

# OIE Collaborating Centres Reports Activities

## *Activities in 2020*

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<b>Title of collaborating centre:</b>	Animal Disease Surveillance Systems, Risk Analysis and Epidemiological Modelling
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**ToR: To provide services to the OIE, in particular within the region, in the designated specialty, in support of the implementation of OIE policies and, where required, seek for collaboration with OIE Reference Laboratories**

**ToR: To identify and maintain existing expertise, in particular within its region**

**1. Activities as a centre of research, expertise, standardisation and dissemination of techniques within the remit of the mandate given by the OIE**

Disease control	
Title of activity	Scope
CWD Map Product	Center for Epidemiology and Animal Health (CEAH) staff assisted in the development of a map product to demonstrate proximity of chronic wasting disease (CWD) infected premises within a region, as well as locations relative to wild cases. The map product also showed wildlife detections within 1, 10, 25, and 50-kilometer zones around infected premises. Data and products were used to evaluate potential risks related to CWD transmission in the geographic area.
Namibia FMD Map Product	CEAH staff developed a map product to illustrate the location of a meat slaughter facility in relation to a foot and mouth (FMD) disease outbreak in Namibia. The map was requested by United States Department of Agriculture (USDA) Veterinary Services (VS) leadership to communicate the Namibia FMD situation.
Software Automation of Data	CEAH staff, in collaboration with the Veterinary Center for Informatics (CFI), worked on an OIE Data Conversion tool for African swine fever (ASF) data to improve our awareness of international disease surveillance activities and apply analytic methods using official data provided by the OIE to support trade decisions. CEAH used this data to produce reports of spatially visualized international ASF detections. The data set is organized for other emerging disease analytics and can be utilized for any disease reports from the OIE. The data preparation organization can be easily altered to be used with other software programs like Alteryx. This tool is not only useful for CEAH, but also for other units in VS and other agencies and institutions interested in analyzing OIE data in a timely manner for decision-making using the most updated reportable global animal disease data available.
Response & Containment Guidelines: Interim Guidance for Animal Health and Public Health Officials Managing Farmed Mink and other Farmed Mustelids with SARS-CoV-2	CEAH staff participated in the One Health-Federal Interagency COVID Coordinating Group - Livestock Working Group tasked with developing a guidance document, "Response & Containment Guidelines: Interim Guidance for Animal Health and Public Health Officials Managing Farmed Mink and other Farmed Mustelids with SARS-CoV-2", for state and federal public health staff regarding SARS-CoV-2 in farmed mink and other farmed mustelids. CEAH wrote the surveillance and monitoring section of the guidance document and provided support for general surveillance questions. The document is now posted on the One Health website: <a href="https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/SA_One_Health">https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/SA_One_Health</a> The final document: <a href="https://www.aphis.usda.gov/publications/animal_health/sars-cov-2-mink-guidance.pdf">https://www.aphis.usda.gov/publications/animal_health/sars-cov-2-mink-guidance.pdf</a>
Custom Geospatial Script Developed	CEAH staff developed a custom script to aid VS staff in developing county-level control areas in the states of Iowa and Florida. The control areas were defined as a well-known text (WKT) file then uploaded and used in the USDA Emergency Management Response System (EMRS).
Equine Arboviral Reporting	CEAH staff produced publicly available annual reports on Eastern Equine Encephalitis and West Nile Virus cases using Centers for Disease Control and Prevention (CDC) ArboNet data.
RHD Disease Case Definition	In response to an ongoing outbreak of Rabbit Hemorrhagic Disease, CEAH staff rapidly generated a case definition that was shared with the National Assembly of State Animal Health Officials (NASAHO), allowing for coordinated and organized reporting.
Animal Disease Spread Model - ADSM	CEAH staff finalized training materials for the use of the Animal Disease Spread Model - ADSM by university partners working in outbreak preparedness and response. Information on ADSM can be found at:  <a href="https://github.com/NAVADMC/ADSM/releases/tag/v3.5.10.21">https://github.com/NAVADMC/ADSM/releases/tag/v3.5.10.21</a>  This version includes additional vaccination functionality.  A wiki provides additional documentation at:  <a href="https://github.com/NAVADMC/ADSM/wiki">https://github.com/NAVADMC/ADSM/wiki</a>  All code is open source and freely available at:  <a href="https://github.com/NAVADMC/ADSM/tree/v3.5.10.21">https://github.com/NAVADMC/ADSM/tree/v3.5.10.21</a>  Training materials are under review and will be available at:  <a href="http://navadmc.github.io/ADSM/">http://navadmc.github.io/ADSM/</a>
RHDV2 Situational Awareness and Response - Interactive Maps	Since March 2020, CEAH staff have provided map support for the RHDV2 outbreak situation awareness and reporting. Throughout the year, the interactive RHDV2 map applications were routinely updated to reflect ongoing cases and extent of RHDV2 impacted areas. Though the number of cases has decreased in previous months, new cases (domestic and wild) were reported in California, Colorado, Utah, and Arizona. The public facing map was updated monthly to show affected counties and progression and density of cases since Spring 2020. Updates can be viewed on the interactive web map here: <a href="https://usda-aphis.maps.arcgis.com/apps/webappviewer/index.html?id=37791da88ef04cd08404a5794aaf0be3">https://usda-aphis.maps.arcgis.com/apps/webappviewer/index.html?id=37791da88ef04cd08404a5794aaf0be3</a> .
<b>Epidemiology, surveillance, risk assessment, modelling</b>	

## Animal Disease Surveillance Systems, Risk Analysis and Epidemiological Modelling - Centers for Epidemiology and Animal Health

Title of activity	Scope
GIS Reusable Scripts	CEAH staff developed a core set of reusable scripts that pull and process data from USDA's Emergency Management Response System to prepare for future outbreaks. The code was developed to ensure the GIS staff can rapidly develop standard map products for outbreaks and emergency events.
FPA Test for Brucellosis Surveillance	CEAH staff were asked by State Veterinarians in Idaho, Wyoming, and Montana to assist in the analytical assessment of the Fluorescence Polarization Assay test for brucellosis surveillance. This work is ongoing.
BSE Surveillance Data	CEAH staff compiled the 2020 bovine spongiform encephalopathy (BSE) surveillance data for the 2020 OIE annual BSE Reconfirmation.
Surveillance and Release Testing Options for State Animal Health Officials Managing SARS-CoV-2 Positive Mink Premises	CEAH staff developed surveillance and release testing options for State animal health officials managing SARS-CoV-2 positive mink premises. This guide, and numerous links with useful resources, was provided to states with farmed mustelids.
Tb Test and Remove Model Application	CEAH staff applied the bovine tuberculosis test and remove model to TB-affected herds to support decision-making on depopulation or test and remove as the more effective option for eradicating the disease in specific herds. CEAH staff continue to work to update model parameterization with the best available science.
National ASF Model Meeting with Industry	CEAH staff participated in a meeting with the swine industry to familiarize CEAH's national African swine fever spread and control model with industry representatives. The meeting provided feedback on model assumptions and increased familiarity with the model and its use for emergency preparedness planning.
Epidemiology of Mycoplasma ovipneumoniae Publication	CEAH staff developed and published a summary of the epidemiology of Mycoplasma ovipneumoniae to the Animal Health and Animal Disease Information website for Sheep and Goats. The summary can be found at the following link: <a href="https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/sa_animal_disease_information/sheep-goat/movi/mycoplasma-ovipneumoniae">https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/sa_animal_disease_information/sheep-goat/movi/mycoplasma-ovipneumoniae</a>
ASF/CSF Integrated Active Surveillance Plan Evaluation	CEAH staff completed the first-year evaluation of the African swine fever/Classical swine fever Integrated Active Surveillance Plan. This comprehensive evaluation consisted of an in-depth analysis of the data collected during the first year of plan operation. A summary is planned for distribution in 2021.
Theileria orientalis Ikeda Genotype Emerging Risk Notice	Theileria orientalis Ikeda Genotype Emerging Risk notice was issued, available at: Emerging Risk Notice: Theileria orientalis (usda.gov).
Presentation of ASF Heterogenous Spread Model	CEAH staff, in cooperation with the University of Minnesota, developed short white papers and host multiple presentations describing preliminary results of African Swine Fever (ASF) surveillance evaluations that were done using a recently enhanced within-herd ASF disease spread model. The model enhancements better reflect reported within herd spread dynamics in ASF-infected swine, and the new model was used to evaluate several surveillance options for detection of ASF in a control area.
Modeling Impacts of Decision Dynamics during an FMD Outbreak Project	CEAH staff collaborated with Kansas State University and the Agricultural Research Service (ARS) Foreign Animal Disease Research Group at Plum Island Animal Disease Control Center on a two-year, ARS-funded project which aims to utilize game theory and multicriteria decision analysis to evaluate tradeoffs in epidemiologic outcomes of dynamic decisions and competing priorities during an outbreak of FMD in the U.S.
Applying Epidemiologic Networks-Based Controls for ASF Preparedness	CEAH conducted an analysis of zone sizes and the impacts of applying diseases control measures to premises within epidemiologic networks in order to improve preparedness for African swine fever. The analysis was used to foster discussion with industry partners, and eventually led to updates to the African swine fever Preparedness and Response Plan published online in April 2020 and available at <a href="https://www.usda.gov/aphis/ourfocus/animalhealth/animal-disease-information/sheep-goat/movi/mycoplasma-ovipneumoniae">asf-responseplan.pdf</a> (usda.gov).
CEAH Hosts Researchers from USDA Agricultural Research Service and Kansas State University	On February 13-14, 2020, CEAH staff hosted Dr. Jonathan Arzt, Veterinary Pathologist at the Foreign Animal Disease Research Unit, Plum Island Animal Disease Center, USDA Agricultural Research Service (ARS) and Dr. Karla Moreno-Torres, Dr. Michael Sanderson and Ms. MaRyka Smith with the College of Veterinary Medicine, Kansas State University (KSU). CEAH staff provided training on CEAH's national foot-and-mouth disease (FMD) model. Dr. Arzt provided a seminar to share advancements in foot and mouth disease and African swine fever pathogenesis and transmission research at Plum Island. This meeting was part of an effort to improve coordination and communication around modeling approaches for FMD preparedness.
Pew AMR Panel and PACCARB Meeting	CEAH staff participated in a panel led by a private research group, Pew, to discuss APHIS' surveillance and research activities related to antimicrobial resistance (AMR) as well as future priorities. Staff also attended the Presidential Advisory Council on Combating Antibiotic-Resistant Bacteria to better understand stakeholder and public concerns around antimicrobial use, stewardship, and resistance.
Status Report on National Brucellosis Surveillance to the Veterinary Services Ruminant Health Center during COVID-19	CEAH staff provided a status update report on national brucellosis surveillance and the possible impacts of COVID-19 related reductions in sample submissions from a slaughter establishment. Detailed analysis of the surveillance data showed that the U.S. would be able to uphold its brucellosis sampling targets in FY2020 for the region defined by the brucellosis Designated Surveillance Areas (DSAs), as well as the remainder of the U.S. outside of the DSAs, despite the loss of submissions.
Promoting Veterinary Services Epidemiology Tools for State Officials	Dr. David Hsi led the Epidemiology Tools subgroup of the USDA APHIS VS National Training and Exercise Programs - Epidemiology Working Group. For its first deliverable, the subgroup put together and distributed a letter to State animal health officials providing awareness of, and information on, the CEAH-supported Outbreak Surveillance Toolbox.
Analysis on Maximum Risk of ASFv Contamination in Non-Animal Origen Feed Ingredient Imports	CEAH conducted an assessment of the maximum probability of pig infection from imported feed rations. This maximum risk was extended to shipment sizes, finding that likelihood of contamination is very low. The results of this analysis are being used to inform potential mitigation policies to prevent introduction of ASF.
Study Design to Evaluate ASFv Inactivation in Swine Carcass Compost Piles and Slurry Systems	Mr. Matthew Vuolo and Dr. Marta Remmenga are working in collaboration with the Office of Interagency Coordination to design and implement two field experiments in Hanoi, Vietnam with researchers at the Vietnam National University of Agriculture. The first experiment is aimed at determining the inactivation time of ASFv in ASFv-infected swine carcasses in compost piles using different carbon materials for the piles; data collection will begin in early 2021 and is estimated to end in summer of 2021. The second field experiment is aimed at determining the inactivation time of ASFv in slurry systems in the scenario where an ASFv-infected farm has just been depopulated; data collection will begin in early 2021 and conclude in summer 2021.
APHIS Proposed a New National List of Reportable Animal Diseases (NLRAD)	The United States Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS) is proposing a new National List of Reportable Animal Diseases (NLRAD) to further strengthen the country's ability to detect, respond to and control animal diseases. The new list will provide a consolidated, comprehensive set of guidelines to ensure Federal and State animal health officials quickly receive information about potential cases of communicable animal diseases.
COVID-19 Case Definition	Drs. Kevin Spiegel and Laura Miles created a case definition for SARS-CoV-2 in animals for the United States. This definition was shared with OIE working groups to facilitate work on case definitions at the international level.
<b>Training, capacity building</b>	
Title of activity	Scope
Hosting Master of Public Health Student	CEAH staff provided support, training, and consultation on a project with a student from the University of North Dakota. The project involved data processing of Asian Longhorned Tick (ALHT) records along with geospatial analysis and characterization of environmental factors associated with the tick's presence in the U.S.

<p>Hosting USDA Pathways Intern Researching ASFv Contamination in Smuggled Pork Products</p>	<p>CEAH staff hosted a USDA Pathways intern from June to August who researched international reports of African swine fever virus contamination in smuggled pork products in the air passenger pathway. As an extension of that work, the student analyzed inspection and interception data on foreign arrivals to the U.S. and identified risk factors that could improve detection and targeting of air passengers to prevent entry of ASFv.</p>
<p>Indemnity Calculator Training</p>	<p>CEAH hosted a webinar training for Veterinary Service's field staff on the transition from indemnity calculators to indemnity tables and the use of these tables. The new tables aim to improve the documentation and standardization of animal valuation methods within USDA. The current scope of the transition was limited to indemnity for cattle infected or exposed to bovine tuberculosis.</p>
<p>Good Emergency Management Practices</p>	<p>Dr. Amy Delgado, CEAH, in collaboration with Dr. Celia Antognoli, Dr. Ed Arza, and Dr. Fred Soltera from Veterinary Services and Dr. Ericka Calderon from the Inter-American Institute for Cooperation on Agriculture, provided training on Good Emergency Management Practices to 38 participants from the official veterinary services and private sector in Colombia. The training focused on the core components of good emergency management practices, while utilizing African Swine Fever as an example to work through numerous exercises and discussions. At the end of the workshop, participants developed a prioritized list for next steps in moving forward in African swine fever preparedness, including the development of numerous standard operating procedures and addressing policy gaps.</p>
<p>Active Surveillance Protocols for African Swine Fever</p>	<p>CEAH staff provided a poster presentation for the virtual Allen D. Leman Swine Conference on active surveillance protocols for detecting African swine fever prior to live animal movements. The project examined different frequencies of testing and options for pooling of individual animal samples. CEAH was able to identify key areas that may help reduce overall testing costs and conserve resources without worsening the probability of detection. The work found that while surveillance was a critical component for permitting animal movements during an outbreak, enhanced biosecurity would be essential in preventing the movement of infected, undetected animals.</p>
<p>Baseline Analysis System Model Training to USDA Economists</p>	<p>CEAH staff held a virtual training for 13 economists with APHIS Policy and Program Development on applications of the Baseline Analysis System Model. The training covered economic evaluations of imports, exports, and animal disease events to improve knowledge and consistent application of this tool.</p>
<p>Epidemiologists and Disease Reporting Officers Training</p>	<p>Dr. David Hsi served as an instructor for a virtual course focused on the use of the Emergency Management Response System for Epidemiologists and Disease Reporting Officers.</p>
<p>Decision Support for Emergency Preparedness ASF Zones Training</p>	<p>CEAH staff provided an extensive overview of the work performed to inform African swine fever zone sizes and network-based controls at the USDA Veterinary Services VScience Webinar "Decision Support for Emergency Preparedness - ASF Zones."</p>

<p>CEAH's Slaughter Condemnation Syndromic Surveillance of Swine, Cattle and Poultry</p>	<p>CEAH conducted syndromic surveillance in swine, cattle, and poultry using slaughter condemnation data from slaughter establishments across the U.S. The results of this surveillance were shared with slaughter establishments in several States, as well as with VS field and swine commodity staff for the purpose of monitoring any increases in dead condemnations at these establishments. In addition, CEAH met with VS swine commodity staff to assist them with using FSIS condemnation data to provide guidance to FSIS inspectors on when to notify VS concerning increased mortality and morbidity at establishments.</p>
<p>Web-Based GIS Training for Veterinary Services Field Operations Employees</p>	<p>The GIS Team developed a training webinar for Veterinary Services Georgia Field Operations staff. The training stepped through a series of use cases to teach staff how to use the tools available in the Georgia Field Operations Resource Planning Map application and develop workflows for resource planning. The web-based map application was developed and hosted in the APHIS GIS Portal.</p>
<p>Successful Migration to new National Animal Health Reporting System (NAHRS) Tool</p>	<p>CEAH launched a new tool for National Animal Health Reporting System (NAHRS) reporting within the VS Data Integration System (DIS) to allow state partners to more easily provide monthly reports on disease occurrence within their state. As part of the interface, States can also see a summary of test results for various diseases, pulled from VS information systems, increasing the value of this reporting system. Previous reports from the legacy NAHRS system were also migrated into DIS to provide a comprehensive view of past and current submissions.</p>
<p>Iowa Pork Congress Meeting</p>	<p>NAHMS Swine specialist, Dr. Charles Haley attended the Iowa Pork Congress, taking place in the highest pork producing state, attended by swine producers from throughout the Midwest U.S. He promoted the NAHMS Swine 2021 study with producers, and Iowa state and national pork industry representatives as part of the National Animal Health Monitoring System (NAHMS) Swine 2021 study marketing efforts.</p>
<p>American Sheep Industry Convention</p>	<p>NAHMS small ruminant specialist, Dr. Natalie Urie, attended the American Sheep Industry Convention in Scottsdale, AZ, to promote the National Animal Health Monitoring System (NAHMS) Goat 2019 study, and to talk with key industry stakeholders and potential collaborators for the NAHMS Sheep 2023 study. These conversations were used to develop a formal needs assessment for the sheep industry, which will be initiated in 2021.</p>
<p>2020 Esri Federal User Conference and Steering Committee</p>	<p>CEAH staff participated in the 2020 Esri Federal User Conference in Washington DC. Following the conference, the APHIS GIS Steering Committee met to review APHIS web mapping progress, issues, and goals through FY21. Finally, the USDA GIS Summit was held on Feb 13th and many APHIS GIS staff shared key projects and GIS successes in oral and poster presentations. CEAH provided a poster presentation on machine learning and remote sensing to map commercial poultry operations within the United States.</p>
<p>Industry and VS meeting in DC concerning African Swine Fever (ASF)</p>	<p>Dr. Oriana Beemer attended a swine packers' meeting with several industry and Veterinary Services (VS) personnel on February 12, 2020. Dr. Beemer presented on CEAH work evaluating potential changes to African swine fever (ASF) control area zone sizes and the use of network-based controls. There were productive discussions around disease testing and surveillance needed to reopen pork export markets following an outbreak of ASF.</p>

Newcastle Disease Response Webinar	Dr. David Hsi, along with Drs. Larry Rawson, Tim Boyer, Lindsey Holmstrom, and Lora Gurley, provided an overview of the California virulent Newcastle disease (vND) response in a February 19, 2020 webinar. The speakers detailed the science and data-driven analyses and tools that have supported disease control strategies applied in the field. The presentation was part of the Veterinary Services VScience webinar series.
Live Bird Marketing Systems Working Group Meeting	Dr. Jennifer Siembieda attended the live bird marketing systems working group meeting February 19-20, 2020 in Atlanta, Georgia. Dr. Siembieda gave a presentation on using data collected from the virulent Newcastle disease response to inform decision making. The meeting was attended by industry, State veterinarians, and APHIS Veterinary Services.
Project Management Institute (PMI) Mile Hi's 22nd Annual Symposium	Mr. Bill Kelley attended Project Management Institute (PMI) Mile Hi's 22nd Annual Symposium in Denver, CO, to learn more about project management, make additional contacts in the field, and gain insight in how other organizations are implementing project management. CEAH is continuing to implement project management best practices to increase operational effectiveness.
North Carolina Pork Council Annual Conference	CEAH's National Animal Health Monitoring System (NAHMS) Swine specialist, Dr. Charles Haley, reached out to producers during the North Carolina Pork Council Annual Conference. CEAH had a booth at the meeting to allow for swine producers to engage and discuss the upcoming NAHMS Swine 2021 study.
Center for Food Safety and Public Health Emerging and Exotic Animal Disease Course	CEAH staff completed a Registry of Approved Continuing Education (RACE) of the American Association of Veterinary State Boards-approved course on the causes and consequences of foreign animal diseases (FAD), how FAD's are transmitted and introduced, the entities involved in a response to a FAD outbreak, what to do if a FAD is suspected, how veterinarians can be involved in a FAD response, and effective communication strategies. This course was designed for veterinarians and veterinary technicians, animal health industry employees and government officials interested in high consequence animal diseases and the response to them.
<b>Wildlife</b>	
<b>Title of activity</b>	<b>Scope</b>
GIS Mapping Support for Yabucoa Tick Control	CEAH staff provided regular support for the Yabucoa Tick Control incident in Puerto Rico. Weekly Incident Action Plan (IAP) maps and biweekly situation report maps are generated to show tick treatment and surveillance zones and affected premises under treatment or investigation.
Vampire Bat Rabies in the United States	Dr. Ryan Miller participated in a panel on surveillance, management and research of vampire bats and vampire bat rabies in the US. Meeting objectives were to develop expert consensus opinion on: optimizing surveillance and management approaches; targeted communication strategies relative to the introduction of common vampire bats into the U.S.; and potential strategies for addressing the challenges associated with a novel species and novel rabies virus variant.

<p>Classification of Wildlife Species with Artificial Intelligence</p>	<p>CEAH staff, in collaboration with colleagues in APHIS Wildlife Services, University of Wyoming, and others published an improved version of artificial intelligence (machine learning) to classify wildlife species in camera trap images. The paper was published in Ecology and Evolution. Camera trap images are routinely used by the Cattle Fever Tick Program (CTFP) and other APHIS programs addressing conflicts at the wildlife-livestock interface. This new model is one step toward developing a tool that will allow CTFP to automatically identify animals in camera trap images. The paper can be found here: <a href="https://onlinelibrary.wiley.com/doi/full/10.1002/ece3.6692">https://onlinelibrary.wiley.com/doi/full/10.1002/ece3.6692</a></p>
<p>Book Publication: Invasive Wild Pigs: Ecology, Impacts and Management</p>	<p>Dr. Ryan Miller contributed to the publication of Invasive Wild Pigs: Ecology, Impacts and Management, which is the first comprehensive text on the topic and addresses all aspects of feral swine issues in North America. The book was named The Wildlife Society's 2020 Wildlife Publication of the Year.</p>
<p><b>Avian diseases</b></p>	
<p><b>Title of activity</b></p>	<p><b>Scope</b></p>
<p>Backyard Bird Valuation Project</p>	<p>CEAH staff completed a project on backyard bird valuations. The goal of this project was to document all methods used to estimate values for backyard birds.</p>
<p>2020 Avian Influenza Report</p>	<p>CEAH staff completed a descriptive summary of all avian influenza tests performed during FY2020, including testing that occurs as part of the National Poultry Improvement Program.</p>
<p>Epidemiologist Deployment to vND Outbreak</p>	<p>CEAH staff deployed to California to respond to the vND 2018 outbreak. Epidemiological support was provided for surveillance activities in peri-urban settings and monitoring efforts among commercial poultry operations.</p>
<p>LP/HPAI Epidemiology in Commercial Turkeys</p>	<p>CEAH staff supported outbreak response and epidemiologic investigations into the source and spread of a low pathogenic avian influenza virus in the U.S. The virus was detected on commercial turkey operations in North Carolina and South Carolina. Initially affected animals were detected through pre-slaughter sampling, and the source of the virus was determined to be wild birds. The virus mutated to a highly pathogenic strain in a single barn on an infected premise. Surveillance, quarantine, euthanasia, and disposal efforts were completed to eradicate the virus. CEAH provided modeling support to estimate the time of virus introduction into the affected farms based on diagnostic data, which was used to support tracing efforts and better understand possible transmission pathways, as well as results from a case control study and environmental risk analysis. A full epidemiologic report of the outbreak will be published in early 2021.</p>
<p>Geospatial Models Developed to Map Commercial Poultry Operations in the U.S.</p>	<p>CEAH staff, in collaborations with Colorado State University, University of Maryland, and the US Geological Survey, developed regional and national models of commercial poultry operations within the United States. The models can be used to prepare for or minimize risk of disease introductions for avian diseases, such as, low or highly pathogenic avian influenzas. Publications include, Modelling the domestic poultry population in the United States: A novel approach leveraging remote sensing and synthetic data methods (<a href="https://doi.org/10.4081/gh.2020.913">https://doi.org/10.4081/gh.2020.913</a>) and Using object-based image analysis to map commercial poultry operations from high resolution imagery to support animal health outbreaks and events <a href="https://doi.org/10.4081/gh.2020.919">https://doi.org/10.4081/gh.2020.919</a> (doi: 10.4081/gh.2020.919)</p>

Aquatic animal diseases	
Title of activity	Scope
Assessment of the Risk of Introduction of Tilapia Lake Virus (TiLV) by Live Tilapia Imported to Terminal Markets	The Center for Epidemiology and Animal Health (CEAH) previously assessed the risk posed to relevant industries by the introduction of tilapia lake virus (TiLV) via tilapia frozen fillets and live fingerlings. This work was completed in November 2019., and the results are available in the document entitled Rapid Risk Assessment for Tilapia Lake Virus (TiLV). In 2020, CEAH supplemented this previous work by evaluating the additional entry pathway of live tilapia imported from Canada to terminal live markets in the United States for human consumption. The risk assessment is available online at: Assessment of the Risk of Introduction of Tilapia Lake Virus (TiLV) by Live Tilapia Imported to Terminal Markets (usda.gov)
Emerging Risk Notice for Infectious hypodermal and hematopoietic necrosis virus (IHHNV)	CEAH produced an emerging risk notice for infectious hypodermal and hematopoietic necrosis virus (IHHNV), following detection of IHHNV in shrimp in the United States. The notice is available online at: Infectious hypodermal and hematopoietic necrosis virus (IHHNV) Emerging Risk Notice August 2020 (usda.gov)
Information Sheet on Infectious hypodermal and hematopoietic necrosis virus (IHHNV)	CEAH produced an information sheet on Infectious hypodermal and hematopoietic necrosis virus (IHHNV) to provide accurate information on the pathogen distribution, transmission and prevention, recommended biosecurity practices, and how to report suspect cases. The sheet is available online at: Infectious hypodermal and hematopoietic necrosis virus (IHHNV) Information Sheet August 2020 (usda.gov)
Koi Herpesvirus Pathogen Summary	CEAH staff completed a Koi Herpesvirus pathogen summary for internal use within Veterinary Services.
Decapod Iridescent Virus 1 Informational Sheet	CEAH staff completed an informational sheet on Decapod Iridescent Virus 1 for use within Veterinary Services.
Aquaculture Initiative	CEAH staff participated in the Veterinary Services Aquaculture Initiative to set future priorities and objectives; created an infographic exploring CEAH's history, and opportunities, in aquaculture; and organized within CEAH to promote better exchange of cross-unit aquaculture work and information.
Expert Elicitation for Oyster Herpes Virus (OsHV-1)	CEAH staff, along with the VS aquaculture commodity health team, conducted an expert elicitation involving subject matter experts from the U.S., Mexico, France and Australia to determine the value of passive surveillance for oyster herpes virus (OsHV-1) detection in the oyster industry. The process identified key components of successful early detection systems and a method to estimate the value of passive surveillance in proving disease freedom. A publication summarizing this work is expected in 2021.
CAHPS Inspection Guidance	CEAH staff led a collaborative Veterinary Services effort to draft Comprehensive Aquaculture Health Program Standards (CAHPS) inspection guidelines, and identify data requirements, for possible adoption by the American Fisheries Society Blue Book. Central guidance includes standards for pathogen-based and risk-based reductions in surveillance.

<p>Cross VS Aquaculture Support</p>	<p>CEAH staff assisted larger VS efforts in aquaculture including: commodity/trade efforts to revise the National Aquatic Animal Health Plan (NAAHP); diagnostic working group focused on developing pooling guidelines for diagnostic testing; surveillance evaluations for United Kingdom shrimp export (per new regulation); National Veterinary Services Laboratory (NVSL)/Agriculture Research Services (ARS) cooperative agreements to assess <i>Perkinsus marinus</i> assays and transmission pathways for infectious salmon anaemia virus (ISAV) introduction to freshwater hatcheries; trade support such as premises freedom guidelines, laboratory criteria, or risk assessment draft reviews; disease outbreak response; and VS Field Operations staff aquaculture outbreak investigation training.</p>
<p>Stakeholder and Advisory Working Groups</p>	<p>CEAH staff was involved in several U.S. aquaculture stakeholder and collaborative working groups. These include the East Coast Shellfish Pathology Working Group to implement a regional surveillance database and hatchery certification program, the Maine Bait Review Committee to evaluate disease introduction risks of new bait sources, the Maine Aquatic Animal Health Technical Committee to support fish health regulatory decisions and responses, the Shellfish Health Advisory Panel to support stakeholder decisions regarding U.S. shellfish health and trade, and editorial services for the journal <i>Diseases of Aquatic Organisms</i> to advance information exchange.</p>
<p>Aquaculture Initiative Working Group meetings</p>	<p>Dr. Lori Gustafson participated in a series of remote Aquaculture Initiative Working Group meetings to discuss critical components of a scalable approach for VS support of aquaculture as the industry advances to meet global challenges in food security and population health.</p>
<p><b>Animal welfare</b></p>	
<p><b>Title of activity</b></p>	<p><b>Scope</b></p>
<p>FMD Modeling - Capabilities, Vaccine Decision Making, Resource Allocation</p>	<p>CEAH delivered a webinar presentation entitled - 'FMD Modeling - Capabilities, Vaccine Decision Making, Resource Allocation' to the Secure Beef and Milk Supply Plans quarterly update meeting, which supports the efforts of industry to prepare for business continuity in the face of foreign animal disease outbreaks, while minimizing animal welfare issues due to movement restrictions.</p>
<p>Risk of ASF Transmission in Imported Animal Feed Products</p>	<p>Animal feed is suspected to be a pathway for ASFv introduction, similar to PEDv. However, the U.S. does not currently test imported animal feed ingredients such as soy and corn for the presence of African Swine Fever virus. Given the history of imported feed and zero reported infections, the "rule of three" can be applied to estimate the maximum probability of infection from imported feed rations. This maximum risk was extended to shipment sizes, finding that likelihood of contamination is very low. Even if a shipment was contaminated, the prevalence is likely too low to be detectable within a sampling program.</p>
<p><b>Other (Name the category)</b></p>	
<p><b>Title of activity</b></p>	<p><b>Scope</b></p>
<p>Repeatable Data Workflow to Support Emergency Response Mapping</p>	<p>CEAH staff developed a repeatable data workflow to download Emergency Management Response System (EMRS) rabbit hemorrhagic disease virus-2 (RHDV2) data from the USDA Data Integration Services (DIS) that is managed by the VS Center for Informatics. The DIS workflow leverages the RHDV2 data that has been pulled and clean for use in developing monthly maps for RHDV2 situation reports and public facing map applications depicting counties affected by the RHDV2 outbreak. This workflow and associated scripts will be updated and used for other VS emergency response activities.</p>
<p>Indemnity Valuation Updates</p>	<p>CEAH staff hosted a meeting with USDA Farm Service Agency (FSA) leadership to discuss policy-level implementation of new indemnity tables, which aim to improve the documentation and standardization of animal valuation methods within USDA.</p>

RFID Cost Assessment	CEAH staff conducted a cost assessment for transition to radio-frequency identification (RFID) for the National Animal Disease Traceability and Veterinary Accreditation Center (NADTVAC).
USDA Veterinary Services TB Indemnity Working Group	CEAH gathered and analyzed historic data from previously affected bovine tuberculosis-infected herds to inform a Veterinary Services working group evaluating alternatives for managing infected herds with the goal of reducing indemnity costs.
Meeting with USDA Office of Chief Economist (OCE) on Indemnity	Dr. Ken Forsythe had a series of meetings with Dr. Callie McAdams of the USDA Office of the Chief Economist (OCE) regarding the joint draft Veterinary Services and USDA Farm Service Agency document on commercial indemnity values. This series of meetings is a step toward higher level policy discussions on a harmonized USDA-level approach to indemnity valuations.
Compliance with U.S. Federal Information Collection Law	CEAH staff developed and submitted information collection packages for two national studies, in compliance with U.S. Federal Law. The Office of Management and Budget (OMB) approved, without change, CEAH's information collection requests for the National Animal Health Monitoring System (NAHMS) Swine 2020 and Feedlot 2020 studies. Both studies were moved to 2021 due to COVID.
NASS Web-based Map Application Created for Internal and Public Use	CEAH staff completed and published a web-based map application displaying key commodities and variables from the 2017 NASS Census of Agriculture. This web mapping application allows users to view geospatial data about major agricultural animal commodities from the NASS 2017 Census of Agriculture. These data include inventory of animals and number of operations at both the county and state levels within the United States. The application includes selection and query tools to work with the data in tabular and map formats. The map application is now available online at: <a href="https://www.usda.gov/aphis/geospatial-products-and-services">USDA APHIS   Geospatial Products and Services</a> .
Meeting with National Bison Association Representatives Regarding the National Animal Health Monitoring System Bison Study	Drs. Katherine Marshall and Margaret Parker traveled to Westminster, Colorado to meet with the Executive Director and Assistant Director of the National Bison Association, specifically to discuss a recent request to Veterinary Services for a National Animal Health Monitoring System (NAHMS) Bison study. This meeting included discussions regarding their interest in a study of risk factors for <i>Mycoplasma bovis</i> in bison and in a national study to examine national management practices, parasitism, and other health concerns.
Piloting New ADT Cooperative Agreement Forms	CEAH successfully launched a pilot test for managing Cooperative Agreements forms related to Animal Disease Traceability. A total of ten states participated in submitting proposed financial and work plans, with back and forth discussions and final approval, all handled within the platform of the VS Data Integration Services (VS DIS). This replaces the previous process of emailing spreadsheets back and forth, and users have provided positive feedback and suggestions for improvement for this new approach.
Health and Management Practices of U.S. Bison Story Maps	CEAH developed a Story Map about the health and management practices in the U.S. Bison industry was published and is now available from multiple web pages, including, the APHIS CEAH website: <a href="https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/SA-Epidemiology-AnimalHealth-CEAH">https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/SA-Epidemiology-AnimalHealth-CEAH</a> and via the scrolling "current projects" list located on <a href="https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/monitoring-and-surveillance/nahms">https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/monitoring-and-surveillance/nahms</a> . The Story shares information and outcomes from the 2014 Bison Survey conducted by NAHMS and provides interactive maps, graphs, and other engaging and rich content to help users better understand the ranching bison industry in the United States.

**ToR : To propose or develop methods and procedures that facilitate harmonisation of international standards and guidelines applicable to the designated specialty**

**2. Proposal or development of any procedure that will facilitate harmonisation of international regulations applicable to the surveillance and control of animal diseases, food safety or animal welfare**

Proposal title	Scope/Content	Applicable area
APHIS Proposed a New National List of Reportable Animal Diseases (NLRAD)	The United States Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS) is proposing a new National List of Reportable Animal Diseases (NLRAD) to further strengthen the country's ability to detect, respond to and control animal diseases. The new list will provide a consolidated, comprehensive set of guidelines to ensure Federal and State animal health officials quickly receive information about potential cases of communicable animal diseases.	<input checked="" type="checkbox"/> Surveillance and control of animal diseases <input type="checkbox"/> Food safety <input type="checkbox"/> Animal welfare

<p>Swine Hemorrhagic Fever Surveillance Plan Presentation to State/Federal/Industry Partners</p>	<p>The results from the Swine Hemorrhagic Fever Surveillance Plan Evaluation were presented at the annual meeting of the United States Animal Health Association (USAHA) as part of the USAHA/American Association of Veterinary Laboratory Diagnosticians Committee on Animal Health Surveillance and Information System.</p>	<p><input checked="" type="checkbox"/> Surveillance and control of animal diseases  <input type="checkbox"/> Food safety  <input type="checkbox"/> Animal welfare</p>
<p>National List of Reportable Animal Diseases Presentation to State/Federal/Industry Partners</p>	<p>Updates on the National List of Reportable Animal Diseases (NLRAD) was presented at the annual meeting of the United States Animal Health Association (USAHA) as part of the USAHA/American Association of Veterinary Laboratory Diagnosticians Committee on Animal Health Surveillance and Information System.</p>	<p><input checked="" type="checkbox"/> Surveillance and control of animal diseases  <input type="checkbox"/> Food safety  <input type="checkbox"/> Animal welfare</p>
<p>FMD Modeling - Capabilities, Vaccine Decision Making, Resource Allocation</p>	<p>CEAH delivered a webinar presentation entitled - 'FMD Modeling - Capabilities, Vaccine Decision Making, Resource Allocation' to the Secure Beef and Milk Supply Plans quarterly update meeting, which supports the efforts of industry to prepare for business continuity in the face of foreign animal disease outbreaks, while minimizing animal welfare issues due to movement restrictions.</p>	<p><input checked="" type="checkbox"/> Surveillance and control of animal diseases  <input type="checkbox"/> Food safety  <input checked="" type="checkbox"/> Animal welfare</p>
<p>Risk of ASF Transmission in Imported Animal Feed Products</p>	<p>Animal feed is suspected to be a pathway for ASFv introduction, similar to PEDv. However, the U.S. does not currently test imported animal feed ingredients such as soy and corn for the presence of African Swine Fever virus. Given the history of imported feed and zero reported infections, the "rule of three" can be applied to estimate the maximum probability of infection from imported feed rations. This maximum risk was extended to shipment sizes, finding that likelihood of contamination is very low. Even if a shipment was contaminated, the prevalence is likely too low to be detectable within a sampling program.</p>	<p><input checked="" type="checkbox"/> Surveillance and control of animal diseases  <input type="checkbox"/> Food safety  <input checked="" type="checkbox"/> Animal welfare</p>
<p>Comments to OIE on BSE Surveillance</p>	<p>CEAH and Veterinary Services staff provided comments on proposed revisions to the BSE surveillance article in the OIE Terrestrial Code. The OIE BSE committee proposed numerous updates to the BSE chapter including changes related to surveillance. One of the updates was to eliminate a point-based surveillance system and move to an exclusively passive surveillance system. We are concerned that a passive surveillance system would have very low sensitivity due to the non-specific clinical signs associated with BSE. We provided alternative text that requires active surveillance and allows for the results of future risk assessments to be used to design active BSE surveillance strategies.</p>	<p><input checked="" type="checkbox"/> Surveillance and control of animal diseases  <input type="checkbox"/> Food safety  <input type="checkbox"/> Animal welfare</p>
<p>COVID-19 Case Definition</p>	<p>Drs. Kevin Spiegel and Laura Miles created a case definition for SARS-CoV-2 in animals for the United States. This definition was shared with OIE working groups to facilitate work on case definitions at the international level.</p>	<p><input checked="" type="checkbox"/> Surveillance and control of animal diseases  <input type="checkbox"/> Food safety  <input type="checkbox"/> Animal welfare</p>
<p>OIE COVID-19 Safe Trade Ad hoc group</p>	<p>Dr. Dana Cole participated with Cristobal Zepeda in the OIE COVID-19 Safe Trade Ad hoc Group to review outcomes of risk assessments and provide input and text to OIE guidance documents to facilitate safe international trade of animals and animal products during COVID-19 pandemic.</p>	<p><input checked="" type="checkbox"/> Surveillance and control of animal diseases  <input type="checkbox"/> Food safety  <input type="checkbox"/> Animal welfare</p>

**ToR: To establish and maintain a network with other OIE Collaborating Centres designated for the same specialty, and should the need arise, with Collaborating Centres in other disciplines**

**ToR: To carry out and/or coordinate scientific and technical studies in collaboration with other centres, laboratories or organisations**

**3. Did your Collaborating Centre maintain a network with other OIE Collaborating Centres (CC), Reference Laboratories (RL), or organisations designated for the same specialty, to coordinate scientific and technical studies?**

Yes

Name of OIE CC/RL/other organisation(s)	Location	Region of networking Centre	Purpose
QUADS	Virtual	<input type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input checked="" type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East	CEAH collaborated with CFIA (Canada), MPI (New Zealand), and AWE (Australia) on the Quads collaboration working group discussing surveillance outside containment zones during an outbreak of classical swine fever or foot and mouth disease.
QUADS + United Kingdom and Ireland	Virtual	<input type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input checked="" type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input type="checkbox"/> Middle East	CEAH collaborated with CFIA (Canada), MPI (New Zealand), AWE (Australia), DEFRA (United Kingdom), AFDA (Ireland), and Public Health Canada partner calls starting in April 2020 on the approach and handling of SARS-CoV-2 in animals amongst the different countries. CEAH provided updates on U.S. companion animal and livestock testing protocols and guidance documents under development.

**4. Did your Collaborating Centre maintain a network with other OIE Collaborating Centres, Reference laboratories, or organisations in other disciplines, to coordinate scientific and technical studies?**

Yes

Name of OIE CC/RL/other organisation(s)	Location	Region of networking Centre	Purpose
CEAH/NVSL	United States	<input type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East	CEAH is leading a working group (WG) exploring the use of oral fluids for detection of African swine fever (ASF) virus utilizing the National Veterinary Services Laboratories (NVSL)'s validated ASF PCR. The WG consists of personnel from NVSL Foreign Animal Disease Diagnostic Laboratory, National Animal Health Laboratory Network, National Preparedness and Incident Coordination staff, the Swine Health Commodity staff, and APHIS senior leadership.

**ToR: To place expert consultants at the disposal of the OIE.**

**5. Did your Collaborating Centre place expert consultants at the disposal of the OIE?**

Yes

Name of expert	Kind of consultancy	Subject
Dr. Lori Gustafson	Aquaculture subject matter expert to the OIE Aquatic Animal Health Code ad hoc group	Dr. Lori Gustafson participated in the ad hoc group meeting on 'Susceptibility of Finfish Species to Infection with OIE List Diseases.'  The purpose of this group is to review literature and recommend updates to species listed as susceptible in pathogen-specific chapters in the OIE Aquatic Animal Health Code. Resulting recommendations go to the Aquatic Animal Standards Commission for consideration and then to member countries for review, prior to adoption.
Dr. Jane Rooney	One Health subject matter expert to the OIE COVID-19 at the Animal-Human Interface ad hoc group	Dr. Jane Rooney participated on the ad hoc group, helping keep the OIE updated on investigations into the potential role of animals and other matters of relevance since June of 2020. The purpose of the calls is to discuss what is known about the role of animals in the emergence of Coronavirus Disease 2019 and to make preliminary recommendations relating to investigations at the human animal ecosystems interface. Meetings are held every 2 - 6 weeks, depending on the urgency of the situation. Meeting note can be found at: Expert groups and guidance: OIE - World Organisation for Animal Health

**ToR: To provide, within the designated specialty, scientific and technical training to personnel from OIE Member Countries**

**6. Did your Collaborating Centre provide scientific and technical training, within the remit of the mandate given by the OIE, to personnel from OIE Member Countries?**

Yes

- a) Technical visits: 0
- b) Seminars: 4
- c) Hands-on training courses: 4
- d) Internships (>1 month): 0

Type of technical training provided (a, b, c or d)	Content	Country of origin of the expert(s) provided with training	No. participants from the corresponding country

b	Dr. Amy Delgado, CEAH, in collaboration with Dr. Celia Antognoli, Dr. Ed Arza, and Dr. Fred Soltera from Veterinary Services and Dr. Ericka Calderon from the Inter-American Institute for Cooperation on Agriculture, provided training on Good Emergency Management Practices to 38 participants from the official veterinary services and private sector in Colombia. The training focused on the core components of good emergency management practices, while utilizing African Swine Fever as an example to work through numerous exercises and discussions. At the end of the workshop, participants had developed a prioritized list for next steps in moving forward in African swine fever preparedness, including the development of numerous standard operating procedures and policy gaps.	United States	38
b	CEAH led a 2-hour class exercise to students at Virginia Polytechnic Institute and State University on an example risk assessment of African Swine Fever entry and exposure via illegal pathways. The course was intended to build critical thinking skills in real world applications. This case study demonstrated how to utilize and adapt the OIE risk assessment framework for evaluating illegal pathways	United States	20
b	Dr. Amy Delgado, in collaboration with other APHIS experts, provided technical assistance to India regarding African Swine Fever surveillance, epidemiology, and disease control through the delivery of a short webinar with an extended question and answer session. Participants included veterinarians and epidemiologists from the state and national level in India.	United States	30
b	Drs. Rebecca Jones and Laura Miles attended the OIE Regional Workshop for Advanced Training on the World Animal Health Information System (WAHIS). The training was held in Panama City, Panama February 17-19, 2020 and was attended by OIE Animal Disease Notification Focal Points from OIE countries in the Americas. The workshop provided instruction on OIE disease reporting requirements and procedures for annual, six month, immediate, and follow-up reports. The workshop also introduced the new WAHIS that will be released in 2020. The purpose of the workshop was to ensure optimal collection and submission of animal disease information to the OIE.	Panama	25

***ToR: To organise and participate in scientific meetings and other activities on behalf of the OIE***

**7. Did your Collaborating Centre organise or participate in the organisation of scientific meetings on behalf of the OIE?**

No

***ToR: To collect, process, analyse, publish and disseminate data and information relevant to the designated specialty***

**8. Publication and dissemination of any information within the remit of the mandate given by the OIE that may be useful to Member Countries of the OIE**

a) Articles published in peer-reviewed journals: 19

Author: Wilber, M. Q., Chinn, S. M., Beasley, J. C., Boughton, R. K., Brook, R. K., Ditchkoff, S. S., Fischer, J. W., Hartley, S. B., Holmstrom, L. K., Kilgo, J. C., Lewis, J. S., Miller, R. S., Snow, N. P., VerCauteren, K. C., Wisely, S. M., Webb, C. T. and Pepin, K. M.

Year: 2020

Title: Predicting Functional Responses in Agro-Ecosystems from Animal Movement Data to Improve Management of Invasive Pests

Journal: Ecological Applications

Volume: 30

Issue: 1

Pages: e02015

ISSN: 1051-0761 (Print)

DOI: 10.1002/eap.2015

Author: Tsao, K., Sellman, S., Beck-Johnson, L. M., Murrieta, D. J., Hallman, C., Lindström, T., Miller, R. S., Portacci, K., Tildesley, M. J. and Webb, C. T.

Year: 2020

Title: Effects of Regional Differences and Demography in Modelling Foot-and-Mouth Disease in Cattle at the National Scale

Journal: Interface Focus

Volume: 10

Issue: 1

Pages: 20190054

ISSN: 2042-8898 (Print)

DOI: 10.1098/rsfs.2019.0054

Author: Tabak, M. A., Norouzzadeh, M. S., Wolfson, D. W., Newton, E. J., Boughton, R. K., Ivan, J. S., Odell, E. A., Newkirk, E. S., Conrey, R. Y., Stenglein, J., Iannarilli, F., Erb, J., Brook, R. K., Davis, A. J., Lewis, J., Walsh, D. P., Beasley, J. C., VerCauteren, K. C., Clune, J. and Miller, R. S.

Year: 2020

Title: Improving the Accessibility and Transferability of Machine Learning Algorithms for Identification of Animals in Camera Trap Images: Mlwic2

Journal: Ecology and Evolution

Volume: 10

Issue: 19

Pages: 10374-10383

DOI: 10.1002/ece3.6692

Author: Stenkamp-Strahm, C., Patyk, K., McCool-Eye, M. J., Fox, A., Humphreys, J., James, A., South, D. and Magzamen, S.

Year: 2020

Title: Using Geospatial Methods to Measure the Risk of Environmental Persistence of Avian Influenza Virus in South Carolina

Journal: Spatial and Spatio-temporal Epidemiology

Volume: 34

Pages: 100342

ISSN: 1877-5845

DOI: 10.1016/j.sste.2020.100342

Author: Stenfeldt, C., Bertram, M. R., Smoliga, G. R., Hartwig, E. J., Delgado, A. H. and Arzt, J.

Year: 2020

Title: Duration of Contagion of Foot-and-Mouth Disease Virus in Infected Live Pigs and Carcasses

Journal: Frontiers in Veterinary Science

Volume: 7

Pages: 334

ISSN: 2297-1769 (Print)

DOI: 10.3389/fvets.2020.00334

Author: Smyser, T. J., Tabak, M. A., Sloomaker, C., Robeson, M. S., II, Miller, R. S., Bosse, M., Megens, H. J., Groenen, M. A. M., Paiva, S. R., de Faria, D. A., Blackburn, H. D., Schmit, B. S. and Piaggio, A. J.

Year: 2020

Title: Mixed Ancestry from Wild and Domestic Lineages Contributes to the Rapid Expansion of Invasive Feral

Swine

Journal: Molecular Ecology  
Volume: 29  
Issue: 6  
Pages: 1103-1119  
ISSN: 0962-1083  
DOI: 10.1111/mec.15392

Author: Sellman, S., Tildesley, M. J., Burdett, C. L., Miller, R. S., Hallman, C., Webb, C. T., Wennergren, U., Portacci, K. and Lindström, T.

Year: 2020

Title: Realistic Assumptions About Spatial Locations and Clustering of Premises Matter for Models of Foot-and-Mouth Disease Spread in the United States

Journal: PLoS Computational Biology

Volume: 16

Issue: 2

Pages: e1007641

ISSN: 1553-734X (Print)

DOI: 10.1371/journal.pcbi.1007641

Author: Schlichting, Peter E., Beasley, James C., Boughton, Raoul K., Davis, Amy J., Pepin, Kim M., Glow, Michael P., Snow, Nathan P., Miller, Ryan S., VerCauteren, Kurt C. and Lewis, Jesse S.

Year: 2020

Title: A Rapid Population Assessment Method for Wild Pigs Using Baited Cameras at 3 Study Sites

Journal: Wildlife Society Bulletin

Volume: 44

Issue: 2

Pages: 372-382

DOI: 10.1002/wsb.1075

Author: Rhyan, J., McCollum, M., Gidlewski, T., Shalev, M., Ward, G., Donahue, B., Arzt, J., Stenfeldt, C., Mohamed, F., Nol, P., Deng, M., Metwally, S. and Salman, M.

Year: 2020

Title: Foot-and-Mouth Disease in Experimentally Infected Mule Deer (*Odocoileus Hemionus*)

Journal: Journal of Wildlife Diseases

Volume: 56

Issue: 1

Pages: 93-104

DOI: 10.7589/2019-03-059

Author: Pierce, Courtney F., Brown, Vienna R., Olsen, Steven C., Boggiatto, Paola, Pedersen, Kerri, Miller, Ryan S., Speidel, Scott E. and Smyser, Timothy J.

Year: 2020

Title: Loci Associated With Antibody Response in Feral Swine (*Sus scrofa*) Infected With *Brucella suis*

Journal: Frontiers in Veterinary Science

Volume: 7

Pages: 554674

DOI: 10.3389/fvets.2020.554674

Author: Pepin, K. M., Smyser, T. J., Davis, A. J., Miller, R. S., McKee, S., VerCauteren, K. C., Kendall, W. and Sloomaker, C.

Year: 2020

Title: Optimal Spatial Prioritization of Control Resources for Elimination of Invasive Species under Demographic Uncertainty

Journal: Ecological Applications

Volume: 30

Issue: 6

Pages: e02126

ISSN: 1051-0761

DOI: <http://dx.doi.org/10.1002/eap.2126>

Author: Patyk, Kelly A., McCool-Eye, Mary J., South, David D., Burdett, Christopher L., Maroney, Susan A., Fox,

Andrew, Kuiper, Grace and Magzamen, Sheryl

Year: 2020

Title: Modelling the domestic poultry population in the United States: A novel approach leveraging remote sensing and synthetic data methods

Journal: Geospatial Health

Volume: 15

Issue: 2

DOI: 10.4081/gh.2020.913

Author: Nol, Pauline, Wehtje, Morgan E., Bowen, Richard A., Robbe-Austerman, Suelee, Thacker, Tyler C., Lantz, Kristina, Rhyan, Jack C., Baeten, Laurie A., Juste, Ramón A., Sevilla, Iker A., Gortázar, Christian and Vicente, Joaquín

Year: 2020

Title: Effects of Inactivated Mycobacterium Bovis Vaccination on Molokai-Origin Wild Pigs Experimentally Infected with Virulent M. Bovis

Journal: Pathogens (Basel, Switzerland)

Volume: 9

Issue: 3

ISSN: 2076-0817, 2076-0817

DOI: <http://dx.doi.org/10.3390/pathogens9030199>

Author: Nol, Pauline, Ionescu, Radu, Geremariam Welearegay, Tesfalem, Barasona, Jose Angel, Vicente, Joaquin, de Jesus Beleño-Sáenz, Kelvin, Barrenetxea, Irati, Jose Torres, Maria, Ionescu, Florina and Rhyan, Jack

Year: 2020

Title: Evaluation of Volatile Organic Compounds Obtained from Breath and Feces to Detect Mycobacterium Tuberculosis Complex in Wild Boar (Sus Scrofa) in Doñana National Park, Spain

Journal: Pathogens (Basel, Switzerland)

Volume: 9

Issue: 5

ISSN: 2076-0817

DOI: <http://dx.doi.org/10.3390/pathogens9050346>

Author: Maroney, Susan, McCool-Eye, MaryJane, Fox, Andrew and Burdett, Christopher

Year: 2020

Title: Using object-based image analysis to map commercial poultry operations from high resolution imagery to support animal health outbreaks and events

Journal: Geospatial Health

Volume: 15

Issue: 2

DOI: 10.4081/gh.2020.919

Author: Lombard, J., Urie, N., Garry, F., Godden, S., Quigley, J., Earleywine, T., McGuirk, S., Moore, D., Branan, M., Chamorro, M., Smith, G., Shivley, C., Catherman, D., Haines, D., Heinrichs, A. J., James, R., Maas, J. and Sterner, K.  
Year: 2020

Title: Consensus Recommendations on Calf- and Herd-Level Passive Immunity in Dairy Calves in the United States

Journal: Journal of Dairy Science

Volume: 103

Issue: 8

Pages: 7611-7624

ISSN: 0022-0302

DOI: 10.3168/jds.2019-17955

Author: Boden, Lisa A., Auty, Harriet K., Delgado, Amy, Grewar, John D., Hagerman, Amy D., Porphyre, Thibaud and Russell, George C.

Year: 2020

Title: Editorial: Risk-Based Evidence for Animal Health Policy

Journal: Frontiers in Veterinary Science

Volume: 7

Pages: 595

Date: Sept

DOI: 10.3389/fvets.2020.00595

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Author: Bertram, M. R., Yadav, S., Stenfeldt, C., Delgado, A. and Arzt, J.

Year: 2020

Title: Extinction Dynamics of the Foot-and-Mouth Disease Virus Carrier State under Natural Conditions

Journal: Frontiers in Veterinary Science

Volume: 7

Pages: 276

ISSN: 2297-1769 (Print)

DOI: 10.3389/fvets.2020.00276

Author: Singer, R.s., Porter, L.J., Schrag, N.F., Davies, P.r., Apley M.D., Bjork, K.

Year: 2020

Title: Estimates of on-farm antimicrobial usage in broiler chicken production in the United States, 2013-2017.

Journal: Zoonoses Public Health

Volume: 67 Suppl 1

Pages: 22-35

DOI: 10.1111/zph.12764

b) International conferences: 1

3rd International Conference on Fisheries & Aquaculture

c) National conferences: 15

American Fisheries Society & The Wildlife Society

American Dairy Goat Association Annual Convention

United States Animal Health Association Annual Meeting

Tableau User Conference

American Sheep Industry Association Convention/American Goat Federation

National Bison Association Winter Meeting

National Cattlemen's Beef Association Annual Convention

Aquaculture America Conference

Agricultural & Applied Economics Association Annual Meeting

Transboundary Animal Disease in Swine

Aquaculture North America Conference

Carthage Conference

Leman Swine Conference

American Association of Bovine Practitioners Annual Meeting

d) Other

(Provide website address or link to appropriate information): 2

NAHMS descriptive reports

Beef 2017 Report I: Beef cow-calf Management Practices in the United States, 2017. USDA-APHIS-VS-CEAH-NAHMS. Fort Collins, CO #.782.0520

[https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/monitoring-and-surveillance/nahms/nahms\\_beef\\_cowcalf\\_studies](https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/monitoring-and-surveillance/nahms/nahms_beef_cowcalf_studies)

NAHMS Story Map

Ranched Bison in the United States: a look at health and management practices on U.S. bison operations. USDA APHIS | Ranched Bison in the United States <https://www.aphis.usda.gov/aphis/maps/animal-health/bison-storymap>

## 9. Additional comments regarding your report:

COVID-19 travel restrictions limited out ability to attend non-virtual conferences and meetings in 2020.