

OIE Collaborating Centres Reports Activities

Activities in 2021

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Title of collaborating centre:	Animal Disease Surveillance Systems, Risk Analysis and Epidemiological Modelling
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Name of writer:	Laura Blanton

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
SARS-CoV-2 Activities	Collaborated with One Health partners on SARS-CoV-2 monitoring activities, including OIE reports of detections in animals, data integration/analysis of epidemiologic information from animal cases, development of data collection systems that comply with all US government requirements, development of active surveillance proposals for mink surveillance activities, and additional epidemiologic support across multiple species.
Contributions to the CARB National Action Plan	CEAH staff along with Veterinary Services (VS) staff provided input to the Combating Antibiotic-Resistant Bacteria (CARB) National Action Plan reporting activities and supported the VS Antimicrobial dashboard project which aims to increase sharing of antimicrobial resistance data.
Public-Private Partnership Collaboration on Antimicrobial Use	Collaborated on the development of a public-private partnership with Pipestone Veterinary Services to study antimicrobial use and resistance related to animal health and production-related indicators in large scale swine production. APHIS is partnering with several animal health and industry organizations on this study, and data review and validation is underway. This collaboration could serve as a model for future studies to monitor antimicrobial use and resistance using detailed on-farm data, while supporting improved situational awareness of producers to optimize antimicrobial stewardship.
CEAH Collaboration with California Department of Food and Agriculture	Collaborated with the California Department of Food and Agriculture (CDFA) throughout the National Animal Health Monitoring System's Goat 2019 study to ensure data collected would meet California's legal obligations to collect antimicrobial use data on goat operations. Custom data tables were created and provided to CDFA for use in their annual reporting.
Analyzed Changes in Dairy Industry Health and Management Practices	Analyzed changes in dairy industry health and management practices from 1991-2014, and changes in antimicrobial use and stewardship practices from 2007 -2014. These results will be published in the 5th descriptive report from the National Animal Health Monitoring System (NAHMS) Dairy 2014 study, 'Changes in Dairy Cattle Health and Management Practices in the United States, 1991-2014.'
United States Cow-Calf Operations Reporting	Completed reporting of animal health, biosecurity, antimicrobial use and stewardship on U.S. cow-calf operations. This report is now available on the National Animal Health Monitoring System (NAHMS) website.

Goat 2019 Study Descriptive Report First Draft	The first descriptive report from the National Animal Health Monitoring System (NAHMS) Goat 2019 study, 'Reference of Goat Management Practices in the United States, 2019' was drafted.
Goat Scrapie Genotype Manuscript published in collaboration with NVSL	The National Animal Health Monitoring System (NAHMS) collaborated with National Veterinary Laboratory Services (NVSL) to publish a manuscript sharing results from scrapie genotype testing, completed as part of the NAHMS Goat 2019 study. The manuscript was published in PLOS ONE and is titled 'Large-scale survey of prion protein genetic variability in scrapie disease-free goats from the United States.'
Info Briefs Published on Goat Industry Health and Management Practices	NAHMS Goat 2019 study data has been used to publish two infographics, two information briefs and two PowerPoint presentations. Topics covered in these documents include industry growth, veterinary use, disbudding practices, animal identification practices, overview of goat management practices, and agritourism practices. Three of the documents are available in both English and Spanish.
Needs Assessment Survey for 2024 Sheep Study	Worked with Veterinary Services staff, sheep industry representatives, and sheep producers from all 50 States to complete a needs assessment survey to identify information gaps that will help prioritize study objectives for the National Animal Health Monitoring System (NAHMS) Sheep 2024 study. Results have been presented to the sheep industry through multiple presentations.
2020 Sheep Death Loss Study Dashboard	Published results from the 2020 Sheep Death Loss Study in an interactive dashboard online. This study includes data on predator and nonpredator losses of sheep and lambs, predator management on sheep operations, use of government specialists to mitigate losses, use of official identification, and reasons why operations stopped raising sheep in 2019.
Small Enterprise Swine 2021 Study	From May 2021 through July 2021, CEAH's National Animal Health Monitoring System (NAHMS), in collaboration with the USDA's National Agricultural Statistics Service (NASS) conducted its third national study of U.S. small enterprise swine operations. Data were collected in 38 states. The study will take an in-depth look at small enterprise swine operations (fewer than 1,000 pigs) and provide new information regarding animal health and management practices used on these operations, as well as the alternative marketing strategies they implement.
Large Enterprise Swine 2021 Study	From July 2021 through January 2022, CEAH's National Animal Health Monitoring System (NAHMS), in collaboration with the USDA's National Agricultural Statistics Service (NASS) conducted its sixth national study of U.S. large enterprise swine operations. Data were collected in 13 states. The Swine 202 Large Enterprise study is designed to provide participants and industry stakeholders with benchmarking information on the U.S. swine industry. Information collected will contribute to critically important epidemiologic surveillance that will inform disease management and preparedness strategies to safeguard the U.S. swine industry.
Improvement of Antimicrobial Resistance Bacteria Detection in Swine	Partnered with Agriculture Research Service (ARS) US Meat and Animal Research Center to design and complete the workplan for a project that will examine improvement of antimicrobial resistance bacteria detection along the farm to fork continuum in swine production.
Aggregate Sampling Methods Project in Swine Fecal Samples	Partnered with ARS U.S. Meat and Animal Research Center to complete analysis for project addressing knowledge gaps for aggregate sampling methods to characterize antimicrobial resistance in bacteria obtained from swine fecal samples.

ASFv Carcass Disposal Projects in Vietnam	Collaborating with Veterinary Services staff by providing study design and statistical assistance on two African Swine Fever virus (ASFv) burial projects in Hanoi, Vietnam using ASFv infected swine carcasses. The projects are studying the effectiveness of composting and Above Ground Burial (AGB) at deactivating ASFv. The composting project is in the data analysis stage, and the AGB project begin data collection in early 2022.
ASFv Carcass Disposal in Oklahoma	Collaborating with Veterinary Services staff by providing study design and statistical assistance on an African Swine Fever virus (ASFv) burial project in Oklahoma using an ASFv-surrogate virus (Swine pox) to determine the effectiveness of above ground burial at deactivating the virus. A manuscript will be submitted for publication in 2022.
Tuberculosis Sampling on Affected Premises	Provided support to Veterinary Services to design a surveillance sampling approach for a tuberculosis-affected premises which had cattle, domestic goats, a variety of exotic ungulates, and wildlife present.
Fluorescence Polarization Assay for Brucellosis Testing	Completed an assessment of the Fluorescence Polarization Assay for bovine brucellosis testing in the Greater Yellowstone Area.
ASF Virus Viability and Infection Risk from Treated Sausage Casings	Quantitatively reevaluated African swine fever virus viability and infection risk from treated sausage casings using data from a recently published live animal study.
Epidemiology, surveillance, risk assessment, modelling	
Title of activity	Scope
Data Collection for NAHMS Feedlot Study	Completed data collection activities for the National Animal Health Monitoring System (NAHMS) Health Management on US Feedlots Study in 2021, with most data collected electronically for the first time.
Development of Electronic Data Collection Tool for Surveillance	Developed an electronic data collection tool for African Swine Fever/Classical Swine Fever Surveillance data collection, improving efficiency of data collection, integration, and analysis across field collectors, laboratories, and APHIS-Veterinary Services staff.
NLRAD Public Comments Addressed	Finalized response to public comments on the National List of Reportable Animal Disease rule. This rule will move forward in the rule-making process in 2022.
Bovine Brucellosis and Tuberculosis National Surveillance Plans Update	Updated bovine brucellosis and tuberculosis national surveillance plans.
Pullorum Typhoid Testing Surveillance Procedures	Evaluated Salmonella Pullorum -Typhoid testing and surveillance procedures in collaboration with Veterinary Services staff. The final report, anticipated in February 2022 will contribute to updates and optimization of this historic disease surveillance program. The National Poultry Improvement Program (NPIP) is a Federal-State-Industry program that was initiated in 1935 to eradicate Salmonella Pullorum-Typhoid (PT) in US commercial poultry. The program is highly successful and all U.S. states currently have "U.S. Pullorum-Typhoid Clean" status.
Interactive Map Development	Developed several interactive map applications to support bovine brucellosis and tuberculosis activities including: a Designated Surveillance Area (DSA) and Data app that brings together the DSA boundaries, range allotments, public lands and other critical data; a Wyoming-centric Brucellosis and Risk Assessment application that provides an overlay of Brucellosis sampling with risk assessment data; and a national map application for quarterly reporting of disease data.
Salmonella, Campylobacter, generic E. coli, E. coli 0157:H7, and Enterococcus Work	Partnered with North Carolina State University to further characterize national-level information on the virulence, antibiotic resistance, and disinfectant resistance potential of Salmonella, Campylobacter, generic E. coli, E. coli 0157:H7, and Enterococcus organisms from fecal samples collected as part of the NAHMS Goat 2019 study. These microbes are being assessed for biofilm-potential, which is novel to a surveillance program of this scale. Results from the Salmonella and E. coli work were presented at the conference for the International Association for Food Protection, and manuscripts are in development.
Swine Health Improvement Plan Guidance	Collaborated with U.S. swine industry to provide input and guidance on proposed sampling approaches within the newly developed Swine Health Improvement Program.
African Swine Fever Red Book Surveillance Chapter	Developed surveillance chapter of published African Swine Fever (ASF) Preparedness and Response Plan - ASF Red Book.
ASF Rapid Surveillance Plan Modification	Supported rapid surveillance plan modifications for Puerto Rico and U.S. Virgin Islands in response to the African Swine Fever detection in the Dominican Republic.
National FMD Disease-Spread and Control Model	Collaborated with Kansas State University on a foot and mouth disease national disease-spread and control model designed to evaluate tradeoffs in vaccination strategies between states.
ASF/CSF Active Surveillance Plan Modifications	Proposed additional swine hemorrhagic fevers active surveillance plan modifications for the remainder of the United States to address newly identified risk pathways after detection of African swine fever in the Dominican Republic.

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

Updated ASF/CSF Models	Updated livestock dealer and slaughter plant parameters in the national African swine fever and classical swine fever models. These updates ensure that analyses for preparedness and response planning are based on the best available data on industry connectivity and movement.
Cattle Fever Tick Epidemiologic and Spatial Analysis	Conducted epidemiologic and spatial analysis to predict infestation time horizons and inform decision making to help improve cattle fever tick control and eradication efforts.
Secondary Hog Market Model	Updated parameters related to secondary hog markets in the African swine fever and classical swine fever national models. These updates ensure that analyses for preparedness and response planning are based on the best available data on industry connectivity and movement.
FMD Epidemiologic Modeling in Feedlots	Completed epidemiologic modeling for the evaluation of the impact of applying feedlot "burn through" strategies for large feedlots infected with FMD. These analyses will support response planning for situations where resources are limited, or operation sizes are very large.
Swine Hemorrhagic Fevers Surveillance Program First Year Evaluation Brief	The Swine Hemorrhagic Fevers Surveillance Program first year evaluation brief was posted to the swine health website. It provides the public with the findings of the first-year surveillance plan evaluation in a short, succinct, and easy to read format. It is available online at: https://www.aphis.usda.gov/animal_health/downloads/animal_diseases/swine/hemorrhagic-csf-asf-brief.pdf
TB and Brucellosis Affected Herds and Designated Surveillance Zones Maps	Provided updated maps to Veterinary Services to show bovine tuberculosis and brucellosis affected herds and designated surveillance zones for geographic regions within the contiguous United States. An interactive mapping application is in development to provide a dynamic map product for viewing and reporting updates in bovine tuberculosis and brucellosis status in the US.
Enhances HPAI and vND Modeling Scenarios	Enhanced highly pathogenic avian influenza and virulent Newcastle disease modeling scenarios through the addition of avian hatcheries and live bird markets to the national model configuration and farm files.
Regional and National Models of Commercial Poultry Operations within the United States	Collaborated with Colorado State University, University of Maryland, and the US Geological Survey, to develop 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 path or high path avian influenzas. Publications include, "Modelling the domestic poultry population in the United States: A novel approach leveraging remote sensing and synthetic data methods" (https://doi.org/10.4081/gh.2020.913) and "Using object-based image analysis to map commercial poultry operations from high resolution imagery to support animal health outbreaks and events" (https://doi.org/10.4081/gh.2020.919).
Training, capacity building	
Title of activity	Scope
Training at the University of Michigan	Attended training at the University of Michigan for survey and questionnaire design to increase capacity within the National Animal Health Monitoring Service (NAHMS). Courses focused on questionnaire writing and survey design.
2017 Antimicrobial Use in Swine 2017 Tableau Dashboard	Designed and posted the first public Tableau dashboard of NAHMS results - 'Antimicrobial Use in Swine 2017.'
Climate Series Talk Proposal	Performed outreach to Guatemala climate scientist to propose climate series talks.
Disease-Spread Model Capabilities and Modeling Outcomes Webinar	Delivered webinar on disease-spread model capabilities and modeling outcomes associated with vaccine distribution in support of the Foot and Mouth Disease National Functional Exercise.
African Swine Fever Response Policy Workshop with Meat Packer and Allied Industries	Participated in the virtual African Swine Fever Response Policy Workshop: Meat Packer and Allied Industries that occurred from January 11 - January 13, 2021. The workshop targeted ASF response and its effect on the meat packing and allied industries and was attended by federal, state, and industry planners and policy makers. The workshop focused on examining foreign animal disease (FAD) response plans, policies, and procedures which would impact meat packer operations from the hypothetical first index case detection of ASF in the continental United States to the point at which the packer and allied industries, and regulatory agencies, have implemented some type of advanced biosecurity to allow packer operations to continue inside and outside of disease control areas.

Dairy Net Zero Meeting	Participated in a meeting with Strategic Conservation Solutions, National Milk Producers Federation, and the Innovation Center for US to hear a briefing on the Dairy Net Zero Initiative and to discuss how the CEAH Dairy program and these organizations can work together to meet information needs for the dairy industry in the areas of environmental stewardship, carbon neutrality, and sustainability. In addition to CEAH and Veterinary Services staff, collaborators from Colorado State University and University of California Davis also attended.
Presented at the Virtual AASV CTED	Attended and presented two original works at the virtual American Association of Swine Veterinarians Committee on Transboundary and Emerging Diseases on January 27, 2021. Presentations were titled "ASF Response-Surveillance Sampling Strategies" and "Potential Uses of a real time PCR Assay for Detection of African Swine Fever Virus in Oral Fluids in the United States."
Helped plan and present information in webinar series on African Swine Fever (ASF): Preparing for ASF	Participated in planning meetings hosted by IICA to provide webinar series on risk analysis for ASF in the Americas. Co-lead a presentation on 11/9/21 entitled, "Foundations of Risk Analysis"
VS Training and Exercise Program	Supported basic and advanced training in epidemiology and surveillance in the VS Training and Exercise Program. This included the development and delivery of virtual webinars as well as strategic planning on training needs for Veterinary Services.
Continued planning virtual international course on Risk Analysis	Continued to plan and develop virtual international course on risk analysis entitled, Introduction to Risk Analysis to be conducted March 7-10, 2022.
Wildlife	
Title of activity	Scope
Feral Swine Home Range Size	Worked with APHIS Wildlife Services to develop estimates of feral swine home range sizes in North America to assist with African swine fever surveillance and response planning.
Tools for Cattle Fever Tick Eradication Program	Developed tools to inform Cattle Fever Tick Eradication Program (CFTEP) decision-making, including an Rshiny app useful for automatically analyzing images from wildlife camera traps and analytic tools to improve cattle fever tick surveillance.
Absence of Rabies Virus on Mongoose Population on US Virgin Islands Manuscript	Supported the analysis and summarization of efforts to determine the absence of rabies virus in mongoose populations in the U.S. Virgin Islands. This work will be published in 2022.
Feral Swine Commercial Slaughter and Condemnation publication	In preparation to add feral swine to APHIS weekly monitoring, a descriptive analysis of feral swine slaughter and condemnations was conducted to understand the extent of commercial feral swine slaughter in the US at federally inspected slaughter establishments and to determine which condemnation reasons should be included. A manuscript of the results was published in Frontiers in Veterinary Science on 3 Sept 2021 titled "Feral Swine Commercial Slaughter and Condemnation at Federally Inspected Slaughter Establishments in the United States 2017-2019."
Avian diseases	
Title of activity	Scope

National Poultry Improvement Plan Enhancements	Initiated National Poultry Improvement Plan (NPIP) avian influenza data initiative, intended to make the data collection, analysis and reporting process more streamlined for all NPIP participants and regulatory agency partners. Tool development has progressed and was successfully tested by three states' cooperators.
Artificial Intelligence and Remote Sensing Technologies in Modeling	Completed two publications on modeling the U.S. commercial poultry operations using artificial intelligence and remote sensing technologies in collaboration with Colorado State University, University of Maryland, and US Geographic Survey. The models can be used to prepare for or minimize risk of disease introductions for avian diseases, such as, low path or high path avian influenza.
On-Farm Monitoring of Antimicrobial Use and Resistance in US Broiler Production Study Preparation	Collaborated with the University of Minnesota to support an Office of Management and Budget (OMB) submission for on-farm monitoring of antimicrobial use and resistance in U.S. broiler production. This longitudinal study in 2022 will measure antimicrobial use patterns and their relationship to antimicrobial resistance of select microbes over time on farms of the 30 top U.S. broiler producers.
Study Design and Statistical Support	Collaborated with Veterinary Services staff by providing study design and statistical assistance on an Infectious Bursal Disease Virus (IBDV) project to facilitate safe trade in US cooked turkey products.
Low Pathogenic Avian Influenza Maps	Following the detection of low pathogenic avian influenza (LPAI) on a Missouri farm, provided maps depicting the trade-impacted zones. Maps were used to communicate ineligible trade zones with global trade partners and the USDA Food Safety Inspection Service.
Webinar to the Poultry Industry on the Global Situation of HPAI	Provided an update on the Highly Pathogenic Avian Influenza (HPAI) global situation at the HPAI Webinar for the Poultry Industry February 2, 2021. CEAH staff developed and delivered a HPAI disease progression video showing global wild bird detections and domestic poultry outbreaks reported to the World Organization for Animal Health (OIE) occurring from January 1, 2020 through January 26, 2021.
Surveillance and Sequestration Strategies to Reduce the Likelihood of Transporting HPAIV Contaminated Layer Manure Manuscript	Published a manuscript titled Surveillance and Sequestration Strategies to Reduce the Likelihood of Transporting HPAIV Contaminated Layer Manure in the Journal of Avian Diseases. The manuscript describes simulation models used to evaluate the impact of different targeted dead-bird active surveillance sampling and RRT-PCR testing protocols, and manure sequestration (i.e., manure that has been removed from the poultry house and isolated for 3 days or more without the addition or contact with fresh manure), on reducing the chances of moving HPAIV contaminated manure from layer operations that use manure belt manure management systems to remove manure from the house.
Model of National Poultry Population Data	Shared with the Ohio State University, Department of Veterinary Preventative Medicine a model of national poultry population data. The model was developed through a cooperative agreement with Colorado State University and will be used for risk analyses and assessments. Details about the model can be found in this article - https://geospatialhealth.net/index.php/gh/article/view/913
Aquatic animal diseases	
Title of activity	Scope
CAHPS Guidance	Designed decision trees and accompanying guidance document to standardize Commercial Aquaculture Health Program Standards (CAHPS) field inspections and guide risk-based surveillance planning.

CAHPS Surveillance Evaluation and Data Gathering Tools	Continued development of surveillance evaluation and data gathering tools to support Commercial Aquaculture Health Program Standards (CAHPS) activities in collaboration with others in Veterinary Services.
Design of Standards for Pooled Samples	Collaborated with VS aquaculture staff and VS laboratory representatives on the design of standards for acceptable use and analysis of pooled samples for shrimp disease testing.
Study Planning for US Shrimp Industry	Initiated study planning with the University of Kentucky for data collection on the US Shrimp industry to benchmark industry production and health management practices.
Shrimp Premises Surveillance Design for CAHPS	Proposed surveillance designs for shrimp premises facilitating international trade and piloting proposed Commercial Aquaculture Health Program Standards (CAHPS) approach.
Epidemiology of OshV-1 and Potential Pathways	Provided a summary of the epidemiology of ostreid herpes virus (OshV-1), and the potential pathways of entry and exposure for this pathogen to the U.S. shellfish industry.
Potential Pathways of Exposure to ST251 Strains of Virulent <i>Aeromonas hydrophila</i> in Farmed Catfish	Provided a summary of the epidemiology and potential international and domestic pathways of ST251 virulent strains of <i>Aeromonas hydrophila</i> in US farmed catfish.
Other (Name the category)	
Title of activity	Scope
American Rescue Plan Technical Coordination Cell (Oriana)	CEAH staff actively participated in the American Rescue Plan Technical Coordination Cell, developing proposals for funding activities which align with lessons learned throughout the pandemic and building towards bigger picture goals to improve surveillance and monitoring systems for zoonotic and emerging diseases.
African Swine Fever Case Progression Video	Developed and provided an African Swine Fever case progression video for the 97th annual Agriculture Outlook Forum. The disease progression video illustrated domestic swine and wild boar cases globally from 2006 through January 2021.
Rabbit Hemorrhagic Disease Virus 2 Maps	Developed internal and publicly available maps showing the Rabbit Hemorrhagic Disease Virus 2 (RHDV2) cases and geographic extent in the United States throughout 2021. Provided interactive map products to the Veterinary Services RHDV2 Coordination Cell and an affected counties web-based map application that was heavily utilized by the rabbit industry and stakeholders to mitigate disease risk.
Tropical Bont Tick Control Maps	Developed internal maps for Tropical Bont Tick Control in the U.S. Virgin Islands.
Cattle Fever Tick Control Maps	Developed internal maps for the Cattle Fever Tick (CFT) Control program in Puerto Rico throughout 2021.
Commercial Indemnity Table for Cattle	Supported the implementation of the cattle sections of the USDA Commercial Indemnity Table to support transparent valuation of animals taken for disease control purposes.
Indemnity Standards Draft	Drafted appraisal standards which are being incorporated into a consolidated Veterinary Services Directive on Indemnity.

Urban Agriculture 2023 Study Outreach	Conducted outreach to agricultural extension, VS swine and poultry health, university, and other stakeholders to identify information gaps and challenges for an urban agriculture study in 2023.
Livestock and Poultry Appraisers List	Developed an initial list of qualified, independent, third-party livestock and poultry appraisers through a contract with the American Society of Farm Managers and Rural Appraisers. A second contract is in progress to expand this list.
Modification to TB Test and Remove Model	Modified the cattle tuberculosis test and remove model to work with the new USDA indemnity tables. Updated output tables and figures for herd reports to support decision making around disease control and eradication.
African Swine Fever Scenarios	Updated African swine fever zone scenarios to support planning around zone sizes, laboratory demand, and personal protective equipment need estimation.
Game Theory Modeling Metrics	In collaboration with Kansas State University, delivered draft datasets for 19 identified metrics from the national foot and mouth disease model to support further analysis using game theory. Delivered five additional datasets to provide for more rapid quality assessment of metric outputs. All datasets generated using Alteryx workflows that were customized for the project.
Design Standards Book Chapter	Preparation of a book chapter on design standards for risk-based surveillance.
Comprehensive and Integrated Surveillance Systems Information Technology Advisory Board	Co-chaired the Comprehensive and Integrated Surveillance Systems Information Technology Advisory Board, prioritizing IT enhancement requests and considering project proposals throughout the year.
2022 Bison Study Design and Questionnaire	Completed the study design and questionnaire development for the National Animal Health Monitoring System (NAHMS) Bison 2022 study.
Impacts of Liquid Diet, Age, and Pooling Methods Analysis	Assisted Texas A&M with completing the analysis to investigate impacts of liquid diet, age, and pooling methods on the fecal microbiome and resistome of dairy calves.
African Horse Sickness Response Plan	Contributed to the draft of the U.S. African Horse Sickness Response Plan which outlined information and knowledge gaps from the literature. This plan will serve as a foundation for a U.S. response to an incursion of African horse sickness in the U.S.
Evaluated Time-Temperature Heat-Treatment Protocols for African Swine Fever	Qualitatively evaluated time-temperature heat-treatment protocols for African Swine Fever virus inactivation in fresh deboned pork from a review of the published literature.
Potential Risk of Disease Introduction Analysis	Completed potential risk of disease introduction analyses following the environmental release of biohazards during the transfer of infectious agents from Plum Island Animal Disease Center (PIADC) to the new National Bio- and Agro-Defense Facility (NBAF).
Environmental Persistence Analysis for ASF, CSF, and FMD	Completed environmental persistence analysis for African swine fever, classical swine fever, and foot and mouth disease associated with the potential release of biohazards during the transfer of infectious agents from Plum Island Animal Disease Center (PIADC) to National Bio- and Agro-Defense Facility (NBAF).

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
Risk of ASF, FMD, and CSF Entry via the Air Passenger Baggage Pathway	Release of double-seal intelligence communication (DHS/USDA) on the risk of ASF, FMD, and CSF entry via the air passenger baggage pathway.	<input checked="" type="checkbox"/> Surveillance and control of animal diseases <input type="checkbox"/> Food safety <input type="checkbox"/> Animal welfare
Targeted ASF Surveillance Program	Analyzing destination of pork products in air passenger, mail, and cargo for use in a domestic feral swine surveillance program and the targeted ASF surveillance program.	<input checked="" type="checkbox"/> Surveillance and control of animal diseases <input type="checkbox"/> Food safety <input type="checkbox"/> Animal welfare
Entry Assessment of ASF, FMD, and CSF in Mail Cargo	Performed an entry assessment of ASF, FMD, CSF in mail cargo pathways with identification of factors influencing entry risk.	<input checked="" type="checkbox"/> Surveillance and control of animal diseases <input type="checkbox"/> Food safety <input type="checkbox"/> Animal welfare
National List of Reportable Animal Diseases Presentation to State/Federal/Industry Partners	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.	<input checked="" type="checkbox"/> Surveillance and control of animal diseases <input type="checkbox"/> Food safety <input type="checkbox"/> Animal welfare
Current Asia, Europe and Caribbean Maps of ASF Detections	Following a specific request by the Department of Homeland Security (DHS) Center for Weapons of Mass Destruction's Food Agriculture Veterinary-Defense, National Biosurveillance Integration Center, CEAH provided the most current Asia, Europe and Caribbean maps of African swine fever detections occurring between January 1, 2020 and August 19, 2021 for DHS to use in their overview and update briefing on ASF to the Operations Deputies.	<input checked="" type="checkbox"/> Surveillance and control of animal diseases <input type="checkbox"/> Food safety <input type="checkbox"/> Animal welfare

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 collaboration on surveillance design	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 Epi-Team Meetings	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	Chaired QUADS Epi-Team collaboration group which included members from CFIA (Canada), MPI (New Zealand), and AWE (Australia). The group met bimonthly and worked on development of an African swine fever model as well as other collaborations.

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
Use of Oral Fluids for ASF Detection	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. Jane Rooney	One Health subject matter expert to the OIE COVID-19 working group at the Animal-Human Interface ad hoc group.	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: 1
- b) Seminars: 0
- c) Hands-on training courses: 0
- 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
a	Dr. Amy Delgado participated in a delegation that traveled to the Dominican Republic. The group discussed support for the control of African and Classical Swine Fever within the country, with an emphasis on developing a plan to address needs within the first half of 2022. Identified needs included laboratory support and equipment for surge capacity planning, surveillance and epidemiologic investigations, and command and coordination structure. The visit will be followed with additional onsite technical visits in early 2022.	Dominican Republic	14

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

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: 22

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

Year: 2020

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

Journal: Zoonoses and Public Health

Volume: 67

Issue: S1

Pages: 22-35

Author: Singer, R. S., Porter, L. J., D., Schragm N. F., Davies, P. R., Apley, M. D. and Bjork, K.

Year: 2020

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

Journal: Zoonoses and Public Health

Volume: 67

Issue: S1

Pages: 36-50

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

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

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

Author: Short, D M and Lombard, J.

Year: 2020

Title: The National Animal Health Monitoring System's perspective on respiratory disease in cattle

Journal: Animal Health Research Reviews

Volume: 21

Issue: 2

Pages: 135-138

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

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

Year: 2021

Title: Assessing intrastate shipments from interstate data and expert opinion

Journal: Royal Society Open Science

Volume: 8

Issue: 3

Start Page: 192042

Author: verCauteren, K. C. and Miller, R. S.

Year: 2021

Title: Characteristics and perspectives of disease at the wildlife-livestock disease interface in North America

Editor: Vincente, Joaquin, verCauteren, K. C. and Gortazar, C

Book Title: Diseases at the Wildlife - Livestock Interface

Series Volume: 3

Pages: 245-269

Series Title: Wildlife Research Monographs

Author: Gorsich, Erin E., Webb, Colleen T., Merton, Andrew A., Hoeting, Jennifer A., Miller, Ryan S., Farnsworth, Matthew L., Swafford, Seth R., DeLiberto, Thomas J., Pedersen, Kerri, Franklin, Alan B., McLean, Robert G., Wilson, Kenneth R. and Doherty Jr., Paul F.

Year: 2021

Title: Continental-scale dynamics of avian influenza in U.S. waterfowl are driven by demography, migration, and temperature

Journal: Ecological Applications

Volume: 31

Issue: 2

Pages: e2245

Author: Yang, Anni, Schlichting, Peter, Wight, Bethany, Anderson, Wesley M., Chinn, Sarah M., Wilber, Mark Q., Miller, Ryan S., Beasley, James C., Boughton, Raoul K., VerCauteren, Kurt C., Wittemyer, George and Pepin, Kim M.

Year: 2021

Title: Effects of Social Structure and Management on Risk of Disease Establishment in Wild Pigs

Journal: Journal of Animal Ecology

Volume: 90

Issue: 4

Pages: 820-833

Author: Bonney, Peter J., Malladi, Sasidhar, Ssematimba, Amos, Spackman, Erica, Torchetti, Mia Kim, Culhane, Marie and Cardona, Carol J.

Year: 2021

Title: Estimating epidemiological parameters using diagnostic testing data from low pathogenicity avian influenza infected turkey houses

Journal: Scientific Reports

Volume: 11

Issue: 1

Pages: 1602

Author: Pepin, K. M., Miller, R. S. and Wilber, M. Q.

Year: 2021

Title: A framework for surveillance of emerging pathogens at the human-animal interface: pigs and coronaviruses as a case study

Journal: Preventive Veterinary Medicine

Volume: 188

Author: Njenga, Kariuki, Kemunto, Naomi, Kahariri, Samuel, Holmstrom, Lindsey, Oyas, Harry, Biggers, Keith, Riddle, Austin, Gachohi, John, Muturi, Mathew, Mwatondo, Athman, Gakuya, Francis, Lekool, Isaac, Sitawa, Rinah, Apamaku, Michael, Osoro, Eric, Widdowson, Marc-Alain and Munyua, Peninah

Year: 2021

Title: High Real-time Reporting of Domestic and Wild Animal Diseases Following Rollout of Mobile Phone Reporting System in Kenya

Journal: PloS ONE

Pages: e0244119

Author: de Jesús Beleño-Sáenz, Kelvin, Cáceres-Tarazona, Juan Martín, Nol, Pauline, Jaimes-Mogollón, Aylene Lisset, Gualdrón-Guerrero, Oscar Eduardo, Durán-Acevedo, Cristhian Manuel, Barasona, Jose Angel, Vicente, Joaquin, Torres, María José, Welearegay, Tesfalem Geremariam, Österlund, Lars, Rhyhan, Jack and Ionescu, Radu

Year: 2021

Title: Non-Invasive Method to Detect Infection with Mycobacterium tuberculosis Complex in Wild Boar by Measurement of Volatile Organic Compounds Obtained from Feces with an Electronic Nose System

Journal: Sensors

Volume: 21

Issue: 2

Pages: 584

Author: Malladi, S., Ssematimba, A., Bonney, P. J., St. Charles, K. M., Boyer, T., Goldsmith, T., Walz, E, Cardona, C. J. and Culhane, M. R.

Year: 2021, under review

Title: Predicting the time to detect moderately virulent African swine fever virus in finisher swine herds using a stochastic disease transmission model

Journal: BMC Veterinary Research

Author: Brown, Vienna R., Miller, Ryan S., McKee, Sophie C., Ernst, Karina H., Didero, Nicole M., Maison, Rachel M., Grady, Meredith J. and Shwiff, Stephanie A.

Year: 2021

Title: Risks of introduction and economic consequences associated with African swine fever, classical swine fever and foot-and-mouth disease: A review of the literature

Journal: Transboundary and Emerging Diseases

Volume: 68

Issue: 4

Pages: 1910-1965

Author: Register, Karen B., Parker, Margaret, Patyk, Kelly A., Sweeney, Steven J., Boatwright, William D., Jones, Lee C., Woodbury, Murray, Hunter, David L., Treanor, John, Kohr, Marshall, Hamilton, Robert G., Shury, Todd K. and Nol, Pauline

Year: 2021

Title: Serological evidence for historical and present-day exposure of North American bison to Mycoplasma bovis

Journal: BMC Veterinary Research

Volume: 17

Issue: 1

Pages: 18

Author: Yang, Anni, Boughton, Raoul K., Miller, Ryan S., Wight, Bethany, Anderson, Wesley M., Beasley, James C., VerCauteren, Kurt C., Pepin, Kim M. and Wittemyer, George

Year: 2021

Title: Spatial variation in direct and indirect contact rates at the wildlife-livestock interface for informing disease management

Journal: Preventive Veterinary Medicine

Volume: 194

Pages: 105423

Author: Malladi, S., Weaver, J. T., Lopez, K.M., Erickson, J. L., Lonsdale, P. S., Nezworski, J., Bonney, P. J. and Halvorson, D. A.

Year: 2021

Title: Surveillance and sequestration strategies to reduce likelihood of transporting highly pathogenic avian

influenza virus contaminated layer manure

Journal: Avian Diseases

Volume: 65

Issue: 2

Pages: 219-226

Date: Jun

Author: Seeger, Riley M, Hagerman, A. D., Johnson, K. K., Pendell, D. L. and Marsh, T. L.

Year: 2021

Title: When poultry take a sick leave: response costs for the 2014-2015 highly pathogenic avian influenza epidemic in the USA

Journal: Food Policy

Volume: 102

Pages: Article no. 102068

Author: Miller, R. S.

Year: 2021

Title: Wildlife in the United States [Chapter 10]

Editor: Duffy, R, J. and Opp, S. M.

Book Title: Environmental Issues Today: Choices and Challenges [2 volumes]

Pages: 171-192

Author: Akkina J, Burkom H, Estberg L, Carpenter L, Hennessey M, Meidenbauer K.

Year: 2021

Title: Feral Swine Commercial Slaughter and Condemnation at Federally Inspected Slaughter Establishments in the United States 2017-2019.

Journal: Frontiers in Veterinary Science

Volume: 8

Pages: eCollection 2021

b) International conferences: 0

c) National conferences: 0

d) Other

(Provide website address or link to appropriate information): 0

9. Additional comments regarding your report:

Due to COVID, activities were more limited than in prior years.