WOAH Collaborative Centre Reports Activities 2023

Activities in 2023

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Centre Information

Title of WOAH Collaborating Centre	Center for Epidemiology and Animal Health
Address of WOAH Collaborating Centre	2150 Centre Ave, Building B, Fort Collins, CO 80526
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Website:	https://www.aphis.usda.gov/livestock-poultry-disease/epidemiology
Name Director of Institute (Responsible Official):	Alan Huddleston
Name (including Title and Position) of Head of the Collaborating Centre (WOAH Contact Point):	Alan Huddleston, Director
Name of the writer:	Caitlin Jandegian

TOR1 AND 2: SERVICES PROVIDED

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

Category	Title of activity	Scope
Disease control (true)	Analysis and summary of depopulation methods used for 2022–2023 HPAI outbreak	CEAH analysts supported American Veterinary Medical Association (AVMA) committees on Poultry Health through detailed analysis and summary of methods used for flock depopulation after detection of Highly Pathogenic Avian Influenza (HPAI). Summary information is being used to inform committee decisions on AVMA recommendations for depopulation methods in poultry.
Epidemiology, surveillance, risk assessment, (true)	National Swine, Cattle, and Poultry Condemnation weekly reports	CEAH staff produced and shared the National Swine, Cattle, and Poultry Condemnation weekly reports within VS and Food Safety and Inspection Service (FSIS). The main purpose of these reports is to describe, visualize, and summarize FSIS slaughter condemnation data on a weekly basis by swine, cattle, and poultry subclass, reason for condemnation, and geographic catchment basin to compare patterns over time.
Training, capacity building (true)	National Training and Exercise Program: ASF lab capacity and surveillance tabletop exercise	CEAH staff trained State and industry co-operators on how surveillance may affect laboratory capacity and preparedness efforts needed to address a potential outbreak. This helps improve stakeholder knowledge and standardization of testing approaches across laboratories.
Wildlife (true)	APHIS Wild Bird Avian Influenza Surveillance Operational Dashboard	Developed a public-facing map-centric, operational dashboard that displays results from samples collected as part of the USDA Wildlife Services National Wildlife Disease Program's wild bird surveillance program. Data is split into high pathogenic and other avian influenza viruses and is updated quarterly. https://www.aphis.usda.gov/livestock-poultry-disease/avian/avian-influenza/hpai-detections/wild-birds

Avian diseases (true)	HPAI Risk Interface Model: Wild Birds to Domestic Poultry	CEAH collaborated with USGS and the University of Maryland on a model of spillover risk from wild waterfowl to domestic poultry across the continental United States for the full annual cycle.
Aquatic animal diseases (true)	Salmonid pathogen pathways assessment	Protected and improved the health, quality, and marketability of the U.S. aquaculture industry by completing the Pathways Assessment and Hazard Identification documents for six WOAH-listed pathogens in imported live salmonid fish, eggs, and gametes, contributing to the safeguarding of the U.S. aquaculture industry.
Disease Control (true)	Provided geospatial and mapping support for the HPAI outbreak in the United States (2022–2023)	CEAH GIS staff provided daily maps for all positive HPAI detections (premises) within the United States. Interactive map tools were developed to facilitate safe routing and movement of poultry products to Canada. Other HPAI Zone Location tools were used to verify that poultry products were not coming out of restricted control areas/zones, minimizing impact to trade. Map products were used to communicate with trade partners regarding status (open/closed) of restricted geographic areas. Maps were also developed for daily situation reports to show all stages of tasks, including detection, depopulation, cleaning, repopulating premises, and closing quarantine zones.
Epidemiology, Surveillance, Risk Assessment, Modeling (true)	Influenza A Virus in Swine Surveillance Fiscal Year 2023 quarterly reports	CEAH produces quarterly and annual reports to provide a brief update on the status of the national surveillance for Influenza A Virus (IAV) in swine for producers, swine practitioners, diagnosticians, and the public. https://www.aphis.usda.gov/animal_health/animal_dis_spec/swine/downloads/fy2023quarter2swinereport.pdf
Epidemiology, Surveillance, Risk Assessment, Modeling (true)	National HPAI Disease-Spread and Control Model	CEAH staff provided multiple modelling tasks requested during the HPAI outbreak: [1] Forecasted geographic locations for future HPAI detections. [2] Forecasted the number of estimated HPAI detections by operation type to inform funding requests for outbreak response. [3] Estimated the impact of vaccinating selected domestic avian classes on the severity and duration of an HPAI outbreak. [4] Estimated the impact of vaccinating selected poultry classes to pre-empt disease introduction and/or spread in specific geographic regions.
Epidemiology, Surveillance, Risk Assessment, Modeling (true)	National Foot and Mouth Disease-Spread and Control Model	CEAH staff generated disease-spread and control modelling scenarios characterizing potential for Foot and Mouth Disease (FMD) introduction and spread for multiple geographic regions in U.S.
Epidemiology, Surveillance, Risk Assessment, Modeling (true)	National African Swine Fever Disease-Spread and Control Model	CEAH staff developed and utilized national disease-spread and control models to examine African swine fever (ASF) spread scenarios, support risk assessments, inform policy decisions, and contribute to preparedness and response planning efforts. Established cooperative agreement with academic partners to perform data collection in the Dominican Republic to inform within-herd disease spread modelling.
Epidemiology, Surveillance, Risk Assessment, Modeling (true)	Epidemiologic and Other Analyses of HPAI-Affected Poultry Flocks: 1 June 2023 Interim Report	CEAH staff published a report with the description of the outbreak, comparison of 2022–2023 HPAI outbreak to 2014/2015 outbreak, phylogenetic analysis and diagnostics (National Veterinary Services Laboratory), case series epidemiologic study, estimating disease spread with the National HPAI Disease Spread Model, time to introduction model in partnership with University of Minnesota, AIV transmission at the wild bird:domestic bird interface in partnership with United States Geological Survey (USGS)/University of Maryland (UMD), AIV surveillance in wild birds (Wildlife Services), and analysis of correlation of eBird and BirdCast public tools.
Epidemiology, Surveillance, Risk Assessment, Modeling (true)	Epidemiologic Analyses of HPAI-Affected Poultry Flocks	CEAH staff conducted two HPAI case-control surveys and published two corresponding manuscripts identifying risk factors for HPAI on turkey farms and table egg farms (see publications section below)
Epidemiology, Surveillance, Risk Assessment, Modeling (true)	2023 U.S. National Animal Health Reporting System (NAHRS) Reportable Diseases, Infections, and Infestations List	CEAH published the updated United States list of reportable animal diseases for 2023 to inform stakeholders of current reportable diseases.
Epidemiology, Surveillance, Risk Assessment, Modeling (true)	2022 Equine Infectious Anemia Cases in the United States report	CEAH published an annual report of 2022 equine infectious anemia cases and testing that occurred in the United States. https://www.aphis.usda.gov/animal_health/downloads/animal_diseases/2022-eia-report.pdf
Epidemiology,		CEAH collaborated with the National Agricultural Statistics Service (NASS) to contact bison operations in 50

Surveillance, Risk Assessment, Modeling (true)	National Animal Health Monitoring System (NAHMS) Bison 2022 study	states and requested their participation in a national study of U.S. bison health and management. This is the second national study of U.S. bison operations, but the first in which fecal and forage samples were collected. The fecal samples will provide data on the prevalence of gastrointestinal parasites and fecal microbes. Winter pasture nutritional content will be examined from the forage samples. Data collection was completed in 2023, and results will be published in 2024.
Epidemiology, Surveillance, Risk Assessment, Modeling (true)	Evaluation of Salmonella and E. coli in equids, including antimicrobial susceptibility	CEAH published a manuscript on antimicrobial susceptibility of Salmonella and Escherichia coli from U.S. equids: Kohnen AB, Wiedenheft AM, Traub-Dargatz JL, Short DM, Cook KL, Lantz K, Morningstar-Shaw B, Lawrence JP, House S, Marshall KL, Rao S. Antimicrobial susceptibility of Salmonella and Escherichia coli from equids sampled in the NAHMS 2015-16 equine study and association of management factors with resistance. Prev Vet Med. 2023 Apr;213:105857.
Epidemiology, Surveillance, Risk Assessment, Modeling (true)	Equine arbovirus dashboard	CEAH developed and maintained a public dashboard showing historical and current equine cases of arboviral disease (Eastern equine encephalitis, Western equine encephalitis, West Nile Virus) that occurred in the United States through 2023. https://www.aphis.usda.gov/aphis/dashboards/tableau/equine-arbovirus-dashboard
Epidemiology, Surveillance, Risk Assessment, Modeling (true)	Outbreak surveillance optimization using within-herd spread models	CEAH has collaborated with the University of Minnesota to develop a within-herd ASF spread model, which is used to evaluate surveillance scenarios to optimize outbreak response planning. Two manuscripts have been published describing this model, and numerous conference presentations and workshops have been held using an R Shiny version of the model to communicate with stakeholders about surveillance concepts, optimizing surveillance strategies, and the value of targeted surveillance. These tools have provided critical functionality to inform updates to ASF outbreak response surveillance plans and permitting guidance. New efforts to expand this modelling framework to additional diseases including HPAI are ongoing. African swine fever detection and transmission estimates using homogeneous versus heterogeneous model formulation in stochastic simulations within pig premises - PubMed (nih.gov) Predicting the time to detect moderately virulent African swine fever virus in finisher swine herds using a stochastic disease transmission model - PubMed (nih.gov)
Epidemiology, Surveillance, Risk Assessment, Modeling (true)	U.S. Swine Hemorrhagic Fevers Integrated Surveillance Plan dashboard	CEAH published quarterly reports quantifying the U.S. ASF and classical swine fever (CSF) surveillance efforts in domestic and feral swine. https://www.aphis.usda.gov/aphis/dashboards/tableau/asf-csf-exec-summary-dashboard
Epidemiology, Surveillance, Risk Assessment, Modeling (true)	ASF composting and deep burial experiments in collaboration with Vietnam National University of Agriculture (VNUA)	CEAH has collaborated with the National Pork Board, University of Maine, and VNUA on ASF carcass disposal experiments taking place at VNUA since 2020. In 2023, data collection began for two new experiments testing ASFv viability in ASF-infected carcasses in the composting and deep burial environments.
Training, Capacity Building (true)	NAHLN National Point of Care (POC) Diagnostic Testing Process Workshop	CEAH staff attended a workshop with Federal, State, industry, and academic stakeholders to discuss processes for assessing and approving POC tests, providing epidemiologic, surveillance and policy expertise to discussions about potential use cases for POC in an ASF outbreak response.
Training, Capacity Building (true)	Use Cases for Swine Oral Fluids Meeting	CEAH staff provided subject matter expertise on oral fluids, swine surveillance, epidemiology, and response planning during a national meeting with USDA APHIS and industry stakeholders to assess potential applications for the use of oral fluids for ASF disease surveillance and response.
Training, Capacity Building (true)	African Swine Fever Technical Working Group	CEAH staff provided subject matter expertise in ASF epidemiology, surveillance, and response planning as part of an APHIS technical working group that included State, Federal and industry partners. The working group assessed U.S. ASF preparedness plans and policies and continues working collaboratively to develop strategies and advance research to strengthen current surveillance, response, depopulation, and disposal plans.
Training, Capacity Building (true)	African Swine Fever Technical Working Group - Slaughter Plant Working Group	CEAH staff provided subject matter expertise in ASF epidemiology, surveillance, and response planning as part of an APHIS slaughter plant working group that included state, federal and industry partners. The working group has evaluated U.S. meat processing systems and developed ASF outbreak playbooks for meat harvest, off-site rendering, and spray-dried blood/plasma facilities. https://www.aphis.usda.gov/livestock-poultry-disease/swine/african-swine-fever
Training, Capacity	Training and exercise plan outbreak	CEAH collaborated on developing and delivering training on surveillance design to support foreign animal disease outbreak response. They were attended by over 500 U.S. regulatory veterinarians and animal health

Building (true)	surveillance training workgroup	professionals.
Aquatic Animal Diseases (true)	APHIS Aquaculture Resources Map Application	CEAH developed a public-facing Aquaculture Resources Map Application that provides links to local and state-level regulatory and disease information. https://www.aphis.usda.gov/aphis/maps/aphis/state-regs-live-aquatic-animals
Other (true)	Honey bee disease case definitions updated	CEAH updated several honeybee disease/infestation case definitions to inform stakeholders and regulatory partners about what is considered a confirmed positive case for each disease/infestation.
Other (true)	Rabbit Haemorrhagic Disease (RHD)	CEAH staff maintain the public-facing RHD map application that provides data on domestic and wild RHD cases in the United States. The application shows the current stable endemic area in the U.S. The case data is summarized at the county level and provides valuable information for industry, academics, and other users. Data is updated quarterly. https://www.aphis.usda.gov/aphis/maps/animal-health/rhd

TOR3: HARMONISATION OF STANDARDS

2. Proposal or development of any procedure that will facilitate harmonisation of international regulations applicable to the main fucus area for which you were designated

Proposal title	Scope/Content	Applicable area
HPAI Routing Tool	CEAH staff continued to update and maintain the HPAI Routing Tool, a web-based secure map application that enables the industry to develop safe routes around restricted zones in place due to the ongoing HPAI outbreak in the United States.	health management

3. In exercising your activities, have you identified any regulatory research needs* relevant for WOAH?

Yes

Research need : 1

Please type the Research need: Possible need for research and guidance on HPAI vaccination and associated surveillance requirements. This may be informed by discussions in the Quads HPAI Vaccination and Surveillance Network.

Relevance for WOAH Disease Control, Capacity Building, Other, Standard Setting, Animal Welfare, Facilitation of international collaboration,

Relevance for the Codes or Manual Code, Manual,

Field Epidemiology and Surveillance, Diagnostics, Vaccines, Therapeutics,

Animal Category Terrestrial, Aquatic,

Disease:

Avian influenza

Kind of disease (Zoonosis, Transboundary diseases) Zoonosis, Transboundary diseases,

If any, please specify relevance for Codes or Manual, chapter and title

(e.g. Terrestrial Manual Chapter 2.3.5 - Minimum requirements for aseptic production in vaccine manufacture)

Answer:

Notes:

Answer: Full name of respondent and email address: Jennifer Sinatra, Jennifer.Sinatra@usda.gov

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

Yes

Name of WOAH CC/RL/other organisation(s)	Location	Region of networking	Purpose

		Centre	
QUADS Epi-Team Meetings	Virtual	Americas Asia and Pasific Europe	CEAH attended the QUADS Epi-Team collaboration group, which met bimonthly.
CEAH collaborated with the FAO and Pirbright Institute to complete an FMD virus serotype C analysis to determine confidence in the potential global extinction of this serotype	Virtual	Europe	CEAH attended the WOAH/FAO Laboratory Network Annual Meeting on November 30, 2022, and presented the analysis of FMDV C.
Quads HPAI Vaccination and Surveillance Network	Virtual	Americas Asia and Pasific Europe	CEAH attended this new network meeting in November 2023. The purpose is to share information across members to allow QUADs leaders to address HPAI vaccination and related surveillance and trade topics. Several outputs are proposed but are yet to be determined.
Collaboration with University of Minnesota (UMN) Center for Animal Health and Food Safety (CAHFS)	Virtual	Americas	CEAH collaborated to develop swine surveillance approaches for ASF and CSF in the United States and in Caribbean countries affected with ASF. Collaborative work continues to identify risk factors for disease introduction and inform parameterization of new disease spread models to support the evaluation of optimal surveillance and mitigation strategies. A qualitative assessment of alternative eradication strategies for African swine fever in the Dominican Republic - PubMed (nih.gov) Pathogens | Free Full-Text | Epidemiological Assessment of African Swine Fever Spread in the Dominican Republic (mdpi.com) Enhanced passive surveillance for early detection of African and classical swine fevers
Collaboration with USGS and UMD	Virtual	Americas	CEAH staff provided avian influenza outbreak data and subject matter expertise to analyze the prevalence of avian influenza virus (AIV) in the United States. The analysis was conducted with our collaborators at USGS and UMD, resulting in the publication, "Waterfowl show spatiotemporal trends in influenza A H5 and H7 infections but limited taxonomic variation." https://doi.org/10.1002/eap.2906
Collaboration with USGS	Virtual	Americas	CEAH collaborators from USGS created a website, "Visualizing Avian Influenza" (https://www.pwrc.usgs.gov/ai/indexus.html), featuring several avian influenza collaborative projects, including preliminary Risk Interface Models that estimate the risk of avian influenza spillover from wild to domestic bird populations. These models depend on data regarding wild waterfowl distribution, influenza prevalence by waterfowl species, farm locations, and the relative risk of each farm based on size, production method, and poultry species. The modelling output is particularly useful for poultry producers who might increase biosecurity or other

			preparedness activities to minimize risk of HPAI introductions.
GeoZone Project - Meetings and Collaboration	Two in-person meetings in the USA and Italy		CEAH staff met with GeoZone organizers in January 2023 to review the pilot project status. The meeting identified future actions planned for GeoZone, including testing of an uploading tool for global quarantine zones. In September 2023, a CEAH staff member met with GeoZone staff in Italy during the GeoVet Conference for additional updates on the project. Testing to upload zone data (quarantine/control areas) is planned for 2024. GitHub will be used as a repository for the GeoZone software and documentation. An assessment survey is being developed to track time and costs related to data preparation, uploading data, working with the software, and other feedback. GeoZone staff plan to complete the pilot by November 2024.

TOR4 AND 5: NETWORKING AND COLLABORATION

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

Yes

Name of WOAH CC/RL/other organisation(s)	Location	Region of networking Centre	Purpose
Collaboration with Canadian Food Inspection Agency on development of a Canadian HPAI disease-spread model	Virtual	Americas	[1] Shared CEAH HPAI model methodologies and parameters with Canadian Food Inspection Agency [CFIA] [2] Discussed methodologies and parameter development with CFIA contractor developing the CFIA regional/national model. [3] Developed and delivered virtual presentation - Modelling the Spread of Highly Pathogenic Avian Influenza (HPAI): Framework & Applications for Canadian Public Health Agencies.

TOR6: EXPERT CONSULTANTS

6. Did your Collaborating Centre place expert consultants at the disposal of WOAH?

Yes

NAME OF EXPERT	KIND OF CONSULTANCY	SUBJECT
Jane Rooney, Laura Miles, Jim Lee	Subject matter expert consultation with WOAH World Animal Health	Participated in a feedback session with Canadian representatives, WOAH WAHIS staff, and their contractors, to discuss the new WAHIS reporting system and its implementation. Provided subject matter expertise on the system's functionality and proposed enhancements to improve the system. Reach out to WOAH WAHIS support on a case-by-case basis when help is needed to ensure accurate reports are submitted through WAHIS.

Kevin Spiegel	Subject matter expert to the WOAH Observatory	Kevin Spiegel participated in the WOAH Observatory group tasked with analyzing WOAH's International Standards for Animal Health and Welfare uptake based on WOAH members. The Observatory is a data-driven program and a key component of WOAH's digital transformation by increasing transparency on the WOAH standard's uptake and, therefore, the progressive harmonization of rules. Meetings are held every quarter.
Lori Gustafson	Subject matter expert consultation with aquaculture ad hoc meetings	Participated in species susceptibility ad hoc working groups for finfish and mollusks.
Sherrilyn Wainwright	Subject matter expert liaison between WOAH, FAO	Collaboration with APHIS International Services, Inter-American Institute for Cooperation on Agriculture, Organismo Internacional Regional de Sanidad Agropecuraria (OIRSA), Centro Panamericano de Fiebre Aftosa (PANAFTOSA), WOAH, United Nations Food and Agriculture Organization (FAO), World Health Organization (WHO) and others to identify and describe emerging animal diseases.

TOR7: SCIENTIFIC AND TECHNICAL TRAINING

7. Did your Collaborating Centre provide advice/services to requests from Members in your main focus area?

Yes

CEAH personnel participated in weekly meetings with Canadian Food Inspection Agency to discuss challenges, policy, surveillance, and modelling related to the ongoing HPAI outbreak.

8. Did your Collaborating Centre provide scientific and technical training, within the remit of the mandate given by WOAH, to personnel from WOAH Members?

Yes

a) Technical visit : 0

b) Seminars : 4

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
B	Dr. Oriana Beemer presented an overview of U.S. surveillance strategies for swine hemorrhagic fevers and the ASF protection zone surveillance elements for Puerto Rico and the U.S. Virgin Islands at the 2023 North American ASF Forum on August 29–31, 2023.	Canada, Mexico	50
B	Dr. Sarah Mielke presented the completed analysis of FMD Serotype C work at the WOAH/FAO Network Laboratory Annual Meeting on November 30, 2022.	Numerous countries present	50
B	Dr. Kevin Spiegel presented an overview of U.S. surveillance strategies for swine hemorrhagic fevers at the United Kingdom audit of the ASF protection zone.	United Kingdom	2
B	Dr. Catherine Lorenz presented an overview of U.S. surveillance strategies for swine hemorrhagic fevers at the Japan ASF surveillance plan and protection zone audit.	Japan	4

TOR8: SCIENTIFIC MEETINGS

9. Did your Collaborating Centre organise or participate in the organisation of scientific meetings related to your main focus area on behalf of WOAH?

Yes

NATIONAL/INTERNATIONAL	TITLE OF EVENT	CO-ORGANISER	DATE (MM/YY)	LOCATION	NO. PARTICIPANTS
International	WOAH ad hoc group on species susceptibility (mollusks)	WOAH	2023-06-01	Paris, France	9
International	WOAH ad hoc group on species susceptibility (mollusks)	WOAH	2023-11-01	Paris, France	9
International	WOAH ad hoc group on species susceptibility (finfish)	WOAH	2023-04-01	Virtual	8
International	WOAH ad hoc group on species susceptibility (finfish)	WOAH	2023-11-01	Virtual	8

TOR9: DATA AND INFORMATION DISSEMINATION

10. Publication and dissemination of any information within the remit of the mandate given by WOAH that may be useful to Members of WOAH

a) Articles published in peer-reviewed journals:

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Mielke SR, Lendzele S, Delgado AH, Abdoulmoumini M, Dickmu S and Garabed R (2023) Patterns of foot-and-mouth disease virus detection in environmental samples in an endemic setting. Front. Vet. Sci. 10:1157538. doi: 10.3389/fvets.2023.1157538

Mielke SR, Rigney C, Hagerman AD, Boyer TC, Delgado AH, Arzt J and Holmstrom LK (2023) Assessment of a reconfiguration of the InterSpread Plus US national FMD model as a potential tool to analyze a foot-and-mouth disease outbreak on a single large cattle feedlot in the United States. Front. Vet. Sci. 10:1205485. doi: 10.3389/fvets.2023.1205485

Lendzele SS, Kong AB, Koumba AA, Milke SR, Nguema RM, Bozdogan H, Mouiche MMM, Abdoulmoumini M, Mavougngou JF. (2023). A survey of Stomoxys Geoffroy, 1762 (Diptera: Muscidae) in eight administrative regions of Cameroon. Revista Brasileira de Entomologia. 67. 10.1590/1806-9665-RBENT-2023-0023.

Duc HM, Hutchinson M, Flory GA, Ngan PH, Son HM, Hung LV, Hoa TTK, Lan NT, Lam TQ, Rozeboom D, et al. Viability of African Swine Fever Virus with the Shallow Burial with Carbon Carcass Disposal Method. Pathogens. 2023; 12(4):628. https://doi.org/10.3390/pathogens12040628

Hutchinson M, Duc HM, Flory GA, Ngan PH, Son HM, Hoa TT, Lan NT, Rozeboom D, Remmenga M, Vuolo M, Miknis R, Miller LP, Burns A, Flory R. (2023). Static Aerated Composting of African Swine Fever Virus-Infected Swine Carcasses with Rice Hulls and Sawdust. Pathogens. 12. 721. 10.3390/pathogens12050721.

Green AL, Branan M, Fields VL, Patyk K, Kolar SK, Beam A, Marshall K, McGuigan R, Vuolo M, Freifeld A, Torchetti MK, Lantz K, Delgado AH. Investigation of risk factors for introduction of highly pathogenic avian influenza H5N1 virus onto table egg farms in the United States, 2022: a case-control study. Front Vet Sci. 2023 Jul 25;10:1229008. doi: 10.3389/fvets.2023.1229008. PMID: 37559891; PMCID: PMC10408129.

Patyk KA, Fields VL, Beam AL, Branan MA, McGuigan RE, Green A, Torchetti MK, Lantz K, Freifeld A, Marshall K and Delgado AH (2023) Investigation of risk factors for introduction of highly pathogenic avian influenza H5N1 infection among commercial turkey operations in the United States, 2022: a case-control study. Front. Vet. Sci. 10:1229071. doi: 10.3389/fvets.2023.1229071

Schettino DM, Perez D, Lantigua E, Beemer O, Remmenga M, Vanicek C, Lopes G, Arzt J, Reyes R, Perez A. Enhanced passive surveillance for early detection of African and classical swine fevers. Rev Sci Tech. 2023 May;42:149-160. English. doi: 10.20506/rst.42.3358. PMID: 37232309.

Schambow RA, Hussain S, Antognoli MC, Kreindel S, Reyes R, Perez AM. Epidemiological Assessment of African Swine Fever Spread in the Dominican Republic. Pathogens. 2023 Dec 1;12(12):1414. doi: 10.3390/pathogens12121414. PMID: 38133297; PMCID: PMC10746036.

b) International conferences:

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Preliminary results of behavioral studies evaluating the use of oral fluid samples for swine disease surveillance and performed through a cooperative agreement between CEAH and Iowa State University were presented at:

- *Iowa Pork Congress Des Moines, Iowa, January 2023*
- *Asian Pig Veterinary Society Congress, August 2023, APVS 2023*

- *American Association of Swine Veterinarians annual meeting Denver, Colorado, June, 2023*
- *European Symposium of Porcine Health Management, May 2023, European Symposium of Porcine Health Management (ESPHM) 2023 | Diagnostikzentrum für Nutztiergesundheit | DZ NTG*

HPAI transmission risk results from the Turkey and Table Egg case-control studies in 2022 were presented at the International Avian Influenza Summit in October 2023. International Avian Influenza Summit | (uada.edu) University of Arkansas.

c) National conferences:
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Preliminary results of behavioral studies evaluating the use of oral fluid samples for swine disease surveillance and performed through a cooperative agreement between CEAH and Iowa State University were presented at:
- *American Association of Veterinary Laboratory Diagnosticians (AAVLD), Oct 2023, 2023 AAVLD / USAHA Annual Meeting*
- *Iowa Pork Congress, May 2023, Iowa Pork Congress 2023 (a2zinc.net)*
- *Iowa Veterinary Medical Association Winter Conference, Feb 2023, Iowa VMA Winter Conference*
- *North American PRRS Symposium, Dec 2023, NA PRRS Symposium - Veterinary Medicine at Illinois*

Preliminary results of field studies on Ornithodoros turicata in Florida performed through a cooperative agreement between CEAH and University of Florida were presented at:
- *The Wildlife Society Annual Conference, November 2023, Annual Meeting - The Wildlife Society*

Preliminary results of ASF within herd modelling to support the value of targeted surveillance sampling performed through a cooperative agreement between CEAH and University of Minnesota were presented at:
- *American Association of Swine Veterinarians conference, March 2023, AASV 2023 Annual Meeting*

Results from highly pathogenic avian influenza epidemiologic studies were presented at:
- *United States Animal Health Association, National Harbor, MD, October 2023.*
- *North Central Poultry Association, March 2023*
- *National Turkey Federation, Health and Welfare Committee, March 2023*
- *HPAI Epidemiology Public Webinar*

d) Other (Provide website address or link to appropriate information):
12
USDA. 2023. "NAHMS Bison Needs Assessment: A Brief Summary of Results Used to Guide Study Development." USDA-APHIS-VS-CEAH-NAHMS. Fort Collins, CO. https://www.aphis.usda.gov/animal_health/nahms/bison/downloads/bison22/bison-2022-needs-assess-sum-brief.pdf

USDA. 2023 "Goat 2019: Reference of Agritourism Practices on Goat Operations in the United States, 2019." USDA-APHIS-VS-CEAH-NAHMS. Fort Collins, CO. https://www.aphis.usda.gov/animal_health/nahms/goats/downloads/goat19/goat2019-reference-agritourism-practices-goat-ops.pdf

USDA. 2023. "Milk Marketing Practices on U.S. Dairy Goat Operations, NAHMS Goat 2019 Study." USDA-APHIS-VS-CEAH-NAHMS. Fort Collins, CO. https://www.aphis.usda.gov/animal_health/nahms/goats/downloads/goat19/goat2019-milk-marketing-practices.pdf

USDA. 2023. "Milking Procedures and Milk Quality on U.S. Diary Goat Operations, NAHMS Goat 2019." USDA-APHIS-VS-CEAH-NAHMS. Fort Collins, CO. https://www.aphis.usda.gov/animal_health/nahms/goats/downloads/goat19/goat2019-milking-procedures-milk-quality.pdf

USDA. 2023. "Management Practices on U.S. Dairy Goat Operations, NAHMS Goat 2019 Study." USDA-APHIS-VS-CEAH-NAHMS. Fort Collins, CO. https://www.aphis.usda.gov/animal_health/nahms/goats/downloads/goat19/goat2019-management-practices.pdf

USDA, 2023. "Bovine Viral Diarrhea on U.S. Beef cow-calf Operations, NAHMS Beef 2017 study." USDA-APHIS-VS-CEAH-NAHMS. Fort Collins, CO. https://www.aphis.usda.gov/animal_health/nahms/beefcowcalf/downloads/beef2017/bvd-infobrief.pdf

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USDA, 2023. "E. coli on U.S. Beef Cow-calf Operations, NAHMS Beef 2017 Study." USDA-APHIS-VS-CEAH-NAHMS. Fort Collins, CO.E. coli on U.S. https://www.aphis.usda.gov/animal_health/nahms/beefcowcalf/downloads/beef2017/beef2017-e-coli-us-beef-cow-calf-ops.pdf

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11. What have you done in the past year to advance your area of focus, e.g. updated technology?
A public-facing R Shiny app was created to share the ASF within-herd spread modelling capability developed under a CEAH and University of Minnesota cooperative agreement:
Secure Foods Systems Team. ASF Shiny App. Version L2, University of Minnesota, March 2023, https://sumn.shinyapps.io/ASF_hetl_g1/

12. Additional comments regarding your report: