



DHS SCIENCE AND TECHNOLOGY

Supplemental Reference for Highly Pathogenic Avian Influenza (HPAI) in Livestock

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Situation Overview

- On 25 March 2024, Highly Pathogenic Avian Influenza (HPAI) Eurasian lineage goose/Guangdong (gsGD) clade 2.3.4.4b was confirmed in dairy cattle by the U.S. Department of Agriculture's (USDA) National Veterinary Services Laboratories.¹ This is the same strain that has been linked to the ongoing HPAI outbreak impacting domestic poultry in the United States and the global outbreak.
- In early March 2024, HPAI was detected in a juvenile goat in Minnesota. Previously, natural HPAI infection had not been reported in domestic ruminants (i.e., goats, cattle, sheep).²
- Illness and reduced milk production in older cattle in dairy herds in Texas, New Mexico, and Kansas was reported in early March 2024³ and samples obtained from the Texas and Kansas herds confirmed HPAI on 25 March 2024.¹
- As of 03 April 2024, HPAI has been detected in dairy herds in Texas, New Mexico, Kansas, Michigan, Idaho, and Ohio.⁴
- Pasteurized milk and dairy products are safe to consume.^{1, 5-6} As of 03 April 2024, the Food and Drug Administration (FDA) and USDA Animal and Plant Health Inspection Service (APHIS) indicate that the current disruption to the milk supply is minimal and should not impact availability or consumer prices.^{5, 7} However, the effect of HPAI infection on milk production has raised concern regarding economic impact should HPAI continue to infect dairy herds, but depopulation of herds is not expected.
- Due to the evolving situation, the USDA APHIS has updated tracking for HPAI in livestock⁴ and recommended that producers practice enhanced biosecurity measures¹⁶ to minimize risk of spread. USDA APHIS has also released updated testing recommendations for influenza A in cattle.⁸
- On 01 April 2024, a person tested positive for HPAI following exposure to dairy cattle in Texas presumed to be infected with HPAI. This is the second person to have tested positive for HPAI in the United State with the first being reported in April 2022.⁹⁻¹⁰

Transmissibility and Infectious Dose - How does it spread from one host to another? How easily is it spread?

- Dairy herd infections are believed to have originated from wild birds.¹
- While the impacted herd in Michigan were moved from an affected location in Texas,¹¹ the subsequent spread of HPAI within the dairy herd suggests that transmission between cattle may occur.^{7, 12}
- The infectious dose of HPAI in cattle and other livestock is currently unknown.
- Infected goats were located on a farm that had a known HPAI detection and it is speculated that the goats may have been exposed due to access to a shared water source with avian sources.²

Incubation Period and Clinical Presentation – How long until symptom onset? What are initial symptoms?

- Initial reports of illness in dairy cattle indicated that the disease peaks in about three to four days and lasts 10 to 14 days.³
- While initially detected in older cattle, HPAI has also been detected in younger lactating cows, though older dairy cattle appear to be more clinically affected with greater lactation impacts.⁵
- Symptoms of HPAI in dairy cattle include decreased herd level milk production, acute sudden drop in production, with some cows experiencing thicker, concentrated, colostrum-like milk, decrease in feed consumption with a simultaneous drop in rumen motility, abnormal tacky or loose feces, lethargy, dehydration, and fever.⁷
- The American Association of Bovine Practitioners (AABP) has indicated that impacted herds can experience a loss of about 20% of milk production for 14 to 21 days.³

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- The recent human patient who likely contracted HPAI from infected cattle reported eye irritation as their only symptom.¹⁰

Fatality Rate - How likely is it that those infected will die from HPAI?

- HPAI infection in juvenile goats was first detected due to concern regarding unusual deaths of young goats.²
- There are no reported fatalities in infected dairy cattle.
- Of the two human HPAI infections reported in the United States, there have been no deaths. HPAI has resulted in human fatalities in other countries.⁹⁻¹⁰

Genomics - How does the disease agent compare to previous strains?

- Initial sequencing of HPAI isolated from dairy cattle has not identified mutations in the viral genome that would make it more adapted to mammals or more transmissible to humans.¹²⁻¹³
- On 02 April 2024, the Centers for Disease Control and Prevention (CDC) provided a technical update on the genome sequence of the isolate from the HPAI positive patient in Texas. It was found that the virus was closely related to isolates from Texas dairy cattle as well as wild birds. Overall, it was concluded that the virus lacked mutations that would indicate adaptation to human or mammalian hosts, specifically the hemagglutinin gene, which codes for one of the two surface glycoproteins and is central to species specificity because it is responsible for virus attachment and fusion with host cells. However, the isolate had the E627K mutation in polymerase basic 2 gene (PB2), which has been associated with adaptation to mammalian hosts in other avian influenza subtypes.¹⁴
- Federal and state agencies are completing whole-genome sequencing of viral samples obtained from sick animals.¹⁵

What else do we know?

- Other aspects of the gsGD lineage HPAI infection in livestock are either presumed or confirmed to agree with those previously described for gsGD lineage HPAI. Additional information can be found in the [DHS S&T Master Question List \(MQL\) for HPAI](#).

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