and Surge Capacity

Dr. Larry Elsken, EDGE Veterinary Vaccines Consulting Group, LLC

There is an increasing realization that in the event of a widespread outbreak of Foot and Mouth Disease (FMD) in North America, the use of FMD vaccine will probably be an essential element in control and eradication measures. Currently, the sole practical source(s) for vaccines are "conventional" killed virus products already in regular production, distribution, and use. However, there are multiple issues related to accessing these vaccines, including availability of vaccine, and issues with the use of vaccines that have not been evaluated and approved by the USDA Center for Veterinary Biologics.

- Current vaccine production capacity is closely matched to the money available to purchase FMD vaccine.
    - Current worldwide FMD vaccine needs greatly exceed number of doses produced.
    - Increasing capacity for ‘possible’ need is not economical or rational.

    - If there were money available, and an outbreak resulted in demand for 100 million to 1 billion 'new' doses of FMD vaccine, it would require months to years for manufacturers to shift production, and years to build increased manufacturing capacity.
- FMD vaccine manufacturers advise policy planners to assume the only FMD vaccine that will be available for the first three months after a 'new' demand occurs will necessarily be supplied from prepared bulk antigen such as:
    - Banked (frozen) vaccine antigens; Vaccine Antigen Concentrates (VACs, not owned by the manufacturer).
    - Prior contracted access to 'on-hand' vaccine inventory.
    - On-hand frozen or refrigerated bulk antigens or vaccines (owned by the manufacturer).
- Storage site(s) for VACs
- Money for vaccine or VAC banks
- 'Triage' for vaccine use: dairy vs. beef vs. swine
- Perspectives on Center for Veterinary Biologics (CVB) approval for any vaccine used:
    - Producer perspective
    - Consumer perspective
    - Redundancy costs (multiple manufacturers)

Committee Business:

A gift was presented to Dr. Paul Gibbs in recognition of his scientific expertise and service to the Committee as chair from 2008-2013.

One new resolution was brought forward to the Committee, namely that the United States Animal Health Association requests that USDA-APHIS supports the completion of the eradication of foot-and-mouth disease from the Americas by 2020 as outlined in the Pan American Foot-and-Mouth Disease Center (PANAFTOSA) action plan. The committee reviewed, discussed and passed this resolution. No other resolutions were brought forward and the meeting was adjourned.