

# Avian Influenza (H5N1) Epizootic – Texas, 2024

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# Overview

- Background
  - History of avian influenza
- 2024 H5N1 Epizootic
  - Timeline of events in Texas
  - Animal case in the United States
    - Bovine
    - Other
  - International Activity
- Texas Response to H5N1



# Background



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# Influenza Virus

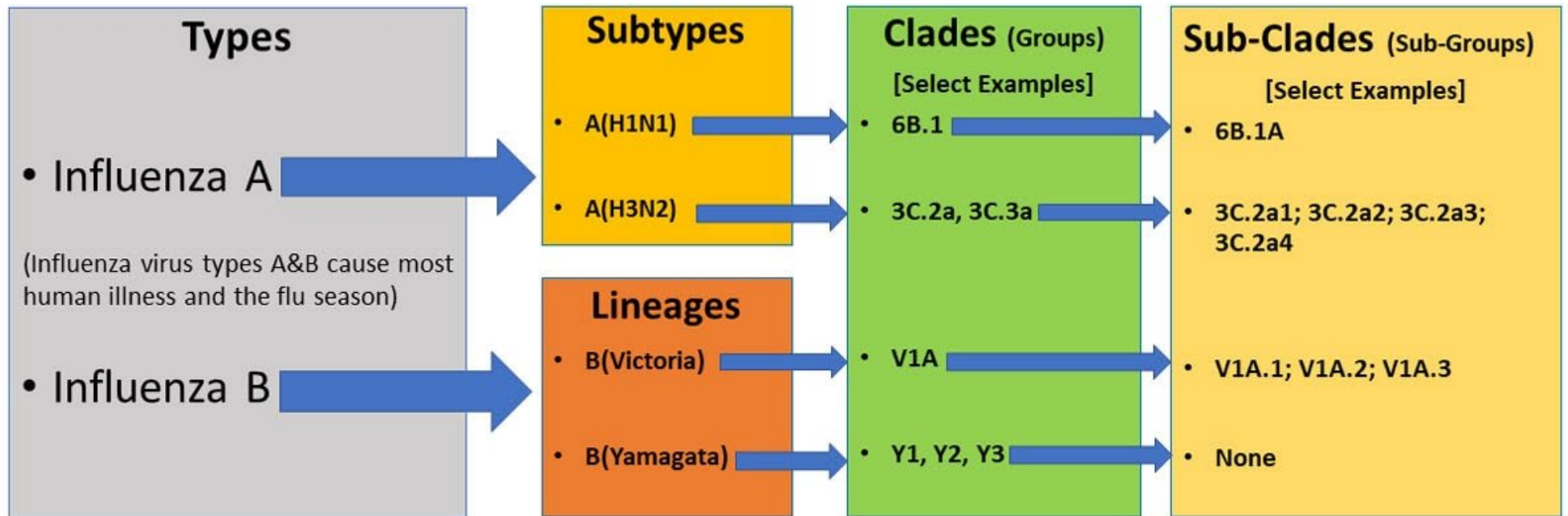
- Influenza virus causes respiratory disease (flu) in humans
  - Disease can be severe in children, elderly, and immunocompromised
  - Season typically runs from MMWR Week 40 through Week 20
- Many varieties of influenza virus\*
  - Influenza A and Influenza B responsible for most seasonal flu
  - Influenza A viruses further divided into subtypes based on different hemagglutinin and neuraminidase subtypes
- Influenza A viruses have been found in a wide range of animals\*\*
  - Bats, cats, dogs, birds, swine, horses, whales, and seals
  - Some viruses can be transmitted between humans and animals



\*Available at: <https://www.cdc.gov/flu/about/viruses/types.htm>, accessed on July 31, 2024

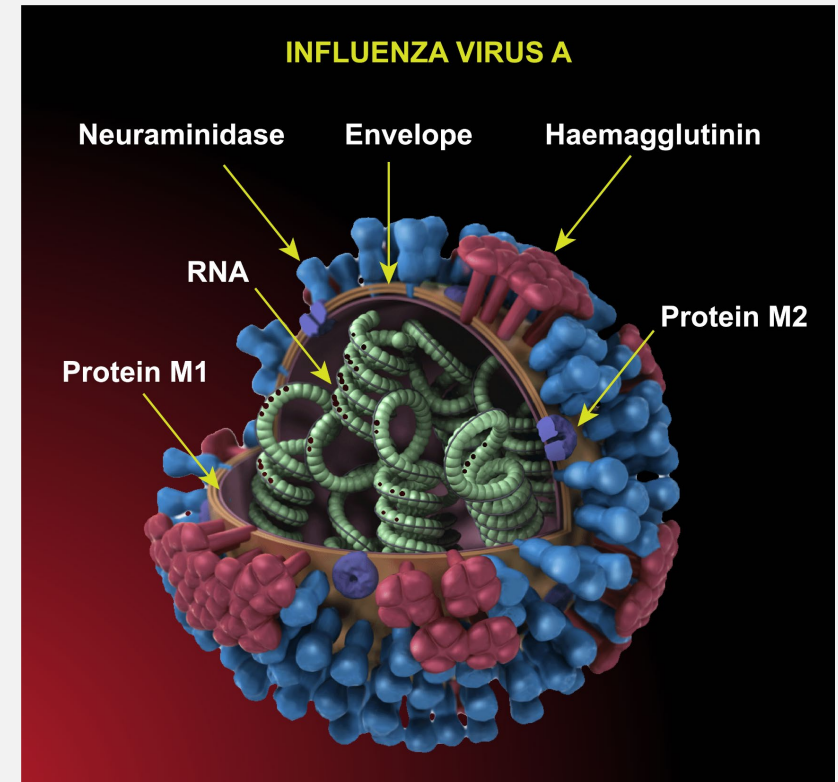
\*\*Available at: <https://www.cdc.gov/flu-in-animals/index.html>, accessed on July 31, 2024

# Human Seasonal Influenza Viruses



# Influenza A Virus

- Major cause of influenza in humans
- All past influenza pandemics have been caused by influenza A viruses
- The multipartite genome is encapsidated with each segment in a separate nucleocapsid.
- Eight different segments of negative-sense single-stranded RNA are present; this allows for genetic reassortment in single cells infected with more than one virus and may result in multiple strains that are different from the initial ones.



# Avian Influenza (AI)

- Primarily an infection in birds and waterfowl are the usual reservoir.
- It is highly infectious and classified according to severity with two recognized forms.
  - HPAI – High pathogenicity avian influenza or fowl plague\*
  - LPAI – low pathogenicity avian influenza
- Most are LPAI but strain mutation or reassortment to an HPAI can occur (through antigenic shift or antigenic drift).

\*note: pathogenicity is described in birds, not necessarily in people



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# Avian Influenza (AI)

- AI is further classified based on surface glycoproteins, hemagglutinin (HA or H) and neuraminidase (NA or N).
- Sixteen H (H1 to H16) subtypes and nine N (N1 to N9) subtypes of influenza A virus have been identified in birds; (two others are found only in bats).
- H5 and H7 subtypes include both HPAI and LPAI strains.
- HPAI is a serious disease and often fatal to chickens.
  - Highly contagious.
  - Requires a quick response to protect the poultry industry.



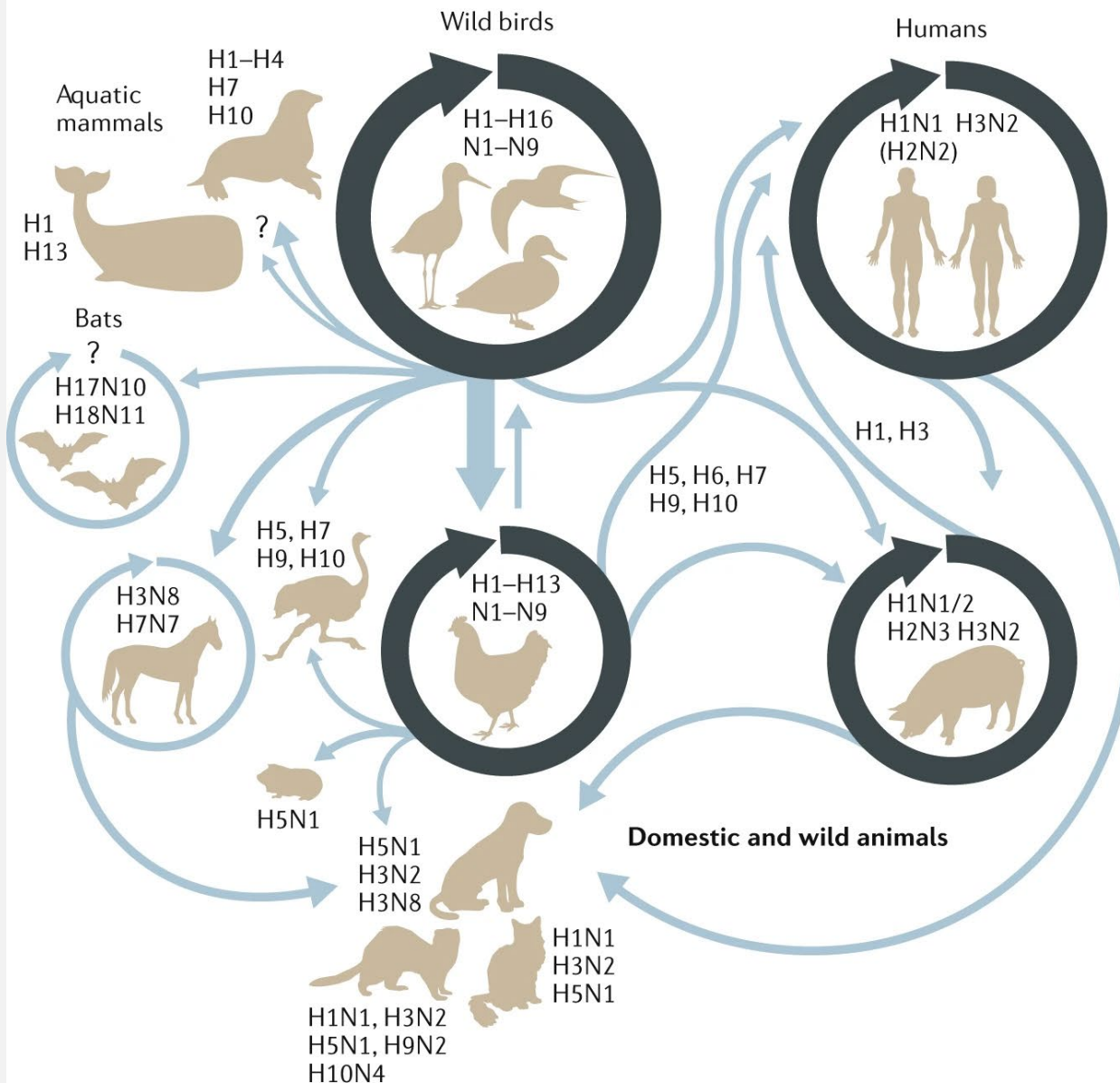
*Photo courtesy of the Centers for Disease Control and Prevention Public Health Image Library (CDC PHIL).*



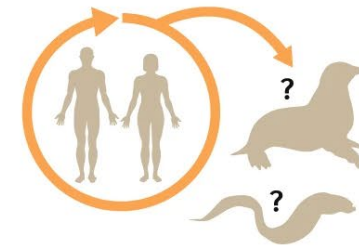
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### Influenza A virus



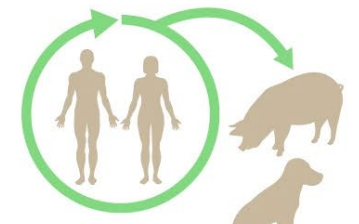
### Influenza B virus



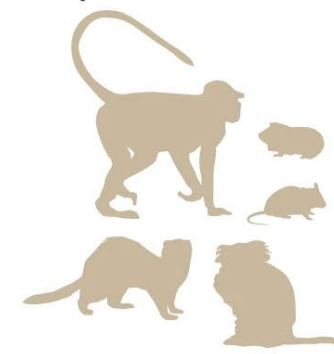
### Other influenza viruses



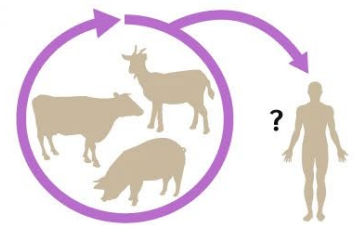
### Influenza C virus



### Experimental animals



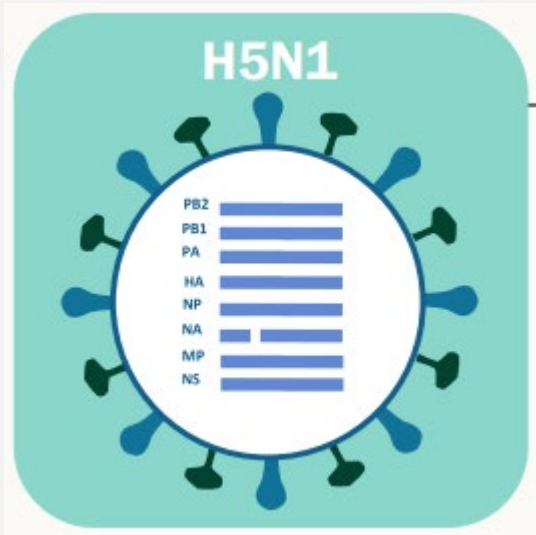
### Influenza D virus



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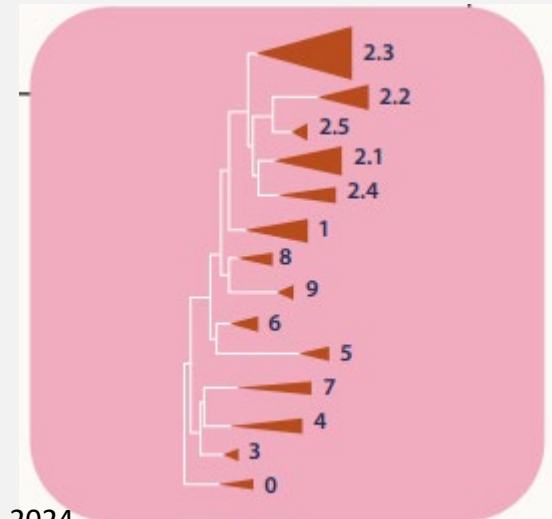
Available at: [www.nature.com/articles/s41579-018-0115-z](http://www.nature.com/articles/s41579-018-0115-z), accessed on July 12, 2024

# Emergence and Evolution of H5N1 Avian Influenza (Bird Flu)



- In 1996, H5N1 is first identified in domestic waterfowl in Southern China. The virus is named A/goose/Guangdong/1/1996.
- In 1997, a poultry outbreak occurs in China and Hong Kong with 18 associated human cases (6 deaths).
- Ultimately, there are 860 human infections with >50% death rate.

- In 2003, H5N1 re-emerges in China and several other countries to cause widespread poultry outbreaks.
- In 2005, wild birds spread H5N1 to poultry in Africa, the Middle East, and Europe. The HA diversifies into many genetic groups (clades) with multiple genotypes.

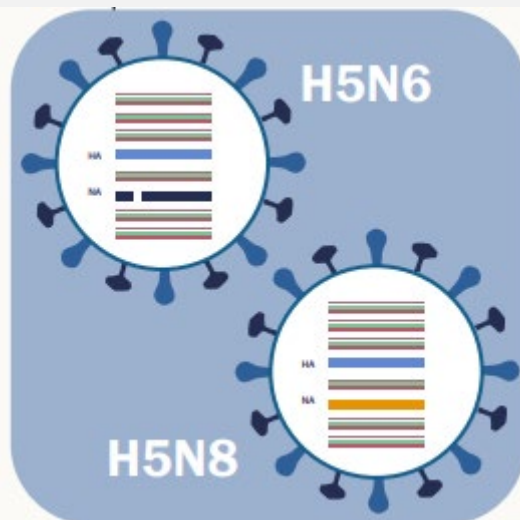


Available at: <https://www.cdc.gov/flu/pdf/avianflu/bird-flu-origin-graphic.pdf>, accessed on July 12, 2024

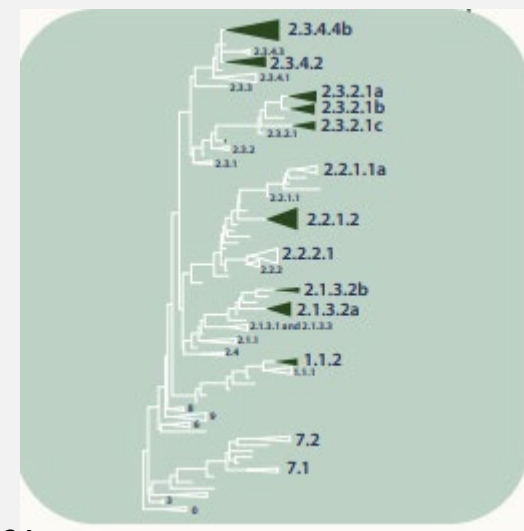


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# Emergence and Evolution of H5N1 Avian Influenza (Bird Flu)



- From 2014-2016, gene swapping of H5 viruses from poultry and wild birds leads to emergence/detection of H5N6 and H5N8 viruses.
- HA diversifies further to clade 2.3.4.4 in Asia, Africa, Europe, the Middle East, and North America. H5 viruses with various NA genes continue to be detected, including in the US wild birds and poultry.
- From 2018-2020, H5N6 and H5N8 viruses become predominant globally.
- As of 2022, there have been more than 70 H5N6 and 7 H5N8 human infections reported.
- The H5 HA diversifies to **clade 2.3.4.4b** which becomes predominant in Asia, Africa, Europe, and the Middle East.



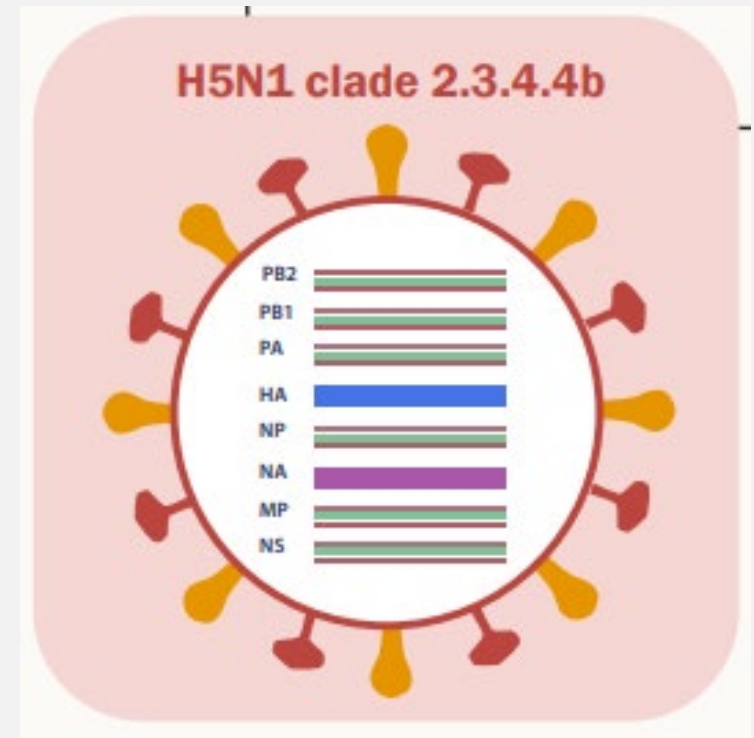
Available at: <https://www.cdc.gov/flu/pdf/avianflu/bird-flu-origin-graphic.pdf>, accessed on July 12, 2024



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# Emergence and Evolution of H5N1 Avian Influenza (Bird Flu)

- A new H5N1 virus belonging to clade 2.3.4.4b with a wild bird adapted N1 NA gene emerges.
  - Rare, sporadic human infections with this H5N1 virus are detected, as well as sporadic infections in mammals.
- The virus is detected in wild birds in Canada and the United States in late 2021.
- In February 2022, the virus begins causing outbreaks in U.S. commercial and backyard poultry.



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# Emergence and Evolution of H5N1 Avian Influenza (Bird Flu)

- With the current circulating strain in poultry and U.S. dairy cows, limited transmission to farm workers has occurred.
- To date, there is no documentation of sustained human to human transmission.



*Photo courtesy of the CDC PHIL.*



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Accessed: <https://www.cdc.gov/bird-flu/situation-summary/index.html>, July 31, 2024

# 2024 H5N1 Epizootic



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# Timeline of Events

FEBRUARY 2024  
TO  
MARCH 2024

Zoonosis partners provided information on an illness affecting dairy cows in Texas DSHS Region 1

Anecdotal reports from on-site veterinarians of symptomatic dairy farm workers

Illness in dairy cows presumed to have started mid-February

MARCH 23, 2024

Influenza surveillance team communicated with PHR partners to provide situational information & available guidance

Zoonosis team remained in contact with local partners for information

Surveillance team began early planning to include broadened guidance & increased surveillance

Regional team planned testing & outreach, mobile field office for offsite-testing

MARCH 25, 2024

H5N1 positives confirmed in dairy cows from samples submitted to the National Veterinary Services Laboratory (NVSL)



MARCH 27, 2024  
TO  
APRIL 1, 2024

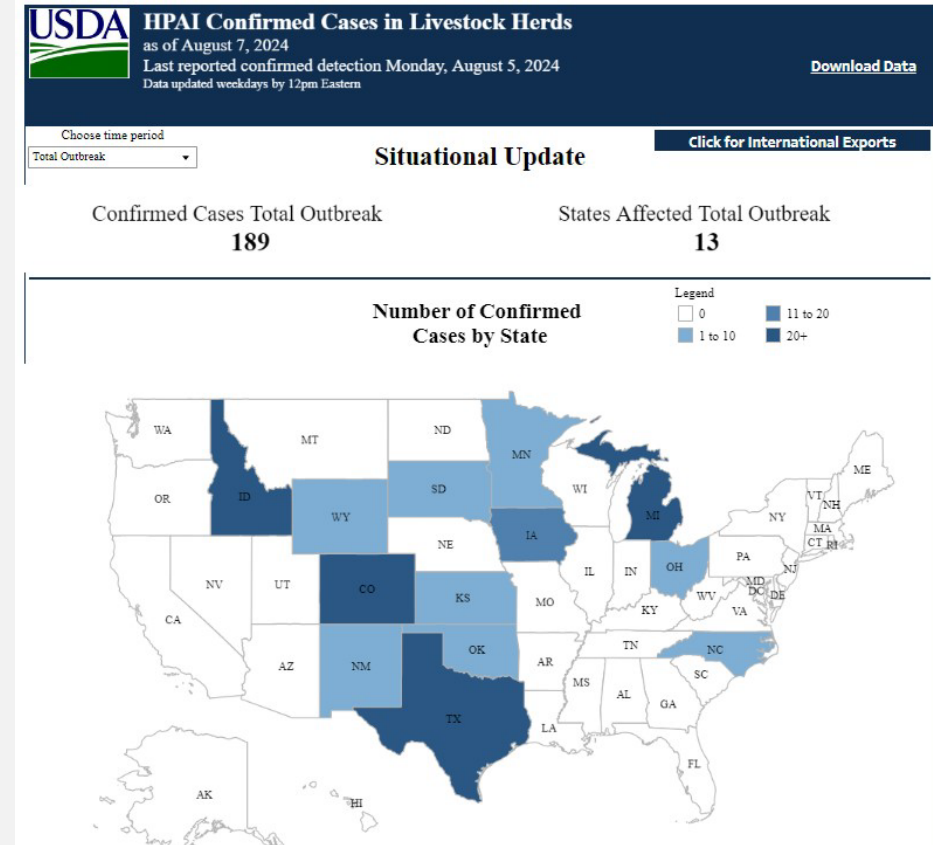
Follow-up of symptomatic persons exposed to dairy cattle

Public health was made aware of a patient presenting with conjunctivitis

Samples were collected & tested in Region 1 Laboratory Response Network (LRN) Lab; resulted presumptive positive for H5, Confirmed by CDC (Case Patient)

# Epizootic Nationally - Dairies

- As of 8/7/24, **13 states** have reported HPAI confirmed dairies
  - Most in Colorado (n=62), Idaho (n=30), and Michigan (n=27)
  - First detection reported 3/25/24 in Texas herd
- **13 confirmed human cases** (TX, MI, and CO)

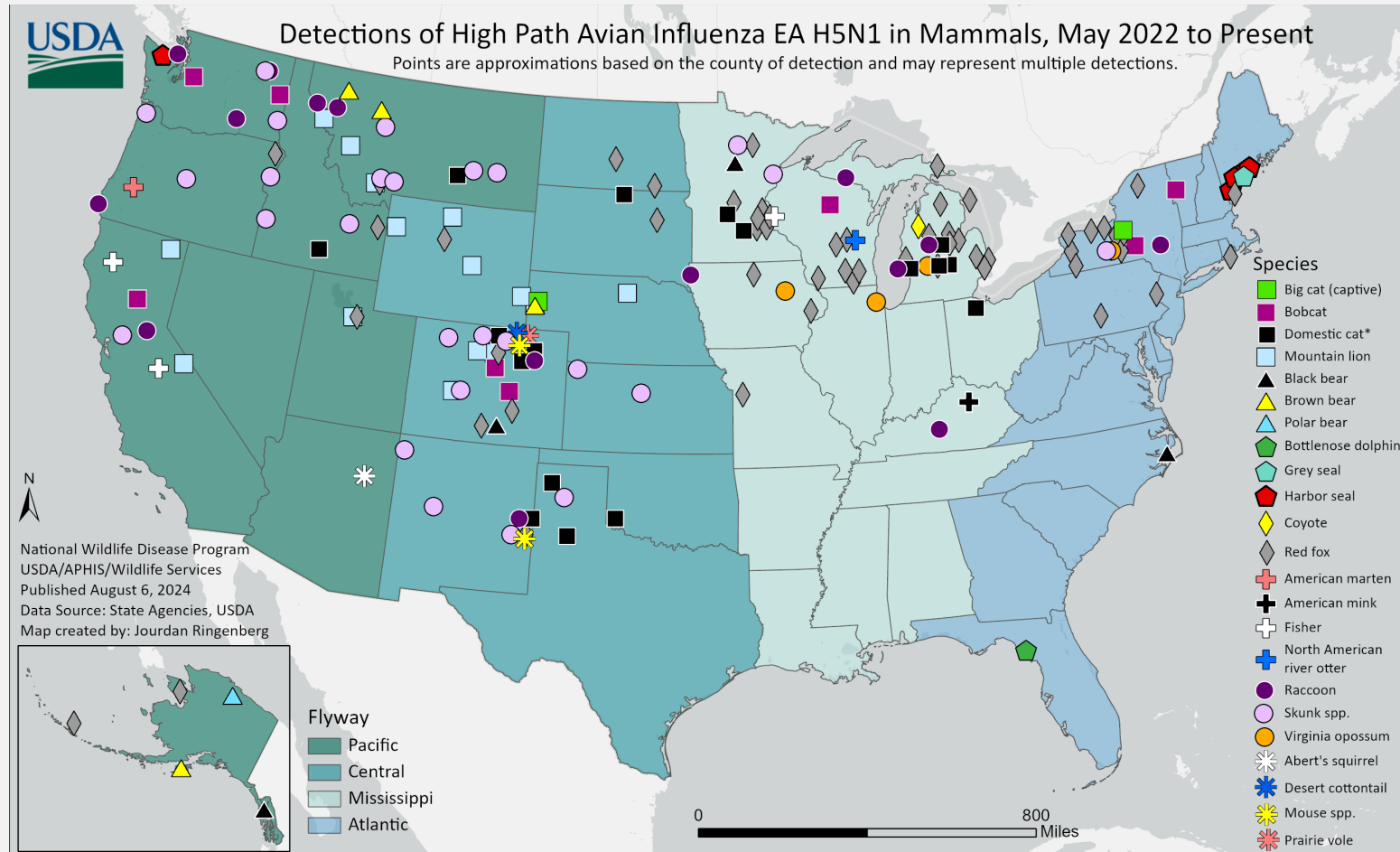


Sources: <https://www.aphis.usda.gov/livestock-poultry-disease/avian/avian-influenza/hpai-detections/mammals>. Accessed on August 7, 2024, and <https://www.cdc.gov/bird-flu/spotlights/h5n1-response-07262024.html>, accessed August 7, 2024





# Epizootic Nationally - Mammals

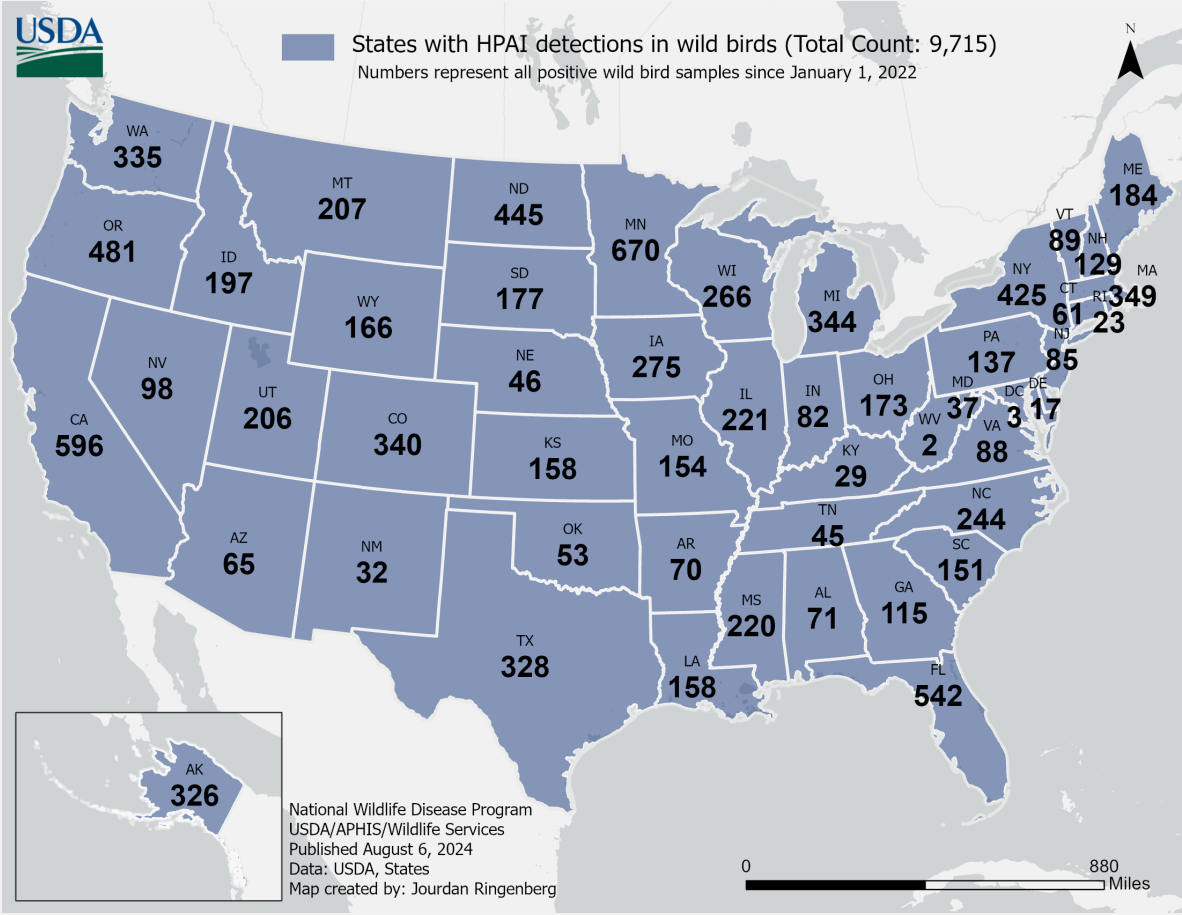


Source: <https://www.aphis.usda.gov/livestock-poultry-disease/avian/avian-influenza/hpai-detections/mammals>. Accessed August 7, 2024



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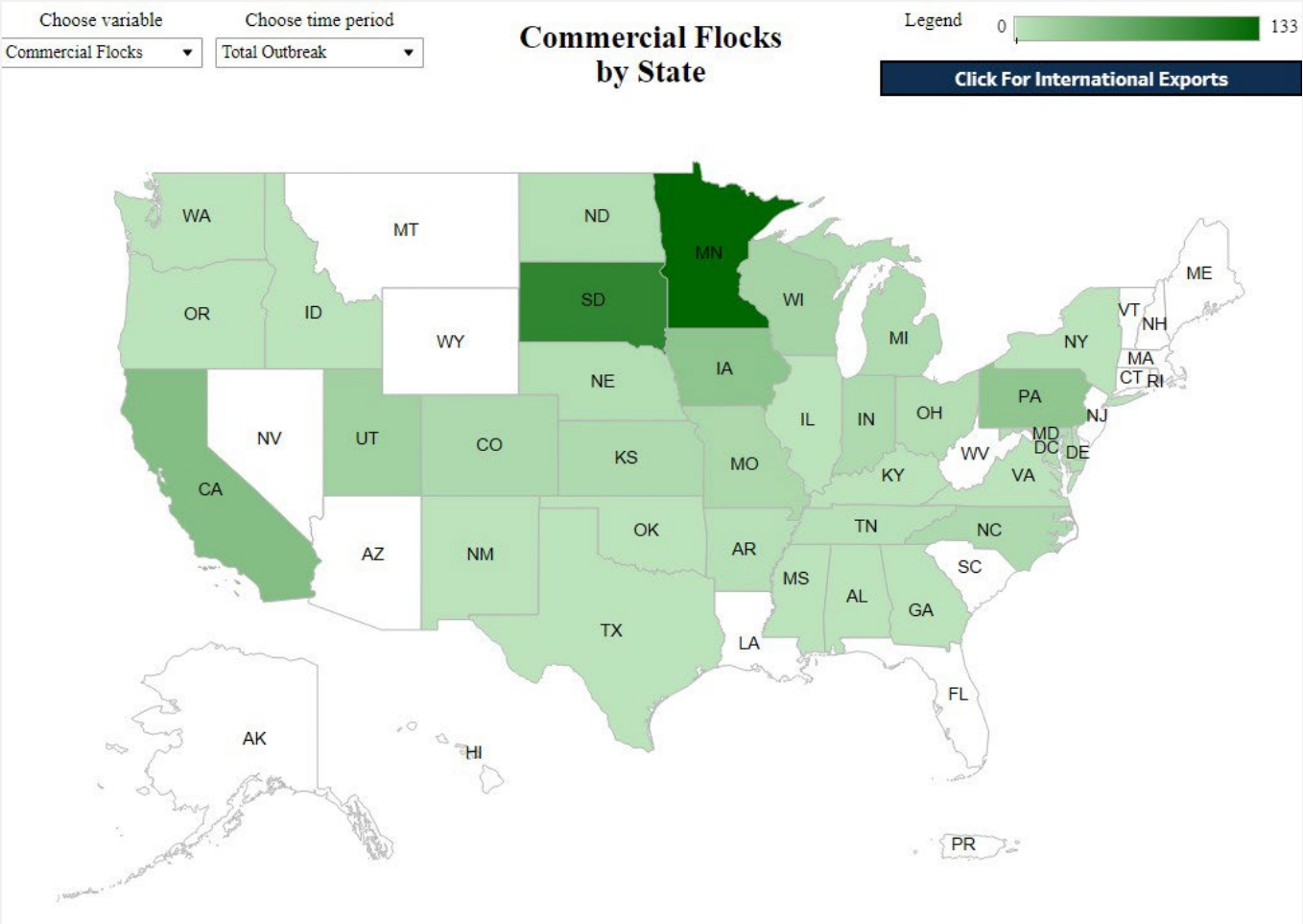
# Epizootic Nationally – Wild birds



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Source: <https://www.aphis.usda.gov/livestock-poultry-disease/avian/avian-influenza/hpai-detections/wild-birds>. Accessed on August 7, 2024

# Epizootic Nationally – Commercial Flocks

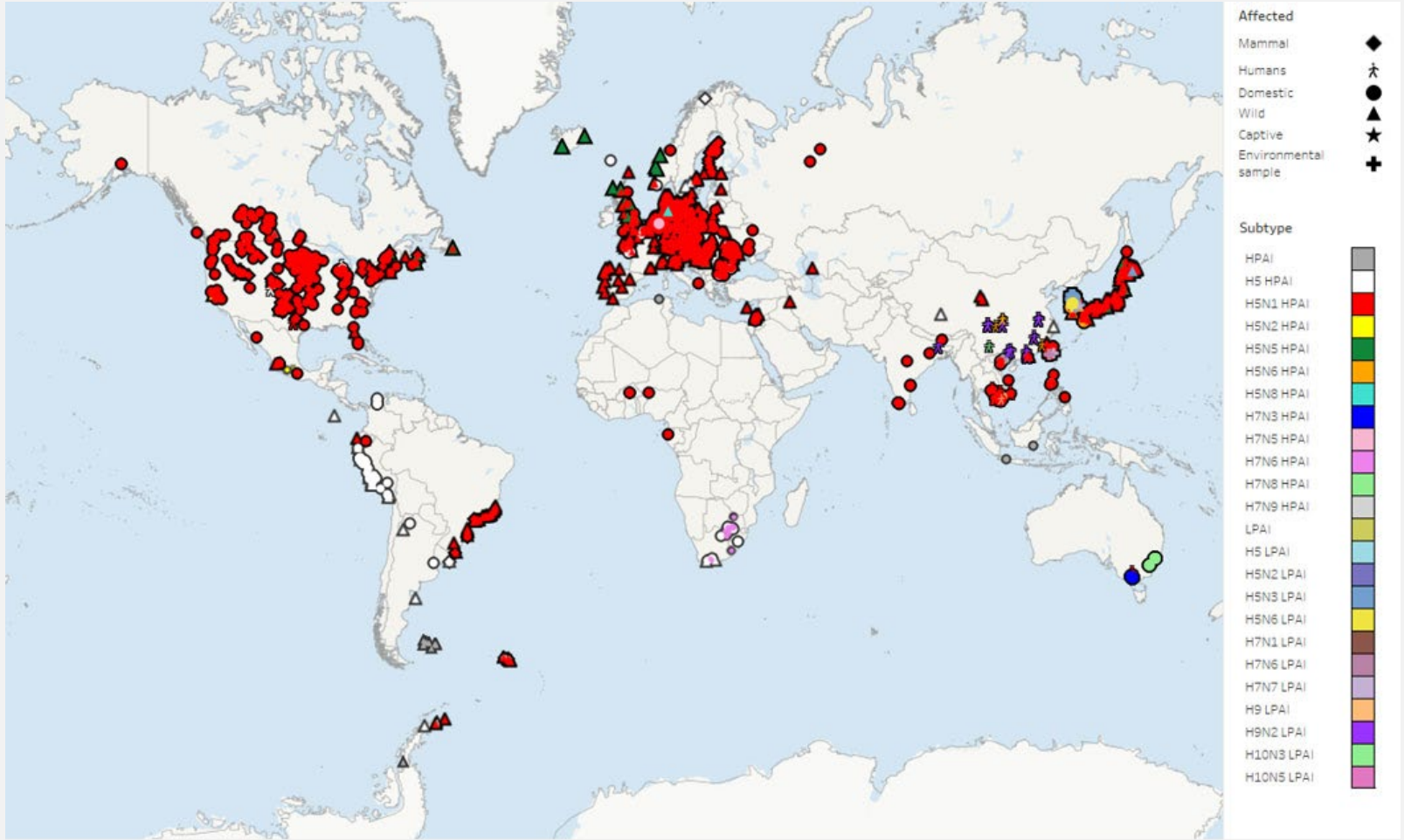


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Source: <https://www.aphis.usda.gov/livestock-poultry-disease/avian/avian-influenza/hpai-detections/commercial-backyard-flocks>.

Accessed on August 7, 2024

# International H5N1 Activity



Source: <https://www.fao.org/animal-health/situation-updates/global-aiv-with-zoonotic-potential/en>. Accessed on August 7, 2024



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# Texas Response to H5N1



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# Outreach by DSHS

- Texas One Health meetings among animal and public health agencies
- Testing for H5N1 at public health laboratories
  - Regular influenza surveillance
  - Exposed individuals with clinically compatible illness
- Anonymous survey to veterinarians with affected clients



# DSHS Press Release – Human Case

## DSHS Reports First Human Case of Avian Influenza in Texas

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NEWS RELEASE

April 1, 2024

### Person Had Direct Contact With Dairy Cattle

The Texas Department of State Health Services is reporting a human case of avian influenza A(H5N1) virus in Texas. The case was identified in a person who had direct exposure to dairy

Source: <https://www.dshs.texas.gov/news-alerts/health-alert-first-case-novel-influenza-h5n1-texas-march-2024>, accessed on July 12, 2024



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# Bird Flu Guidance for Farm Workers

1. Infected animals can pass disease to people in their **milk, saliva (spit), feces (poop), and other body fluids.**

2. Signs and symptoms of infection may include:



- Eye redness (conjunctivitis)
- Fever (temperature of 100°F (37.8°C) or greater) or chills



- Cough
- Sore throat
- Runny or stuffy nose



- Headaches
- Fatigue

- Diarrhea
- Nausea
- Difficulty breathing/shortness of breath (call 911 immediately)

3. **Personal protective equipment (PPE)** should be put on and taken off in areas away from animals.



- Masks
- Safety glasses, goggles or face shields
- Disposable gloves
- Overalls/gown



4. **Do not drink unpasteurized milk.** Do not take milk home.



5. **Wash your hands with soap and water** or use hand sanitizer after touching animals or their **milk, saliva (spit), feces (poop), or other body fluids.**

6. **Do not touch your face, eyes, mouth, phone, food,** or other commonly used objects until after you've washed your hands.

Even though it's rare for humans to get sick from bird flu, we want you to know how to monitor your health and the health of your family.



For questions and 24/7 support, contact 806-778-7391 to reach the Texas Department of State Health Services in Lubbock. Let them know you work with cattle.

# Guía Sobre la Gripe Aviar para Trabajadores de Lecherías

1. Los animales infectados pueden transmitir enfermedades a las personas a través de **la leche, la saliva, el excremento, y otros fluidos.**

2. Los signos y síntomas de una infección pueden incluir:



- Enrojecimiento de los ojos (conjunctivitis)
- Fiebre (temperatura de 100°F (37.8°C) o más) o escalofríos
- Tos



- Dolor de garganta
- Secreción o congestión nasal
- Dolores de cabeza



- Fatiga
- Diarrea
- Náuseas
- Dificultad para respirar/falta de aire (llame al 911 de inmediato)

3. El **equipo de protección personal (PPE en inglés)** debe ponerse y quitarse en un área alejada de los animales.



- Máscaras
- Gafas, anteojos de seguridad o protectores faciales
- Guantes desechables
- Bata/delantal



4. **No tome leche no pasteurizada.** No se lleve leche a casa.



5. **Lávese las manos con agua y jabón** o gel desinfectante después de tocar **animales o leche, saliva, excremento, y otros fluidos.**

6. **No se toque la cara, los ojos, la boca, su teléfono, la comida ni otros objetos** hasta después de lavarse las manos.

Aunque es raro que los humanos se enfermen a causa de la influenza aviar, queremos que sepa cómo controlar su salud y la de su familia.



Si tiene preguntas y necesita ayuda 24/7, comuníquese al 806-778-7391 para comunicarse con el Departamento de Servicios de Salud del Estado de Texas, Región 1 de Salud Pública. Hágales saber que trabaja con ganado.



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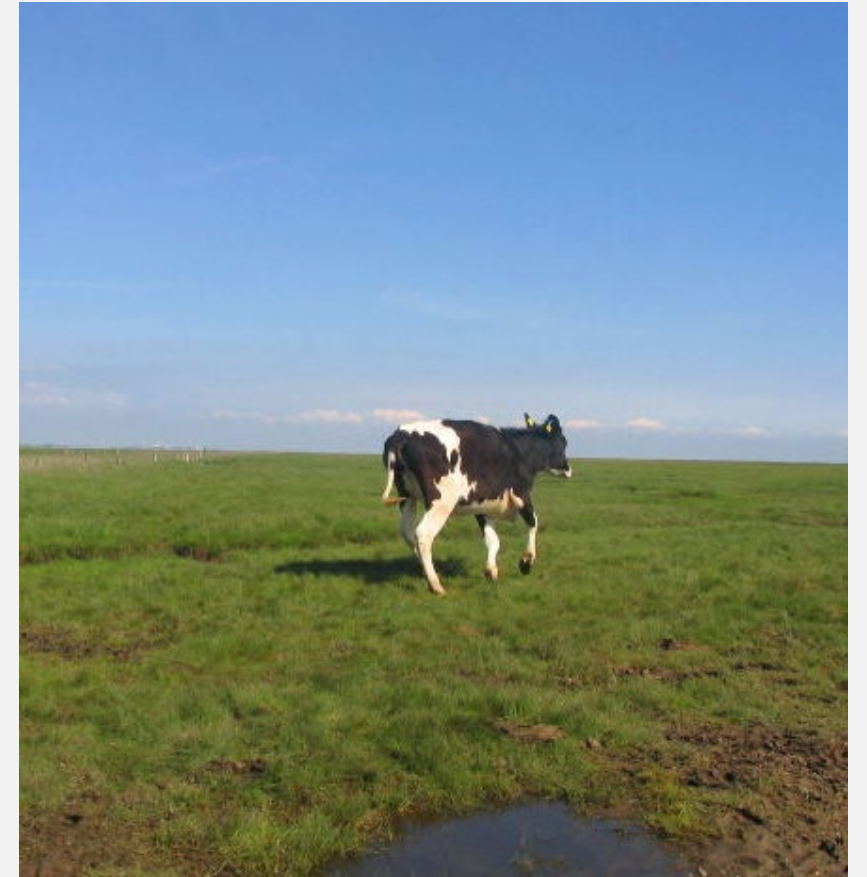
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# Lessons Learned

- Importance of fostering One Health relationships
  - Private veterinarians
  - State and federal agencies
  - Laboratorians
- Importance of developing partnerships with industry groups and agricultural farm worker populations
- Expect the unexpected



*Photo courtesy of chris/MorgueFile*



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# Thank you!

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