OIE Collaborating Centres Reports Activities

Activities in 2017

This report has been submitted : 2018-01-13 04:40:24

Title of collaborating centre:	Animal Disease Surveillance Systems, Risk Analysis and Epidemiological Modelling
Address of Collaborating Centre:	USDA-APHIS-VS-CEAH 2150 Centre Ave, Building B Fort Collins, CO 80526-8117 UNITED STATES OF AMERICA
Tel.:	+1-970 494.72.00
Fax:	+1-970 472.2668
E-mail address:	vs.ceah@aphis.usda.gov
Website:	www.aphis.usda.gov/aphis/ourfocus/animalhealth/SA-Epidemiology-AnimalHealth-CEAH
Name of Director of Institute (Responsible Official):	Dr. Bruce Wagner
Name (including Title and Position) of Head of the Collaborating Centre (formally OIE Contact Point):	Dr. Bruce Wagner Director Center for Epidemiology and Animal Health Science, Technology and Analysis Services USDA-APHIS-VS
Name of writer:	Dr. Theresa Boyle

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**
Screwworm Fly Mapping	CEAH GIS staff provided regular Screwworm fly assessment maps to the Incident Management Team. The team used streamlined mapping methods automation of specific mapping tasks. The fly assessment map shows the status and progress of the sterile fly release program in Florida.
Case definitions	CEAH staff updated the draft case definitions for infectious salmon anemia virus (ISAV) and screwworm myiasis.
Program evaluation	CEAH evaluated pseudorabies and swine brucellosis program documentation for Veterinary Services.
Rendering for Emergency Carcass Management	CEAH staff attended a Rendering for Emergency Carcass Management Workshop, to identify obstacles to using rendering in an outbreak response and methods to overcome those obstacles.
Epidemiology, surveillance, risk assessment, modelling	
Title of activity	**Scope**
Retrieving, processing, and reporting data	An automated process for retrieving, processing, and reporting data on BSE samples was developed. This process was adapted from previously developed code into workflows and will be scheduled to run automatically
Model for Cattle Fever Tick Program	CEAH staff provided an overview of a model developed to provide guidance to the Cattle Fever Tick Eradication Program (CFTEP) and Texas Animal Health Commission (TAHC). The two main goals of the model are to 1) provide guidance on the number of cattle to pasture in areas where nilgai antelope are present and 2) evaluate the impact of not treating 100% of cattle on a premises at each visit. Another component of the model, a cost calculator, is being developed and will be added to the model within the next month.
FMD modeling	CEAH collaborated with the California Department of Food and Agriculture (CDFA) on California-specific FMD modeling requests to help facilitate CDFA's upcoming workshop on FMD vaccination. The CEAH modeling team has parameterized CEAH's National FMD Model based on CDFA input and will be providing data analysis/visualizations of model results for use at their upcoming workshop.

Livestock Traceability	CEAH staff participated in the Strategy Forum on Livestock Traceability as a panel member for the Animal Disease Traceability Working Group to help report on and then discuss the preliminary working group's recommendations and also spoke on using Radio Frequency Identification to advance traceability.
Animal Disease Risk associated with Hurricane Harvey	CEAH staff produced a report on the Animal Disease Risk associated with Hurricane Harvey. The report addressed the disease agents of concern following the landfall of Hurricane Harvey and associated flooding in Texas and Louisiana.
Extracting and compiling surveillance data	CEAH staff worked with VS Emergency Management Response System (EMRS) staff specialists to extract and compile surveillance data on the Tennessee-Alabama HPAI-LPAI outbreak.
Use of Software for Assisted Habitat Modeling	CEAH staff introduced a new statistical platform that can be used to map likelihood of introduction or annual spread during an Analytical Workshop. This new platform, Software for Assisted Habitat Modeling (SAHM), was designed by the USGS Invasive Species Program for modeling habitat suitability. The advantages of using SAHM include rapid model development, automatically captured metadata and decision making during development, and easy sharing between collaborators.
Use of slaughter condemnation data	CEAH collaborated on the use of temperature, humidity and slaughter condemnation data to predict increases in transport losses of swine heading to slaughter.
Epidemiologic and economic modeling	CEAH staff completed an epidemiologic and economic model for bovine tuberculosis affected beef herds.
Epidemiological investigation	CEAH staff conducted an epidemiological investigation of the HPAI outbreak. The purpose of the investigation was to identify and weigh major risk factors associated with presence of disease that will assist in the identification of mitigation and prevention strategies.
Non-spatial, partial equilibrium, net trade model	CEAH developed a non-spatial, partial equilibrium, net trade model that deals with import actions and can be used to estimate price, quantity, and welfare effects due to a particular economic change.
TB DPP test parameters	CEAH participated in the development of test parameters for the Dual Path Platform (DPP) test for bovine tuberculosis. CEAH is also working on developing a set of parameters based on existing data which can be used in the Warwick model and other TB models.
Training, capacity building	
Title of activity	**Scope**
Machine learning tools	CEAH hosted a representative from the University of Minnesota who presented on machine learning tools for veterinary epidemiology. The purpose of this seminar was to introduce the field of machine learning to CEAH analysts and explore some recent applications.
Cuban Assistance	CEAH staff provided technical assistance to Cuban Animal Health Officials. Systemic challenges in the area of pests and diseases in the Cuban agricultural arena were identified that constrain its food security and threaten U.S. agricultural health; and support provided in the development of science-based standards and adhere to a rules-based international trading system.

One Health Zoonotic Disease Prioritization	CEAH staff attended the CDC's One Health Zoonotic Disease Prioritization (OHZDP) Facilitator Training Workshop. The workshop focused on the use of a multi-sectorial, One Health approach to determine the zoonotic diseases of greatest national concern that should be jointly addressed by human, animal, and environmental health sectors.
Network models	CEAH hosted a collaborator from Kansas State University to present work on network models and experiences with HPAI surveillance in Indonesia during a seminar open to all of CEAH.
Enhanced Passive Surveillance	CEAH staff participated in the Institute for Infectious Animal Diseases (IIAD) AgConnect Enhanced Passive Surveillance Exercise. This data-driven exercise was designed to showcase and evaluate the AgConnect system for syndromic detection /characterization of emerging diseases and health anomalies in livestock and poultry.
Geospatial training	CEAH considered opportunities to integrate geospatial training into existing epidemiology courses offered by APHIS. The Excel Mapping tool can be used to demonstrate options for mapping and spatial analyses within Excel workbooks.
Data Governance and Information Quality	CEAH staff attended training workshops as part of the Data Governance and Information Quality Conference to receive training in practical application of data governance, including managing meta-data, data standards, and data stewardship, to improve data quality.
Compensation and appraisal processes	CEAH staff provided training on compensation and appraisal processes, including the process for indemnification, live animal evaluation, calculator application, and troubleshooting.
CSF surveillance	CEAH staff presented “An overview of Classical Swine Fever (CSF) surveillance in the United States” in a CSF surveillance course to enhance the awareness of CSF’s clinical presentations, describe current CSF surveillance, identify the strengths and weaknesses of the swine industry’s biosecurity system related to CSF, understand risk and pathways for CSF, and update knowledge on current CSF diagnostic techniques and vaccines available.
Quantitative Risk Analysis in R	CEAH staff participated in a Quantitative Risk Analysis in R training that covered important risk modeling principles, methods, and techniques using the R statistical language, including the selection of the appropriate distribution for modeling, the use of data, and how to avoid common mistakes.
Using GIS to Safeguard Animal Health	CEAH staff presented a lecture—Using GIS to Safeguard Animal Health—focused on the use of GIS and geospatial methods within CEAH to support analytical projects, outbreak response, and tick vector modeling.
Wildlife	
Title of activity	**Scope**
Machine learning algorithm to identify wildlife species	CEAH staff met with computer scientists at the University of Wyoming about the prospect of developing a machine learning algorithm to identify wildlife species from game camera traps. If successful, this tool would allow researchers to feed pictures from game cameras into the algorithm and receive identifying information about the species in the pictures. This would save thousands of hours of time evaluating photos.
Avian diseases	

Title of activity	Scope
Embryonated chicken eggs	CEAH and University of Minnesota collaborators provided an update on an assessment of the risk of moving embryonated chicken eggs from breeder flocks to vaccine production during an outbreak of highly pathogenic avian influenza.
Embryo Eggs to Human Influenza Vaccine Production HPAI Risk Assessment	CEAH staff participated in the Embryo Eggs to Human Influenza Vaccine Production HPAI Risk Assessment to further assess various active surveillance protocol options intended to reduce the likelihood of moving HPAI contaminated embryo eggs to vaccine production.
Aquatic animal diseases	
Title of activity	**Scope**
Shellfish Database	CEAH staff presented a webinar on “Designing a Participant Driven Surveillance Database for Regional Shellfish Health Management”.
Fin Fish	CEAH staff presented at a Fin Fish Foreign and Emerging Animal Disease Training course.
Veterinary medicinal products	
Title of activity	**Scope**
Antimicrobial use in livestock	CEAH met with academics to discuss their studies on antimicrobial use in livestock, including study design, data collection, data validation methodology, and planned analyses.
Data on Antimicrobials	CEAH considered the "U.S Food and Drug Administration's Proposed Method for Adjusting Data on Antimicrobials Sold or Distributed for Use in Food-Producing Animals, Using a Biomass Denominator". The proposed method will help calculate estimates of annual antimicrobial drug sales adjusted for the size of the animal population potentially being treated with those drugs, allowing a more nuanced view of trends over time.
Other (Name the category)	
Title of activity	**Scope**
Tableau	CEAH is helping to create a data-driven culture by showing the value of Tableau through productivity, quality, and innovation.
Story Maps	CEAH contributed to the IT Roadmap by identifying geospatial business needs throughout APHIS, including web-based solutions for data sharing, distribution of map applications and tools, and implementation of geospatial reporting tools, such as Story Maps.
ArcGIS Pro	CEAH staff attended an all-day training and workshop for ArcGIS Pro at Colorado State University. ArcGIS Pro is the newer platform for web-based GIS. The software utilizes ArcGIS OnLine (AGOL) or Portal accounts and platforms for geospatial processing, tools, cartography, and analytical functions.
Geospatial solutions	CEAH staff attended the "Premier Geospatial Conference of the Rocky Mountain West". Insight was shared regarding the successful integration of geospatial solutions within diverse types of industries.

Mapping support	CEAH provided mapping support for the U.S. Hurricane Harvey response. The maps provided information on agriculture animal populations in affected counties in Texas and Louisiana.
Web GIS tools	CEAH staff gave a presentation on Web GIS tools. The presentation provided an overview of Story Maps, Excel Mapping, and web mapping for outbreak response. Demonstrations included an overview of the New World Screwworm Story, a use case showing the use of Excel mapping to allocate resources for slaughter plant inspections, and a demonstration of the web-based HPAI Outbreak response tool for improved map delivery.
GIS	CEAH collaborated on improving international capacity building using GIS training for outbreak response, risk mapping, diseases reporting, and geospatial analysis.
Remote sensing methodologies	CEAH staff reviewed, tested, and provided feedback on remote sensing methodologies being developed to map poultry operations. Staff worked to validate methods for rapidly mapping poultry facilities to refine methods for identifying poultry barns in aerial imagery and then mapping those facilities. This can be a valuable tool and product for emergency response surveillance. A major goal for this project is to develop methods and tools for rapid identification of poultry operations within Avian Influenza zones during an active outbreak to assist with surveillance activities.
Climex/Dymex	CEAH staff participated in a training workshop for Climex/Dymex. This software package allows users to fit models and evaluate the risk of pest/disease establishment potential from their native ranges to the U.S. CEAH will continue to evaluate the potential of the software to rapidly assess disease risk due to climate.
Data graphics	CEAH created three data graphics to use in a World Health Organization Vaccine Composition Meeting. The data merged FAO EMPRES Global Animal Disease Information System data with Wildlife Services wild bird avian influenza surveillance data.

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
AMR – One Health	CEAH collaborated on writing a paper for the OIE on One Health on AMR - a U.S. Perspective. The paper focused on why AMR is a One Health issue, then details about the animal sector, the human sector, and the environment sector. CEAH was tasked with writing the animal sector section of the paper, including surveillance and preventive approaches.	☐Surveillance and control of animal diseases ☒Food safety ☐Animal welfare

Chapter 1.4 Animal Health Surveillance of the OIE Terrestrial Animal Health Code	CEAH prepared and submitted comments on the revised Chapter 1.4 Animal Health Surveillance of the OIE Terrestrial Animal Health Code.	☒Surveillance and control of animal diseases ☐Food safety ☐Animal welfare
Global Action Plan on Antimicrobial Resistance	CEAH responded to OIE's annual request for antimicrobial (AM) sales data. As part of their work within the tripartite and the Global Action Plan on Antimicrobial Resistance, OIE has taken the lead to build a global database on AM agents intended for use in animals, and has conducted annual reporting since 2015. See http://www.oie.int/en/our-scientific-expertise/veterinary-products/antimicrobials/ for more information.	☐Surveillance and control of animal diseases ☒Food safety ☐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
Wageningen Bioveterinary Research Institute, Netherlands	United States	☐Africa ☐Americas ☐Asia and Pacific ☒Europe ☐Middle East	International Collaboration on Disease Transmission Modeling Studies. CEAH hosted Dr. Ed G.M. van Klink and Dr. Armin Elbers, from the Wageningen Bioveterinary Research Institute. The researchers met with CEAH personnel to identify areas for potential collaboration between the two centres and to support modeling projects used in the analysis of potential control strategies for highly transmissible diseases of livestock. One outcome of the meeting was an agreement to share methodology for the estimation of disease transmission rate parameters and detection triggers for avian influenza in poultry.

Peruvian animal health authorities (SENASA)	Peru	☐Africa ☒Americas ☐Asia and Pacific ☐Europe ☐Middle East	CEAH staff travelled to Peru to establish a work collaboration with Peruvian animal health authorities (SENASA). The collaboration was aimed at facilitating the exchange of information and resources with focus on classical swine fever surveillance, as well as diagnostics and control strategies. A path forward for collaboration was outlined and included the following: - SENASA Peru agreed to share CSF field strains with FADDL for use in future diagnostic developments. - FADDL experts will assist with guiding the development of a protocol to validate PCR for detection of CSF virus in pools of tonsils in Peru, explore possibly sharing a protocol for diagnosis of PRV in serum samples, and provide information regarding the controls used for Seneca Virus A PCR. - Veterinary services in both countries agreed to collaboratively evaluate diagnostic protocols for differentiation of field and vaccine virus (c strain) and surveillance protocols.
European Food Safety Authority (EFSA)	United States and EFSA	☐Africa ☐Americas ☐Asia and Pacific ☒Europe ☐Middle East	CEAH Staff held a conference call meeting between CEAH and the European Food Safety Authority (EFSA) to continue to build upon our relationship, discuss emerging risks, antimicrobial resistance and surveillance in wildlife.

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

Yes

Name of OIE CC/RL/other organisation(s)	Location	Region of networking Centre	Purpose
Quad Agency (United States, Canada, Australia, New Zealand)	Conf call	☐Africa ☒Americas ☒Asia and Pacific ☐Europe ☐Middle East	CEAH staff participated in the Quad Countries Agency call on AMR. First the discussion focused on the recent Codex meeting in South Korea, and what comes next.
Wageningen Bioveterinary Research in the Netherlands	United States	☐Africa ☐Americas ☐Asia and Pacific ☒Europe ☐Middle East	CEAH staff met with staff from the Netherland's Wageningen Bioveterinary Research, to discuss antimicrobial use and resistance. The Netherlands has seen significant decreases in antimicrobial use over the past decade, and have a strong national surveillance network to track use and resistance. The Ministry of Agriculture works closely with the Ministry of Public Health to track trends and respond to disease outbreaks

Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food (SAGARPA) in Mexico	Mexico	☐Africa ☒Americas ☐Asia and Pacific ☐Europe ☐Middle East	CEAH participated in a low frequency radio frequency identification devices (LF RFID) tagging pilot with the Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food (SAGARPA) in Mexico. Animals were later presented for export at a US Port of Entry. All animals had been previously tagged with LF RFID and the blue metal tag had been correlated prior to the exportation. All RFID tags were successfully read using both SAGARPA and USDA systems. Collaboration will continue.

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
Marta Remmenga and Matt Branan	Training in statistical modeling.	Marta Remmenga and Matt Branan presented a 5-day training program on statistical modeling for OIE staff in Paris. The OIE requested the workshop to build the capacity of its staff to analyse, describe, and model disease outbreak data using R software effectively for further use by the global community.
Lori Gustafson	Aquaculture subject matter expert	Lori Gustafson participated in the first of a series of OIE ad hoc working group meetings to discuss demonstration of disease freedom for aquatic populations.

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: 2
b) Seminars: 2
c) Hands-on training courses: 1
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	Ryan Miller and Steve Sweeney hosted a 2-day workshop with cooperators from Washington State University, U.S. Geological Survey, Idaho Department of Fish and Game, and invited U.S. and U.K. experts. Key objectives were to: 1) define stages of spillover for various diseases at the wildlife-livestock (W-L) interface; 2) identify and contrast spillover thresholds and barriers; and 3) link potential management actions to spillover stages. The goal is to build a framework for assessing risk of pathogens traversing the W-L interface, and using this framework to develop a general mathematically-based model of pathogen transmission risk.	US and UK	12
c	CEAH epidemiologist Morgan Hennessey traveled to Cali, Colombia to serve as a subject matter expert on Avian Influenza. The training workshop was hosted by the Instituto Colombiano Agropecuario, and was attended by approximatley 40 federal Colombian veterinarians. Lectures were given on Avian Influenza epidemiology, surveillance, data analysis, and outbreak response. In addition a field visit was conducted in which poultry sample collection techniques and depopulation techniques were demonstrated.	Colombia	40
a	A delegation of seven scientists from the Korean Ministry of Environment, Ministry of Health and Welfare Centers for Disease Control and Prevention, and the Animal and Plant Quarantine Agency visited the Center for Epidemiology and Animal Health (CEAH). Discussion areas included a CEAH overview, wildlife diseases, avian influenza, swine surveillance, tuberculosis, brucellosis, and the National Animal Health Monitoring System. Korea also presented on the Animal and Plant Quarantine Agency structure and the Centers for Disease Control and Prevention Response to Avian Influenza.	Korea	7
a	CEAH staff met with 10 Brazilians visiting Fort Collins to discuss climate-smart agriculture. The delegation consisted of Ministry of Agriculture and Health officials, private industry and members of NGOs. Common challenges were identified such as producer and rancher project and research needs and communication to both stakeholders and policy makers.	Brazil	10
b	CEAH Staff participated in a classical swine fever (CSF) training course. The goal of the training was to enhance awareness of current clinical presentation and challenges with CSF worldwide; to review and reflect on disease diagnostics and surveillance programs; and to further discuss risk factors and pathways of introduction for the disease. A representative from the Dominican Republic's (DR) Ministry of Agriculture Animal Health Division provided extremely valuable information on the Dominican Republic's current disease status, the disease's clinical presentation, and control methods for CSF in the DR.	Dominican Republic	16

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: 20

1) Pepin, KM, Kay, SL, Golas, BD, Shriner, SS, Gilbert, AT, Miller, RS, Graham, AL, Riley, S, Cross, PC, Samuel, MD, Hooten, MB, Hoeting, JA, Lloyd-Smith, JO, Webb, CT, Buhnerkempe, MG. (2017), Inferring infection hazard in wildlife populations by linking data across individual and population scales. Ecol Lett, 20: 275–292. doi:10.1111/ele.12732

2) Register, K, Woodbury, M, Jones, L, Hunter, D, et al. A Serological Investigation of the Thirty-year History of Exposure to Mycoplasma bovis in Healthy North American Bison. International Bison Conference. Big Sky, MT. July 4-7, 2017.

3) Stenfeldt C, Pacheco JM, Brito BP, et al. Transmission of Foot-and-Mouth Disease Virus during the Incubation Period in Pigs. Front. Vet. Sci. 3:105. doi: 10.3389/fvets.2016.00105

4) Portacci K, Rooney A, Dobos R. Assessing the potential for Burkholderia pseudomallei in the southeastern United States. Journal of American Veterinary Medical Association. 2017, Jan 15;250(2):153-159. DOI: 10.2460/javma.250.2.153

5) Pedersen, K, Miller, RS, Anderson, TD, Pabilonia, KL, Lewis, JR, Mihalco, RL, Gortázar, C, Gidlewski, T. (2017) Limited Antibody Evidence of Exposure to Mycobacterium Bovis in Feral Swine (Sus Scrofa) in the USA. Journal of Wildlife Diseases: January 2017, Vol. 53, No. 1, pp. 30-36. https://doi.org/10.7589/2016-07-164

6) Bauermann, F, Ridpath, J, and Dargatz, D. Bovine leukemia seroprevalence among cattle presented for slaughter in the United States. Journal of Veterinary Diagnostic Investigation. 1-3:2017 DOI: 10.1177/1040638717702183

7) Bjork, KE, Fields, V, Garber, LP, Kopral, CA. Factors associated with Salmonella prevalence in U.S. swine grower/finisher operations, 2012. Submitted to Foodborne Diseases and Pathogens or Food Protection. 2017

8) Gorsich, E; McKee, CD, Grear, DA, Miller, RS, Portacci, K, Lindstrom, T, Webb, CT. (2017) Model-guided suggestions for targeted surveillance based on cattle shipments in the U.S. Preventative Veterinary Medicine, Vol 150, pp52-59. https://doi.org/10.1016/j.prevetmed.2017.12.004

9) Hayer SS, VanderWaal K, Ranjan R, et al. Foot-and-mouth disease virus transmission dynamics and persistence in a herd of vaccinated dairy cattle in India. Transbound Emerg Dis. 2017;00:1–12. https://doi.org/10.1111/tbed.12774

10) Johnson, KK, Pendell, DL. (2017) Market Impacts of Reducing the Prevalence of Bovine Respiratory Disease in United States Beef Cattle Feedlots. Front. Vet. Sci., 09 November 2017 | https://doi.org/10.3389/fvets.2017.00189

11) Miller, RS, Sweeney, SJ, Slootmaker, C, Grear, DA, Di Salvo, PA, Kiser, D, Shwiff, SA. Cross-species transmission potential between wild pigs, livestock, poultry, wildlife, and humans: implications for disease risk management in North America. Scientific Reports 7, Article number: 7821 (2017) doi:10.1038/s41598-017-07336-z

12) Tabak, MA, Piaggio, AJ, Miller, RS, Sweitzer, RA, Ernest, HB. 2017. Anthropogenic factors predict movement of an invasive species. Ecosphere 8(6):e01844. 10.1002/ecs2.1844

13) McConnel, CS, McNeil, AA, Hadrich, JC, Lombard, JE, Garry, FB, Heller, J. Dairy cow disability weights. Preventative Veterinary Medicine. Vol 143, August 2017, p1-10. https://doi.org/10.1016/j.prevetmed.2017.04.014

14) Lewis, JS, Farnsworth, ML, Burdett, CL, Theobald, DM, Gray, M, Miller, RS. (2017) Biotic and abiotic factors predicting the global distribution and population density of an invasive large mammal. Scientific Reports 7, Article number: 44152. doi:10.1038/srep44152

15) Adams AE, Lombard JE, Fossler CP, Román-Muñiz IN, Kopral CA. Associations between housing and management practices and the prevalence of lameness, hock lesions, and thin cows on US dairy operations. J

Dairy Sci. 2017 Mar;100(3):2119-2136. doi: 10.3168/jds.2016-11517. Epub 2016 Dec 29.
16) Peterson E, Remmenga M, Hagerman AD, Akkina JE.Use of Temperature, Humidity, and Slaughter Condemnation Data to Predict Increases in Transport Losses in Three Classes of Swine and Resulting Foregone Revenue. Front Vet Sci. 2017 May 11;4:67. doi: 10.3389/fvets.2017.00067. eCollection 2017.
17) Hopkins RS, Tong CC, Burkom HS, Akkina JE, Berezowski J, Shigematsu M, Finley PD, Painter I, Gamache R, Vilas VJDR, Streichert LC. A Practitioner-Driven Research Agenda for Syndromic Surveillance. Public Health Rep. 2017 Jul/Aug;132(1_suppl):116S-126S. doi: 10.1177/0033354917709784.
18) Dargatz DA, Erdman MM, Harris B. A survey of methods used for antimicrobial susceptibility testing in veterinary diagnostic laboratories in the United States. J Vet Diagn Invest. 2017 Sep;29(5):669-675. doi: 10.1177/1040638717714505. Epub 2017 Jun 9.
19) Mollenkopf DF, Mathys DA, Dargatz DA, Erdman MM, Habing GG, Daniels JB, Wittum TE. Genotypic and epidemiologic characterization of extended-spectrum cephalosporin resistant Salmonella enterica from US beef feedlots. Prev Vet Med. 2017 Oct 1;146:143-149. doi: 10.1016/j.prevetmed.2017.08.006. Epub 2017 Aug 12.
20) Garza, SJ, Tabak, MA, Miller, RS, Farnsworth, ML, Burdett, CL. Abiotic and biotic influences on home-range size of wild pigs (Sus scrofa). Journal of Mammalogy, , gyx154, https://doi.org/10.1093/jmammal/gyx154

b) International conferences: 10

1) Dr. Lori Gustafson, CEAH, travelled to Wellington, New Zealand, Sept. 19-28 to meet with the New Zealand Ministry for Primary Industries. The purpose was to discuss federal aquatic animal health surveillance designs, visit several aquaculture sites, and deliver a presentation on infectious salmon anaemia virus control and surveillance.
2) July 10 - 14th, CEAH cartographer, Chris McCarty, attended the 2017 Esri International User Conference. The event drew over 10,000 GIS users from around the globe and featured technical talks, poster session, and training workshops. Mr. McCarty focused on technical support and trends related to the Collector application used in Veterinary Services for Cattle Fever Tick data collection.
3) In coordination and cooperation with CEAH, Charlotte Cook (Animal & Plant Health Agency, UK) will present QUADS Epiteam work on early decision indicators to predict severity of an FMD outbreak at the Modeling in Animal Health Conference in Nantes, France.
4) CEAH staff members Lori Gustafson and Marta Remmenga attended a workshop entitled “Evaluation and Management of Trans-boundary Diseases of Aquatic Animals” May 30-31 in Ottawa, Canada. Participants included government and academic representatives from Canada, Norway, Australia, Chile, and the U.S. During the workshop, the group developed a structured approach to trans-boundary disease evaluation and management for aquaculture.
5) The third iteration of the International Conference on Animal Health Surveillance (ICAHS) was held in Rotorua, New Zealand from April 30th through May 4th, 2017. The focus of this conference series is the intersection of science, policy, and animal health surveillance. For this particular instance of the conference series, the theme is "Beyond animal health surveillance," where the domain of "Beyond" encompasses risk identification and analysis, economics, modeling, IT infrastructure, and the social sciences and examples of applied topics include antimicrobial resistance and big data problems. At the conference Dr. Judy Akkina, CEAH, gave an oral presentation titled “Use of the Heat Index to Predict Increases in Swine Condemnations in Slaughter Surveillance Data” and Matthew Branan, CEAH, presented a poster titled "Risk-Based Strategy to Establish a Trichinella Negligible Risk Compartment."
6) CEAH staff participated in the international Pre-COSALFA Seminar in Pirenópolis, Goiás, Brazil, 3-4 April 2017. The agenda of the International Pre-COSALFA Seminar addressed topics such as how the recommendations from the “Technical Guide for the last stage of the Hemispheric Program for the Eradication of Foot-and-Mouth Disease (PHEFA)” are being implemented, the future impact and effects that the transition of health status will have on the FMD programs, an update on the risks of FMD C virus circulation, and tools contributing to improve the preparation for a timely response in case of an FMD outbreaks. Dr. Amy Delgado facilitated presentations on the economic impacts of an FMD-free South America by Dr. Hagerman; FMD: Testing Strategies for outbreak Surveillance by Oriana Beemer; and Modeling Support for Preparedness and Response by Amy Delgado.
7) On March 27-28, 2017 Amy Hagerman and Kamina Johnson, Economists from CEAH, travelled to the Inaugural Meeting of the International Society for the Economics and Social Sciences of Animal Health (ISESSAH) in Aviemore, Scotland. The conference was organized around the topics of "Where do we come from", "Where we stand now", and "Where we should go." The Society for Veterinary Epidemiology and Preventive Medicine (SVEPM) annual meeting was held March 29-31 in Inverness, Scotland. Amy delivered an oral presentation titled "Current and Potential Methods for Valuing Nonmarket Animals" and contributed to a flash talk for a poster presentation titled "The Value of Cost Collection during an Animal Health Event." Kamina gave poster presentations titled "Cost-Benefit Analysis of Commercial Aquaculture Health Program Standards (CAHPS) Shellfish Pilot Project" and "The Challenges of Making Resource Allocation Decisions across Several Hazards within a Surveillance Portfolio."
8) Marshall, K. Health management and biosecurity practices of U.S. sheep producers. International Sheep Veterinary Conference. Harrogate, England. May 22-26, 2017.

9) Thompson, JM, Hagerman, A, Johnson, K. Current and potential methods for valuing non-market animals. International Society for Economics and Social Sciences of Animal Health. Inverness, Scotland. March 27-28, 2017.
10) Thompson, JM, Hagerman, A, Johnson, K. How does farm size affect optimal biosecurity levels. International Society for Economics and Social Sciences of Animal Health. Inverness, Scotland. March 27-28, 2017.

c) National conferences: 15
1) CEAH staff attended the Society for Risk Analysis Conference from Dec 10-13. Clay Hallman presented a poster entitled "Application of a Livestock Shipment Model to Address Regional Risk of Disease Spread and Detection" containing risk-related applications of a livestock shipment model (US Animal Movement Model) developed at CEAH in collaboration with modellers at Colorado State, Linkoping, and Warwick Universities.
2) On December 4th, CEAH staff attended the Conference for Research Workers in Animal Diseases (CRWAD) in Chicago, Illinois, USA. Chloe Stenkamp-Strahm, a CSU cooperator with APHIS VS, gave a presentation titled, "Using geospatial methods to measure the risk of environmental persistence of avian influenza in South Carolina".The presentation focused on results of a pilot study that used geospatial tools to assess geographic areas in South Carolina where environmental conditions and wild bird hosts result in heightened risk for the presence and persistence of avian influenza.
3) CEAH staff, Drs. Kathy Orloski and Oriana Beemer participated in the monthly District Epidemiologists meeting. They gave presentations on the recent BSE Surveillance Evaluation, key findings from the Assessment of Oral Fluids for Swine ASF, CSF, and FMD Surveillance paper, and preliminary findings from the ongoing Scrapie Surveillance Evaluation.
4) CEAH staff, Dr. Steve Sweeney and David Wolfson attended The Wildlife Society's 24th Annual Conference in Albuquerque, New Mexico from September 23-27. David Wolfson gave an oral presentation entitled "Evaluating the Roles of Propagule Size, Life History, and Environmental Conditions on the Establishment Success of an Invasive Species Using Transient Dynamics Models", co-authored by CEAH scientists Drs. Michael Tabak and Ryan Miller. The Wildlife Society Conference is the largest annual gathering of wildlife professionals in North America.
5) CEAH staff, Drs. Jason Lombard and Kathy Orloski, both veterinary epidemiologists, gave presentations on bovine tuberculosis (TB) at the TB Summit workshop, held in Fort Collins on July 26-27, 2017. The objective of the meeting was to better understand current issues and road blocks to achieving eradication of TB.
6) CEAH Staff, Davd Hsi gave a presentation, "Comparing Foodborne Illness Risks among Meat Commodities" at the American Veterinary Medical Association Convention in Indianapolis as part of the Current Issues/Advances section of the Public and Corporate Practice tract. This presentation encompassed work done while a part of USDA FSIS Office of Field Operations and looked at the comparative risk of illness due to either salmonella or Shiga toxin-producing Escherichia coli O157 between four different meat commodities: beef, lamb, pork, and poultry.
7) CEAH staff, Josie Traub-Dargatz, presented on biosecurity principles and lessons learned at the Border Port Conference held in El Paso, Texas on June 27-29, 2017.
8) CEAH staff, Kamina Johnson, Charlotte Ham, and Stephen Ott, attended the Livestock Marketing Information Center (LMIC) Spring Outlook Conference, in Denver, CO on Thursday, April 21, 2017. Kamina gave a presentation titled, "Comments on Animal Disease Issues: Focus on HPAI".
9) CEAH staff, Dr. Kathy Orloski gave two presentations at a bovine tuberculosis eradication training for Federal and State employees. The meeting was held in Albuquerque, New Mexico, April 4-7, 2017.
10) CEAH staff, Kathy Orloski, gave a presentation on “Comprehensive and Integrated Surveillance (CIS) and Potential New Approaches” on March 15 at a workshop on cattle health sponsored by the Institute for Infectious Animal Diseases (IIAD) in Washington, DC. The presentation described key features of disease surveillance and highlighted possible new areas for cattle disease surveillance through the CIS approach.
11) Patyk, KA, Parker, M, Sweeney, SJ. Highlights of NAHMS Bison 2014 Study. United States Animal Health Association, Committee on Infectious Diseases of Cattle, Bison and Camelids. Greensboro, NC. October 16, 2016.
12) Patyk, KA, Duncan, C, Rhyan, J, Nol, P, McCollum, M, Atwood, T. Polar bears as a sentinel for emerging wildlife zoonoses: past and present occurrence of Brucella spp., Coxiella burnetii, and Toxoplasma gondii in the southern Beaufort Sea population. The Wildlife Society 23rd Annual Conference. Raleigh, NC. October 15-19, 2016.
13) Schoenbaum, M, Assefa, D, Holmstrom, L, Delgado, A. Simulating Foot-and-Mouth Disease in the United States using the Animal Disease Spread Model. ModSim World 2017. April 25-27, 2017.
14) Parker M, Patyk K, Sweeney S. 2017. Bison 2014: Selected results from the National Animal Health Monitoring System’s first national study of health and management practices on U.S. ranched-bison operations. Invited Poster, Fifth International Bison Conference. Big Sky, MT.
15) Bacigalupo-Sanguesa, P, McConnell, C, Garry, FB, Lombard, JE, Pinedo, P. Time lost to disease in dairy cattle: Associations between two consecutive lactations. American Dairy Science Association. Pittsburg, PA. June 25-28, 2017.

d) Other
(Provide website address or link to appropriate information): 10

1) Screwworm Story Map was made available as a link from the APHIS New World Screwworm page, https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-disease-information/cattle-disease-information/nws/new-world-screwworm.
The Screwworm Story Map provides information to the public about the New World Screworm (NWS) biology, historic eradication programs, and interactive maps showing both current screwworm cases and the status of the sterile fly release program in Florida.
2) VS FAD Eye features an article describing the epidemiology-economic model for managing bovine tuberculosis. The model, developed by CEAH, helps VS officials decide on the disposition of cattle herds affected by bovine TB. The epi model estimates the number of herd tests for quarantine release and the number of animals that test positive during screening for the test-and-remove program (TRP). The economic model provides estimates to compare the costs of depopulation versus TRP. FAD Eye is a nationwide communication network.
3) A comparison of national estimates from the CEAH National Animal Health Monitoring System (NAHMS) national swine studies conducted in 1995, 2000, 2006 with NAHMS Swine 2012 study have been released in a report titled “Part III: Changes in the U.S. Swine Industry, 1995-2012.” Estimates on health and productivity are highlighted. The report is available on the NAHMS website: http://www.aphis.usda.gov/nahms
4) The poster, "Communicating Disease Status in a Timely Manner: Geospatial Methods Used for Reporting During the US 2015 HPAI Outbreak", was selected for inclusion in the Esri 2018 Federal Map Book. The map book highlights notable examples of applied mapping solutions across the Federal government.
5) Hagerman, A. The cost per pound of composted turkeys in the 2014-2015 HPAI outbreak. Analysis report. May 2017.
6) Bush, E. Toxoplasma gondii seroprevalence in U.S. swine. Information Sheet, APHIS Veterinary Services Center for Epidemiology and Animal Health. November 2016.
7) Seitzinger, A, Hagerman, A. Transportation Rate Calculation Change. Info Sheet, SPRS Indemnity SharePoint. July 2017.
8) Miller, RS, Medley, A, Bevins, S, Walsh, D, Weaver, T, Deliberto, T, Torchetti, MK, Forsythe, KW, Garber, L, Remmenga, M, Styles, DK, Lenoch, JB 2017. Assessment of wild bird avian influenza A virus surveillance activities. USDA-APHIS. Fort Collins, CO. #389.0317
9) Ryan S. Miller, Kerri Pedersen, Troy T. Bigelow. Targeted Antibody Surveillance for National Diseases of Concern in Feral Swine in the USA. USDA-APHIS. Fort Collins, CO.
10) Dirsmith, K. L., M. A. Tabak, D. W. Wolfson, and R. S. Miller. 2017. New Mexico Feral Swine Litter Size and Pregnancy Technical Report. USDA-APHIS. Fort Collins, CO.