Risk assessment of highly pathogenic avian influenza H5 in swine

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Research

Divergent Pathogenesis and Transmission of Highly Pathogenic Avian Influenza A(H5N1) in Swine

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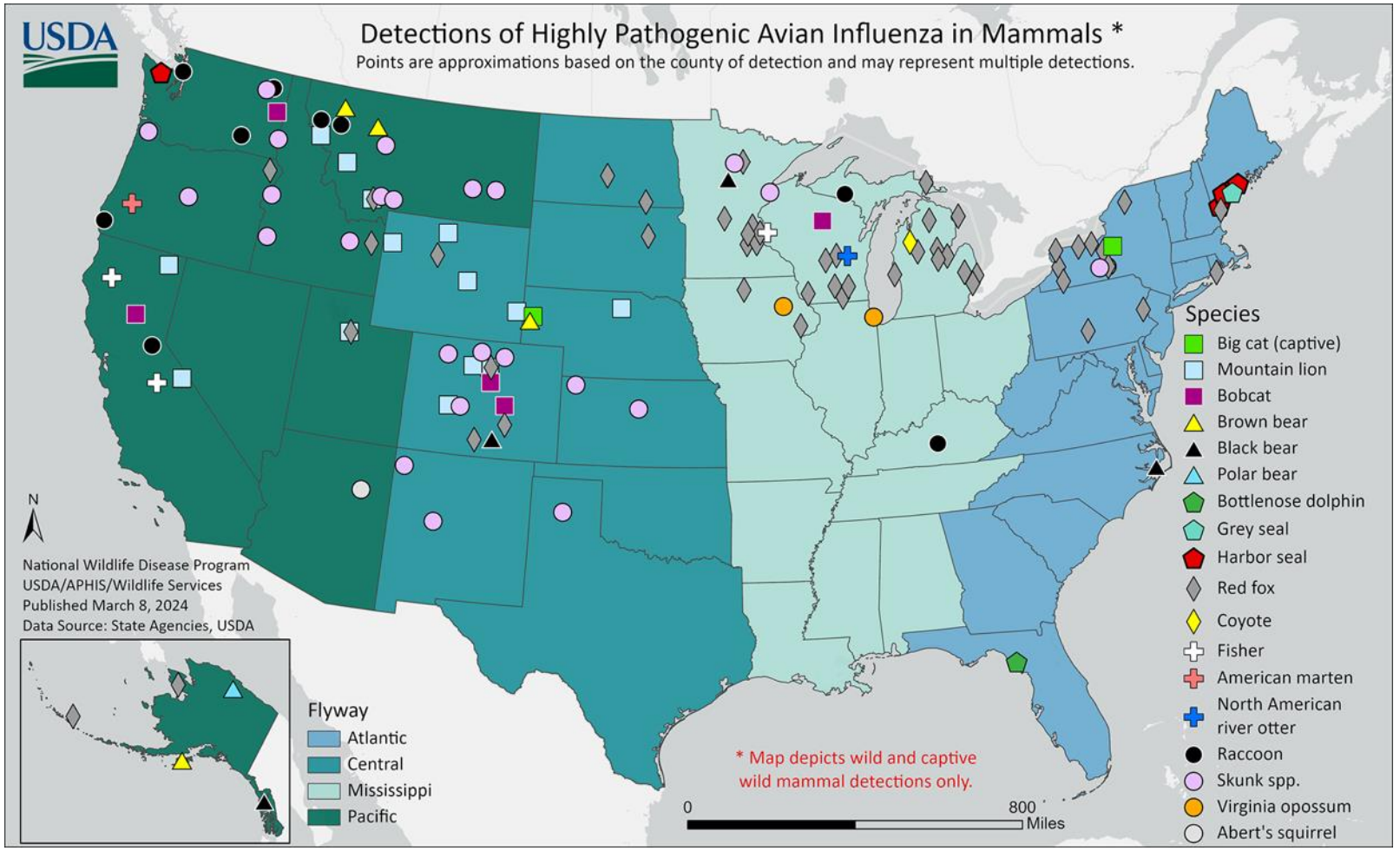
H5 Clade 2.3.4.4b Change in HPAI Epidemiology



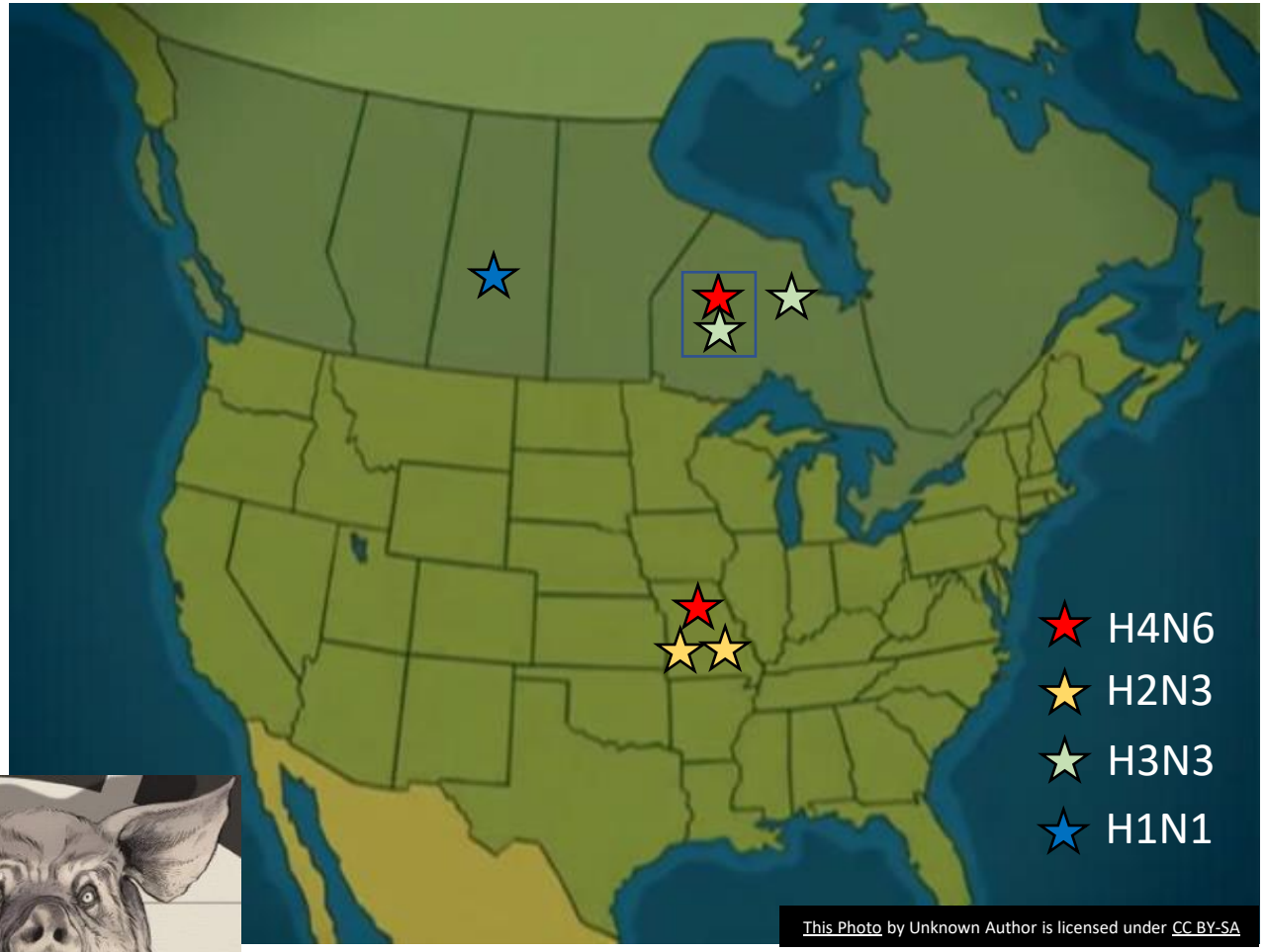
- Unprecedented mammalian detections → Potential for increased risk to humans if becomes mammalian adapted.
  - Detection in many scavenger carnivore species in the USA and globally.
  - Disease and depopulation of 50,000 mink in Spain and other subsequent fur farms in Finland.
  - Multiple outbreaks and die-offs of seals and marine mammals.
  - Clinical signs often include neurologic disease with virus detected in brain.

https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-disease-information/avian/avian-influenza/hpai-2022/2022-hpai-mammals

Why worry about pigs?

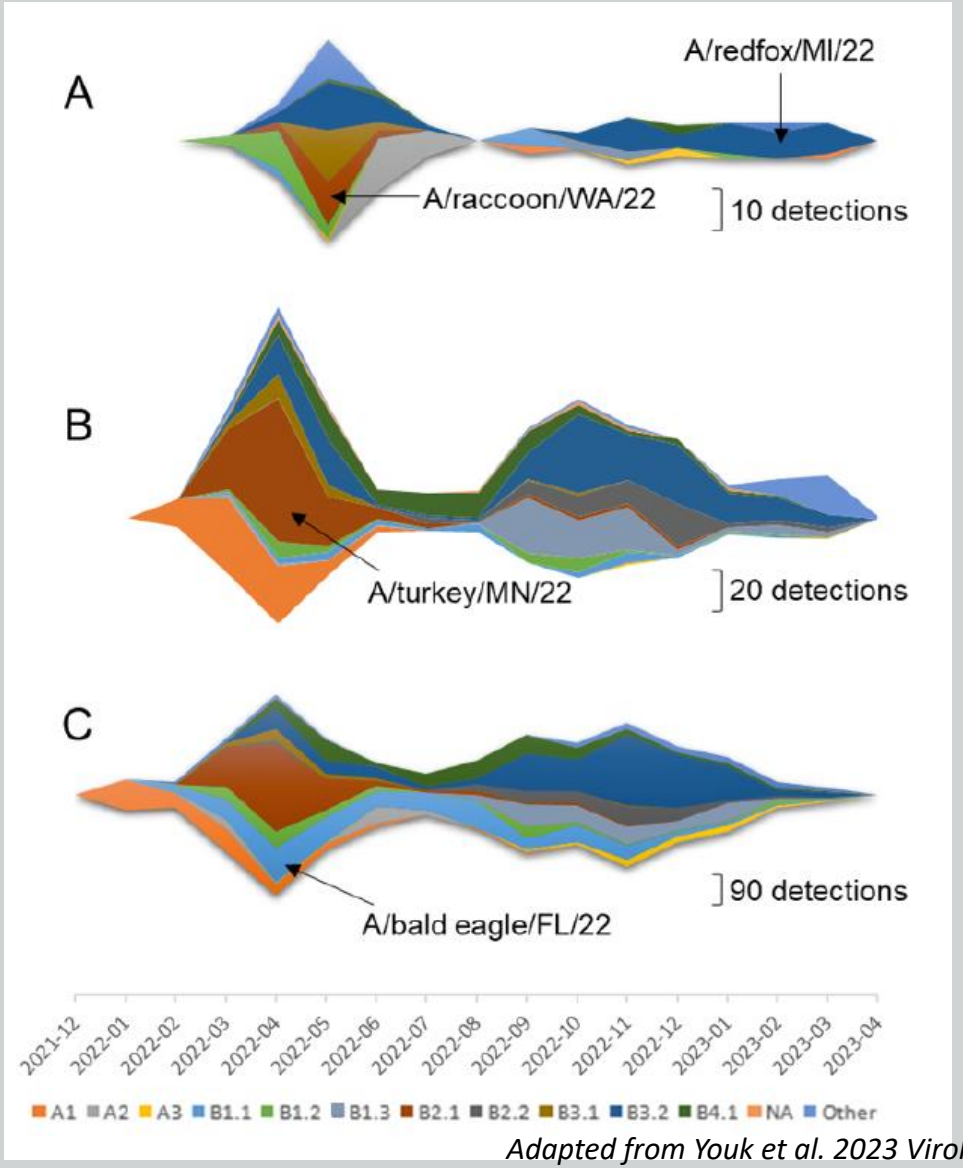
- Periodic detections of LPAI in ***commercial swine***
  - 1999, 2001, 2002, 2006, 2015
- Respiratory disease reported
- Extent of transmission varied
- Source
  - *Unknown*
  - Raw lake water
- Seroconversion of swine on a ***multi-species farm*** against 2.3.4.4b clade virus in Italy (Rosone et al. 2023)

LPAI detections in commercial swine herds



HPAI
United States

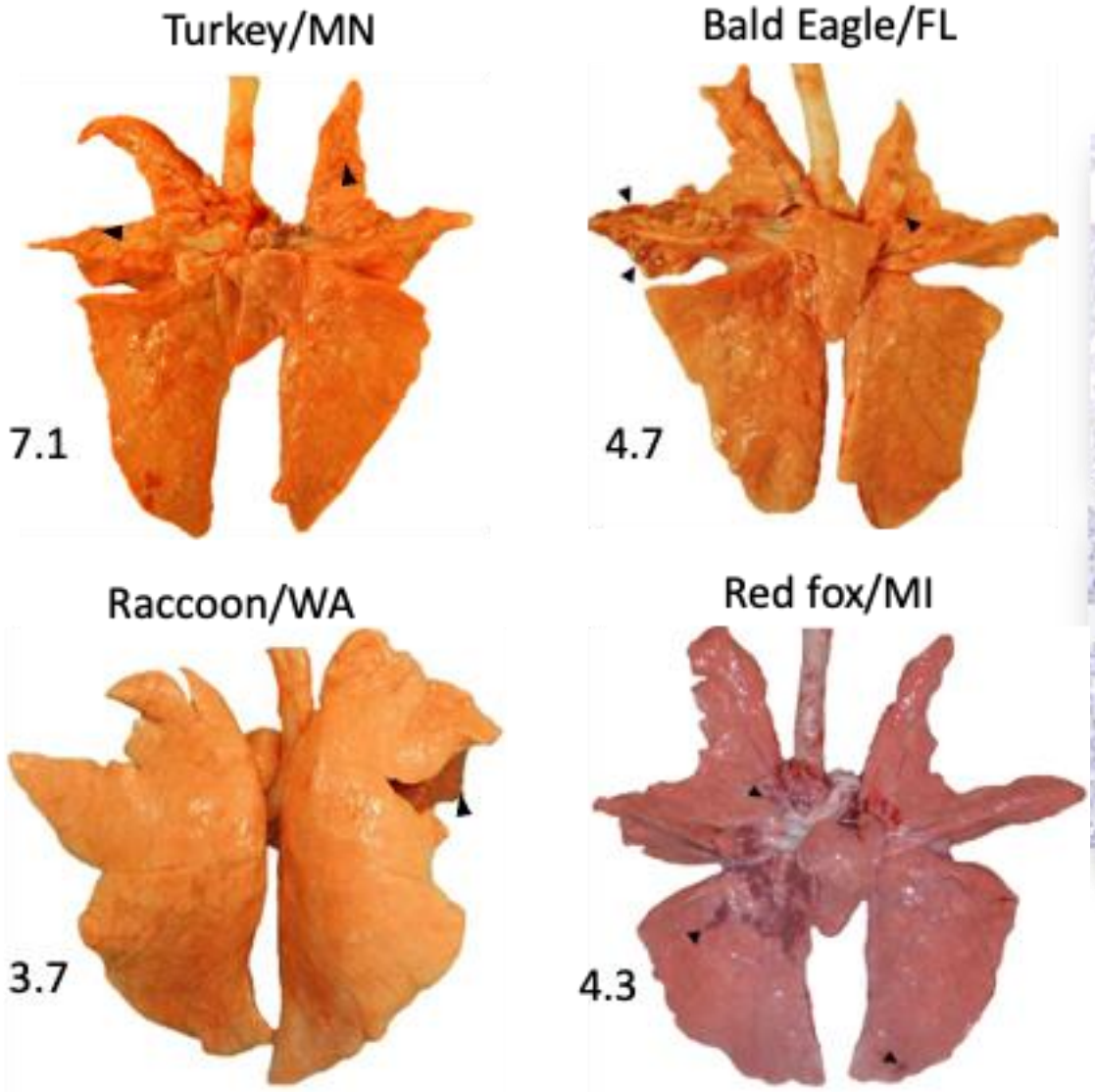
A. Wild mammals
B. Poultry
C. Wild birds

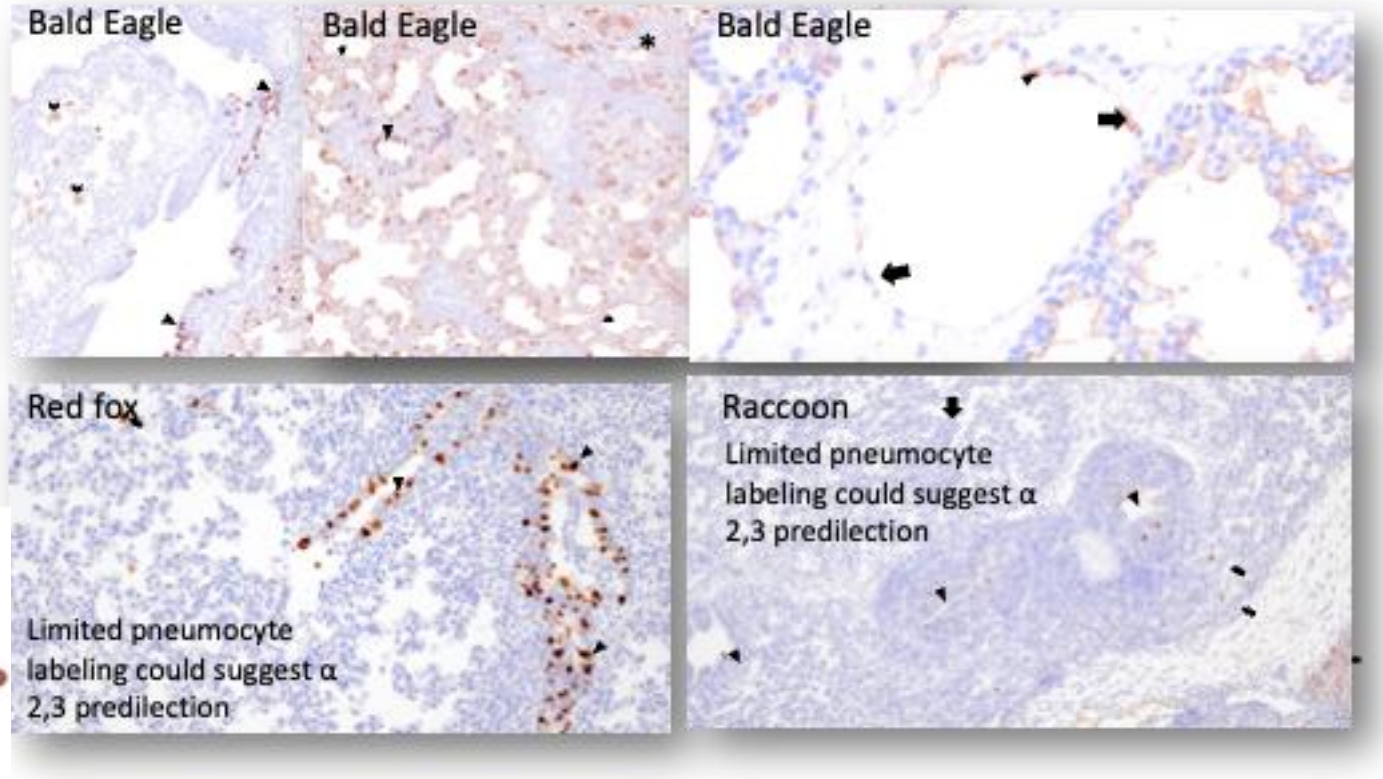


Adapted from Youk et al. 2023 Virol

Many mammalian detections contained known adaptation mutations.

Lung lesions consistent with IAV & virus replication in the lungs but limited pig to pig transmission





HPAI infection in pigs

- Pigs are at risk to HPAI H5 circulating strains.
  - Limited pig-to-pig transmission of mammalian isolates.
  - Reassortment with endemic swine strains is a concern.
- Risk is higher in feral swine, backyard multi-species or transitional outdoor pig farms with poultry and/or wild waterfowl species.
- Risk of incursion into conventional confinement swine operations in the US is likely low but awareness and precautions are critical.
  - Avoid untreated surface water.
  - Ensure bird-proofing.
  - Restrict scavenger mammals.
- *Additional genotypes currently on test in follow-up studies.*

US Cattle Updates:
Mia, Marie, Amy

USDA Animal and Plant Health Inspection Service
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Highly Pathogenic Avian Influenza (HPAI) Detections in Livestock

Last Modified: March 30, 2024

Print

The U.S. Department of Agriculture, Food and Drug Administration, Centers for Disease Control and Prevention, and State veterinary and public health officials are investigating an illness among primarily older dairy cows.

View Frequently Asked Questions

Latest News

4/01/24	USDA Confirms Highly Pathogenic Avian Influenza in Dairy Herd in New Mexico
3/29/24	USDA, FDA and CDC Share Update on HPAI Detections in Dairy Cattle
3/25/24	Federal and State Veterinary, Public Health Agencies Share Update on HPAI Detection in Kansas, Texas Dairy Herds

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https://www.cdc.gov/media/releases/2024/p0401-avian-flu.html

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Highly Pathogenic Avian Influenza A (H5N1) Virus Infection Reported in a Person in the U.S.

CDC's Risk Assessment for the General Public Remains Low

Print

Press Release

For Immediate Release: Monday, April 1, 2024
Contact: Media Relations
(404) 639-3286

April 1, 2024—A person in the United States has tested positive for highly pathogenic avian influenza (HPAI) A(H5N1) virus ("H5N1 bird flu"), as reported by Texas and confirmed by CDC. This person had exposure to dairy cattle in Texas presumed to be infected with HPAI A(H5N1) viruses. The patient reported eye redness (consistent with conjunctivitis), as their only symptom, and is recovering. The patient was told to isolate and is being treated with an antiviral drug for flu. This infection does not change the H5N1 bird flu human health risk assessment for the U.S. general public, which CDC considers to be low. However, people with close or prolonged, unprotected exposures to infected birds or other animals (including livestock), or to environments contaminated by infected birds or other animals, are at greater risk of infection. CDC has interim recommendations for prevention, monitoring, and public health investigations of HPAI A(H5N1) viruses.

CDC is working with state health departments to continue to monitor workers who may have been in contact with infected or potentially infected birds/animals and test those people who develop symptoms. CDC also has recommendations for clinicians on monitoring, testing, and antiviral treatment for patients with suspected or confirmed avian influenza A virus infections.

This is the second person reported to have tested positive for influenza A(H5N1) viruses in the United States. A previous human case occurred in 2022 in Colorado. Human infections with avian influenza A viruses, including A(H5N1) viruses, are uncommon but have occurred sporadically worldwide. CDC has been monitoring for illness among people exposed to H5 virus-infected birds since outbreaks were first detected in U.S. wild birds and poultry in late 2021. Human illnesses with H5N1 bird flu have ranged from mild (e.g., eye infection, upper respiratory symptoms) to severe illness (e.g., pneumonia) that have resulted in death in other countries.

H5 bird flu is widespread among wild birds in the U.S. and globally. These viruses also have caused outbreaks in commercial and backyard poultry flocks, and sporadic infections in mammals. HPAI in dairy cows was first reported in Texas and Kansas by the U.S. Department of Agriculture (USDA) on March 25, 2024. Unpasteurized milk from sick

IAV One Health

- Swine HA and NA are highly diverse in the US and globally.
  - Repeated introductions of human seasonal influenza greatly contributes to this diversity.
  - Many swine populations remain under-surveilled.
- Human variant cases from many swine HA clades are detected globally and monitored by the World Health Organization Collaborating Centres of the Global Influenza Surveillance and Response System.
  - Human population lacks immunity to many swine viruses.
  - Candidate vaccine viruses (CVV) are developed against human variant cases, but many contemporary swine strains do not have a CVV.
- Avian influenza viruses occasionally infect pigs and the current HPAI panzootic is a concern for swine health and human pandemic preparedness.
- ***Robust surveillance in pigs is the foundation for improving intervention strategies for swine health and public health.***

Acknowledgements

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CDC

Thank you